Catalog of Hymenoptera in America North of Mexico

Carl F. W. Muesebeck

This catalog is dedicated to our cherished colleague with affectionate regard for his kindliness and with admiration for his distinguished scholarly contributions to our knowledge of North American Hymenoptera for more than half a century.

Catalog of Hymenoptera in America North of Mexico

Prepared cooperatively by
specialists on the various groups of Hymenoptera
under the direction of
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Introduction

By
Karl V. Krombein,
Paul D. Hurd, Jr.,
and
David R. Smith

This catalog, which is an outgrowth of the highly successful Hymenoptera of America North of Mexico Synoptic Catalog (1951), including the first and second supplements (1958, 1967), provides simultaneously, by use of computer technology (Krombein, Mello and Crockett, 1974. Ent. Soc. Amer., Ann. 20 :24-29), a printed version as well as a computer-queriable data base of the basic systematic, biological, and morphological information on the order Hymenoptera as it occurs in America north of Mexico. While the format of the present catalog closely parallels that of the original catalog, every effort has been made to increase the information content to fulfill better the needs of the biological community. This has been accomplished chiefly by the introduction of textbook prose at most higher category levels, by the presentation of explanatory or descriptive comments as appropriate, and by the inclusion of more complete listings of citations to taxonomic, biological, and morphological literature at all hierarchical levels together with parenthetical annotations concerning the content for many of these citations. Similarly, the data about hosts, parasites, prey, predators, and pollen sources are covered more fully than in the original catalog. Since these data have been reported in various ways and under differing names in the primary literature, an attempt has been made to organize this information and present it, usually, alphabetically even though sometimes such data have been recorded in the literature with scientific or vernacular names or both. Although many of these names have been checked for accuracy, no consistent attempt has been made to verify that the names agree with current usage or status. While those authors of zoological names are usually abbreviated in the citation of hosts, parasites, and the like, the authors of the scientific botanical names are not included. Elsewhere in the catalog, the last name of an author is cited in full, but without initials. Since the technology employed in the preparation of this catalog precluded the use of diacritical marks, these have been omitted and consequently, as in the case of the umlaut, a variant spelling has been substituted as appropriate.

The International Code of Zoological Nomenclature (1961) including the intent and preamble of the Code and of any pertinent opinions usually has been followed. Thus a name in current usage as deterimned by the code is employed, but mention is made, as appropriate, that an application is pending before the International Commission of Zoological Nomenclature.

An attempt has been made to record all the recent taxa, with their synonyms, described

from, or known to occur in, the political divisions of the conterminous United States, Canada, Alaska, and Greenland. Insofar as known, all species introduced from other countries and liberated in America north of Mexico for biological control purposes have been listed. Some of these have never been recovered and, apparently, were unsuccessful in establishing themselves. For each such species a statement has been included, following the distribution, that the species was liberated but did not become established.

As in the original catalog, the arrangement is systematic for species-groups and higher categories insofar as our present knowledge and the limitations of a linear arrangement permit. The generic and subgeneric concepts represented in this arrangement are based upon what are believed to be the correct type-species. In each instance the type-species is cited together with the authority for the selection. Where designations of type-species have been found to be invalid under the International Code of Zoological Nomenclature, new type-species designations, believed to be valid, are given in the catalog. Generic synonymy is included under the generic headings except where subgenera are recognized, in which cases such synonymy is given under the subgeneric names, and references to revisional or other papers are listed under the appropriate higher category.

The arrangement of species within genera, subgenera, and species groups is alphabetical. Where subspecies are recognized, the subspecific names are placed in alphabetical order under the species to which they belong; and varieties are listed under the particular species or subspecies in which they were described. In each case the specific, subspecific, or infrasubspecific, name is followed by an indication of the known distribution, and by brief statements, as appropriate, of preferred habitats or the like, hosts, parasites, prey, predators, or pollen sources. Much of this information on synonymy, distribution, ecology, hosts, parasites, prey, and so forth has not been published previously. The type localities are usually recorded for those forms that are known only from the localities where the type specimens were obtained. Otherwise the distribution is usually shown by states and provinces, or by other means such as life zones.

Since unquestionably a catalog is indispensable in the support of systematic and other biological research, no effort has been spared toward making this catalog as useful as possible to all of the scientific community interested in these fascinating insects.

LITERATURE COVERAGE

All authors have attempted to include all pertinent references to synonyms, revisions, taxonomy, biology, and morphology beginning with 1758, the publication date of the 10th edition of "Systema Naturae" by Linnaeus. The cut-off dates vary for the several sections of the catalog and are as follows:

Symphyta through 1974;
Ichneumonoidea through 1976;
Chalcidoidea—Torymidae (except Agaoninae) and Encyrtidae through 1976; other families and Agaoninae through 1972;
Cynipoidea through 1972;
Evanioidea through 1976;
Pelecinoidea, Proctotrupoidea, and Ceraphronoidea through 1972;
Trigonaloidea through 1976;
Bethyloidea and Scolioidea through 1975;
Formicoidea through mid-1975;
Vespoidea, Pompiloidea, and Sphecoidea through 1975; and
Apoidea through 1976.

All authors have included some references subsequent to the dates listed above.

LITERATURE CITATIONS

The source for journal abbreviations is Whitlock, C., 1939, *Abbreviations used in the Department of Agriculture for titles of publications*, United States Department of Agriculture Miscellaneous Publication No. 337, 278 pages. Abbreviations for other titles and journals not found in Whitlock essentially follow the same format and abbreviations that she recommends. Book titles are usually shortened to omit irrelevant adjectives and include abbreviations, e.g.: Wheeler and Wheeler, 1963. The Ants of North Dakota, p. —, is cited as Wheeler and Wheeler, 1963. Ants of N. Dak., p. —. Certain lengthy nonserial titles are also abbreviated, e.g.: Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2 (App.), p. —, rather than Say, 1824. *In* Keating, Narrative of an Expedition to the Source of St. Peter's River, Lake Winnepeek . . ., etc. The titles are intended to be uniform throughout the catalog, but, in a work of this magnitude, there will naturally be some deviations. The abbreviations should be adequate to find the cited publication.

SYMBOLS AND ABBREVIATIONS

Certain symbols and abbreviations are frequently used in this catalog. Though there may be slight variations in some, they are generally as follows:

(!)—lapsus or misspelling of a scientific name.

"♀" = ♂ or "♂" = ♀—incorrect sex determination.

♀ (♂ misdet.) or ♂ (♀ misdet.)—only one of the sexes described belongs to the species cataloged.

♀—female.

♂—male.

☿—worker.

♃—soldier.

ab.—aberration.

app.—appendix.

cent.—central.

changed status—used after a species-group name to indicate a rank different from that previously accorded to it; not necessarily the same as new status.

desig.—designated; *e.g.*, in type-species designation, "Desig. by Rohwer, 1911."

e., east.—east, eastern.

emend.—emendation.

fasc.—fascicle.

fig., figs.—figure, figures.

h.—heft.

n. comb.—new combination; used after a species-group name to indicate a new generic assignment.

n. name—new name; used after a genus-group or species-group name to indicate a substitute name for a homonym.

N. name—New name; used after a bibliographic citation to indicate a previously proposed name.

Nom. nud.—Nomen nudum.

n. s.—new series.

n. status—new status; used where a taxon is here accorded a rank different from that which it had previously.

N. syn.—New synonymy; used to indicate a synonym newly proposed in this catalog.

n., no., north.—north, northern.

n.e., northeast.—northeast, northeastern.

n.w., northwest.—northwest, northwestern.

orig. desig.—original designation; used to indicate type-species designation.

p., pp.—page, pages.

pl., pls.—plate, plates.

preocc.—preoccupied; used after a genus-group or species-group name to indicate a homonym.

pt.—part.

revised status—revised status; used to denote a taxon that has been removed from synonymy.

ser.—series.

s., so., south.—south, southern.

s.e., southeast.—southeast, southeastern.

s.w., southwest.—southwest, southwestern.

sp., spp.—species.

ssp., sspp.—subspecies.

subg.—subgenus.
transcont.—transcontinental.
v., vol.—volume.
var.—variety.
w., west.—west, western.

FAUNAL ZONES

Bor.	Boreal
Canad.	Canadian
Huds.	Hudsonian
Transit.	Transition
Austr.	Austral
U. Austr.	Upper Austral
L. Austr.	Lower Austral
Alleghan.	Alleghanian
Austrorip.	Austroriparian
Carol.	Carolinian
Sonor.	Sonoran
U. Sonor.	Upper Sonoran
L. Sonor.	Lower Sonoran

GEOGRAPHICAL NAMES

Abbreviation	*Political Unit*
Ala.	Alabama
Alaska	Alaska
Alta.	Alberta
Ariz.	Arizona
Ark.	Arkansas
B.C.	British Columbia
Calif.	California
Canada	Canada
Colo.	Colorado
Conn.	Connecticut
Del.	Delaware
D.C.	District of Columbia
Fla.	Florida
Ga.	Georgia
Greenland	Greenland
Idaho	Idaho
Ill.	Illinois
Ind.	Indiana
Iowa	Iowa
Kans.	Kansas
Ky.	Kentucky
La.	Louisiana
Labrador	Labrador, Newfoundland (Labrador)
Maine	Maine
Man.	Manitoba
Mass.	Massachusetts
Md.	Maryland
Mexico	Mexico
Mich.	Michigan
Minn.	Minnesota
Miss.	Mississippi
Mo.	Missouri
Mont.	Montana
N. B.	New Brunswick
N. C.	North Carolina
N. Dak.	North Dakota
Nebr.	Nebraska
Nev.	Nevada
Newfoundland	Newfoundland, Newfoundland (insular)
N. H.	New Hampshire
N. J.	New Jersey
N. Mex.	New Mexico
N. S.	Nova Scotia
N. W. T.	Northwest Territories
N. Y.	New York
Ohio	Ohio
Okla.	Oklahoma
Ont.	Ontario
Oreg.	Oregon
Pa.	Pennsylvania
P. E. I.	Prince Edward Island
Que.	Quebec
R. I.	Rhode Island
Sask.	Saskatchewan
S. C.	South Carolina
S. Dak.	South Dakota
Tenn.	Tennessee
Tex.	Texas
U. S.	United States
Utah	Utah
Vt.	Vermont
Va.	Virginia
Wash.	Washington (state)
W. Va.	West Virginia
Wis.	Wisconsin
Wyo.	Wyoming
Yukon	Yukon Territory

The catalog contains one undiagnosed new species in the Ichneumonidae, *Pterocormus clasma* Carlson, p. 521, proposed for the taxon misidentified as *Ichneumon canadensis* Cresson by Heinrich (1961).

The catalog contains one undiagnosed new genus also in the Ichneumonidae, *Woldstedtius* Carlson, type-species *Bassus biguttatus* Gravenhorst, p. 719, proposed for *Syrphoctonus* Foerster *sensu* Dasch (1964).

The following new names are proposed to replace preoccupied names:

Tenthredinidae

Pachynematus gamus Smith for *Pachynematus graminis* Marlatt (1896) .....p. 58
Nematus attus Smith for *Amauronematus dyari* Marlatt (1896) .....p. 68
Amauronematus peralus Smith for *Nematus pectoralis* Cresson (1880) .....p. 80

Ichneumonidae

Oedomopsis davisi Carlson for *Trophon ? nasutus* Cresson (1868) .....p. 366
Gelis cushmani Carlson for *Hemiteles apantelis* Cushman (1927) .....p. 405
Oresbius shumaginensis Carlson for *Stiboscopus ferrugineus* Ashmead (1902) ....p. 438
Pterocormus dionymus Carlson for *Ichneumon anonymus* Heinrich (1961) .....p. 522
Casinaria affinisima Carlson for *Casinaria affinis* Walley (1947) .....p. 635

Pteromalidae

Mesopolobus fuscipedes Burks for *Platyterma fuscipes* Ashmead (1896) .....p. 816

Eurytomidae

Harmolita ovatella Burks for *Harmolita ovata* Phillips and Emery (1919) .....p. 840

Eulophidae

Syntomosphyrum orgyiazele Burks for *Tetrastichomyia orgyiae* Girault (1916) ..p.1005

Diapriidae

Trichopria kiefferi Muesebeck for *Diapria montana* Kieffer (1906) p.1147

Scelionidae

Trimorus contractus Muesebeck for *Gryon flavipes* Ashmead (1893) p.1162

Ceraphronidae

Aphanogmus harringtoni Muesebeck for *Aphanogmus salicicola* Harrington (1899) p.1190

Megaspilidae

Dendrocerus obscurellus Muesebeck for *Atritomus californicus* Kieffer (1906) ..p.1194

Masaridae

Euparagia richardsi Bohart for *Psiloglossa simplicipes* Rohwer (1909) p.1470

Philanthidae

Cerceris bolingeriana Krombein for *Cerceris bolingeri* Scullen (1972) p.1730

Anthophoridae

Triepeolus mitchelli Hurd for *Triepeolus subluratus* Mitchell (1962) p.2094

There are a number of other nomenclatural and taxonomic changes. These are considered of lesser bibliographic importance than the new names, so tabulations of them are deferred to Volume 3 which will also contain the indexes and a table of the number of valid genera and species for each family and higher category. These nomenclatural and taxonomic changes are as follows:

A number of generic transfers are made. They are usually cited in the text as **xantianum** (Saussure), n. comb. The authority

responsible for the transfer is the author of that section unless the name of another specialist is included.

There are also a number of instances where a taxon formerly considered to be a species is treated here as a subspecies of another taxon, or where a taxon formerly considered to be a subspecies is now raised to specific rank. The authority responsible for the change is the author of that section unless the name of another specialist is included. These are usually cited in the text as **clavatum johannis** (Richards), n. status or **alba** Rohwer, n. status.

The words—changed status—occasionally follow the author of a species-group name. This indicates that the taxon has a rank different from that accorded it elsewhere. It is not the same as new status for it reflects a change which has already been published.

In a few taxa, the words—revised status—follow the author of a species-group name. This denotes a taxon which has been removed from synonymy.

There are a few new synonyms at the genus-group level and numerous new synonyms at the species-group level. These are indicated by the abbreviation N. syn. following the bibliographic citation of the new synonym. As noted above, the synonymy is to be attributed to the author of the section unless the name of another specialist appears in parentheses following the abbreviation N. syn.

Volume 3

It is intended that Volume 3 will contain separate indexes to the taxa of Hymenoptera, and to their hosts, parasites, prey, predators, and pollen and nectar sources. Preparation of the indexes has already begun, and we anticipate that the tapes for Linotron production will be sent to the Government Printing Office during 1978. We will also include in Volume 3 a tabulation of the number of valid genera and species for each family and higher category, and lists of the nomenclatural and taxonomic changes other than the new names which are listed above.

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We are indebted to a host of cooperating hymenopterists for generous assistance which

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In the Symphyta, H. E. Milliron, formerly of the Biosystematics Research Institute (BRI), Agriculture Canada, Ottawa, reviewed parts of the manuscript and provided information, as did H. R. Wong, Northern Forest Research Centre, Edmonton, Alberta, for *Pristiphora* Latr. H. Greenbaum, University of Florida, Gainesville, furnished data on Florida sawflies.

The accuracy of host names in the Parasitica was checked by the following specialists: Smithsonian Institution—J. F. G. Clarke, D. R. Davis, W. D. Duckworth, T. L. Erwin, W. D. Field, and R. C. Froeschner; Systematic Entomology Laboratory (SEL), U. S. Department of Agriculture—D. C. Ferguson, R. J. Gagné, R. D. Gordon, A. B. Gurney, J. L. Herring, R. W. Hodges, J. M. Kingsolver, J. P. Kramer, A. S. Menke, D. M. Miller, L. M. Russell, C. W. Sabrosky, D. R. Smith, T. J. Spilman, M. B. Stoetzel, E. L. Todd, R. E. Warner, and R. E. White. D. M. Weisman (SEL) identified the remains of some lepidopterous larvae which served as hosts.

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O. W. Richards, British Museum (Natural History), London, and R. M. Bohart reviewed the entire manuscript for Vespoidea. J. van der Vecht, Putten, The Netherlands, recommended the systematic sequence adopted in the Eumenidae and reviewed the manuscript.

M. J. West-Eberhard, Universidad del Valle, Cali, Colombia, and R. R. Snelling reviewed the manuscript on Vespidae and supplied data on taxonomy and biology. J. E. Gillaspy, Texas A & I University, Kingsville, provided information on *Polistes* Latr.

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Computerization of the catalog and its production by the computer-driven Linotron required the highly skilled technical expertise of specialists in computer storage and applications. James F. Mello, formerly Chief of the Data Processing (ADP) Program at NMNH, carefully analyzed the 1951 Hymenoptera Catalog and developed the data analysis matrix which governed entry of information into the computer. R. Creighton, Manager, Information Retrieval and Indexing Division, Office of Computer Services (OCS), SI, devised the programs for editing, arranging, querying, and displaying data from the manuscripts. J. J. Crockett, Manager, Software Systems and Program Maintenance (OCS), developed the program for conversion of the computerized data to special magnetic tapes capable of driving the Photo Typesetting Unit, the Mergenthaler Linotron 1010, in the Government Printing Office. T. G. Gautier, Chief (ADP), and D. Bridge, Operations Manager (ADP), maintained daily collaboration with the Editorial Board in assignment of clerical assistance, and production of the edit phases, merge files, and SELGPO printouts.

Finally, we are most grateful for the careful, accurate typing of the manuscripts for computer entry by the corps of dedicated clerk typists. R. M. Garlick served with the

program as principal typist from its inception until his reassignment in mid-1976 as a computer technician; he also trained the other assigned typists. P. R. Brown is currently the only typist assigned full time. Other typists who worked for varying lengths of time during the six years of manuscript production and computer entry were: L. E. Back, L. M. Bybell, R. Cloyed, L. E. Hatton, M. Monahan, L. G. Oliver, J. Peabody, P. A. Sunkel, and M. F. Ward.

Division ACULEATA

By Karl V. Krombein

This divisional name is retained because of the substantial biological literature published on the groups of Hymenoptera popularly called ants, wasps and bees. No clear-cut unambiguous criteria exist by which one can separate Aculeata from Parasitica for there are annectent forms in both divisions.

In North America we recognize about equal numbers of valid species-level taxa in the Aculeata and Parasitica (or Terebrantia). However, there are comparatively few undescribed Aculeata, and subsequent revisionary studies probably will synonymize nearly as many taxa now considered to be valid as there will be new taxa described. Undoubtedly there are numerous undescribed small Parasitica.

Aculeata occur in all major zoogeographic regions and on many of the oceanic islands; they are absent from Antarctica. Brothers (1975) recognizes 38 families of Aculeata. The majority occur in America north of Mexico except the Plumariidae, Scolebythidae, Loboscelidiidae and Fideliidae (sometimes placed in Megachilidae), all small families with very few species. The Cleptidae are here considered to be a subfamily of Chrysididae. The exotic Loboscelidiidae are best considered as an extremely aberrant subfamily of Chrysididae allied to the Amiseginae. Brothers considered the Crabronidae, here treated as a family, to be a subfamily of Larridae.

Brothers recognized only three superfamilies of Aculeata, placing the scolioid, pompiloid and vespoid families in the Vespoidea, and consolidating the Sphecoidea and Apoidea under the former name. Further discussion of Brothers' arrangement will be found under appropriate superfamily headings.

In general the Hymenoptera included in the Aculeata are characterized by conversion of the ovipositor to a stinging function only. The eggs are no longer exserted through the ovipositor as in most Parasitica but through an orifice anterior to it. The ovipositor with associated poison glands now serves several purposes, the temporary or permanent paralysis of the prey of wasps, as a defensive mechanism in bees and some ants, and as an offensive mechanism in some ants. However, annectent forms occur in some Proctotrupoidea of the Parasitica, and Bethyloidea and Scolioidea of the Aculeata. In many higher Parasitica the wing venation and thorax are much more reduced than in the Aculeata.

Biologically the majority of Aculeata may be distinguished by their non-parasitic habits and the construction of nests for their young. Most higher wasps belonging to the Vespoidea, Pompiloidea and Sphecoidea are predaceous upon other arthropods and build nests which vary from simple to quite elaborate. A few species of Pompiloidea and Sphecoidea behave as parasitoids, paralyzing the prey, laying an egg upon it, and making no nest; the prey later recovers and leads a normal life until killed by the growing larva. Most of the vespoid Masaridae and all of the free-living bees have converted to a larval diet of pollen and nectar. Cleptoparasites or brood-parasites, whose larvae develop in the nests of other wasps or bees, have evolved inde-

pendently a number of times in all aculeate superfamilies. However, these biological distinctions break down in most of the more primitive wasps belonging to the Bethyloidea and Scolioidea. Many of these behave as true parasitoids in that the larval prey may be only temporarily paralyzed, occasionally several eggs may be laid on a single prey larva, and frequently no nest whatever is made, the prey being left in situ, or at most a crude cell may be constructed around the subterranean prey as in most Tiphiidae and Scoliidae. Parasitism of the egg stage of the host is known only among the Amiseginae (Chrysididae). Polyembryony is unknown, but parthenogenesis occurs in some Aculeata. Usually this is of the facultative kind as is found in social insects such as some ants, vespid wasps and honeybees. It may be obligate in some aculeates, such as the tiphiid wasp *Methocha* and some species of the bee genus *Ceratina*, where males are rare or unknown.

The simplest kind of nest among the aculeates is made by the wasp dragging the paralyzed prey into a crevice in or above ground or back into the prey's burrow; the opening is usually sealed off by particles of the substrate to make a crude cell. A second type of nest is also made in a pre-existing cavity, such as borings of beetle larvae in wood or twigs, or in old insect galls or abandoned mud cells. The nest in this second type may be unicellular as in the first kind of nest, or it may consist of a linear series of cells, each cell separated from its neighbor by a partition of mud, wood chips, resin, masticated plant leaves, or other substances. A third kind of nest is excavated by the wasp or bee in the ground, in rotten wood, or in the soft pith of such shrubs as sumac and elderberry. The subterranean nests are frequently unicellular but multicellular nests in the ground, rotten wood or pith may have the individual cells arranged in a linear series or in clusters with the individual cells sealed by a partition or closing plug of the substrate. Occasionally a mud turret may be constructed over the entrance of subterranean nests. Next, there are the nests constructed entirely from foreign materials. Usually these are above ground although some Vespidae and Bombinae have subterranean nests. The nests of solitary species may be made of mud, or a mixture of resin and pebbles, with the cells arranged in parallel tubes, or in clusters or with separate but adjacent cells; some exotic social Vespidae make a mud envelope around combs of hexagonal cells. A number of social species make paper or carton nests in which the nesting material consists of masticated wood fibers, bark or rotten wood. Finally, there is the complex nest of the honeybees constructed from wax secreted from glands in the abdomen of workers.

Aculeate larvae are normally cannibalistic if they come in contact accidentally. This tendency is prevented in multicellular nests by the existence of partitions separating adjacent larvae. However, some species make brood cells in which several larvae develop amicably without the occurrence of cannibalism. Such nests have been reported for a few North American *Isodontia* (Sphecidae) and *Megachile* (Megachilidae), and for many exotic Allodapini (Anthophoridae).

True sociality (eusociality) has arisen independently several times in the higher aculeates, the Formicoidea, Vespoidea, Sphecoidea and Apoidea. All of the ants are eusocial or are social parasites of other ants, but the majority of wasps and bees are solitary species. Wilson (1971) considers that eusocial insects must possess three traits: "individuals of the same species cooperate in caring for the young; there is a reproductive division of labor, with more or less sterile individuals working on behalf of fecund individuals; and there is an overlap of at least two generations in life stages capable of contributing to colony labor, so that offspring assist parents during some period of their life." Presocial insects exhibit one or two of the above traits. Solitary species have none of these traits.

Most solitary aculeates practice mass provisioning, that is, the egg is laid and a store of food is placed in the cell with it, then the cell is closed; in many species the store of food is provided before oviposition. Some sphecoid wasps, such as many Bembicinae (Nyssonidae), have taken the first step toward subsocial status by adopting progressive provisioning. This behavior is characterized by placing the egg on a single prey specimen and not furnishing additional prey until the egg has hatched or by the hatching of the egg before any food is provided; after hatching the larva is fed daily or at intervals as required. Other aculeates, e.g., *Moniaecera* (Crabronidae), some *Andrena* (Andrenidae) and *Exomalopsis* (Anthophoridae), have achieved the higher level of communal status, in which several females use a common burrow entrance but presumably maintain separate cells. A higher level of presocial behavior (quasisocial) is found rarely in some exotic bees where two or more gravid females of the same generation cooperatively construct and provision the cells. Some of our Halictidae have attained the semisocial stage which is similar to the quasisocial except that unmated females of the same generation associate with a

gravid female or females and care for the larvae of the latter. A semisocial colony may evolve into a primitive eusocial colony as happens later in the season in some *Augochlorella* nests when the colony becomes monogynous and only the workers forage for pollen. Another stage toward the eusocial is the subsocial in which one female cares for her own larvae as in many Allodapini (Anthophoridae) and young nests of *Bombus* (Apidae); such a colony may later become truly eusocial as happens when the first brood of *Bombus* workers ecloses and takes over the foraging activities previously performed by the queen.

Taxonomy: Lanham, 1960. Ent. News 71: 85-86 (significance of hind tibial strigil in classification). —Richards, 1972 (1971). Ent. Essays to Commemorate Retirement of Prof. K. Yasumatsu, pp. 1-13, 10 figs. (thoracic spiracles in classification). —Brothers, 1975. Kans. Univ. Sci. Bul. 50: 483-648, 101 figs., 7 tabs. (phylogeny, especially Mutillidae).

Biology: Walsh and Riley, 1869. Amer. Ent. 1: 122-143, figs. 96-112 (habits of wasps). —Ashmead, 1894. Psyche 7: 19-26, 39-46, 59-66, 75-79 (habits of wasps). —Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 1-245, 14 pls. (instincts and habits of solitary wasps in Wis.). —Hartman, 1905. Tex. Acad. Sci., Trans. 7: 15-85, 24 figs., also published as Univ. Tex., Bul. 65, Sci. Series 6: 3-73, 24 figs. (habits of some Texan solitary wasps). —Peckham and Peckham, 1905. Wasps social and solitary, 311 pp. (prey, nests, life history in Wis.). —Rau and Rau, 1918. Wasp studies afield, 372 pp., 68 figs. (nests, prey, life history in Mo.). —Wheeler, 1919. Amer. Phil. Soc., Proc. 58: 1-40 (evolution of parasitic Aculeata). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 1-44 (prey, nests, ecology of Mo. wasps, bees, ants). —Wheeler, 1923. Social Life Among the Insects, 375 pp., 113 figs. —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 157-277, 8 pls. (ecology of wasps and bees nesting in clay bank in Mo.). —Williams, 1928. Hawaii. Sugar Planters' Assoc. Expt. Sta., Bul. Ent. Ser. 19: 30-60, 112-174 (tropical wasps and bees). —Wheeler, 1928. Social Insects, 378 pp., 79 figs. —Rau, 1928. Acad. Sci. St. Louis, Trans. 35: 325-489, 68 figs. (behavior non-social wasps in Mo.). —Reinhard, 1929. The witchery of wasps, 291 pp., 14 pls., 10 text figs. (prey, nests, life history in Md.). —Rau, 1933. Jungle bees and wasps of Barro Colorado Island, 324 pp. (nests, prey, life history). —Iwata, 1942. Tenthredo 4: 1-46, 5 pls., 1 fig., 2 pp. unnumbered figs. (compar. studies behavior of solitary wasps). —Hurd, 1955. Century of Progress in Natural Sciences, pp. 573-575, Calif. Acad. Sci. (history of wasp taxonomy). —Cooper, 1957. Jour. Expt. Zool. 134: 469-514, 26 figs. (functions of cell partitions in preventing parasitism, predation and cannibalism, and in orienting larva for pupation). —Evans, 1958 (1956). Tenth Internatl. Congr. Ent., Proc. 2: 449-457 (evolution of social life in wasps). —Olberg, 1959. Das Verhalten der solitaeren Wespen Mitteleuropas, 402 pp., 779 photos. (prey, nests). —Evans and Linsley, 1960. South. Calif. Acad. Sci., Bul. 59: 30-37 (sleeping aggregations of aculeates). —Michener, 1961. Roy. Ent. Soc. London, Symp. 1: 43-56 (aspects of social polymorphism). —Krombein, 1962. Ent. Soc. Wash., Proc. 64: 11-19 (parasitism of several wasps and bees by acarid mites). —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 148-164, 9 figs. (sleeping aggregations). —Evans, 1962. Evolution 16: 468-483, 6 figs. (evolution of prey-carrying mechanisms in wasps). —Evans, 1963. Wasp farm, 178 pp., 25 pls., 16 text-figs. (popular account). —Hamilton, 1964. Jour. Theoret. Biol. 7: 1-52 (genetic evolution of social behavior). —Evans, 1966. Ann. Rev. Ent. 11: 123-154, 2 figs. (behavior patterns of solitary wasps). —Krombein, 1967. Trap-nesting wasps and bees: Life histories, nests and associates, 570 pp., 29 pls., 2 text-figs. Cited in text as Trap-nesting wasps and bees. —Andrewes, 1969. The lives of wasps and bees, 204 pp., 16 pls., 15 text-figs. (popular account). —Evans and Eberhard, 1970. The wasps, 265 pp., 122 figs. (synthesis of data on life history, behavior, ecology). —Flanders, 1970. Canad. Ent. 102: 898-905 (cannibalistic infanticide in social Hymenoptera). —Wilson, 1971. Insect societies, 548 pp., figs. (synthesis of insect sociology). —Iwata, 1972 (1971). Evolution of instinct--comparative studies of Hymenoptera behavior, 503 pp., 50 figs. (in Japanese). —Michener and Lin, 1972. Quart. Rev. Biol. 47: 131-159 (evolution of sociality). —Spradbery, 1973. Wasps: an account of the biology and natural history of solitary and social wasps, 408 pp., 28 pls., 131 text figs. —Hamilton, 1973. Ann. Rev. Syst. Ecol. 3: 193-232 (altruism in social insects). —Cazier and Linsley, 1974. Amer. Mus. Novitates 2546: 1-20, 6 figs. (foraging behavior of bees and wasps on *Kallstroemia*). —Schmidt et al., 1974. Sozialpolymorphismus bei Insekten, 974 pp. —Trivers and Hare, 1976. Science 191: 249-263, 7 figs., 6 tabs. (haplodiploidy and evolution of social insects). —Iwata, 1976.

Evolution of Instinct: Comparative Ethology of Hymenoptera, 535 pp., frontisp., 50 figs. (English translation, Natl. Tech. Inform. Serv., PB 257052).

Superfamily BETHYLOIDEA

By Karl V. Krombein

Family BETHYLIDAE

North American members of this family are tiny or small wasps, rarely over 10 mm long. They are considered to have been derived from a very primitive aculeate stock, and in some features of behavior and development are more like the typical Parasitica rather than the Aculeata. Usually the female stings the host larva a number of times until it is completely and permanently paralyzed. The host larva is left in situ or it may be dragged to a crevice. The bethylid female usually deposits several eggs on each host specimen and the gregarious bethylid larvae develop externally. The Bethylinae and a few Epyrinae prey upon lepidopterous larvae, principally borers and seed-feeders, but also case bearers and leaf rollers. Most of the other bethylids prey upon coleopterous larvae (occasionally pupae), especially species dwelling in the soil, boring in wood or infesting seeds. There have been a few unconfirmed reports of hymenopterous larvae serving as hosts.

Despite Evans' recent numerous revisions of many of the genera of North American Bethylidae, we must expect that intensive, specialized collecting and biological observations in the future will enlarge our native fauna by as much as 50 percent.

Revision: Evans, 1964. Mus. Compar. Zool., Bul. 132: 1-222, 144 figs. (generic reclassification of New World spp.).

Taxonomy: Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 27-77. —Kieffer, 1914. Das Tierreich, Lief. 41, pp. 1-595. —Richards, 1939. Roy. Ent. Soc. London, Trans. 89: 297-344.

Biology: Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 16-20.

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 402-409, figs. 42-44, 46 (female, male thorax).

Subfamily BETHYLINAE

Genus PROSIEROLA Kieffer

Prosierola Kieffer, 1905. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 243.
Type-species: *Epyris ? nasalis* Westwood. Monotypic.

bicarinata (Brues). Ga., Fla., Tex.; Mexico. Host: *Laspeyresia caryana* (Fitch); *Desmia funeralis* (Hbn.) in leaf rolls.
Parasierola bicarinata Brues, 1907. Wis. Nat. Hist. Soc., Bul. 5: 100. ♀.

Biology: Doutt, 1973. Ent. Soc. Amer., Ann. 66: 486-487, 1 fig. (brood tending).

Genus PARASIEROLA Cameron

Parasierola Cameron, 1883. Ent. Soc. London, Trans., p. 197.
Type-species: *Parasierola testaceicornis* Cameron. Monotypic.
Perisierola Kieffer, 1914. Das Tierreich, Lief. 41, p. 533.
Type-species: *Parasierola gallicola* Kieffer. Desig. by Muesebeck and Walkley, 1951.

Several species have been reared from microlepidopterous pests such as the pink bollworm and the Oriental fruit moth. Males are uncommon and thelytokous parthenogenesis may be common, four gererations of females having been reared from an unfertilized female.

alutacea Kieffer. Nev. (Ormsby Co.).
Parasierola cellularis var. *alutacea* Kieffer, 1906. Berlin. Ent. Ztschr. 50: 254. ♂.

breviceps (Krombein). Calif. (Tracy). Host: *Myelois venipars* Dyar, larva.
Perisierola breviceps Krombein, 1954. Pan-Pacific Ent. 30: 259. ♀.

cellularis (Say). Pa., N. J., Md., Va., Ohio, Mich., Ind., Iowa, Mo., Nebr., Kans.; Mexico (Nuevo Leon). Host: *Pyrausta ainsliei* Heinr.; *Ancylis comptana fragariae* (W. and R.).
Bethylus cellularis Say, 1836. Boston Jour. Nat. Hist. 1: 279.

Biology: Guajardo and Ortiz, 1966. Soc. Nuevoleon Hist. Nat., Bol. 1: 41.

distinguenda Kieffer. Calif.; Nicaragua.
Parasierola distinguenda Kieffer, 1908. *In* Wytsman, Gen. Ins., fasc. 76, p. 14. ♀. N. name for the taxon misidentified as *cellularis* (Say) by Kieffer, 1906, Berlin Ent. Ztschr. 50: 254.

emigrata (Rohwer). Tex.; Hawaii. Host: *Pectinophora gossypiella* (Saund.).
Perisierola emigrata Rohwer, 1917. Insecutor Inscitiae Menstruus 5: 1. ♀, ♂.

Biology: Busck, 1917. Insecutor Inscitiae Menstruus 5: 3-5. —Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 21. —Williams, 1927. U. S. Dept. Agr., Tech. Bul. 19: 11.

gracilicornis Kieffer. Oreg., Calif., Idaho, Nev., N. Mex., Tex.
Parasierola cellularis var. *gracilicornis* Kieffer, 1906. Berlin. Ent. Ztschr. 50: 254. ♀.

punctaticeps Kieffer. Calif., Tex. Host: *Laspeyresia caryana* (Fitch); *Acrobasis* sp., *A. caryae* Grt.; *Pectinophora gossypiella* (Saund.).
Parasierola cellularis var. *punctaticeps* Kieffer, 1906. Berlin. Ent. Ztschr. 50: 254. ♀.

Biology: Rude, 1937. Jour. Econ. Ent. 30: 840-841. —Nichols, Pierce and Pinkney, 1950. U. S. Dept. Agr., Tech. Bul. 1011: 14.

Genus GONIOZUS Foerster

Goniozus Foerster, 1856. Hym. Stud., v. 2, p. 96.
Type-species: *Bethylus claripennis* Foerster. Desig. by Ashmead, 1893.
Progoniozus Kieffer, 1905. Soc. Sci. Bruxelles, Ann. 29: 105.
Type-species: *Perisemus floridanus* Ashmead. Orig. desig.

Most species whose hosts are known prey on microlepidopterous larvae. North American species have been recorded from a number of economically important hosts. Males may be produced from unfertilized eggs.

Revision: Fouts, 1928. Ent. Soc. Wash., Proc. 30: 127-132.

brevinervis Fouts. Ohio, N. J. Host: *Coleophora* sp.; *Aroga trialbamaculella* (Chamb.).
Goniozus brevinervis Fouts, 1928. Ent. Soc. Wash., Proc. 30: 127, 128. ♀, ♂.

castaneicolor Evans. "United States."
Bethylus castaneus Kieffer, 1907. Berlin. Ent. Ztschr. 51: 295. ♀. Preocc. in *Goniozus*.
Goniozus castaneicolor Evans, 1964. Mus. Compar. Zool., Bul. 132: 201. N. name.

Taxonomy: Evans, 1962. Breviora, No. 150, p. 1 (generic transfer).

clarimontis Kieffer. Calif. (Claremont).
Gonziozus clarimontis Kieffer, 1906. Berlin. Ent. Ztschr. 50: 253. ♀.

columbianus Ashmead. N. J., D. C., Va., Utah. Host: *Ancylis comptana fragariae* (W. and R.), *Rhyacionia buoliana* (Schiff.).
Goniozus columbianus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 76. ♂, ♀.
Perisemus minimus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 71. ♀.

electus Fouts. La. (Bogalusa). Host: *Rhyacionia frustrana* (Comst.), *R. buoliana* (Schiff.), *R.* spp.
Goniozus electus Fouts, 1928. Ent. Soc. Wash., Proc. 30: 128, 132. ♀, ♂.

flavipes Fouts. Kans. (Junction City).
Goniozus flavipes Fouts, 1928. Ent. Soc. Wash., Proc. 30: 128, 130. ♀, ♂.

floridanus (Ashmead). Fla. (Jacksonville).
Perisemus floridanus Ashmead, 1887. Ent. Amer. 3: 76. ♂, ♀.

foveolatus Ashmead. Ont. to Fla., west to Sask. and Tex., Ariz. Host: *Acrobasis caryae* Grote; *Polychrosis viteana* (Clem.); *Coleophora malivorella* Riley; *Ancylis comptana fragariae* (W. and R.); *Anchylopera nubeculana* Clem.; *Grapholitha molesta* (Busck); *Acrobasis caryivorella* Rag.; *Gracilaria negundella* Chamb.; *Nemapogon granella* (L.); *Laspeyresia caryana* (Fitch); *Rhyacionia buoliana* (Schiff.).
Goniozus foveolatus Ashmead, 1887. Ent. Amer. 3: 76. ♀.
Goniozus hortorum Brues, 1907. Wis. Nat. Hist. Soc., Bul. 5: 150. ♀.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, No. 14: 44-46, pl. 15, figs. E, F (male genitalia).

gallicola Fouts. Oreg., Calif. Host: *Deoclona yuccasella* Busck in Yucca seed pods; *Melissopus latiferreanus* (Wlsm.)? in galls of *Cynips maculipennis* Gill.
Goniozus gallicola Fouts, 1942. Ent. Soc. Wash., Proc. 44: 168. ♀.

Biology: Fouts, 1942. Ent. Soc. Wash., Proc. 44: 168 (host ?). —Gordh, 1976. U. S. Dept. Agr., Tech. Bul. 1524: 1-27, 5 figs. (behavior, life history, host).

hubbardi Howard. Fla. Host: *Platynota rostrana* (Wlkr.); *Platoeceticus gloveri* Pack.
Goniozus hubbardi Howard, 1885. *In* Hubbard, Ins. Affecting the Orange, p. 217. ♀.

longiceps Kieffer. Tex. Host: *Rhyacionia bushnelli* (Busck), *R. buoliana* (Schiff.), *R.* spp.
Goniozus longiceps Kieffer, 1904. Arkiv for Zool. 1: 529. ♀.

longinervis Fouts. Nebr., S. Dak., Calif. Host: *Rhyacionia bushnelli* (Busck), *R.* spp., *Argyrotaenia citrana* (Fern.).
Goniozus longinervis Fouts, 1928. Ent. Soc. Wash., Proc. 30: 128, 131. ♀, ♂.

megacephalus Ashmead. Fla. (Key West).
Goniozus megacephalus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 74. ♀.
Goniozus megalocephalus Schulz, 1906. Spolia Hym., p. 152. Emend.

mellipes (Ashmead). Fla. (Jacksonville).
Perisemus mellipes Ashmead, 1887. Ent. Amer. 3: 76. ♀.

occipitalis Kieffer. Nev., Calif.
Goniozus occipitalis Kieffer, 1906. Berlin. Ent. Ztschr. 50: 252. ♀.

platynotae Ashmead. Conn., N. Y., to Fla. west to Kans. and La., also Utah and Ariz.; Puerto Rico. Host: *Platynota idaeusalis* (Wlkr.); *P. flavedana* Clem.; *P. stultana* Wlsh.; *Archips argyrospila* (Wlkr.); *A. griseus* (Robinson); *A. rosaceana* (Harr.); *Archips* sp.; *Coelostathma discopunctana* Clem.?; *Sparganothis sulphurana* (F.); *Canarsia* sp.; *Argyrotaenia velutinana* (Wlkr.); *Pandemis limitata* Rob.; *Acrobasis caryae* Grote; *Ancylis comptana fragariae* (W. and R.); *Agathodes designalis* Guen. Parasite: *Perilampus fulvicornis* Ashm. (secondary).
Goniozus platynotae Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 75. ♂, ♀.
Goniozus euliae Fouts, 1926. Ent. Soc. Wash., Proc. 28: 167. ♀, ♂.

Biology: Fouts, 1928. Ent. Soc. Wash., Proc. 30: 129. —Wolcott, 1948. Puerto Rico Univ. Jour. Agr. 32: 848. —Bennett, 1961. Tenn. Acad. Sci., Jour. 36: 353. —Oatman and Jenkins, 1962. Mo. Univ. Coll. Agr., Res. Bul. 789: 12. —Wilde and Semel, 1966. Jour. Econ. Ent. 59: 1040. —Krombein, 1967. Trap-nesting Wasps and Bees, p. 69. —Prokopy, 1968. Jour. Econ. Ent. 61: 351. —Goertzen and Doutt, 1975. Ent. Soc. Amer., Ann. 68: 869-870 (female ovicidal behavior).

politus Ashmead. Md. (Virginia Beach).
Goniozus politus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 75. ♀.

Genus BETHYLUS Latreille

Bethylus Latreille, 1802-03. Hist. Nat. Crust. Ins., v. 3, p. 315.
Type-species: *Omalus fuscicornis* Jurine. Desig. by Internatl. Comn. Zool. Nomencl. Op. 153, 1944.
Perisemus Foerster, 1856. Hym. Stud., v. 2, pp. 95, 96.
Type-species: *Perisemus triareolatus* Foerster. Monotypic.
Episemus Thomson, 1862. Ofvers. k. Vetensk. Akad. Forh. 18: 452.
Type-species: *Episemus variabilis* Thomson. Desig. by Richards, 1939.
Digoniozus Kieffer, 1905. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 245.
Type-species: *Perisemus oregonensis* Ashmead. Monotypic.

Species of this genus prey upon larvae of Microlepidoptera, although there is a questionable host record for a nitidulid beetle larva. Both sexes exhibit polymorphy in wing length, and no fully winged North American specimens are known.

Revision: Evans, 1962. Breviora, No. 150, 12 pp., 3 figs., 1 map.

amoenus Fouts. N. W. T. south to Alta., east through Wis. and Ill. to N. Y., Maine, and N. S.
Host: *Rhopobata naevana* (Hbn.); ? *Brachypterolus pulicarius* (L.).
Bethylus amoenus Fouts, 1928. Ent. Soc. Wash., Proc. 30: 127. ♀, ♂.

decipiens (Provancher). Alaska south to central Calif. eastward to N. Y., Maine and N. S.
Host: *Cnephasia* sp.
Gonatopus decipiens Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 179. ♀.
Perisemus oregonensis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 70. ♀.
Arysepyris californicus Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 34. ♀.
Bethylus brachypterus Whittaker, 1928. Ent. Soc. London, Trans. 2: 385. ♀.
Bethylus flavicornis Whittaker, 1928. Ent. Soc. London, Trans. 2: 385. ♂, ♀.

Subfamily EPYRINAE

Tribe EPYRINI

Genus RHABDEPYRIS Kieffer

Hosts of the American species are unknown. Two European species have been taken in ant nests, but the association is probably fortuitous.

Revision: Evans, 1965. Mus. Compar. Zool., Bul. 133: 67-151, 7 pls.

Genus RHABDEPYRIS Subgenus RHABDEPYRIS Kieffer

Rhabdepyris Kieffer, 1904. Soc. Hist. Nat. Metz., Bul. (2)11: 32.
Type-species: *Rhabdepyris myrmecophilus* Kieffer. Desig. by Kieffer, 1906.

gracilis Evans. Calif.; Mexico (Durango).
Rhabdepyris (*Rhabdepyris*) *gracilis* Evans, 1965. Mus. Compar. Zool., Bul. 133: 76. ♀, ♂.

mellipes Evans. Fla. (Orange Co.).
Rhabdepyris (*Rhabdepyris*) *mellipes* Evans, 1965. Mus. Compar. Zool., Bul. 133: 72, fig. 1. ♀.

muesebecki Evans. Tex. (Brownsville); Mexico, Honduras, Costa Rica, Ecuador, Bolivia.
Rhabdepyris (*Rhabdepyris*) *muesebecki* Evans, 1965. Mus. Compar. Zool., Bul. 133: 74. ♀, ♂.

nigripilosus (Ashmead). Ariz. (Huachuca Mts.); Mexico (Nayarit).
Mesitius nigripilosus Ashmead, 1895. Calif. Acad. Sci., Proc. (2)5: 539. ♀.
Rhabdepyris (*Rhabdepyris*) *huachucae* Evans, 1965. Mus. Compar. Zool., Bul. 133: 73. ♀.

Taxonomy: Evans, 1965. Psyche 72: 268.

Genus RHABDEPYRIS Subgenus TRICHOTEPYRIS Kieffer

Rhabdepyris subg. *Trichotepyris* Kieffer, 1906. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 376.

Type-species: *Rhabdepyris pallidipennis* Kieffer. Desig. by Muesebeck and Walkley, 1951.

Species Group Megacephalus

angusticeps Evans. Ariz. (Tucson).
Rhabdepyris (*Trichotepyris*) *angusticeps* Evans, 1965. Mus. Compar. Zool., Bul. 133: 102, figs. 8, 48. ♀.

apache Evans. Ariz. (Pima Co.); Mexico (Sonora, Sinaloa, Nayarit, Jalisco).
Rhabdepyris (*Trichotepyris*) *apache* Evans, 1965. Mus. Compar. Zool., Bul. 133: 91, figs. 5, 26. ♀, ♂.

carolinianus Evans. S. C., Fla.
Rhabdepyris (*Trichotepyris*) *carolinianus* Evans, 1965. Mus. Compar. Zool., Bul. 133: 100, figs. 7, 28, 46. ♀.

megacephalus (Ashmead). Tex., N. Mex., Ariz., Calif.
Epyris megacephalus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 61. ♀.
Epyris megalocephala Schulz, 1906. Spolia Hym., p. 153. Emend.

texanus Evans. Tex., Ariz.; Mexico (Sonora, Sinaloa, Morelos).
Rhabdepyris (*Trichotepyris*) *texanus* Evans, 1965. Mus. Compar. Zool., Bul. 133: 93, figs. 6, 18, 27. ♀, ♂.

werneri Evans. Ariz. (Gila Co., Pima Co.); Mexico (Chihuahua).
Rhabdepyris (*Trichotepyris*) *werneri* Evans, 1965. Mus. Compar. Zool., Bul. 133: 89, figs. 4, 17, 25, 44. ♀, ♂.

Species Group Pulchripennis

amabilis Fouts. Mass., N. Y., Md., D. C., Va., Fla., Ark., Mo.
Rhabdepyris amabilis Fouts, 1927. Ent. Soc. Wash., Proc. 29: 165. ♀.

Genus RHABDEPYRIS Subgenus CHLOREPYRIS Kieffer

Chlorepyris Kieffer, 1913. Lab. Zool. Gen. e Agr. Portici, Bol. 7: 108.
Type-species: *Epyris semiviridis* Kieffer. Desig. by Kieffer, 1914.

Species Group Viridissimus

fulgens (Brues). Tex. (Brownsville); Honduras.
Epyris fulgens Brues, 1907. Wis. Nat. Hist. Soc., Bul. 5: 99. ♀.

Genus ANISEPYRIS Kieffer

Anisepyris Kieffer, 1905. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 248.
Type-species: *Epyris amazonicus* Westwood. Monotypic.
Rhabdepyris subg. *Lophepyris* Evans, 1959. Ent. Soc. Wash., Proc. 61: 201.
Type-species: *Rhabdepyris* (*Lophepyris*) *bridwelli* Evans. Orig. desig.

Revision: Evans, 1959. Ent. Soc. Wash., Proc. 61: 97-120, 28 figs. (U. S. species). —Evans, 1959. Ent. Soc. Wash., Proc. 61: 201-204 (*Lophepyris*). —Evans, 1966. Studia Ent. 9: 1-120, 151 figs. (New World species).

Species Group Aeneus

The Aeneus Species Group is equivalent to subgenus *Lophepyris* Evans.

aeneus Kieffer. Southern Tex. to Panama.
Anisepyris aeneus Kieffer, 1906. Soc. Sci. Bruxelles, Ann. 30: 138. ♀.
Anisepyris sublevis Kieffer, 1906. Soc. Sci. Bruxelles, Ann. 30: 140. ♂.
Rhabdepyris (*Lophepyris*) *bridwelli* Evans, 1959. Ent. Soc. Wash., Proc. 61: 202. ♀, ♂.

bradleyi (Evans). Fla., Tex.
Rhabdepyris (*Lophepyris*) *bradleyi* Evans, 1959. Ent. Soc. Wash., Proc. 61: 204. ♀.

Species Group Aurichalceus

aurichalceus (Westwood). Fla. (Miami); Cuba, Puerto Rico, St. Thomas, St. Kitts.
Epyris aurichalceus Westwood, 1874. Thesaurus Ent. Oxon., p. 160, pl. 31, fig. 3. ♀.
Anisepyris viridis Kieffer, 1907. Soc. Sci. Bruxelles, Ann. 32: 12. ♂. Preocc.
Anisepyris viridellus Kieffer, 1914. Das Tierreich, Lief. 41, p. 438. N. name.
Anisepyris cubensis Fouts, 1928. Ent. Soc. Wash., Proc. 30: 125. ♀.

Species Group Proteus

arapaho Evans. Tex. (Culberson Co.).
Anisepyris arapaho Evans, 1966. Studia Ent. 9: 62, figs. 44, 65. ♀.

dietrichorum Evans. Southern Ariz.; Mexico (Sinaloa, Nayarit, Jalisco, Veracruz).
Anisepyris dietrichorum Evans, 1959. Ent Soc. Wash., Proc. 61: 118, fig. 21. ♀.

papago Evans. Ariz. (Pima Co.).
Anisepyris papago Evans, 1966. Studia Ent. 9: 63, fig. 45. ♀.

rugosicollis Brues. Tex. (Brownsville).
Anisepyris rugosicollis Brues, 1908. Wis. Nat. Hist. Soc., Bul. (2) 6: 48. ♀.

Species Group Occidentalis

arizonicus Evans. Ariz. (Pima Co., Cochise Co.).
Anisepyris arizonicus Evans, 1959. Ent. Soc. Wash., Proc. 61: 112, fig. 15. ♀.

gibbosifrons Evans. N. J., Fla.
Anisepyris gibbosifrons Evans, 1959. Ent. Soc. Wash., Proc. 61: 116, figs. 23, 25, 26. ♀, ♂.

laticeps Evans. Southeastern Ariz.
Anisepyris laticeps Evans, 1959. Ent. Soc. Wash., Proc. 61: 113, figs. 18, 19, 24. ♀, ♂.
Anisepyris latifrons (!) Evans, 1959. Ent. Soc. Wash., Proc. 61: 115, fig. 24 legend. Lapsus.

occidentalis (Ashmead). Wash., Oreg., Idaho, Utah, Nev., Calif., Ariz.; Mexico (Aguascalientes, Guadalajara, Guerrero, Chiapas).
Epyris occidentalis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 58, 59. ♂, ♀.
Anisepyris punctaticeps Kieffer, 1906. Soc. Sci. Bruxelles, Ann. 30: 139. ♂.

subviolaceus Kieffer. Mass., Mich., Alta. and B. C. south to Fla., Tex. and Ariz.; Mexico (Sinaloa, Nayarit, Morelos, Veracruz).
Anisepyris subviolaceus Kieffer, 1910. Soc. Ent. France, Ann. 79: 39. ♀.

Species Group Columbianus

columbianus (Ashmead). Idaho and Wash. south through Ariz. and Calif. to Costa Rica.
Epyris columbianus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 58, 60. ♂, ♀.
Anisepyris pulchellus Fouts, 1928. Ent. Soc. Wash., Proc. 30: 126. ♀.

grandis (Ashmead). Fla.
Goniozus grandis Ashmead, 1887. Ent. Amer. 3: 76. ♂, ♀.
Epyris aeneiceps Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 59. ♀..

williamsi Evans. Utah, Idaho and Oreg., south through Ariz. and Calif. to southern Mexico.
Anisepyris williamsi Evans, 1959. Ent. Soc. Wash., Proc. 61: 106, fig. 9. ♀, ♂.

Species Group Amazonicus

analis (Cresson). N. C. to Fla., Tenn., Tex.; Mexico (Hidalgo).
Epyris analis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 193. ♀.

Genus EPYRIS Westwood

Epyris Westwood, 1832. London, Edinb. and Dublin Phil. Mag. and Jour. (ser. 3) 1 (2): 129.
Type-species: *Epyris niger* Westwood. Monotypic.
Muellerella Saussure, 1892. *In* Grandidier, Hist. Nat. Madagascar 20: pl. 25, fig. 20.
Type-species: *Muellerella amabilis* Saussure. Monotypic.
Empyris (!) Melander and Brues, 1903. Biol. Bul. 5: 23.
Parepyris Kieffer, 1913. Lab. Zool. Gen. e Agr. Portici, Bol. 7: 108.
Type-species: *Epyris interruptus* Kieffer. Desig. by Kieffer, 1914.
Psilepyris Kieffer, 1913. Lab. Zool. Gen. e Agr. Portici, Bol. 7: 108.
Type-species: *Epyris indivisus* Kieffer. Desig. by Kieffer, 1914.

Several species are known to parasitize soil-dwelling beetle larvae, especially Tenebrionidae. A few species hibernate gregariously beneath or in bark of trees. Several species of which *E. californicus* (Ashm.) is an example, have a very painful sting and can cause severe allergic reactions in humans.

Revision: Evans, 1969. Amer. Ent. Soc., Trans. 95: 181-352, 168 figs., 24 maps (New World species).

Species Group Connexus

connexus Evans. Southern Ariz. and Calif.
Epyris connexus Evans, 1967. Ent. News 78: 97. ♀, ♂.

spissus Evans. Ont., Mass., south to Fla.
Epyris spissus Evans, 1969. Amer. Ent. Soc., Trans. 95: 193, figs. 1, 3, 7, map 1. ♀, ♂.

Species Group Tricostatus

cariniceps Evans. Central Calif., southern Ariz., western Tex. to Costa Rica.
Epyris cariniceps Evans, 1969. Amer. Ent. Soc., Trans. 95: 216, figs. 17, 41, 49, map 5. ♀, ♂.

eriogoni Kieffer. Calif., Ariz., N. Mex., Tex. south to Veracruz.
Epyris eriogoni Kieffer, 1906. Berlin. Ent. Ztschr. 50: 245. ♂.
Epyris erigoni (!) Brues, 1907. Wis. Nat. Hist. Soc., Bul. 5: 97.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 220, figs. 22, 25, 40, 50, map 6. ♀, ♂.

oriplanus Kieffer. Va. to Fla., Tex. to Calif., south to Chiapas.
Epyris oriplanus Kieffer, 1911. Soc. Sci. Bruxelles, Ann. 35: 228. ♀.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 213, figs. 10, 11, 19, 33, 34, map 4. ♀, ♂.

tricostatus Evans. Pa. to Fla., Kans., Tex.
Epyris tricostatus Evans, 1969. Amer. Ent. Soc., Trans. 95: 208, figs. 16, 39, 47, map 3. ♀, ♂.

vogti Evans. Md. (Nanjemoy).
Epyris vogti Evans, 1969. Amer. Ent. Soc., Trans. 95: 211, fig. 24, map 5. ♀.

Species Group Rufipes

brachypterus (Ashmead). Md., D. C., Va., "Carolina".
Mesitius brachypterus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 66. ♀.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 273, map 11. ♀.

californicus (Ashmead). Pa. to Fla., Ill., Kans., Colo., Tex., Oreg., Calif. and Ariz. south to Honduras.
Mesitius californicus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 65. ♀.
Mesitius minutus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 65. ♂.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 260, figs. 63, 64, 72, 98-101, map 10. ♀, ♂.

Biology: Essig and Michelbacher, 1932. Science 76: 407-408.

clarimontis Kieffer. Fla., N. Dak. to Wash. south to Calif. and Tex., thence to central Mexico.
Epyris clarimontis Kieffer, 1906. Berlin. Ent. Ztschr. 50: 243. ♀.
Epyris indivisus Kieffer, 1905. Berlin. Ent. Ztschr. 50: 243. ♂.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 280, figs. 73, 74, 75, 86, 108-111, map 14. ♀, ♂.

cochise Evans. Idaho, Utah, Nev., Ariz., N. Mex., Tex.
Epyris cochise Evans, 1969. Amer. Ent. Soc., Trans. 95: 285, figs. 84, 85, 114, map 15. ♂, ♀.

deficiens Krombein. N. Y. to Ga., W. Va., ?Kans.
Epyris deficiens Krombein, 1956. Ent. Soc., Wash., Proc. 58: 156, fig. 3. ♀.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 288, figs. 68, 69, 78, 115, map 15. ♀, ♂.

guatemalensis Cameron. Southern Calif. through western and central Mexico to Guatemala.
Epyris guatemalensis Cameron, 1888. Biol. Cent.-Amer., Hym. 1: 453, pl. 19, fig. 20. ♀.

Epyris guatamalensis (!) Evans, 1969. Amer. Ent. Soc., Trans. 95: 264, fig. 104, map 17. ♀, ♂.

monticola (Ashmead). Colo.; Mexico (Durango).
Epyris monticola Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 8. ♂.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 256, figs. 58, 59, 96, map 16. ♂.

myrmecophilus (Brues). Vt., Wis. and Colo. south to Fla., Tex., Ariz., southern Calif.
Mesitius myrmecophilus Brues, 1903. Amer. Ent. Soc., Trans. 29: 124. ♀.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 269, figs. 65, 105, 107, map 12. ♀, ♂.

rufipes (Say). Que., B. C., U. S. south at higher elevations to Guatemala.
Bethylus rufipes Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 329. ♀ (?).
Bethylus formicoides Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 179. ♀.
Epyris rufipes Cameron, 1888. Manchester Lit. and Phil. Soc., Mem. and Proc. 1: 173. ♀. Preocc.
Epyris montezuma Cameron, 1888. Manchester Lit. and Phil. Soc., Mem. and Proc. Errata 1: vii. N. name.
Mesitius vancouverensis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 64. ♀.
Mesitius nevadensis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 64. ♀.
Mesitius bifoveolatus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 66. ♂, ♀.
Epyris longicollis Kieffer, 1906. Berlin. Ent. Ztschr. 50: 244. ♀. Preocc.
Epyris nudicornis Kieffer, 1906. Berlin. Ent. Ztschr. 50: 245. ♂.
Epyris gracilicollis Kieffer, 1908. *In* Wytsman, Gen. Ins., fasc. 76, p. 28. N. name.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 250, figs. 53, 54, 91-94, 97, map 9. ♀, ♂.

sculleni Evans. Alta., Wash., Idaho, Utah, Oreg., Calif., Ariz., N. Mex.; Mexico (Hidalgo).
Epyris sculleni Evans, 1969. Amer. Ent. soc., Trans. 95: 266, figs. 66, 67, 82, 102, 103, map 11. ♂, ♀.

sepulchralis Evans. Mass., Md., Fla., Tenn., Okla., Tex., southern Calif.; Mexico (Guanajuato, Jalisco, Veracruz).
Epyris sepulchralis Evans, 1969. Amer. Ent. Soc., Trans. 95: 275, figs. 76, 79, 80, 112, map 13. ♂, ♀.

texanus (Ashmead). N. Y., Va., N. C., Ill., Tex.
Mesitius texanus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 67. ♀.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 290, map 16. ♀.

vierecki Krombein. Mass., N. Y., Md., Va., W. Va., N. C., S. C., Ga.
Epyris vierecki Krombein, 1962. Biol. Soc. Wash., Proc. 75: 1. ♂, ♀.

Taxonomy: Evans, 1969. Amer. Ent. Soc., Trans. 95: 277, figs. 77, 81, 106, map 14. ♀, ♂.

Species Group Depressigaster

alachua Evans. Fla. (Alachua Co.).
Epyris alachua Evans, 1969. Amer. Ent. Soc., Trans. 95: 337, fig. 153, map 22. ♀.

corticinus Evans. Pa., Md., Va.
Epyris corticinus Evans, 1969. Amer. Ent. Soc., Trans. 95: 338, figs. 148, 149, map 22. ♀.

festivus Evans. Fla. (Lake Co., Dixie Co.).
Epyris festivus Evans, 1969. Amer. Ent. Soc., Trans. 95: 339, map 22. ♀.

Species Group Idionotum

idionotum Evans. Fla.
Epyris idionotum Evans, 1969. Amer. Ent. Soc., Trans. 95: 340, figs. 146, 156, map 23. ♂.

Nomen Nudum in Epyris Westwood

Epyris monticola Ashmead *in* Cockerell, 1889. Colo. Biol. Assn., 10th Rept., [p. 2] (probably published originally in Custer County Courant newspaper).

Genus BAKERIELLA Kieffer

Bakeriella Kieffer, 1910. Soc. Ent. France, Ann. 78: 288.
Type-species: *Bakeriella flavicornis* Kieffer. Monotypic.

floridana Evans. Fla. (Paradise Key).
Bakeriella floridana Evans, 1964. Mus. Compar. Zool., Bul. 132: 134, fig. 84. ♂, ♀.

Genus HOLEPYRIS Kieffer

Holepyris Kieffer, 1904. Mus. Civ. Stor. Nat. Genova, Ann. 41: 390.
Type-species: *Holepyris africanus* Kieffer. Desig. by Kieffer, 1906.
Holepyris subg. *Rysepyris* Kieffer, 1906. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 341.
Type-species: *Holepyris* (*Rysepyris*) *numidicus* Kieffer. Desig. by Kieffer, 1914.
Misepyris Kieffer, 1913. Lab. Zool. Gen. e Agr. Portici, Bol. 7: 108.
Type-species: *Holepyris remotus* Kieffer. Desig. by Kieffer, 1914.
Parepyris Brethes, 1913. Buenos Aires Mus. Nac. de Hist. Nat., An. 24: 87.
Type-species: *Parepyris sylvanidis* Brethes. Monotypic.

Authenticated host records indicate that members of this genus parasitize coleopterous larvae, although in the laboratory they can be induced to attack Microlepidoptera also. One North American species attacks larvae infesting grain, and another was reared from a beetle larva beneath bark.

coronatus (Ashmead). Md. (Bladensburg). Host: *Catogenus rufus* (F.).
Apenesia coronata Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 47. ♂.

floridanus (Ashmead). Fla.
Isobrachium floridanum Ashmead, 1887. Ent. Amer. 3: 76. ♂.

haemorrhoidalis (Kieffer). Tex.
Rhabdepyris haemorrhoidalis Kieffer, 1904. Arkiv. for Zool. 1: 528. ♀.

marylandicus Fouts. Md., N. C.
Holepyris marylandicus Fouts, 1928. Ent. Soc. Wash., Proc. 30: 125. ♀.

punctifrons Fouts. Fla. (Hawthorne).
Holepyris punctifrons Fouts, 1927. Ent. Soc. Wash., Proc. 29: 166. ♀.

subapterus (Melander and Brues). Mass.
Empyris (!) *subapterus* Melander and Brues, 1903. Biol. Bul. 5: 23. ♀.

sylvanidis (Brethes). Widespread in U. S.; cosmopolitan. Host: *Oryzaephilus surinamensis* (L.); *Sitophilus oryza* (L.); *Tribolium castaneum* (Hbst.); *T. confusum* Duv.; *Laemophloeus ferrugineus* (Steph.).
Parepyris sylvanidis Brethes, 1913. Buenos Aires Mus. Nac. de Hist. Nat., An. 24: 87. ♂, ♀.
Rhabdepyris zeae Turner and Waterson, 1921. Rpt. Grain Pests (War) Com. [Gt. Brit.], No. 9, p. 29. ♀.

Genus LAELIUS Ashmead

Laelius Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 50.
Type-species: *Laelius trogodermatis* Ashmead. Orig. desig.
Paralaelius Kieffer, 1905. Soc. Sci. Bruxelles, Ann. 29: 129.
Type-species: *Bethylus pedatus* Say. Desig. by Kieffer, 1914.

All authenticated host records for North American *Laelius* are larvae of Dermestidae, usually in and around buildings.

Revision: Muesebeck, 1939. Biol. Soc. Wash., Proc. 52: 171-176.

centratus (Say). Fla., Ind., Colo.
Bethylus centratus Say, 1836. Boston Jour. Nat. Hist. 1: 281.

occidentalis Whittaker. B. C. (Chilliwack).
Laelius occidentalis Whittaker, 1928. Ent. Soc. London, Trans. p. 387. ♀.

pedatus (Say). N. J., N. Y., D. C., Va., S. C., Fla., Ind., Colo. south to Mexico (Morelos). Host: *Anthrenus verbasci* (L.).
Bethylus pedatus Say, 1836. Boston Jour. Nat. Hist. 1: 280.
Ateleopterus nubilipennis Ashmead, 1887. Ent. Amer. 3: 97. ♀.
Laelius tricarinatus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 51. ♂, ♀.
Laelius rufipes Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 51. ♀. Preocc.

Laelius nigripilosus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 52. ♂, ♀.
Bethylus constrictus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 53. ♀.
Laelius ashmeadi Kieffer, 1908. *In* Wytsman, Gen. Ins., fasc. 76, p. 38. N. name.
Laelius fumipennis Brues, 1910. Wis. Nat. Hist. Soc., Bul. (Ser. 2) 8: 45. ♀.

trogodermatis Ashmead. Que., N. Y., D. C., Va., Fla. Host: *Trogoderma parabile* Beal, *T. simplex* Jayne, *T. versicolor* Creutz.
Laelius trogodermatis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 51. ♂, ♀.

Biology: Howard, 1901. The Insect Book, pp. 34-36, fig. 18. —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 13-14.

utilis Cockerell. Ont., Mass., Md., D. C., Va., N. C. Host: *Trogoderma versicolor* Creutz.; *Bruchus brachialis* Fahr.?
Laelius utilis Cockerell, 1920. Canad. Ent. 52: 34. ♀.

voracis Muesebeck. D. C., Va.; India. Host: *Anthrenus vorax* (Waterh.).
Laelius voracis Muesebeck, 1939. Biol. Soc. Wash., Proc. 52: 172. ♀, ♂.

Biology: Back, 1940. Ent. Soc. Wash., Proc. 42: 110-113, 1 pl. —Kurian, 1954. Agra Univ., Jour. Res. (Sci.) 3: 422, figs. 9-13.

Tribe CEPHALONOMIINI

Genus PLASTANOXUS Kieffer

Plastanoxus Kieffer, 1905. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 244.
Type-species: *Anoxus chittendenii* Ashmead. Desig. by Gahan, 1931.

These tiny wasps are parasitic on coleopterous larvae.

Revision: Gahan, 1931. Wash. Acad. Sci., Jour. 21: 213-218, figs. 1-3.

Taxonomy: Evans, 1964. Mus. Compar. Zool., Bul. 132: 151-152 (key to species).

chittendenii (Ashmead). Transcontinental in southern Canada and U. S.; adventive in England. Host: *Cis fuscipes* Mellie?
Anoxus Chittendenii Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 68. ♂.

incompletus Evans. Ariz. (Mesa).
Plastanoxus incompletus Evans, 1964. Mus. Compar. Zool., Bul. 132: 152. ♀.

laevis (Ashmead). D. C.; ?Brazil.
Anoxus laevis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 68. ♀.

westwoodi (Kieffer). D. C., Ga.; probably cosmopolitan. Host: *Laemophloeus pusillus* (Schonh.).
Cephalonomia westwoodi Kieffer, 1914. Das Tierreich, Lief. 41, p. 248. ♂, ♀.
Plastanoxus kiefferi Gahan, 1931. Wash. Acad. Sci., Jour. 21: 217. ♀, ♂ (? Lapsus for *westwoodi*.)

Genus CEPHALONOMIA Westwood

Cephalonomia Westwood, 1853. Mag. Nat. Hist. 6: 420.
Type-species: *Cephalonomia formicifornis* Westwood. Monotypic.
Holopedina Foerster, 1850. Naturh. Ver. Rheinlande Verh. 7: 502.
Type-species: *Holopedina polypori* Foerster. Monotypic.
Cephalonomia subg. *Cephaloderma* Hoffer, 1936. Festchr. Embrik Strand, v. 1, p. 459.
Type-species: *Cephalonomia* (*Cephaloderma*) *strandi* Hoffer. Monotypic.

So far as known these tiny wasps parasitize the larvae or pupae of small Coleoptera occurring in cryptic situations. One group attacks pests of stored grains, another parasitizes Ciidae occurring in fungi, and the third attacks bark beetles. Four types of species may be distinguished based on development of the wings in both sexes: One in which both sexes are macropterous; one in which the males are macropterous, the females macropterous or brachypterous; a third in which the males are macropterous or apterous and the females apterous; and the last in which the males are macropterous or apterous, the females macropterous, micropterous or apterous.

Biology: Evans, 1964. Mus. Compar. Zool., Bul. 132: 158-159.

Morphology: Grandi, 1929. Bol. Lab. Ent. Bologna 2: 301-314. —van Emden, 1931. Ztschr. f. Morph. u. Oekol. der Tiere 23: 425-574. —Grandi, 1932. Bol. Lab. Ent. Bologna 5: 13-21.

cynipsiphila (Ashmead). Fla.
Sclerochroa cynipsiphila Ashmead, 1887. Ent. Amer. 3: 75. ♀.

gallicola (Ashmead). Widely distributed in North America; probably cosmopolitan. Host: *Stegobium paniceum* (L.); *Lasioderma sericorne* (F.); *Ptinus* sp.; *Araecerus fasciculatus* de Geer.
Sclerochroa gallicola Ashmead, 1887. Ent. Amer. 3: 75. ♀.
Holopedina nubilipennis Ashmead, 1887. Ent. Amer. 3: 97. ♀.
?Cephalonomia xambeui Giard, 1898. Soc. Ent. France, Bul., p. 50. ♀, ♂.
Cephalonomia quadridentata Duchaussoy, 1917. Soc. Hist. Nat. Afrique du Nord, Bul. 9: 111. ♀.
Cephalonomia caesarorum van Emden, 1931. Ztschr. Morph. u. Oekol. Tiere 23: 431.
Cephalonomia (*Cephaloderma*) *strandi* Hoffer, 1936. Festschr. Embrik Strand, v. 1, p. 460. ♀.

Biology: van Emden, 1931. Ztschr. Morph. u. Oekol. Tiere 23: 425-574. —Kearns, 1934. Jour. Econ. Ent. 27: 801-806. —Kearns, 1934. Ent. Soc. Amer., Ann. 27: 533-541. —Cabal Concha, 1956. Rev. Facult. Nac. Agron. [Colombia] 18: 64.

Morphology: van Emden, 1931. Ztschr. Morph. u. Oekol. Tiere 23: 425-574. —Grandi, 1932. Lab. Ent. R. Ist. Sup. Agr. Bologna, Bol. 5: 113-115. —Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 403-404.

hyalinipennis Ashmead. Mass., Conn., Fla., Calif. Host: *Conophthorus coniperda* (Schw.); *Hypothenemus* spp.; *Pissodes terminalis* Hopping; *Pityophthorus* sp.; *Scolytus rugulosus* (Ratz.). Also recorded from galls of *Amphibolips cinerea* (Ashm.) and *Disholcaspis omnivora* (Ashm.), where, presumably, it parasitizes bark beetles invading the woody tissues of the galls.
Cephalonomia hyalinipennis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 49. ♂, ♀.

Biology: Stark and Wood, 1964. Canad. Ent. 96: 1217. —Godwin and Odell, 1965. Ent. Soc. Amer., Ann. 58: 218.

perpusilla Evans. Oreg., Calif., Ariz.; Mexico (Baja California, Nayarit). Host: Ciid beetle larvae in fungi.
Cephalonomia perpusilla Evans, 1963. Psyche 70: 152. ♂, ♀.

tarsalis (Ashmead). Widely distributed in U. S.; probably cosmopolitan. Host: *Oryzaephilus surinamensis* (L.); *Sitophilus oryzae* (L.).
Ateleopterus tarsalis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 45. ♀, ♂.
Cephalonomia carinata Kieffer, 1907. Berlin. Ent. Ztschr. 51: 295. ♀.
Cephalonomia kiefferi Fouts, 1920. Ent. Soc. Wash., Proc. 22: 77. ♀, ♂.

Biology: Richards and Herford, 1930. Ann. Appl. Biol. 17: 382. —Powell, 1938. Ent. Soc. Amer., Ann. 31: 44-49.

utahensis Brues. Utah, Calif. Host: *Conophthorus lambertianae* Hopk.; *C. monophyllae* Hopk.; *C. ponderosae* Hopk.; *C. radiatae* Hopk.
Cephalonomia utahensis Brues, 1909. Wis. Nat. Hist. Soc., Bul. 6: 154. ♀.

Biology: Ruckes, 1956. Pan-Pacific Ent. 32: 184-185, 1 fig. —Schaefer, 1962. Ent. Soc. Amer., Ann. 55: 574-575, fig. 6. —Ruckes, 1963. Pan-Pacific Ent. 39: 45.

waterstoni Gahan. Widely distributed in North America; probably cosmopolitan. Host: *Laemophloeus ferrugineus* (Steph.).
Cephalonomia waterstoni Gahan, 1931. Wash. Acad. Sci., Jour. 21: 219. ♀.

Biology: Sheppard, 1936. Colo. Expt. Sta., Tech. Bul. 17: 16-17. —Rilett, 1949,. Canad. Jour. Res., Sect. D, Zool. Sci. 27: 1-27. —Finlayson, 1950. Bul. Ent. Res. 41: 79.

Tribe SCLERODERMINI

Genus NESEPYRIS Bridwell

Nesepyris Bridwell, 1920. Hawaiian Ent. Soc., Proc. 4: 309.

Type-species: *Nesepyris ewa* Bridwell. Monotypic.

The small rare species belonging to this genus are probably parasitic on borers in twigs or bark.

floridanus Evans. Fla.; Mexico.
Nesepyris floridanus Evans, 1964. Mus. Compar. Zool., Bul. 132: 165, 111, 112, ♀.

virginianus Evans. Md., Va. Bred from redbud (*Cercis canadensis*) and found under hickory bark.
Nesepyris virginianus Evans, 1964. Mus. Compar. Zool., Bul. 132: 164, fig. 110. ♀.

Genus GLENOSEMA Kieffer

Glenosema Kieffer, 1905. Soc. Sci. Bruxelles, Ann. 29: 100. No species.
Type-species: *Glenosema nigra* Kieffer. First included species.
Arysepyris Kieffer, 1905. Soc. Sci. Bruxelles, Ann. 29: 102.
Type-species: *Arysepyris merceti* Kieffer. Orig. desig.

crandalli Evans. Ariz. (Santa Catalina Mts.).
Glenosema crandalli Evans, 1964. Mus. Compar. Zool., Bul. 132: 170, fig. 116. ♀.

Genus SCLERODERMUS Latreille

Sclerodermus Latreille, 1809. Gen. Crust. Ins., v. 4, p. 118.
Type-species: *Sclerodermus domesticus* Latreille. Monotypic.
Scleroderma(!) Oken, 1817. Isis 8: 1178. Emend.
Schlerochroa Foerster, 1850. Naturh. Ver. Rheinlande, Verh. 7: 501. Unnecessarily proposed as a new name for *Sclerodermus* Latr.
Schleroderma (!) Costa, 1862. Annuario Mus. Zool. Napoli 2: 131. Misspelling.
Neoscleroderma Kieffer, 1905. Soc. Sci. Bruxelles, Ann. 29: 106.
Type-species: *Ateleopterus virginiensis* Ashmead. Desig. by Kieffer, 1914.

The North American species are parasitic on wood-boring beetle larvae, frequently those infesting houses. The adult wasps have frequently been reported as stinging humans in infested houses.

carolinensis (Ashmead). Conn. and N. Y. to Ga. Host: *Dicerca lepida* Lac.; *Urographis fasciata* (de Geer).
Dissomphalus carolinensis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 42, 43. ♀.
Ateleopterus virginiensis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 45. ♂, ♀.

macrogaster (Ashmead). D. C., Va., N. C., Fla., Miss., Tex.; Cuba, Hispaniola, Jamaica, Brazil. Host: *Megacyllene antennatus* (White), *Scolytus rugulosus* (Ratz.), *Xyletinus peltatus* (Harr.).
Sclerochroa macrogaster Ashmead, 1887. Ent Amer. 3: 75. ♀.

Subfamily PRISTOCERINAE

Genus PRISTOCERA Klug

Genus PRISTOCERA Subgenus PRISTOCERA Klug

Pristocera Klug, 1808. Mag. Gesell. Naturf. Freunde Berlin 2: 49.
Type-species: *Bethylus depressus* Fabricius. Monotypic.
Mangesia Kieffer, 1911. Soc. Sci. Bruxelles, Ann. 35: 209.
Type-species: *Mangesia fuscipennis* Kieffer. Orig. desig.
Trichelobrachium Kieffer, 1914. Das Tierreich, Lief. 41, p. 425.
Type-species: *Pristocera obliterata* Kieffer. Monotypic.

The typical subgenus does not occur in North America.

Genus PRISTOCERA Subgenus ACREPYRIS Kieffer

Acrepyris Kieffer, 1905. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 249.
Type-species: *Epyris reticulatus* Kieffer. Orig. desig.

Pristocera subg. *Neopristocera* Yasumatsu, 1955. Fac. Agr. Kyushu Univ., Jour. 10: 248.
Type-species: *Pristocera japonica* Yasumatsu. Orig. desig.

These wasps are parasitic on the larvae of Elateridae (wireworms) in the soil. Males carry the females in flight during mating.

Revision: Evans, 1963. Mus. Compar. Zool., Bul. 129: 241-290, 60 figs.

armifera (Say). N. H. and Vt. south to Fla., west to S. Dak., Colo. and Tex. Host: *Aeolus* sp.; *Limonius agonus* (Say); *Melanotus* sp.
Bethylus armiferus Say, 1828. Contrib. Maclur. Lyc. Phila. 1: 80. ♂.
Scleroderma thoracica Westwood, 1839. Ent. Soc. London, Trans. 2: 167. ♀.
Scleroderma contracta Westwood, 1839. Ent. Soc. London, Trans. 2: 169, pl. 12, fig. 11. ♀.
Epyris laeviventris Cresson, 1872. Amer. Ent. Soc., Trans. 4: 193. ♂.
Epyris reticulatus Kieffer, 1904. Arkiv for. Zool. 1: 527. ♂.

Biology: Hyslop, 1916. Ent. Soc. Wash., Proc. 18: 170, pl. 11, figs. 1-3.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14: 44-46, pl. 15, figs. A-D (male genitalia).

atra Klug. N. C. to Fla., west to N. Mex.
Pristocera atra Klug, 1810. Beitr. Naturk., v. 2, p. 206. ♂.

Taxonomy: Evans, 1963. Mus. Compar. Zool., Bul. 129: 273-276, figs. 5, 12, 17, 48, 53, 54. ♂, ♀.

bridwelli Evans. Ark. (Dodd City).
Pristocera (*Acrepyris*) *bridwelli* Evans, 1963. Mus. Compar. Zool., Bul. 129: 267. ♂, ♀.

californica Evans. Calif., Utah, Wyo.
Pristocera (*Acrepyris*) *californica* Evans, 1963. Mus. Compar. Zool., Bul. 129: 263. ♂.

chihuahua Evans. Ariz.; Mexico (Chihuahua, Zacatecas).
Pristocera (*Acrepyris*) *chihuahua* Evans, 1963. Mus. Compar. Zool., Bul. 129: 284. ♂.

cockerelli Evans. Tex. to Calif.; Mexico (Sonora, Oaxaca).
Pristocera (*Acrepyris*) *cockerelli* Evans, 1963. Mus. Compar. Zool., Bul. 129: 264. ♂, ♀.

fraterna Evans. N. C. to Fla., Kans.
Pristocera (*Acrepyris*) *fraterna* Evans, 1963. Mus. Compar. Zool., Bul. 129: 261. ♂, ♀ (?).

hyalina Brues. Ark., La., Tex., N. Mex., south to central Mexico.
Pristocera hyalina Brues, 1906. Wis. Nat. Hist. Soc., Bul. 4: 143. ♂.

Genus APENESIA Westwood

Apenesia Westwood, 1874. Thesaurus Ent. Oxon., p. 170.
Type-species: *Apenesia amazonica* Westwood. Desig. by Westwood, 1881.
Aeluroides Tullgren, 1904. Ark. Zool. 1: 428.
Type-species: *Aeluroides sjostedti* Tullgren. Monotypic.
Propristocera Kieffer, 1905. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 247.
Type-species: *Propristocera interrupta* Kieffer. Desig. by Kieffer, 1914.
Cleistepyris Kieffer, 1910. Soc. Ent. France, Ann. 79: 48.
Type-species: *Cleistepyris punctatus* Kieffer. Desig. by Kieffer, 1914.
Dipristocera Kieffer, 1914. Das Tierreich, Lief. 41, p. 471.
Type-species: *Dipristocera microchela* Kieffer. Monotypic.
Neopristocera Benoit, 1957. Explor. Parc Nat. Albert, Mission DeWitte, fasc. 88, p. 44. Preocc.
Type-species: *Neopristocera triloba* Benoit. Orig. desig.

Hosts are unknown for the North American species, but two Old World species have been reared from weevil larvae (Curculionidae) in roots or stems.

Revision: Evans, 1963. Mus. Compar. Zool., Bul. 130: 249-359, 138 figs.

Species Group Exilis

cochise Evans. Ariz. (Cochise Co.).
Apensia cochise Evans, 1963. Mus. Compar. Zool., Bul. 130: 296, figs. 27, 32. ♂.

exilis Evans. Ariz., Calif.
Apenesia exilis Evans, 1963. Mus. Compar. Zool., Bul. 130: 293, figs. 28, 30, 33, 34. ♂.

martini Evans. Fla. (Manatee Co.).
Apenesia martini Evans, 1963. Mus. Compar. Zool., Bul. 130: 294, fig. 29. ♂.

pima Evans. Ariz. (Cochise Co.).
Apenesia pima Evans, 1963. Mus. Compar. Zool., Bul. 130: 292, figs. 26, 31, 35, 36. ♂.

Species Group Dissomphaloides

dissomphaloides Evans. Ariz.; Mexico (Sinaloa).
Apenesia dissomphaloides Evans, 1963. Mus. Compar. Zool., Bul. 130: 297, figs. 37, 42. ♂.

Species Group Laevigata

pallidula Evans. Ariz. (Cochise Co.).
Apenesia pallidula Evans, 1963. Mus. Compar. Zool., Bul. 130: 300, figs. 38, 43, 46, 50. ♂.

Species Group Mexicana

chiricahua Evans. Tex., Ariz.; Mexico (Sinaloa, Durango, Mexico).
Apenesia chiricahua Evans, 1963. Mus. Compar. Zool., Bul. 130: 306, figs. 57, 60, 69, 80, 84. ♂.

malinche Evans. Ariz. (Tucson Mts.); Mexico (Sinaloa, Puebla).
Apenesia malinche Evans, 1963. Mus. Compar. Zool., Bul. 130: 309, figs. 59, 62. ♂.

mohave Evans. Calif.; Mexico (Baja California).
Apenesia mohave Evans, 1963. Mus. Compar. Zool., Bul. 130: 308, figs. 58, 61. ♂.

Species Group Brasiliensis

parapolita Evans. Ark., La., Ala., and Ga., north to Ill., W. Va. and N. Y.
Propristocera polita Evans, 1958. Ent. Soc. Wash., Proc. 59: 294, figs. 2, 6. ♂. Preocc.
Apenesia parapolita Evans, 1963. Mus. Compar. Zool., Bul. 130: 322 (male), 347 (female), figs. 81, 96, 127, 136. N. name.

Genus PARASCLERODERMA Kieffer

Parascleroderma Kieffer, 1904. Mus. Civ. Stor. Nat. Genova, Ann. 41: 376.
Type-species: *Parascleroderma fulviceps* Kieffer. Orig. desig.

No host information is available for the single North American species. Two Old World species have been recorded as attacking the larvae of bostrichid and clerid beetles. The normal hosts apparently are larvae occurring under bark or in borings in wood.

insolita (Evans). Tex. (Brownsville).
Apenesia insolita Evans, 1963. Mus. Compar. Zool., Bul. 130: 350, figs. 130, 138. ♀.

Genus DISSOMPHALUS Ashmead

Dissomphalus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 41.
Type-species: *Dissomphalus xanthopus* Ashmead. Orig. desig.
Ecitopria Wasmann, 1899. Zoologica, h. 26, p. 55.
Type-species: *Ecitopria crassicornis* Wasmann. Monotypic.
Dissemphalus (!) Ashmead, 1902. Canad. Ent. 34: 271.
? Psilobethylus Kieffer, 1906. *In* Andre, Spec Hym. Eur. Alg., v. 9, p. 461.
Type-species: *Psilobethylus luteus* Kieffer. Monotypic.
Thaumatepyris Kieffer, 1910. Soc. Ent. France, Ann. 79: 47.
Type-species: *Thaumatepyris punctatus* Kieffer. Monotypic.
Glenobethylus Kieffer, 1910. Soc. Ent. France, Ann. 79: 50.
Type-species: *Glenobethylus montanus* Kieffer. Monotypic.
Parecitopria Ogloblin, 1930. Soc. Ent. Arg., Rev. 3: 15.
Type-species: *Parecitopria azarai* Ogloblin. Monotypic.

Associated data with several species suggest that these minute wasps are probably parasitic on larvae of both myrmecophilous and wood-boring beetles. The wingless females are apparently carried by the males during mating flights.

Revision: Evans, 1954. Ent. Soc. Wash., Proc. 56: 288-309, 21 figs. (North American species).

Taxonomy: Evans, 1962. Ent. Soc. Wash., Proc. 64: 65-78, 4 figs. (revised key, North American and West Indian species).

Species Group Kansanus

arizonicus Evans. Ariz. (Portal).
Dissomphalus arizonicus Evans, 1962. Ent. Soc. Wash., Proc. 64: 70, fig. 3. ♂.

kansanus Evans. Pa., Fla., Ill., Kans.
Dissomphalus kansanus Evans, 1954. Ent. Soc. wash., Proc. 56: 302, figs. 4, 11, 17. ♂.

Species Group Xanthopus

barberi Evans. Maine, Md., N. C.
Dissomphalus barberi Evans, 1954. Ent. Soc. Wash., Proc. 56: 298, figs. 3, 10, 16, 19. ♂, ♀.

californicus Ashmead. Ariz., Calif.
Dissomphalus californicus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 42. ♂.

Taxonomy: Evans, 1967. Ent. News 78: 17. ♂.

xanthopus Ashmead. U. and L. Austr. Zones east of Rockies, south in Mexico to Chiapas.
Dissomphalus xanthopus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 42. ♀, ♂.
Psilobethylus lucidus Brown and Cheng, 1952. Psyche 58: 146, figs. 2, 3. ♀.

Species Group Apertus

altivolans Evans. Ill., Ala., La., Tex., Ariz., Calif.; Mexico (Sonora).
Dissomphalus altivolans Evans, 1954. Ent. Soc. Wash., Proc. 56: 307, figs. 7, 21. ♂.

Taxonomy: Evans, 1962. Ent. Soc. Wash., Proc. 64: 76. ♀.

apertus Kieffer. N. Y., Ohio and Kans., south into Mexico (Cordoba).
Dissomphalus apertus Kieffer, 1914. Soc. Ent. France, Bul. 1: 50. ♂.

foveolatus (Brown and Cheng). Md., Va., Ga., Ill., Miss., Ark.
Psilobethylus foveolatus Brown and Cheng, 1952. Psyche 58: 143, fig. 1. ♀.

nigrescens Evans. Tex., ?Ark., La., Ala.
Dissomphalus nigrescens Evans, 1954. Ent. Soc. Wash., Proc. 56: 308, figs. 8, 14. ♂.

Taxonomy: Evans, 1962. Ent. Soc. Wash., Proc. 64: 75-76 (putative female).

Genus PSEUDISOBRACHIUM Kieffer

Genus PSEUDISOBRACHIUM Subgenus PSEUDISOBRACHIUM Kieffer

Pseudisobrachium Kieffer, 1904. Mus. Civ. Stor. Nat. Genova, Ann. (3a) 1: 368.
Type-species: *Pseudisobrachium laticeps* Kieffer. Desig. by Kieffer, 1906.
Monepyris Kieffer, 1905. Soc. Sci. Bruxelles, Ann. 29: 101, 124.
Type-species: *Epyris halidayi* Westwood. Monotypic.
Xestobethylus Cameron, 1909. Amer. Ent. Soc., Trans. 35: 449.
Type-species: *Xestobethylus pallidipes* Cameron. Monotypic.
Plutobethylus Kieffer, 1910. Soc. Ent. France, Ann. 79: 51.
Type-species: *Plutobethylus distans* Kieffer. Orig. desig.
Lyssepyris Kieffer, 1913. Portici Lab. Zool. Gen. e Agr., Bol. 7: 108.
Type-species: *Holepyris flavicornis* Kieffer. Monotypic.
Xantepyris Kieffer, 1913. Portici Lab. Zool. Gen. e Agr., Bol. 7: 108.
Type-species: *Epyris flaviventris* Kieffer. Monotypic.
Lissepyris (!) Kieffer, 1914. Das Tierreich, Lief. 41, p. 236. Typ. error.
Xanthepyris Kieffer, 1914. Das Tierreich, Lief. 41, p. 417. Emend.
Parisobrachium Kieffer, 1914. Das Tierreich, Lief. 41, p. 424.
Type-species: *Rhabdepyris* (?) *albipes* Kieffer. Monotypic.

Only the typical subgenus occurs in North America.

Females of several species have been found in ant nests, but unsuccessful laboratory testing on ant larvae suggests that the wasps parasitize myrmecophilous beetle larvae occurring in the ant nests.

Revision: Evans, 1961. Mus. Compar. Zool., Bul. 126: 211-318, 5 pls.

Species Group Crassum

crassum Evans. Tex. (Brownsville, San Antonio).
Pseudisobrachium crassum Evans, 1961. Mus. Compar. Zool., Bul. 126: 239, fig. 13. ♂.

texanum Evans. Tex. (Harlingen, Brownsville, Wharton, San Antonio).
Pseudisobrachium texanum Evans, 1961. Mus. Compar. Zool., Bul. 126: 240, figs. 48, 53. ♂.

Species Group Occidentale

castaneum Evans. Calif. (San Diego).
Pseudisobrachium castaneum Evans, 1961. Mus. Compar. Zool., Bul. 126: 248, fig. 56. ♂.

matthewsi Evans. Tex., N. Mex., Ariz.
Pseudisobrachium matthewsi Evans, 1961. Mus. Compar. Zool., Bul. 126: 249, fig. 36. ♂, ♀ (?).

occidentale Evans. Calif., Ariz. Associated with dolichoderine ants.
Pseudisobrachium occidentale Evans, 1961. Mus. Compar. Zool., Bul. 126: 244, figs. 14, 55. ♂, ♀ (?).

Species Group Obscurum

carolinianum Evans. S. C., Fla.
Pseudisobrachium carolinianum Evans, 1961. Mus. Compar. Zool., Bul. 126: 254. ♂.

gibbosum Evans. N. Mex. (Rodeo).
Pseudisobrachium gibbosum Evans, 1961. Mus. Compar. Zool., Bul. 126: 255. ♂.

obscurum Evans. Tex., Ariz., Nev., Utah, Calif.; Mexico (Chihuahua, Baja California, Nayarit).
Pseudisobrachium obscurum Evans, 1961. Mus. Compar. Zool., Bul. 126: 258, figs. 16, 36. ♂, ♀ (?).

otiosum Evans. Ariz.; Mexico (Sonora, Nayarit).
Pseudisobrachium otiosum Evans, 1961. Mus. Compar. Zool., Bul. 126: 256. ♂.

pallidum Evans. Ariz., Calif.; Mexico (Sonora).
Pseudisobrachium pallidum Evans, 1961. Mus. Compar. Zool., Bul. 126: 258, fig. 17. ♂.

werneri Evans. Ariz.; Mexico (Sonora, Sinaloa).
Pseudisobrachium werneri Evans, 1967. Ent. News 78: 20. ♂.

Species Group Prolongatum

arenarium Evans. N. J., Pa. (?), N. C., Ga., Fla. (?), Ala., Miss., Mo. (?), Ill. Associated with ponerine ants.
Pseudisobrachium arenarium Evans, 1961. Mus. Compar. Zool., Bul. 126: 263, figs. 20, 39, 57. ♂, ♀ (?).

prolongatum (Provancher). N. B. and N. S. west to B. C., and Wash., south to N. C., Ky., Ill. and Iowa. Associated with formicine and myrmicine ants.
Bethylus prolongatus Provancher, 1881. Nat. Canad. 12: 265. "♀" = ♂.
Isobrachium magnum Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 36. ♂.
Isobrachium myrmecophilum Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 37. ♀, (♂ misdet.).
Isobrachium mandibulare Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 38. ♀, (♂ misdet.).
Isobrachium montanum Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 39. ♀, (♂ misdet.).
Pseudisobrachium rugosulum Fouts, 1928. Ent. Soc. Wash., Proc. 30: 124. ♂.
Pseudisobrachium agilis Whittaker, 1928. Roy. Ent. Soc. London, Trans. 76: 386, pl. 13, fig. 4. ♂.

Species Group Carbonarium

ashmeadi Evans. Mass., Ont., Mich. and Kans., south to Fla., Ala. and La. Host: Associated with formicine and dolichoderine ants.
Pseudisobrachium ashmeadi Evans, 1961. Mus. Compar. Zool., Bul. 126: 275, figs. 23, 33, 58, 63. ♂, ♀ (?).

carbonarium (Ashmead). Md. south to Ga., Ala., W. Va., Ky. (?), Ill., Kans., N. Dak. (?).
Epyris carbonarius Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 59, pl. 4, fig. 4. ♂.

Taxonomy: Evans, 1961. Mus. Compar. Zool., Bul. 126: 271, figs. 23, 37. ♂, ♀ (?).

krombeini Evans. Tex., N. Mex.; Mexico (Sonora).
Pseudisobrachium krombeini Evans, 1961. Mus. Compar. Zool., Bul. 126: 287, figs. 27, 50. ♂.

minimum Evans. N. Mex., Ariz.; Mexico (Sinaloa, Michoacan, Mexico).
Pseudisobrachium minimum Evans, 1961. Mus. Compar. Zool., Bul. 126: 280, fig. 24. ♂.

minutissimum Evans. N. Mex., Ariz.; Mexico (Morelos, Baja California), Guatemala.
Pseudisobrachium minutissimum Evans, 1961. Mus. Compar. Zool., Bul. 126, fig. 26. ♂.

navajo Evans. Ariz. (Coconino and Yavapai Counties).
Pseudisobrachium navajo Evans, 1961. Mus. Compar. Zool., Bul. 126: 283, fig. 25. ♂.

persimile Evans. Calif., B. C. (?).
Pseudisobrachium persimile Evans, 1961. Mus. Compar Zool., Bul. 126: 284, fig. 2. ♂, ♀ (?).

Species Group Rufiventre

apache Evans. Ariz. (Santa Cruz, Gila and Pinal Counties).
Pseudisobrachium apache Evans, 1961. Mus. Compar. Zool., Bul. 126: 299, fig. 46. ♂.

comanche Evans. Ariz., Tex.; Mexico (Sinaloa).
Pseudisobrachium comanche Evans, 1961. Mus. Compar. Zool., Bul. 126: 298, fig. 59. ♂.

emarginatum Evans. Tex. (Kerrville).
Pseudisobrachium emarginatum Evans, 1961. Mus. Compar. Zool., Bul. 126: 303, fig. 49. ♂.

flavinervis Fouts. Tex., Ariz., Nev., Calif.; Mexico (Sonora, Nayarit).
Pseudisobrachium flavinervis Fouts, 1928. Ent. Soc. Wash., Proc. 30: 123. ♂.

Taxonomy: Evans, 1961. Mus. Compar. Zool., Bul. 126: 305, figs. 6, 31, 38, 62. ♂, ♀ (?).

flaviventre (Kieffer). Del. to Fla., west to Tex., Kans., Ill. Host: Associated with myrmicine ants.
Epyris flaviventris Kieffer, 1904. Arkiv for Zool. 1: 526. ♂.

Taxonomy: Evans, 1961. Mus. Compar. Zool., Bul. 126: 288, figs. 41, 60. ♂, ♀(?).

foutsi Evans. Tex., N. Mex. (?), Ariz. (?), Calif. (?); Mexico (Sonora, Coahuila).
Pseudisobrachium foutsi Evans, 1961. Mus. Compar. Zool., Bul. 126: 300, figs. 29, 61. ♂.

macrops Evans. Tex. (Cameron and Hidalgo Counties).
Pseudisobrachium macrops Evans, 1961. Mus. Compar. Zool., Bul. 126: 309. ♂.

pusillum Evans. La. (Shreveport), Ark. (?).
Pseudisobrachium pusillum Evans, 1961. Mus. Compar. Zool., Bul. 126: 297. ♂, ♀ (?).

rectangulatum Evans. Tex., Kans., Nebr.; Mexico (Nuevo Leon).
Pseudisobrachium rectangulatum Evans, 1961. Mus. Compar. Zool., Bul. 126: 304. ♂.

rufiventre (Ashmead). Mass. and N. Y. south to Fla. and La. Host: Associated with formicine ants.
Isobrachium rufiventre Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 38. ♀, ♂.
Pseudisobrachium flavicoxis Fouts, 1928. Ent. Soc. Wash., Proc. 30: 122. ♀.
Pseudisobrachium puncticeps Fouts, 1928. Ent. Soc. Wash., Proc. 30: 123. ♂.

Unplaced Taxa of Pseudisobrachium Subgenus Pseudisobrachium Kieffer

anomalum Evans. N. J., Va., Fla., Ill.
Pseudisobrachium anomalum Evans, 1961. Mus. Compar. Zool., Bul. 126: 311, figs. 8, 54, 64, 67. ♂.

paucipunctata Fouts. Utah, Calif.
Pseudisobrachium paucipunctata Fouts, 1928. Ent. Soc. Wash., Proc. 30: 122. ♀.

Unplaced Taxa of Bethylidae

Bethylus musculus Say, 1836. Boston Jour. Nat. Hist. 1: 280. Ind.

Family SCLEROGIBBIDAE

So far as is known, members of this family are parasites of Embioptera. The wasp larvae develop as external parasites of embiid nymphs in much the same manner as larval Dryinidae and Rhopalosomatidae.

Revision: Richards, 1939. Roy. Ent. Soc. London, Proc., Ser. B, Taxonomy, 8: 211-223.

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 412-414, figs. 53-54 (female, male thorax).

Genus PROBETHYLUS Ashmead

Probethylus Ashmead, 1902. Canad. Ent. 34: 270.
Type-species: *Probethylus schwarzi* Ashmead. Orig. desig.

Taxonomy: Shetlar, 1973. Ent. News 84: 205-206 (generic redescription, key to spp.).

Biology: Callan, 1939. Roy. Ent. Soc. London, Proc., Ser. B, Taxonomy, 8: 223-224 (*Probethylus callani* Rich. from Trinidad).

schwarzi Ashmead. Ariz.
Probethylus schwarzi Ashmead, 1902. Canad. Ent. 34: 270. ♂.

Taxonomy: Shetlar, 1973. Ent. News 84: 206-208, figs. 1-4 (redescription male, female).

Biology: Shetlar, 1973. Ent. News 84: 208, fig. 5 (host, life history).

Family CHRYSIDIDAE

The cuckoo or ruby-tailed wasps constitute one of the most attractive families of Hymenoptera because of their brilliantly metallic coloration. Almost all of our species are either purple, blue or green, but many Palaearctic species are marked also with golden or ruby in specific patterns.

The behavior and life history also make this a very fascinating group. All species are parasitic, and, as one common name implies, many of them exhibit behavior in the host nests similar to that of cuckoos in the nests of their bird hosts. Members of the small subfamilies Cleptinae and Amiseginae parasitize, respectively, the resting larvae of sawflies in their cocoons and eggs of walking sticks. Almost all species belonging to the Elampinae, Chrysididinae and Parnopinae have as their hosts solitary wasps or bees which nest in the ground or in cavities in wood or which build mud cells; one exotic species of *Chrysis* L. is known to parasitize the resting larva of the oriental moth in its cocoon. The parasite egg is deposited in the host cell while it is being provisioned by the mother wasp or bee. In most species the newly hatched chrysidid larva devours the host egg or young larva and then feeds on the provisions stored for the host. However, in species of *Chrysura* Dahlb. the parasite larva attaches to the host larva, sucks only a small amount of body fluids, and does not devour the host larva until the latter attains full growth and spins its cocoon. Eggs of *Parnopes* Latr. and *Chrysis pellucidula* Aar. are deposited in the host nest while the host wasp is provisioning; these parasite larvae also devour the resting host larva in its cocoon. The female of *Chrysis fuscipennis* Br. chews a hole in the host mud cell, oviposits therein, and the parasite larva develops on the resting larva of the host.

The arrangement of genera in the Chrysididinae and division into Species Groups in *Chrysis* Linnaeus are by R. M. Bohart who also contributed new synonymy and distribution in both the Chrysididinae and Elampinae.

Subfamily CLEPTINAE

So far as is known, members of this subfamily are parasitic on resting larvae of sawflies in their cocoons.

Revision: Aaron, 1885. Amer. Ent. Soc., Trans. 12: 209-248 (No. Amer. spp.). —Mocsary, 1889. Monog. Chrysid., 643 pp. (spp. of world). —Ashmead, 1902. Canad. Ent. 34: 221-231 (gen.). —Bischoff, 1913. Gen. Ins., Fasc. 151, 86 pp., 5 pls. —Linsenmaier, 1959. Schweiz. Ent. Ges., Mitt. 32: 1-232, 711 figs. (European spp.).

Biology: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 141-168, 2 pls. (spp. of coastal N. C.). —Krombein, 1967. Trap-nesting wasps and bees, pp. 437-475, figs. 87, 88, 128-134 (life history of spp. attacking wasps and bees nesting in borings in wood.).

Genus CLEPTES Latreille

Genus CLEPTES Subgenus CLEPTES Latreille

Cleptes Latreille, 1802. Hist. Nat. Crust. Ins. 3: 316.
Type-species: *Sphex semiaurata* Linnaeus. Monotypic.

semiauratus (Linnaeus). New Jersey (Metuchen); Europe. Adventive from Europe. Host: *Pristiphora* sp., *Nematus* spp., *Pachynematus* spp. in Europe.
Sphex semiaurata Linnaeus, 1761. Fauna Suec., Ed. 2, p. 413. ♂.

Biology: Gauss, 1964. Ztschr. f. Angew. Ent. 54: 225-232, figs. 1-4 (life history, European hosts).

Genus CLEPTES Subgenus LEIOCLEPTES Moczar

Cleptes subg. *Leiocleptes* Moczar, 1962. Acta. Zool., Acad. Sci. Hungaricae 8: 118.
Type-species: *Cleptes nitidulus* Fabr. Orig. desig.

alienus Patton. Mont., Wyo.
Cleptes aliena Patton, 1879. Canad. Ent. 11: 66. ♀.

blaisdelli Bridwell. Calif.
Cleptes blaisdelli Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 37. ♂.

insperatus Aaron. Mont.
Cleptes insperata Aaron, 1885. Amer. Ent. Soc., Trans. 12: 212. ♀.

Genus CLEPTES Subgenus MELANOCLEPTES Moczar

Cleptes subg. *Melanocleptes* Moczar, 1962. Acta Zool., Acad. Sci. Hungaricae 8: 121.
Type-species: *Cleptes morawitzi* Rad. Orig. desig.

provancheri Aaron. Canada, "Wash. Ter.", Idaho, Colo. Host: *Neodiprion* sp. near *scutellatus* Rohw.
Cleptes americana Provancher, 1881. Nat. Canad. 12: 304. ♀. Preocc.
Cleptes Provancheri Aaron, 1885. Amer. Ent. Soc., Trans. 12: 212. N. name.

Biology: Smith, 1962. Pan-Pacific Ent. 38: 189.

purpuratus Cresson. Wash., Oreg., Calif., Colo., Nev. Host: *Neodiprion* sp. in *fulviceps* complex, *N.* sp.
Cleptes purpurata Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. x. ♀.
Cleptes Americana Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. x. ♂, ♀.

Biology: Dahlsten, 1961. Canad. Ent. 93: 192-193. —Dahlsten, 1967. Ecology 48: 287.

speciosus Aaron. Mont.
Cleptes speciosa Aaron, 1885. Amer. Ent. Soc., Trans. 12: 212. ♀.

Subfamily AMISEGINAE

Members of this subfamily are parasitic in the eggs of walking sticks.

Taxonomy: Krombein, 1957. Amer. Ent. Soc., Trans. 82: 147-215, 4 pls. (generic reclassification of world fauna).

Genus MESITIOPTERUS Ashmead

Mesitiopterus Ashmead, 1902. Canad. Ent. 34: 231.
Type-species: *Mesitiopterus Kahlii* Ashmead. Orig. desig.

floridensis Krombein. Fla. (Gainesville).
Mesitiopterus floridensis Krombein, 1960. Amer. Ent. Soc., Trans. 86: 28, fig. 6. ♂, ♀.

kahlii Ashmead. N. Y. south to N. C., Wis., Minn., Kans., Ariz. Host: *Diapheromera femorata* Say, eggs.
Mesitiopterus Kahlii Ashmead, 1902. Canad. Ent. 34: 231. ♂.

Biology: Milliron, 1950. Ent. Soc. Wash., Proc. 52: 47.

Genus MICROSEGA Krombein

Microsega Krombein, 1960. Amer. Ent. Soc., Trans. 86: 31.
Type-species: *Microsega bella* Krombein. Orig. desig.

bella Krombein. Tex., Okla.
Microsega bella Krombein, 1960. Amer. Ent. Soc., Trans. 86: 32, figs. 1, 2, 5. ♀.

Genus ADELPHE Mocsary

Adelphe Mocsary, 1890. Termes. Fuzetek 13: 46.
Type-species: *Adelphe mexicana* Mocsary. Monotypic.
Pseudepyris Ducke, 1902. Ztschr. Hym. Dipt. 2: 204.
Type-species: *Pseudepyris paradoxa* Ducke. Monotypic.
Adelpha Schulz, 1906. Spolia Hym., p. 153. Proposed unnecessarily for *Adelphe* Mocsary. Preocc.
Parachrysis Kieffer, 1910. Soc. Ent. France, Ann. 78: 287. Preocc.
Type-species: *Parachrysis metallica* Kieffer. Monotypic.

anisomorphae Krombein. Ga., Fla., La. Host: *Anisomorpha ferruginea* (Beauv.), eggs.
Adelphe anisomorphae Krombein, 1960. Amer. Ent. Soc., Trans. 86: 35, fig. 3. ♂, ♀.

Subfamily ELAMPINAE

These predominantly small wasps are parasites of solitary ground- and wood-nesting wasps and bees.

Genus OMALUS Panzer

Most of these species parasitize twig-nesting wasps although one has been reared from a ground-nesting species. Authenticated host records all pertain to aphid-storing pemphredonine wasps. European records of other wasps and bees as hosts of *Omalus* are probably erroneous and based on mixed nests where supersedure by or of the pemphredonine had occurred.

Revision: Bohart and Campos, 1960. Ent. Soc. Amer., Ann. 53: 235-250, 30 figs.

Genus OMALUS Subgenus OMALUS Panzer

Omalus Panzer, 1801. Faunae Ins. German. H. 85, no. 13.
Type-species: *Chrysis aenea* Fabricius. Monotypic.
Homalus Saunders, 1873. Ent. Soc. London, Trans. p. 411. Emend.
Ellampus subg. *Dictenulus* Semenov, 1932. Soc. Ent. Ross., Hor. 42: 6.
Type-species: *Ellampus* (*Dictenulus*) *specularis* Semenov. Orig. desig.

aeneus (Fabricius). Canada and U. S. south to Ga., N. Mex. and Ariz., chiefly in Canadian and Transition Zones, occasionally Upper Austral; Europe. Host: *Passaloecus cuspidatus* Sm.; *P.* sp.; *Pemphredon* sp. Predator: *Philanthus pulcher* D. T.
Chrysis aeneus Fabricius, 1787. Mant. Ins. 1: 284.
Omalus laeviventris Cresson, 1865. Ent. Soc. Phila., Proc. 4: 303. ♀.
Elampus cyanescens Provancher, 1881. Nat. Canad. 12: 303. ♀.
Omalus diversus Aaron, 1885. Amer. Ent. Soc., Trans. 12: 213. ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 97 (host record). —Krombein, 1967. Trap-nesting wasps and bees, p. 442 (life history). —Evans, 1973. Great Basin Nat. 33: 155 (host).

butleri Bohart and Campos. Ariz., N. Mex., Utah, Colo., B. C., Ind., N. Y.
Omalus (*Omalus*) *butleri* Bohart and Campos, 1960. Ent. Soc. Amer., Ann. 53: 240, figs. 6, 17. ♀, ♂.

glomeratus (du Buysson). Calif. to Wash., east to Idaho, Colo., N. Mex. Host: *Stigmus i. inordinatus* Fox.
Ellampus glomeratus du Buysson, 1901. K. K. Naturhist. Hofmus., Ann. 16: 98. ♂.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (host record).

iridescens (Norton). Throughout Canada and U. S., in Canadian, Transition and Austral Zones. Host: *Stigmus i. inordinatus* Fox, *S. americanus* Pack., *Psenulus trisulcus* (Fox), *Passaloecus* sp.
Elampus iridescens Norton, 1879. Amer. Ent. Soc., Trans. 7: 234. ♂.
Elampus marginatus Provancher. 1881. Nat. Canad. 12: 304. ♀. Preocc.

Biology: Davidson, 1895. Psyche 7: 271 (host record). —Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 94. —Krombein, 1967. Trap-nesting wasps and bees, pp. 442-443 (life history).

Genus OMALUS Subgenus PSEUDOMALUS Ashmead

Pseudomalus Ashmead, 1902. Canad. Ent. 34: 229.
Type-species: *Omalus semicircularis* Aaron. Monotypic.

auratus (Linnaeus). N. Y. south to S. C., Ohio, Ind.; widely distributed in the Palearctic Region. Undoubtedly adventive in U. S. Host: *Pemphredon l. lethifer* (Shuck.), *Passaloecus turionum* Dahlb.; *Perithous divinator* (Rossi).
Sphex aurata Linnaeus, 1758. Syst. Nat., ed. 10, p. 572.
Hedychrum sinuosum Say, 1828. Contrib. Maclur. Lyc. Phila. 1: 82. ♀.

Taxonomy: Krombein, 1959. Brooklyn Ent. Soc., Bul. 54: 95-96.

Biology: Thomas, 1962. Ent. News 73: 217-218.

janus (Haldeman). Canada and U. S. south to Calif., Ariz., N. C., chiefly in Canadian and Transition Zones. Host: *Pemphredon concolor* Say, *P. errans* Roh.
Hedychrum janus Haldeman, 1844. Acad. Nat. Sci. Phila., Proc. 1: 53. ♀.
Elampus coruscans Norton, 1879. Amer. Ent. Soc., Trans. 7: 234. ♀.
Omalus corruscans (!) Aaron, 1885. Amer. Ent. Soc., Trans. 12: 214.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (host record).

purpuratus (Provancher). Alaska, Canada and U. S. south to Calif., Ariz. and Ga. Host: *Stigmus americanus* Pack., *Pemphredon l. lethifer* (Shuck.), *P. harbecki* Roh. ?, *Passaloecus cuspidatus* Sm.
Elampus purpuratus Provancher, 1881. Nat. Canad. 12: 302. ♀.
Elampus purpurascens (!) Provancher, 1881. Nat. Canad. 12: 303.
Omalus (*Pseudomalus*) *macswaini* Bohart and Campos, 1960. Ent. Soc. Amer., Ann. 53: 244, fig. 22. ♂, ♀. N. syn. (W. R. M. Mason).

Biology: Krombein, 1960. Ent. News 71: 32-33 (host record). —Parker and Bohart. 1966. Pan-Pacific Ent. 42: 94 (host record). —Evans, 1973. Great Basin Nat. 33: 155 (host).

semicircularis Aaron. Colo., Nev.
Omalus semicircularis Aaron, 1885. Amer. Ent. Soc., Trans. 12: 215. ♂.

trilobatus Bohart and Campos. B. C. and Idaho south to Calif., Ariz. and Colo., in Canadian, Transition and Upper Sonoran Zones. Host: *Pemphredon giffardi* (Roh.).
Omalus (*Pseudomalus*) *trilobatus* Bohart and Campos, 1960. Ent. Soc. Amer., Ann. 53: 245, figs. 4, 15, 25, 28. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (host record).

Genus OMALUS Subgenus DIPLORRHOS Aaron

Diplorrhos Aaron, 1885. Amer. Ent. Soc., Trans. 12: 216.
Type-species: *Diplorrhos plicatus* Aaron. Monotypic.

cressoni (Aaron). Oreg., Calif., Ariz., Colo., Utah, Mont., Nebr. Host: *Diodontus occidentalis* Fox, *Pemphredon giffardi* (Roh.), *Stigmus i. inordinatus* Fox, *Passaloecus cuspidatus* Sm.
Elampus cressoni Aaron, 1885. Amer. Ent. Soc., Trans. 12: 215. ♂, ♀.

Biology: Powell, 1964. Wasmann Jour. Biol. 21: 172-173 (host record). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94-95 (host record). —Evans, 1973. Great Basin Nat. 33: 155 (host).

downeyi Bohart and Campos. Oreg., Calif., Nev., chiefly in Canadian Zone.
Omalus (*Diplorrhos*) *downeyi* Bohart and Campos, 1960. Ent. Soc. Amer., Ann. 53: 246, figs. 5, 8. ♂, ♀.

granti Bohart and Campos. Calif., Ariz., N. Mex., Nev., Colo.
Omalus (*Diplorrhos*) *granti* Bohart and Campos, 1960. Ent. Soc. Amer., Ann. 53: 247, fig. 19. ♂, ♀.

intermedius (Aaron). Mont., Md. Host: *Diodontus virginianus* (Roh.).
Notozus intermedius Aaron, 1885. Amer. Ent. Soc., Trans. 12: 218. ♂.

Biology: Krombein, 1963. Ent. Soc. Wash., Proc. 65: 264 (host record).

krombeini Bohart and Campos. Ariz., southern Calif.
Omalus (*Diplorrhos*) *krombeini* Bohart and Campos, 1960. Ent. Soc. Amer., Ann. 53: 247, figs. 3, 13. ♂, ♀.

plicatus (Aaron). Alaska, Canada, western and northern U. S. south to Calif., N. Mex., Minn., Mich., N. Y.
Diplorrhos plicatus Aaron, 1885. Amer. Ent. Soc., Trans. 12: 216. ♂, ♀.

seminudus (Aaron). Alaska, B. C. south to Calif., Idaho, Ont.
Notozus seminudus Aaron, 1885. Amer. Ent. Soc., Trans. 12: 218. ♂, ♀.

speculum (Say). Wash., Oreg., Calif., Colo.
Hedychrum speculum Say, 1836. Boston Jour. Nat. Hist. 1: 225. ♂.

telfordi Bohart and Campos. Tex. to southern Calif., Nev.
Omalus (*Diplorrhos*) *telfordi* Bohart and Campos, 1960. Ent. Soc. Amer., Ann. 53: 249, figs. 14, 27. ♂, ♀.

variatus (Aaron). Western N. Amer. in Canadian, Transition and Upper Sonoran Zones. Host: *Stigmus i. inordinatus* Fox.
Elampus variatus Aaron, 1885. Amer. Ent. Soc., Trans. 12: 215. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (host record).

Genus NOTOZUS Foerster

Elampus Spinola, 1806. Insectorum Liguriae, v. 1, p. 10.
Type-species: *Chrysis panzeri* Fabricius. Desig. by Latreille, 1810.
Notozus Foerster, 1853. Naturh. Ver. Rheinlande, Verh. 10: 351.
Type-species: *Notozus frivaldszkii* Foerster. Desig. by Bodenstein, 1939 (=*Chrysis panzeri* Fabricius).
Ellampus (!) Agassiz, 1846. Nomencl. Zool., Index Univ., pp. 135, 136.

The few available host records indicate that species of this genus parasitize ground-nesting sphecoid wasps.

Taxonomy: Huber, 1975. Bul. Zool. Nomencl. 32: 181-187 (petition to suppress *Elampus* Spinola, 1806, and place *Notozus* Foerster, 1853, on Official List of Generic Names).

aaroni (Bodenstein), n. comb. Man., Sask., Alta., Mont., Colo., Calif.
Notozus productus Aaron, 1885. Amer. Ent. Soc., Trans. 12: 219. ♀. Preocc.
Elampus aaroni Bodenstein, 1951. U. S. Dept. Agr., Monog. 2: 719. N. name.

connexus Viereck. Kans., Calif.
Notozus connexus Viereck, 1906. Amer. Ent. Soc., Trans. 32: 192.

hyalinus Aaron. N. C., Fla., Mich., Ill., Minn., Iowa, Mo., S. Dak., Kans., Tex., Okla., Colo., N. Mex., Mont., Nev., Utah, Ariz.
Notozus hyalinus Aaron, 1885. Amer. Ent. Soc., Trans. 12: 218. ♀.

marginatus Patton. Entire U. S. and Canada.
Notozus marginatus Patton, 1879. Canad. Ent. 11: 66.

nitidus Aaron. West and Southwest, east to Iowa., Man.; Mexico (Sonora).
Notozus nitidus Aaron, 1885. Amer. Ent. Soc., Trans. 12: 218. ♂.

versicolor (Norton), n. comb. Calif., Mont., Ariz., N. Mex., "Dakota," Kans., Man.; Mexico (Baja California).
Elampus versicolor Norton, 1879. Amer. Ent. Soc., Trans. 7: 235. ♂.

viridicyaneus (Norton), n. comb. Transcont. in Canad., Transit. and Austral Zones. Host: *Hoplisoides costalis* (Cress.). Predator: *Philanthus pulcher* D. T.
Elampus viridicyaneus Norton, 1879. Amer. Ent. Soc., Trans. 7: 235. ♀.
Elampus spinosus Provancher, 1881. Nat. Canad. 12: 302. ♀.

Genus HOLOPYGA Dahlbom

Holopyga Dahlbom, 1845. Dispos. Method. Spec. Hym., pt. 2, p. 4.
Type-species: *Holopyga amoenula* Dahlbom. Desig. by Ashmead, 1902 (=*Chrysis gloriosa* Fabricius).
Halopyga (!) Tournier, 1878. Schweiz. Ent. Gesell., Mitt. 5: 305.

Members of this genus are parasites of ground-nesting sphecid wasps.

hora Aaron. Calif., Idaho, Nev., N. Mex., Colo., Wyo., Ariz., Mont., Kans., Tex.; Mexico (Baja California, Oaxaca).
Holopyga horus Aaron, 1885. Amer. Ent. Soc., Trans. 12: 220. ♂, ♀.
Hedychrum continuum Aaron, 1885. Amer. Ent. Soc., Trans. 12: 224. ♂, ♀. N. syn. (R. M. Bohart).

lazulina Dahlbom. Ill., Tex. south to Argentina.
Holopyga lazulina Dahlbom, 1854. Hym. Europaea, v. 2, p. 49.

ventralis (Say). Widely distributed throughout U. S., Canada and north. Mexico. Host: *Bicyrtes fodiens* (Handl.), *B. quadrifasciata* (Say). Predator: *Philanthus pulcher* D. T.
Hedychrum ventrale Say, 1824. *In* Keating, Narr. Long's 2nd. Exped., v. 2, App., p. 330.
Hedychrum asperum Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 52. ♀. N. syn. (R. M. Bohart).
Holopyga Dohrni Dahlbom, 1854. Hym. Europaea, v. 2, p. 48.
Holopyga compacta Cresson, 1865. Ent. Soc. Phila., Proc. 4: 304.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 160, 169 (hosts).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14, pp. 42-43, pl. 13 (male genitalia).

Genus MUESEBECKIDIUM Krombein

Muesebeckidium Krombein, 1969. Ent. Soc. Wash., Proc. 71: 352.
Type-species: *Hedychrum obsoletum* Say. Orig. desig.

obsoletum (Say). Widely distributed in North America in U. and L. Austr. Zones east of 100th meridian.
Hedychrum obsoleta Say, 1836. Boston Jour. Nat. Hist. 1: 284. ? ♀.
Hedychrum zimmermanni Dahlbom, 1845. Dispos. Method. Spec. Hym., pt. 2, p. 2. ♂.

occidentale Krombein. N. Mex., Ariz.; Mexico (Sonora, Durango).
Muesebeckidium occidentale Krombein, 1969. Ent. Soc. Wash., Proc. 71: 357, fig. 13. ♂, ♀.

Genus PSEUDOLOPYGA Krombein

Pseudolopyga Krombein, 1969. Ent. Soc. Wash., Proc. 71: 357.
Type-species: *Holopyga taylori* Bodenstein. Orig. desig.

taylori (Bodenstein). Mo., N. Mex., Ariz., Nev., Idaho, Calif. Host: *Solierella affinis blaisdelli* (Bridw.); *S. peckhami* (Ashm.).
Holopyga taylori Bodenstein, 1939. Ent. News 50: 19. ♂, ♀.
Hedychridium carrilloi Bohart and Brumley, 1967. Pan-Pacific Ent. 43: 232, figs. 1-4. ♂, ♀.

Taxonomy: Carrillo and Caltagirone, 1970. Ent. Soc. Amer., Ann. 63: 677-679, figs. 8-11 (egg, larvae, pupa, cocoon).

Biology: Krombein, 1967. Trap-nesting wasps and bees, p. 443 (host). —Carrillo and Caltagirone, 1970. Ent. Soc. Amer., Ann. 63: 677-679, figs. 8-12 (life history)

Genus HEDYCHRIDIUM Abeille de Perrin

Hedychridium Abeille de Perrin, 1878. Diagn. Chrysid. Nouv., p. 3.
Type-species: *Hedychrum minutum* Lepeletier. Desig. by Ashmead, 1902 (=*Chrysis ardens* Coquebert).

Most species of *Hedychridium* parasitize ground-nesting wasps and bees, but one has been recorded as parasitizing a twig-nesting sphecid wasp.

amabile Cockerell. Calif., Ariz., Nev., Utah, N. Mex.; Mexico (Baja California, Sonora).
Hedychridium amabile Cockerell, 1903. Canad. Ent. 35: 262.

caeruleum (Norton). N. J., Ind., Ill., Iowa, N. Dak., Mont.
Hedychrum caeruleum Norton, 1879. Amer. Ent. Soc., Trans. 7: 239. ♀.

cockerelli du Buysson. Colo., S. Dak.
Hedychridium cockerelli du Buysson, 1906. Rev. Ent. Caen 25: 111. ♂.

dimidiatum (Say). Throughout U. S. and Canada; Mexico.
Hedychrum dimidiatum Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, App., p. 330, n. 2.
Chrysis Mexicana Cameron, 1888. Biol. Cent.-Amer., Hym., v. 1, p. 460. N. syn. (R. M. Bohart).
Holopyga (*Hedychridium*) *mexicana* Mocsary, 1911. Mus. Nat. Hungarici, Ann. 9: 448. ♂. N. syn. (R. M. Bohart).

fletcheri Bodenstein. Western U. S. and Canada to Ind. and Sask., Ala., Fla. Host: *Tachysphex similis* Roh. Predator: *Philanthus pulcher* D. T.
Hedychrum viride Cresson, 1865. Ent. Soc. Phil., Proc. 4: 306. Preocc.
Hedychridium fletcheri Bodenstein, 1951. U. S. Dept. Agr. Monog., 2: 720. N. name.

Biology: Kurczewski, 1967. Kans. Ent. Soc., Jour. 40: 278-284, 1 fig. (life history, behavior).

semirufum (Cockerell). N. Mex., Ariz.
Holopyga semirufa Cockerell, 1896. Psyche (sup.) 7: 17. ♀.

solierellae Bohart and Brumley. Western U. S., B. C.; Mexico (Baja California). Host: *Solierella affinis blaisdelli* (Bridw.); *S. peckhami* (Ashm.).
Hedychridium solierellae Bohart and Brumley, 1967. Pan-Pacific Ent. 43: 234. ♂, ♀.

Taxonomy: Carrillo and Caltagirone, 1970. Ent. Soc. Amer., Ann. 63: 679-680, figs. 13-15 (egg, larvae, pupa, cocoon).

Biology: Carrillo and Caltagirone, 1970. Ent. Soc. Amer., Ann. 63: 679-680, figs. 13-15 (life history).

Genus HEDYCHRUM Latreille

Hedychrum Latreille, 1802. Hist. Nat. Crust. Ins., v. 3, p. 317.
Type-species: *Hedychrum lucidulum* Latreille. Monotypic (=*Sphex nobile* Scopoli).
Hedycrum (!) Say, 1825. *In* Keating, Narr. Long's 2nd Exped., v. 2, App., p. 65.

Wasps of this genus are parasitic on ground-nesting wasps and bees.

confusum du Buysson. U. S. and Canada west to N. Mex., Wyo., Sask. Host: *Cerceris halone* Bks., *C. architis* Mick.
Hedychrum confusum du Buysson, 1891. Rev. Ent. Caen 10: 30. ♂, ♀.
Hedychrum nearcticum Mocsary, 1914. Mus. Nat. Hungarici, Ann. 12: 11. ♀. N. syn. (R. M. Bohart).

cupricolle Cresson. Alta., Colo., Kans., Nebr., Minn.
Hedychrum cupricolle Cresson, 1865. Ent. Soc. Phila., Proc. 4: 305. ♀.

louisianiae Norton. N. C., Fla. west to N. Mex., Mo., Kans., Colo.; Mexico (Mexico).
Hedychrum Louisianiae Norton, 1879. Amer. Ent. Soc., Trans. 7: 238. ♂.
Hedychrum Louisianae(!) Aaron, 1885. Amer. Ent. Soc., Trans. 12: 223. Emend.

nigropilosum Mocsary. Western U. S. and Canada to Wyo., Colo., Alta.
Hedychrum nigropilosum Mocsary, 1889. Monog. Chrysid., p. 162. ♂.

parvum Aaron. Transcontinental in U. S., Man., Alta., B. C., N. W. T.
Hedychrum violaceum var. *parvum* Aaron, 1885. Amer. Ent. Soc., Trans. 12: 223.

Hedychridium polygoni Rohwer, 1909. Psyche 16: 87. ♀. N. syn. (R. M. Bohart).

violaceum Brulle. Throughout U. S., Canada and northern Mexico.
Hedychrum violaceum Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 51. ♂.
Hedychrum affinissimum Bischoff, 1910. Berlin Zool. Mus., Mitt. 4: 444. ♀. N. syn. (R. M. Bohart).

wiltii Cresson. Ark., Tex., Colo., Ariz.
Hedychrum Wiltii Cresson, 1865. Ent. Soc. Phila., Proc. 4: 305. ♂.

Subfamily CHRYSIDIDINAE

Members of this subfamily have as hosts a wide variety of wasps and bees, including species that nest in the ground, in cavities in wood, or that construct nests of mud.

Genus CHRYSIS Linnaeus

Genus CHRYSIS Subgenus CHRYSIS Linnaeus

Chrysis Linnaeus, 1761. Fauna Suecica, Ed. 2, p. 414.
Type-species: *Sphex ignita* Linnaeus. Desig. by Latreille, 1810.
Chrysis subg. *Tetrachrysis* Lichtenstein, 1876. Petites Nouv. Ent., v. 2, p. 27.
Type-species: *Chrysis aeruginosa* Dahlbom. Desig. by Ashmead, 1902 (=*Chrysis succincta* Linnaeus).
Chrysis subg. *Hexachrysis* Lichtenstein, 1876. Petites Nouv. Ent., v. 2, p. 27.
Type-species: *Chrysis micans* Rossi. Desig. by Bodenstein, 1939 (=*Chrysis sexdentata* Christ).
Chrysis subg. *Actinochrysis* Haupt, 1956. [Dresden] Mus. f. Tierkunde u. Voelkerk., Abhandl. u. Ber. 23: 74.
Type-species: *Chrysis succincta* Linnaeus. Orig. desig.
Chrysis subg. *Cymatochrysis* Haupt, 1956. [Dresden] Mus. f. Tierkunde u. Voelkerk., Abhandl. u. Ber. 23: 74.
Type-species: *Chrysis viridula* Linnaeus. Orig. desig.

Only the typical subgenus occurs in North America, but it has been divided into a number of species groups.

Taxonomy: Bohart, 1962. Acta Hym. 1: 361-375, 25 figs. (hexadentate species).

Species Group Dorsalis

alfkenella du Buysson. Western U. S. to Nebr., Ark.
Chrysis (*Tetrachrysis*) *Alfkenella* du Buysson, 1904. Rev. Ent. Caen 23: 266. ♂.

dorsalis Aaron. Transcontinental in U. S. and Canada. Host: *Photopsis* sp.
Chrysis dorsalis Aaron, 1885. Amer. Ent. Soc., Trans. 12: 234. ♂, ♀.

Biology: Ferguson, 1962. Univ. Calif. Pubs. Ent. 27: 29 (host record).

meta Aaron. Colo., Wyo., Mont., Alta.
Chrysis meta Aaron, 1885. Amer. Ent. Soc., Trans. 12: 234. ♂, ♀.

montana Aaron. Ont. and Maine south to Fla., Tex., Mich., Ill., Iowa, Mo., Kans., Nebr., Colo., Mont., Idaho, Utah,Calif.
Chrysis montana Aaron, 1885. Amer. Ent. Soc., Trans. 12: 234. ♀.
Chrysis hirsuta Aaron, 1885. Amer. Ent. Soc., Trans. 12: 235. ♂, ♀. Preocc. N. syn. (R. M. Bohart).
Chrysis (*Tetrachrysis*) *aaroni* Mocsary, 1889. Monog. Chrysid., p. 386.
Chrysis (*Tetrachrysis*) *equidens* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 193. N. syn. (R. M. Bohart).
Chrysis (*Hexachrysis*) *nana* Mocsary, 1913. Mus. Nat. Hungarici, Ann. 11: 33. ♂. N. syn. (R. M. Bohart).

Taxonomy: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 145-146, fig. 6 (*equidens* redescription). —Bohart, 1962. Acta Hym. 1: 375 (synonymy of *hirsuta* and *nana*).

provancheri Schulz. Maine, Ont., Minn., S. Dak., N. Dak., Alta., N. W. T.
Chrysis aurichalcea Provancher, 1881. Nat. Canad. 12: 300. ♀. Preocc.

Chrysis Provancheri Schulz, 1906. Spolia Hym., p. 154. N. name.

scitula Cresson. Colo., Utah, Calif.
Chrysis scitula Cresson, 1865. Ent. Soc. Phila., Proc. 4: 308. ♀.
Chrysis Californica Gribodo, 1879. Mus. Civ. Stor. Nat. Genova, Ann. 14: 336. ♀. N. syn. (R. M. Bohart).

tenuicornis Taylor. Oreg., Calif., Ariz., N. Mex.; Mexico (Baja California, Jalisco, Durango).
Chrysis (*Tetrachrysis*) *tenuicornis* Taylor, 1924. Calif. Acad. Sci., Proc. (4)13: 327. ♀.

Taxonomy: Bohart, 1962. Acta Hym. 1: 373, figs. 3, 15.

Species Group Conica

conica Brulle. D. C. to Fla., Ky., Tenn., Tex., Ariz.; Mexico. Host: *Eumenes fraternus* Say in mud nests.
Chrysis conica Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 32. ♂, ♀.
Chrysis peracuta Aaron, 1885. Amer. Ent. Soc., Trans. 12: 237. ♀.
Chrysis peregrina du Buysson, 1887. Rev. d'Ent. 6: 188. ♀.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14, pp. 42, 43, pl. 13, fig. O (male genitalia).

Species Group Derivata

amala Rohwer. Mass., Iowa, Minn., Kans., Colo., N. Mex., Utah, Nev., Mont., Wash.
Chrysis (*Tetrachrysis*) *amala* Rohwer, 1909. Psyche 16: 91. ♀.

antennalis Mocsary. Tex., N. Mex., Ariz.; northern Mexico.
Chrysis (*Tetrachrysis*) *antennalis* Mocsary, 1912. Mus. Nat. Hungarici, Ann. 10: 564. ♂.

barri Bohart. Idaho, Nev., Calif. Host: *Parancistrocerus toltecus* (Sauss.) nesting in twig cavities.
Chrysis barri Bohart, 1966. Biol. Soc. Wash., Proc. 79: 132. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (host record).

derivata du Buysson. Transcontinental in U. S. and southern Canada. Host: *Ancistrocerus catskill halophilus* Vier.; *Euodynerus foraminatus apopkensis* (Robt.), *E. f. scutellaris* (Sauss.); *Symmorphus cristatus nevadensis* (Cam.). Undoubtedly parasitizes a number of other eumenid wasps nesting in cavities in twigs or borings in wood.
Chrysis (*Tetrachrysis*) *derivata* du Buysson, 1891. Rev. Ent. Caen 10: 38. ♂.
Chrysis (*Tetrachrysis*) *decepta* Rohwer, 1909. Psyche 16: 90. ♀. N. syn. (R. M. Bohart).

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 92-94 (host record). —Krombein, 1967. Trap-nesting wasps and bees, p. 462 (life history).

irwini Bohart. Calif., Oreg. Host: Eumenidae in twigs.
Chrysis irwini Bohart, 1966. Biol. Soc. Wash., Proc. 79: 133. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 98 (host record).

pattoni Aaron. Transcontinental in U. S., Sask., B. C. Host: *Ancistrocerus spilogaster* Cam.; *Leptochilus washo* Prkr.; *Microdynerus bakerianus* (Cam.). Hosts nest in cavities in twigs.
Chrysis Pattoni Aaron, 1885. Amer. Ent. Soc., Trans. 12: 235. ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (host record). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 2-3 (host records). —Parker, 1970. Pan-Pacific Ent. 46: 242 (host record).

snowi Viereck. U. S. and Canada west of 100th meridian.
Chrysis (*Tetrachrysis*) *snowi* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 195.

stenodyneri Krombein. Transcontinental in U. S., south to Panama. Host: *Stenodynerus h. histrionalis* (Robt.), *S. krombeini* Boh., *S. lineatifrons* Boh.; *Parancistrocerus histrio* (Lep.); *Microdynerus bakerianus* (Cam.).
Chrysis (*Chrysis*) *stenodyneri* Krombein, 1958. Amer. Ent. Soc., Trans. 84: 151, figs. 1, 2, 8. ♀, ♂.

Biology: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 155-160 (life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 471-472 (life history). —Parker, 1970. Pan-Pacific Ent. 46: 242 (host record).

Species Group Smaragdula

Taxonomy: Bohart, 1962. Acta Hym. 1: 362-363, figs. 16, 21-25 (group characters).

arizonica Bohart. Tex., N. Mex., Ariz.; northern Mexico. Host: *Euodynerus guerrero* (Sauss.); *Parancistrocerus toltecus* (Sauss.). Hosts nest in borings in wood.
Chrysis arizonica Bohart, 1962. Acta Hym. 1: 366, figs. 2, 10, 18, 19. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 455-456 (life history).

bequaerti Bohart. D. C., Ga., Ark., Mo., Iowa, Ill., Ind., S. Dak. to Tex., N. Mex.
Chrysis bequaerti Bohart, 1962. Acta Hym. 1: 366, figs. 7, 9, 20, 21, 25. ♂, ♀.

clara Cresson. S. Dak., Colo., Wash.
Chrysis clara Cresson, 1865. Ent. Soc. Phila., Proc. 4: 313. ♀.

Taxonomy: Bohart, 1962. Acta Hym. 1: 367.

inaequidens Dahlbom. Over most of U. S., N. Y. to Wash. and south into Mexico (Chihuahua, Nuevo Leon, Baja California). Host: *Euodynerus foraminatus apopkensis* (Robt.), *E. foraminatus scutellaris* (Sauss.), *E. megaera* (Lep.); *Monobia quadridens* (L.); *Pachodynerus erynnis* (Lep.); *Stenodynerus pulvinatus surrufus* Krom.; *Parancistrocerus salcularis rufulus* (Boh.). Undoubtedly parasitizes a number of other eumenid wasps nesting in borings in wood or abandoned mud-dauber nests.
Chrysis inaequidens Dahlbom, 1854. Hym. Europaea, v. 2, p. 334. ♂.
Chrysis Texana Gribodo, 1879. Mus. Civ. Stor. Nat. Genova, Ann. 14: 829. ♂, ♀.

Taxonomy: Bohart, 1962. Acta Hym. 1: 368, fig. 14.

Biology: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 161-163 (life history). —Moore and Parker, 1962. Pan-Pacific Ent. 38: 14 (host record). —Krombein, 1967. Trap-nesting wasps and bees, pp. 463-465 (life history).

intricata Brulle. Tex. (Brownsville); Mexico south to Brazil.
Chrysis intricata Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 25. ♀.
Chrysis smidti Dahlbom, 1845. Hym. Europaea v. 2, p. 317. ♀.
Chrysis cognata Gribodo, 1879. Mus. Civ. Stor. Nat. Genova, Ann. 14: 328. ♀.
Chrysis proxima Cameron, 1888. Biol. Cent.-Amer., Hym. v. 1, p. 465. ♀.
Chrysis (*Hexachrysis*) *schulthessi* Mocsary, 1889. Monog. Chrysid., p. 572. ♂.
Chrysis (*Hexachrysis*) *aenescens* Mocsary, 1889. Monog. Chrysid., p. 577. ♀.
Chrysis aperta du Buysson, 1898 (1897). Ann. Soc. Ent., France 66: 559. ♂.

Taxonomy: Bohart, 1962. Acta Hym. 1: 368, fig. 16.

oraria Bohart. Ariz., N. Mex., Tex.
Chrysis oraria Bohart, 1962. Acta Hym. 1: 370. ♂, ♀.

praestans du Buysson. Ky., Colo. to Tex., west to Wash. and Calif., B. C., Alta., Man.; West Indies (Grenada).
Chrysis praestans du Buysson, 1898. Rev. Ent. Caen 17: 144. ♀.

Taxonomy: Bohart, 1962. Acta Hym. 1: 370, fig. 8.

serrata Taylor. U. S. west of 100th meridian, B. C.
Chrysis (*Hexachrysis*) *serrata* Taylor, 1924. Calif. Acad. Sci., Proc. (4)13: 329. ♂, ♀.

Taxonomy: Bohart, 1962. Acta. Hym. 1: 371, fig. 12.

smaragdula Fabricius. N. J. to Fla., Ky., Mo., La., N. Mex., Ariz., Utah. Host: *Monobia quadridens* Fabr. Hosts nest in borings in wood.
Chrysis smaragdula Fabricius, 1775. Systema Ent., p. 357.
Chrysis pensylvanica Lepeletier, 1846. Hist. Nat. Ins. Hym., v. 4, p. 24. ♀.

Taxonomy: Bohart, 1962. Acta Hym. 1: 371, fig. 13.

Biology: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 163 (life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 469-471 (life history).

wasbaueri Bohart. Generally distributed over U. S., Mass. to Wash., south to Mexico (Chihuahua, Nuevo Leon, Durango).
Chrysis wasbaueri Bohart, 1962. Acta Hym. 1: 372, figs. 11, 22, 23, 24. ♂, ♀.

Species Group Lauta

Taxonomy: Bohart, 1964. Biol. Soc. Wash., Proc. 77: 223-228, figs. 3, 6, 17, 20, 21, 24, 25 (group characters and descriptions of all species except *tripartita* Aar.).

coloradica Bohart. Oreg., Calif., Nev., Idaho, Wyo., Colo., Utah, Ariz. Host: *Anthidium collectum* Huard, in ground nests.
Chrysis pulcherrima Cresson, 1865. Ent. Soc. Phila., Proc. 4: 311. ♂. Preocc.
Chrysis coloradica Bohart, 1964. Biol. Soc. Wash., Proc. 77: 224. N. name.

Biology: Bohart, 1964. Biol. Soc. Wash., Proc. 77: 225 (host record).

florissanticola Rohwer. Alaska, Yukon, Alta., Wash., Calif., Utah, Wyo., Colo. Host: *Anthidium banningense* Ckll.
Chrysis (*Tetrachrysis*) *florissanticola* Rohwer, 1909. Psyche 16: 88. ♂.
Chrysis florissantensis (!) Bohart, 1962. Acta Hym. 1: 363.

Biology: Grigarick and Stange, 1968. Calif. Insect Survey, Bul. 9: 15 (host record).

lauta Cresson. N. C., Ga., Miss., Tex., Kans., Nebr., Colo., N. Mex., Ariz.; Mexico (Morelos, Jalisco, San Luis Potosi, Oaxaca.) Host: *Anthidium porterae* Ckll.
Chrysis lauta Cresson, 1865. Ent. Soc. Phila., Proc. 4: 310 ♀.
Chrysis prasinus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 310. ♀. Preocc.
Chrysis chlorophana Mocsary, 1887. Termes. Fuzetek 11: 16. N. name.
Chrysis (*Tetrachrysis*) *clypeata* Mocsary, 1889. Monog. Chrysid., p. 393. ♂.
Chrysis (*Tetrachrysis*) *falsifica* du Buysson, 1891. Rev. Ent. Caen 10: 38. N. name.

Taxonomy: Bohart, 1964. Biol. Soc. Wash., Proc. 77: 224 (synonymy).

Biology: Custer, 1928. Ent. News 39: 123-134.

tripartita Aaron. Ga., Mo., Kans., Colo., Tex. west to Calif.; northern Mexico. Host: *Anthidium collectum* Huard; *A. maculosum* Cr. Hosts nest in ground or in twig cavities.
Chrysis tripartita Aaron, 1885. Amer. Ent. Soc., Trans. 12: 238. ♀.
Chrysis (*Tetrachrysis*) *indeterminabilis* Bischoff, 1910. Berlin Zool. Mus., Mitt. 4: 476. ♀. N. syn. (R. M. Bohart).

Biology: Grigarick and Stange, 1968. Calif. Insect Survey, Bul. 9:19 (host record). —Horning, 1971. Ent. Soc. Wash., Proc. 73: 43 (host record).

tularensis Bohart. Calif. (Tulare Co.).
Chrysis tularensis Bohart, 1962. Acta Hym. 1: 373, figs. 4, 6. ♂, ♀.

vagabunda Bohart. Calif., Oreg., Wash., Idaho, Nev., Utah, Ariz. Host: *Anthidium collectum* Huard.
Chrysis vagabunda Bohart, 1964. Biol. Soc. Wash., Proc. 77: 225, figs. 24, 25. ♂, ♀.

xerophila Bohart. Calif.
Chrysis xerophila Bohart, 1964. Biol. Soc. Wash., Proc. 77: 226, figs. 3, 20, 21. ♂, ♀.

Species Group Nisseri

nisseri Dahlbom. N. J. to Fla., Mo., Ark., Tex.; Mexico, Central and South America.
Chrysis nisseri Dahlbom, 1845. Dispos. Method. Spec. Hym., pt. 2, p. 14. ♀.
Chrysis (*Tetrachrysis*) *propinqua* Mocsary, 1889. Monog. Chrysid., p. 343. ♂, ♀. N. syn. (R. M. Bohart).
Chrysis (*Tetrachrysis*) *laminifera* Bischoff, 1910. Berlin Zool. Mus., Mitt. 4: 460. ♀. N. syn. (R. M. Bohart).
Chrysis (*Tetrachrysis*) *chiriquensis* Bischoff, 1910. Berlin Zool. Mus., Mitt. 4: 461. ♀. N. syn. (R. M. Bohart).
Chrysis (*Tetrachrysis*) *palifera* Bischoff, 1910. Berlin Zool. Mus., Mitt. 4: 461. ♂. N. syn. (R. M. Bohart).

Taxonomy: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 149, fig. 3.

Species Group Fuscipennis

fuscipennis Brulle. D. C., Md., Va., Ky., Calif.; Hawaii; Palaearctic, Oriental, Australian. Probably adventive from Hawaii. Host: *Sceliphron caementarium* (Dru.) in U. S.; *Eumenes conica* (F.) in India, *Sceliphron* spp. in Japan. Hosts are resting mature larvae of mud-daubers.
Chrysis fuscipennis Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 38. ♀.
Chrysis erratica Abeille de Perrin, 1887. *In* Buysson, Rev. d'Ent. 6: 189. ♂, ♀.
Chrysis pulchellus Cameron, 1888. Manchester Lit. and Phil. Soc., Mem. and Proc. 26: 126. Preocc.

Taxonomy: Krombein, 1956. Ent. Soc. Wash., Proc. 58: 275.

Biology: Stage, 1960. Pan-Pacific Ent. 36: 191-195, 1 pl. (life history).

Species Group Venusta

Taxonomy: Bohart, 1964. Biol. Soc. Wash., Proc. 77: 233-235, figs. 8, 9, 10, 12, 13 (group characters and descriptions of all species except *venusta* Cr.).

astralia Bohart. Oreg., Calif., Nev., Utah, Ariz., N. Mex.; Mexico (Baja California, Sonora, Zacatecas, Morelos, Jalisco).
Chrysis astralia Bohart, 1964. Biol. Soc. Wash., Proc. 77: 233, figs. 8, 13. ♂, ♀.

venusta Cresson. Kans., Colo., Tex., N. Mex., Calif.
Chrysis venusta Cresson, 1865. Ent. Soc. Phila., Proc. 4: 311. ♂.
Chrysis (*Tetrachrysis*) *frey-gessneri* Gribodo, 1879. Mus. Civ. Stor. Nat. Genova, Ann. 14: 333. ♀. N. syn. (R. M. Bohart).

Taxonomy: Bohart, 1964. Biol. Soc. Wash., Proc. 77: 232, fig. 10 (male genitalia).

venustella Bohart. Wash., Oreg., Calif., Nev., Idaho, Wyo.
Chrysis venustella Bohart, 1964. Biol. Soc. Wash., Proc. 77: 235, figs. 9, 12. ♂, ♀.

Species Group Propria

Taxonomy: Bohart, 1964. Biol. Soc. Wash., Proc. 77: 228-233, figs. 1, 2, 5, 7, 11, 17 (group characters and descriptions of new species only).

aridula Bohart. Ariz., southern Calif.
Chrysis aridula Bohart, 1962. Acta Hym. 1: 364, figs. 1, 5, 17. ♂, ♀.

crotema Bohart. N. Mex., Ariz.; Mexico (Chihuahua, Zacatecas).
Chrysis crotema Bohart, 1964. Biol. Soc. Wash., Proc. 77: 228, figs. 5, 18, 19. ♂, ♀.

prolata Bohart. Kans., Iowa, Ill., Wis.
Chrysis prolata Bohart, 1964. Biol. Soc. Wash., Proc. 77: 229. ♀.

propria Aaron. Transcontinental in U. S., Alta., B. C.; Mexico (Chihuahua, Durango).
Chrysis propria Aaron, 1885. Amer. Ent. Soc., Trans. 12: 238. ♂, ♀.
Chrysis (*Tetrachrysis*) *kahli* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 194. ♂.
Chrysis (*Tetrachrysis*) *pattonella* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 194. ♂.

Taxonomy: Krombein, 1957. Ent. News 68: 191.

rivalis Bohart. Calif., Oreg., Wash., Idaho, Mont., Wyo., Utah, Colo., Nev.
Chrysis rivalis Bohart, 1964. Biol. Soc. Wash., Proc. 77: 229, figs. 4, 22, 23. ♂, ♀.

submontana Rohwer. N. Mex., Colo., Utah, Wash., Oreg., Calif.
Chrysis (*Tetrachrysis*) *submontana* Rohwer, 1909. Psyche 16: 91.

tensa Bohart. Calif., Utah, Ariz., N. Mex., Tex., Kans., Nebr.; Mexico (Sonora, Chihuahua).
Chrysis tensa Bohart, 1964. Biol. Soc. Wash., Proc. 77: 230, figs. 2, 14, 15. ♂, ♀.

vibex Bohart. Calif., Ariz., N. Mex., Tex., Okla., Kans.; Mexico (Chihuahua, Nuevo Leon, Jalisco).
Chrysis vibex Bohart 1964. Biol. Soc. Wash., Proc. 77: 231, figs. 1, 7, 11, 16. ♂, ♀.

Species Group Coerulans

Taxonomy: Moore, 1966. Ent. Soc. Amer., Ann. 59: 1125-1131, 9 figs. (group characters, synonymy and description of both sexes of included species).

canadensis du Buysson. Transcontinental in U. S. and Canada; Mexico (Guerrero).
Chrysis (*Tetrachrysis*) *canadensis* du Buysson, 1891. Rev. Ent. Caen 10: 37. ♀.

Chrysis (*Tetrachrysis*) *altivolans* Mocsary, 1914. Mus. Nat. Hungarici, Ann. 12: 53. ♂. N. syn. (R. M. Bohart).
Chrysis (*Tetrachrysis*) *coerulans* var. *nanula* Rohwer, 1909. Psyche 16: 88. ♀. N. syn (R. M. Bohart).

cembricola Krombein. Transcontinental in U. S. and Canada. Host: *Symmorphus canadensis* (Sauss.). Hosts nest in borings in wood.
Chrysis (*Chrysis*) *cembricola* Krombein, 1958. Ent. Soc. Wash., Proc. 60: 53, fig. 1. ♀, ♂.

Biology: Krombein, 1958. Ent. Soc. Wash., Proc. 60: 57-58 (life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 456-457 (life history).

coerulans Fabricius. Widely distributed in southern Canada and U. S. Host: *Ancistrocerus a. antilope* (Panz.); *A. c. catskill* (Sauss.); *A. c. albophaleratus* (Sauss.); *A. spilogaster* Cam.; *A. a. adiabatus* (Sauss.); *A. a. cytainus* (Cam.); *A. tuberculocephalus sutterianus* (Sauss.); *Euodynerus foraminatus apopkensis* (Robt.); *E. f. foraminatus* (Sauss.); *E. f. scutellaris* (Sauss.); *E. leucomelas* (Sauss.); *E. megaera* (Lep.); *Parancistrocerus acarophorus* (Boh.); *P. salcularis rufulus* (Boh.); *Symmorphus albomarginatus* (Sauss.); *S. c. cristatus* (Sauss.); *Hoplitis anthocopoides* (Schenk). Parasite: *Melittobia chalybii* Ashm. Hosts nest in cavities in twigs, borings in wood, and in old mud-dauber nests.
Chrysis coerulans Fabricius, 1805. Systema Piezatorum, p. 172. ♀.
Chrysis Servillei Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 37. N. syn. (R. M. Bohart).
Chrysis bella Cresson, 1865. Ent. Soc. Phila., Proc. 4: 312. ♀.
Chrysis Nortoni Aaron, 1885. Amer. Ent. Soc., Trans. 12: 237. ♂, ♀. N. syn. (R. M. Bohart).
Chrysis (*Tetrachrysis*) *conserta* du Buysson, 1891. Rev. Ent. Caen 10: 37. ♀.
Chrysis (*Tetrachrysis*) *praticola* Mocsary, 1914. Mus. Nat. Hungarici, Ann. 12: 50. ♂, ♀. N. syn. (R. M. Bohart).
Chrysis (*Tetrachrysis*) *sejuncta* Mocsary, 1914. Mus. Nat. Hungarici, Ann. 12: 51. ♀. N. syn. (R. M. Bohart).

Biology: Walsh, 1869. Amer. Ent. 1: 135 (host record, erroneous). —Ashmead, 1894. Psyche 7: 79 (host record, erroneous). —Parker, 1962. Pan-Pacific Ent. 38: 140 (host record). —Medler, 1964. Ent. News 75: 26-27 (host record). —Medler, 1964. Ent. Soc. Wash., Proc. 66: 209-215 (life history). —Medler, 1964. Ent. Soc. Amer., Ann. 57: 59 (host record). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (host records). —Krombein, 1967. Trap-nesting wasps and bees, pp. 457-462 (life history). —Eickwort, 1973. Search, Agr. 3: 24 (host). —Evans, 1973. Great Basin Nat. 33: 152 (host).

inflata Aaron. Tex., Colo. and N. Mex. west to Calif. and Oreg., Idaho, B. C.; Mexico. Host: *Ancistrocerus durangoensis* Cam.; *A. lineativentris* Cam.; *A. tuberculocephalus sutterianus* (Sauss.); *A. t. tuberculocephalus* (Sauss.); *Euodynerus guerrero* (Sauss.). Hosts nest in cavities in twigs and in borings in wood.
Chrysis inflata Aaron, 1885. Amer. Ent. Soc., Trans. 12: 237. ♂, ♀.
Chrysis Dugesi du Buysson, 1898 (1897). Soc. Ent. France, Ann. 66: 532, pl. 18, fig. 7. ♀. N. syn. (R. M. Bohart).
Chrysis (*Tetrachrysis*) *nokomis* Rohwer, 1909. Psyche 16: 89. ♂, ♀. N. syn. (R. M. Bohart).

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (host record). —Krombein, 1967. Trap-nesting wasps and bees, pp. 465-466 (life history).

nitidula Fabricius. Transcontinental in U. S. and Canada. Host: *Ancistrocerus a. antilope* (Panz.); *A. c. catskill* (Sauss.); *A. c. albophaleratus* (Sauss.); *A. a. adiabatus* (Sauss.); *Euodynerus f. foraminatus* (Sauss.); *E. schwarzi* (Krom.); *Symmorphus c. cristatus* (Sauss.). Hosts nest in cavities in stems, borings in wood, and abandoned mud cells of mining bees.
Chrysis nitidula Fabricius, 1775. Systema Ent., p. 359.
Chrysis cyanea Villers, 1789. Caroli Linnaei Ent., v. 3, p. 257.
Chrysis (*Tetrachrysis*) *cessata* du Buysson, 1891. Rev. Ent. Caen 10: 36.
Chrysis (*Tetrachrysis*) *chalcopyga* Mocsary, 1914. Mus. Nat. Hungarici, Ann. 12: 48. ♀.

Biology: Harrington, 1896. Canad. Ent. 28: 79 (host record). —Hobbs, Nummi and Virostek, 1961. Canad. Ent. 93: 147 (host record). —Medler, 1964. Ent. Soc. Amer., Ann. 57: 59 (host

record). —Medler, 1964. Ent. Soc. Wash., Proc. 66: 209-215 (life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 466-468 (life history).

parkeri Moore. Que., Alta., B. C., Mont., Idaho, Utah, Nev., Oreg., Calif. Host: *Euodynerus foraminatus scutellaris* (Sauss.); *Leptochilus rufinodus* (Cr.); *Microdynerus bakerianus* (Cam.); *Parancistrocerus acarigaster* (Boh.). Hosts nest in cavities in twigs and in abandoned mud-dauber nests.
Chrysis parkeri Moore, 1966. Ent. Soc. Amer., Ann. 59: 1130, fig. 8. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (host records). —Parker, 1970. Pan-Pacific Ent. 46: 242 (host record).

pellucidula Aaron. Transcontinental in U. S. and southern Canada. Host: *Trypargilum collinum rubrocinctum* (Pack.), *T. t. tridentatum* (Pack.). Hosts nest in cavities in twigs and in borings in wood.
Chrysis pellucidula Aaron, 1885. Amer. Ent. Soc., Trans. 12: 235. ♀.

Biology: Hicks, 1934. Univ. Colo. Studies 21: 267 (host record). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (host record). —Krombein, 1967. Trap-nesting wasps and bees, p. 473 (life history). —Medler, 1967. Amer. Midland Nat. 78: 351 (host record).

remissa Mocsary. Pa., Va., Tex., N. Mex., Ariz.; Mexico (Zacatecas, Veracruz).
Chrysis (*Tetrachrysis*) *remissa* Mocsary, 1914. Mus. Nat. Hungarici, Ann. 12: 52. ♀.

Genus CHRYSIS Subgenus PRAESTOCHRYSIS Linsenmaier

Chrysis subg. *Praestochrysis* Linsenmaier, 1959. Schweiz. Ent. Ges., Mitt. 32: 164.
Type-species: *Chrysis shanghaiensis* Smith. Orig. desig.

This subgenus is not a member of the Nearctic fauna.

shanghaiensis Smith. Liberated in Mass. in 1917-18 but not recovered since 1919; Japan, China, Thailand, India, East Indies. Introduced from China. Host: Diapausing larva, *Cnidocampa flavescens* (Wlkr.), the oriental moth.
Chrysis Shanghaiensis Smith, 1874. Ent. Soc. London, Trans., p. 460. ♀.
Chrysis (*Pentachrysis*) *himalayensis* Mocsary, 1888. *In* Radoszkowski, Hor. Soc. Ent. Ross. 23: 31, fig. 63. ♂.
Chrysis (*Pentachrysis*) *crassiscuta* Mocsary, 1889. Monog. Chrysid., p. 524. ♀.

Biology: Parker, 1936. Jour. Agr. Res. 52: 449-458 (life history, behavior).

Morphology: Parker, 1936. Jour. Agr. Res. 52: 452-455, 5 figs. (egg, larva).

Genus CERATOCHRYSIS Cooper

Chrysis subg. *Ceratochrysis* Cooper, 1952. Amer. Ent. Soc., Trans. 78: 138.
Type-species: *Chrysis* (*Ceratochrysis*) *enhuycki* Cooper. Orig. desig.

Biology and host relationships are known for only a few of the included species. These meager data indicate that species of this genus parasitize eumenid and sphecoid wasps and megachilid bees nesting in cavities in twigs.

Taxonomy: Cooper, 1952. Amer. Ent. Soc., Trans. 78: 137-148. —Bohart, 1966. Kans. Ent. Soc., Jour. 39: 112-113 (redefined and raised to generic rank).

alveata Bohart. Calif., Ariz.
Ceratochrysis alveata Bohart, 1966. Kans. Ent. Soc., Jour. 39: 113, figs. 7, 11, 14. ♂, ♀.

antyga Bohart. Calif., Nev., Ariz., N. Mex. Host: *Trypargilum t. tridentatum* (Pack.); *Pisonopsis birkmanni* Roh.
Ceratochrysis antyga Bohart, 1966. Kans. Ent. Soc., Jour. 39: 115, figs. 6, 13. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94-95 (host records).

bitumida Bohart. N. Mex. (Hidalgo Co.).
Ceratochrysis bitumida Bohart, 1966. Kans. Ent. Soc., Jour. 39: 116, fig. 1. ♀.

cavicantha Bohart. Calif., Ariz.
Ceratochrysis cavicantha Bohart, 1966. Kans. Ent. Soc., Jour. 39: 116, fig. 8. ♂, ♀.

crossata Bohart. Oreg., Calif., Nev., Utah, Ariz., N. Mex., Tex.; Mexico (Hidalgo, San Luis Potosi, Puebla, Mexico).
Ceratochrysis crossata Bohart, 1966. Kans. Ent. Soc., Jour. 39: 117, figs. 2, 9, 12. ♂, ♀.

cyanosoma Mocsary. Wash., Oreg., Calif., Nev., Utah, Wyo.
Chrysis (*Holochrysis*) *cyanosoma* Mocsary, 1914. Mus. Nat. Hungarici, Ann. 12: 17. ♀.

declinis Bohart. N. B., N. S., Ont., Maine, N. H., Conn., N. Y., Mich., Wis., Minn., Sask., Colo., Alta.
Ceratochrysis declinis Bohart, 1966. Kans. Ent. Soc., Jour. 39: 119, figs. 10, 15. ♂, ♀.

enhuycki (Cooper). N. Y. to Fla., Mo., Tex., Utah, Ariz. Host: *Leptochilus ornatus* Sauss. Reared from sumac twigs.
Chrysis (*Ceratochrysis*) *enhuycki* Cooper, 1952. Amer. Ent. Soc., Trans. 78: 140, figs. 3, 5, 6, 8, 9. ♀, ♂.

Biology: Krombein, 1959. Ent. News 70: 17-23 (life history).

faceta (Aaron). Colo., Tex., N. Mex., Calif.
Chrysis faceta Aaron, 1885. Amer. Ent. Soc., Trans. 12: 229. ♂.

Taxonomy: Cooper, 1952. Amer. Ent. Soc., Trans. 78: 144-147, figs. 1, 4, 10 (redescription male). —Bohart, 1966. Kans. Ent. Soc., Jour. 39: 119.

kansensis (Viereck). Generally distributed in southern Canada and U. S. west to Alta., Wyo., Colo. and Ariz.; Mexico (Jalisco).
Chrysis (*Gonochrysis*) *kansensis* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 193.

Taxonomy: Bohart, 1966. Kans. Ent. Soc., Jour. 39: 120, fig. 19.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14, pp. 42-43, pl. 13, figs. J-N (male genitalia).

longiceps Bohart. Nev., Ariz.; Mexico (Guanajuato).
Ceratochrysis longiceps Bohart, 1966. Kans. Ent. Soc., Jour. 39: 120, fig. 4. ♂, ♀.

nearctica (Mocsary). Tex., Ariz., Calif.; Mexico (Sonora).
Spintharis nearctica Mocsary, 1911. Mus. Nat. Hungarici, Ann. 9: 462. ♀.

Taxonomy: Bohart, 1966. Kans. Ent. Soc., Jour. 39: 115, 121.

perpulchra (Cresson). U. S. and Canada west of 100th meridian, south to Costa Rica. Host: *Ammophila aberti* Hald.
Chrysis perpulchra Cresson, 1865. Ent. Soc. Phila., Proc. 4: 308. ♀.

Taxonomy: Bohart, 1966. Kans. Ent. Soc., Jour. 39: 122.

Biology: Hicks, 1932. Canad. Ent. 64: 150-151 (host record).

quadrituberculata (Cameron). Idaho, Tex., Ariz., south to El Salvador, Honduras.
Chrysis quadrituberculata Cameron, 1888. Biol. Cent.-Amer., Hym., v. 1, p. 461, pl. 20, figs. 7, 72.

Taxonomy: Cooper, 1952. Amer. Ent. Soc., Trans. 78: 142-144, figs. 2, 7, 11. ♂, ♀. —Bohart, 1966. Kans. Ent. Soc., Jour. 39: 119.

thysana Bohart. Oreg., Calif., Nev. Host: *Leptochilus periallis* Prkr.
Ceratochrysis thysana Bohart, 1966. Kans. Ent. Soc., Jour. 39: 120, figs. 5, 16. ♂, ♀.

Biology: Parker and Bohart, 1968. Pan-Pacific Ent. 44: 2 (host record).

trachypleura Bohart. B. C. and Mont. south to Calif., Ariz. and Colo. Host: *Ammophila aberti* Hald.
Ceratochrysis trachypleura Bohart, 1966. Kans. Ent. Soc., Jour. 39: 121, figs. 3, 17. ♂, ♀.

Biology: Hicks, 1932. Canad. Ent. 64: 150 (host; parasite misdet. as *perpulchra* Cr.).

tuberella Bohart. Oreg., Calif., Nev., Utah, Colo. Host: *Leptochilus rufinodus* (Cr.).
Ceratochrysis tuberella Bohart, 1966. Kans. Ent. Soc., Jour. 39: 122, fig. 18. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (host record).

unita (Mocsary). Tex., Colo., Calif.; Mexico.
Chrysis (*Olochrysis*) *unita* Mocsary, 1889. Monog. Chrysid., p. 211. ♀.

Genus EUCHROEUS Latreille

Taxonomy: Linsenmaier, 1968. Schweiz.Ent. Ges., Mitt. 41: 38-47.

Genus EUCHROEUS Subgenus EUCHROEUS Latreille

Euchroeus Latreille, 1809. Gen. Crust. Ins., v. 4, p. 578.
Type-species: *Chrysis purpuratus* Fabricius. Monotypic.

The typical subgenus does not occur in North America.

Genus EUCHROEUS Subgenus PSEUDOSPINOLIA Linsenmaier

Euchroeus subg. *Pseudospinolia* Linsenmaier, 1951. Schweiz. Ent. Ges., Mitt. 24: 27.
Type-species: *Chrysis uniformis* Dahlbom. Orig. desig.

neglectus (Shuckard). Alta., Man., Sask., Minn., N. Dak., Nebr., Mont., Colo., N. Mex.; Europe, Asia. Host: *Odynerus spinipes* (L.), *O. reniformis* (Gmel.) in Europe; putative host in North America is *O. dilectus* Sauss.
Chrysis neglecta Shuckard, 1837. Ent. Mag. 4: 169.
Olochrysis semicuprea Viereck, 1903. Amer. Ent. Soc., Trans. 29: 70. ♀. N. syn. (R. M. Bohart).

Genus SPINTHAROSOMA Zimmermann

Spintharosoma Zimmermann, 1959. Deut. Ent. Ztschr. 6: 32.
Type-species: *Spintharosoma chrysonota* Dahlbom. Orig. desig.
Euchroeus subg. *Hyalichroeus* Linsenmaier, 1959. Schweiz. Ent. Ges., Mitt. 32: 70.
Type-species: *Spintharosoma chrysonota* Dahlbom. Orig. desig.

Dahlbom misidentified *Spintharis* Klug. The names listed above were proposed for *Spintharis* sensu Dahlbom.

mesillae (Cockerell). Southern Tex. to southern Calif., Utah; Mexico (Sonora). Host: *Ammophila breviceps* Sm.; *A. femurrubra* Fox. The host species nest in soil.
Chrysis (*Dichrysis*) *mesillae* Cockerell, 1894. Ent. News 5: 125. ♀.
Chrysis (*Dichrysis*) *bigeloviae* Cockerell, 1897. Ann. and Mag. Nat. Hist. 19: 401. ♂.
Spintharis annulipes Mocsary, 1911. Mus. Nat. Hungarici, Ann. 9: 462. ♂.

trochilus (du Buysson). U. S. west of 100th meridian; Mexico (Sonora).
Chrysis (*Spintharis*) *trochilus* du Buysson, 1891. Rev. Ent. Caen 10: 32. ♀.

Genus CHRYSURA Dahlbom

Chrysura Dahlbom, 1845. Dispos. Method. Spec. Hym., pt. 2, p. 6.
Type-species: *Chrysis austriaca* Fabricius. Desig. by Bodenstein, 1939.
Chrysogona Foerster, 1853. Naturh. Ver. Rheinlande, Verh. 10: 327.
Type-species: *Chrysogona gracillima* Foerster. Monotypic.
Chrysis subg. *Olochrysis* Lichtenstein, 1876. Petites Nouv. Ent., v. 2, p. 27.
Type-species: *Chrysis aerata* Dahlbom. Desig. by Ashmead, 1902 (=*Chrysis trimaculata* Foerster).
Chrysis subg. *Monochrysis* Lichtenstein, 1876. Petites Nouv. Ent., v. 2, p. 27.
Type-species: *Chrysis hybrida* Lepeletier. Desig. by Ashmead, 1902.
Holochrysis Rye, 1878. Zool. Record for 1876, v. 13, Ins., p. 134. Emend.
Chrysoura Dalla Torre, 1892. Cat. Hym., v. 6, p. 40. Emend.
Chrysis subg. *Arctochrysis* Haupt, 1956. [Dresden] Mus. f. Tierkunde u. Voelkerk., Abhandl. u. Ber. 23: 72.
Type-species: *Chrysis austriaca* Fabricius. Orig. desig.
Chrysis subg. *Taeniochrysis* Haupt, 1956. [Dresden] Mus. f. Tierkunde u. Voelkerk., Abhandl. u. Ber. 23: 72.
Type-species: *Chrysis dichroa* Dahlbom. Orig. desig.
Chrysis subg. *Selenochrysis* Haupt, 1956. [Dresden] Mus. f. Tierkunde u. Voelkerk., Abhandl. u. Ber. 23: 72.
Type-species: *Chrysis candens* Germar. Orig. desig.

Chrysis subg. *Ischnochrysis* Haupt, 1956. [Dresden] Mus. f. Tierkunde u. Voelkerk., Abhandl. u. Ber. 23: 73.
Type-species: *Chrysis gracillima* Foerster. Orig. desig.

The known life histories indicate that the female *Chrysura* deposits her egg in a host cell at the time that it is being provisioned. The parasite egg hatches after that of the host and the newly hatched *Chrysura* larva attaches to the host body, imbibes a small amount of body fluids, but does not molt until the host larva spins its cocoon and enters the resting stage. The *Chrysura* larva then molts, devours the host larva, and spins its cocoon within that of the host. Development to the adult stage and emergence from the nest is synchronized with the host. In vernal univoltine species the host and parasite transform to adults late in the summer and overwinter in the cocoons.

In addition to the hosts listed below for some of the species, Thorp (1968. Kans. Ent. Soc., Jour. 41: 324-331) published life history notes on a species near *pacifica* (Say) which parasitized *Proteriades bunocephala* (Mich.) in California.

boharti Horning. B. C., Wash., Idaho, Calif., Wyo.
Chrysura boharti Horning, 1971. Pan-Pacific Ent. 47: 29, figs. 2, 5, 8, 9, 11, 13. ♂, ♀.

cobaltina (Aaron). Mass., Mich., Ind., Ill., Mont., Wyo., Utah, Calif., Wash., B. C.
Chrysis cobaltina Aaron, 1885. Amer. Ent. Soc., Trans. 12: 228. ♀.
Chrysis lateri-dentata Aaron, 1885. Amer. Ent. Soc., Trans. 12: 228. ♀.

crescentis Horning. U. Sonor. and Transit. Zones in central and southern California.
Chrysura crescentis Horning, 1971. Pan-Pacific Ent. 47: 27, figs. 1, 3, 4, 6, 7, 10, 12. ♂, ♀.

densa (Cresson). Wash., Idaho, Oreg., Calif., Nev., Utah, Ariz., Wyo., Colo., Tex. Host: *Pseudomasaris edwardsii* (Cr.); *P. vespoides* (Cr.); *P. zonalis* (Cr.). Hosts nest in mud cells attached to rocks.
Chrysis densa Cresson, 1865. Ent. Soc. Phila., Proc. 4: 307. ♀.

Biology: Hicks, 1927. Canad. Ent. 59: 78 (host record). —Hicks, 1929. Canad. Ent. 61: 122 (host record).

inusitata Aaron. B. C., Oreg., Calif., Utah, Colo., N. Y., Va.
Chrysis inusitata Aaron, 1885. Amer. Ent. Soc., Trans. 12: 227. ♂.
Chrysis optima Aaron, 1885. Amer. Ent. Soc., Trans. 12: 227. ♀.
Chrysis (*Holochrysis*) *interfata* du Buysson, 1908. Rev. Ent. Caen 27: 208.

kyrae Krombein. Md. to Ga., Ind., Mo., Colo., Utah, Idaho, B. C., Wash., Oreg., Calif. Host: *Osmia l. lignaria* Say in borings in wood.
Chrysura kyrae Krombein, 1963. Ent. News 74: 150. ♂, ♀.

Biology: Krombein, 1963. Ent. News 74: 152 (life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 444-445, figs. 87, 88, 128-130 (life history).

martia (Patton). Lower Canada, Mich.
Chrysis martia Patton, 1879. Canad. Ent. 11: 67-68.

pacifica (Say). Transcontinental in U. S. and Canada. Host: *Osmia kincaidii* Ckll., *O. pumila* Cr., *O. tanneri* Sandh., *O. georgica* Cr., *O. nigrifrons* Cr., *O. coloradensis* Cr. Predator: *Philanthus pulcher* D. T.
Chrysis pacifica Say, 1828. Contrib. Maclur. Lyc. Phila. 1: 82.
Chrysis hilaris Dahlbom, 1854. Hym. Europaea, v. 2, p. 103.
Chrysis halictula Gribodo, 1874. Mus. Civ. Stor. Genova, Ann. 6: 359.
Chrysis resecta Gribodo, 1879. Mus. Civ. Stor. Nat. Genova., Ann. 14: 336. N. syn. (R. M. Bohart).

Taxonomy: Krombein, 1963. Ent. News 74: 149-150. —Horning, 1971. Pan-Pacific Ent. 47: 31.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 97 (host record). —Krombein, 1967. Trap-nesting wasps and bees, pp. 446-447, fig. 131 (life history). —Parker, 1975. Pan-Pacific Ent. 51: 182 (host). —Hawkins, 1975. Kans. Ent. Soc., Jour. 48: 498 (host).

smaragdicolor (Walker) B. C. to Calif., Idaho, Wyo., Utah, N. Mex., Colo., N. Dak. Host: *Osmia longula* Cr.
Chrysis smaragdicolor Walker, 1866. *In* Lord, Naturalist in Vancouver Isl. and B. C., v. 2, p. 343.

Taxonomy: Krombein, 1963. Ent. News 74: 149.

Biology: Leech, 1948. Ent. Soc. Brit. Columbia, Proc. 44: 27 (host record).

sonorensis (Cameron). Idaho, Oreg., Calif., Utah, Ariz., N. Mex.; Mexico (Baja California).
Host: *Ashmeadiella aridula* Ckll.; *A. bigeloviae* (Ckll.); *A. bucconis denticulata* (Cr.); *A. occipitalis* Mich.; *Hoplitis producta gracilis* (Mich.); *Anthocopa c. copelandica* (Ckll.); *A. c. albomarginata* (Ckll.); *Osmia kincaidii* Ckll. Hosts nest in cavities in twigs or in borings in wood.
Chrysis Sonorensis Cameron, 1888. Biol. Cent.-Amer., Hym., v. 1, p. 461.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 96-97 (host records). —Parker, 1967. Pan-Pacific Ent. 43: 215 (host record). —Krombein, 1967. Trap-nesting wasps and bees, pp. 447-449 (life history). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 4 (host record). —Parker, 1975. Pan-Pacific Ent. 51: 119 (host).

tota (Aaron). Md., Iowa, Colo., Idaho, Utah, Calif., B. C.
Chrysis integra Cresson, 1865. Ent. Soc. Phila., Proc. 4: 306-307. ♂. Preocc.
Chrysis tota Aaron, 1885. Amer. Ent. Soc., Trans. 12: 228. N. name.
Chrysis elongata Mocsary, 1887. Termes., Fuzetek 11: 15. N. name.

Genus NEOCHRYSIS Linsenmaier

Taxonomy: Bohart, 1966 (1963). Brooklyn Ent. Soc., Bul. 58: 139-144 (generic reclassification).

Genus NEOCHRYSIS Subgenus NEOCHRYSIS Linsenmaier

Pleurocera subg. *Neochrysis* Linsenmaier, 1959. Schweiz. Ent. Ges., Mitt. 32: 74.
Type-species: *Chrysis punctatissima* Spinola. Orig. desig.

montezuma (Cameron). Southern Ariz. south to Yucatan.
Chrysis montezuma Cameron, 1888. Biol. Cent.-Amer., Hym., v. 1, p. 463. ♀.

Genus NEOCHRYSIS Subgenus EXOCHRYSIS Bohart

Neochrysis subg. *Exochrysis* Bohart, 1966 (1963). Brooklyn Ent. Soc., Bul. 58: 141.
Type-species: *Chrysis panamensis* Cameron. Orig. desig.

panamensis (Cameron). Pa. to Fla., Ind., Okla., south to Panama. Ecology: Hosts nest in borings in wood. Host: *Podium rufipes* (F.); *P. luctuosum* Sm.?
Chrysis Panamensis Cameron, 1888. Biol. Cent.-Amer., Hym., v. 1, p. 464, pl. 20, fig. 8. ♀.
Chrysis (*Tetrachrysis*) *alabamensis* Mocsary, 1914. Mus. Nat. Hungarici, Ann. 12: 49. ♀.

Taxonomy: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 149, fig. 4. —Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 108 (synonymy). —Bohart, 1966 (1963). Brooklyn Ent. Soc., Bul. 58: 141. ♀, ♂.

Biology: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 147-149 (life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 473-475 (life history).

Genus NEOCHRYSIS Subgenus IPSIURA Linsenmaier

Ipsiura Linsenmaier, 1959. Schweiz. Ent. Ges., Mitt. 32: 74.
Type-species: *Chrysis marginalis* Brulle. Orig. desig.

genbergi (Dahlbom). Fla.; Brazil, Argentina.
Chrysis genbergi Dahlbom, 1854. Hym. Europaea, v. 2, p. 319. ♀.

neolateralis Bohart. D. C., Va., Ga., Ill., Kans., Ark. south to El Salvador.
Neochrysis (*Ipsiura*) *neolateralis* Bohart, 1966 (1963) Brooklyn Ent. Soc., Bul. 58: 143. ♂, ♀.

pilifrons (Cameron). Southern Tex. to southern Mexico.
Chrysis pilifrons Cameron, 1888. Biol. Cent.-Amer., Hym., v. 1, p. 465. ♂.
Chrysis (*Hexachrysis*) *stenops* Mocsary, 1889. Monog. Chrysid., p. 571. ♀.

Genus TRICHRYSIS Lichtenstein

Chrysis subg. *Trichrysis* Lichtenstein, 1876. Petites Nouv. Ent., v. 2, p. 27.

Type-species: *Sphex cyanea* Linnaeus. Monotypic.

Chrysis subg. *Alocochrysis* Haupt, 1956. [Dresden] Mus. f. Tierkunde u. Voelkerk., Abhandl. u. Ber. 23: 73.
Type-species: *Chrysis cyaneus* Linnaeus. Monotypic.

The hosts of *Trichrysis*, so far as known, nest in cavities in twigs, borings in wood or abandoned nests of mud-daubers.

areolata (Mocsary). Md., Tenn., Tex.; Mexico (Guerrero).
Chrysogona areolata Mocsary, 1911. Mus. Nat. Hungarici, Ann. 9: 463. ♀.

carinata (Say). Mass. to Fla., W. Va., Wis., Mo., Kans., Colo., Tex. Host: *Trypargilum c. collinum* (Sm.); *T. collinum rubrocinctum* (Pack.); *T. clavatum* (Say); *T. striatum* (Prov.).
Chrysis carinata Say, 1828. Contrib. Maclur. Lyc. Phila. 1: 82.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 450-454, figs. 132, 133 (?), 134 (life history).

deversor Bohart. B. C. to Calif., Idaho, Mont., Nev., Utah, Colo. Host: *Trypargilum t. tridentatum* (Pack.).
Trichrysis deversor Bohart, 1966. Biol. Soc. Wash., Proc. 79: 131. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (host record).

doriae (Gribodo). Southern Canada and U. S. south to Panama. Host: *Trypargilum collinum rubrocinctum* (Pack.); *Trypoxylon backi* Sandh.; *T. bidentatum* Fox; *T. fastigium* Fox; *T. frigidum* Sm.; *T. sculleni* Sandh.
Chrysis Doriae Gribodo, 1874. Mus. Civ. Stor. Nat. Genova, Ann. 6: 359.
Chrysis verticalis Patton, 1879. Canad. Ent. 11: 67. ♂.
Chrysis striatellus Norton, 1879. Amer. Ent. Soc., Trans. 7: 241. ♀.
Chrysis discreta Aaron, 1885. Amer. Ent. Soc., Trans. 12: 230. ♀.

Biology: Thomas, 1962. Amer. Midland Nat. 67: 365-366 (life history). —Thomas, 1963. Mich. Acad. Sci., Arts, Letters, Papers 48: 127-130 (life history). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (host records). —Krombein, 1967. Trap-nesting wasps and bees, pp. 449-450 (life history). —Medler, 1967. Amer. Midland Nat. 78: 350 (host record).

mucronata (Brulle). ? Canada, Tex., Ariz., Calif.; south to Venezuela. Host: *Trypargilum t. tridentatum* (Pack.); *Euodynerus p. pratensis* (Sauss.).
Chrysis mucronata Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 45. ♀.

Taxonomy: Bohart, 1966. Biol. Soc. Wash., Proc. 79: 132.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 454-455 (life history).

tridens (Lepeletier). U. S. east of Rocky Mts., south to Argentina. Host: *Trypargilum politum* (Say).
Pyria tridens Lepeletier, 1825. *In* Olivier, Encycl. Meth., Dict. Ins., v. 10, p. 495. ♀.
Chrysis truncata Guerin, 1842. Rev. Zool., p. 146. ♂, ♀.
Chrysis Mexicana Guerin, 1842. Rev. Zool., p. 147.
Chrysis tridentata Dahlbom, 1845. Dispos. Method. Spec. Hym., pt. 2, p. 13.
Chrysis unicolor Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 42. ♀. Preocc.
Chrysis olivieri Brulle, 1846. Hist. Nat. Ins. Hym., v. 4, p. 43. ♀. Type locality erroneous. N. syn. (R. M. Bohart).
Chrysis virens Cresson, 1865. Ent. Soc. Phila. Proc. 4: 309. ♀. Preocc.
Chrysis Brullei Abeille de Perrin, 1879. Soc. Linn. Lyon, Ann. 26: 42. N. name for unicolor Br.

Taxonomy: Bohart, 1966. Biol. Soc. Wash., Proc. 79: 132.

Biology: Johnson, 1974. Ent. Soc. Wash., Proc. 76: 448-449 (host).

Genus STILBUM Spinola

Stilbum Spinola, 1806. Insectorum Liguriae, v. 1, p. 9.
Type-species: *Stilbum calens* Spinola. Desig. by Latreille, 1810 (=*Chrysis cyanura* Foerster).

This genus is not an established member of the Nearctic fauna. A specimen from Ontario in the Provancher collection is either mislabeled or is a stray which did not become established.

cyanurum var. **amethystinum** (Fabricius). One specimen from Ont., but not established; Mediterranean area, Asia, East Indies.
Chrysis amethystina Fabricius, 1775. Systema Ent., p. 359.
Stilbum splendidulum Westwood, 1842. *In* Donovan, Epitome Nat. Hist. Ins. India, p. 88.

Subfamily PARNOPINAE

Genus PARNOPES Latreille

Parnopes Latreille, 1796. Precis. Caract. Gen. Ins., p. 126. No species —Latreille, 1802. Hist. Nat. Crust. Ins., v. 3, p. 317.
Type-species: *Chrysis grandior* Pallas. First included species (=*Chrysis carnea* Fabricius).

Species of *Parnopes* are parasitic on ground-nesting sphecoid wasps belonging to the Bembicini. The egg of *Parnopes* is deposited during provisioning of the nest by the host wasp, but the *Parnopes* larva does not develop until the host larva has spun its cocoon.

Revision: Viereck, 1904. Amer. Ent. Soc., Trans. 30: 245-250. —Telford, 1964. Univ. Calif. Pubs. Ent. 36: 1-42, 5 pls., 1 text fig.

borregoensis Telford. Southern Calif.; Mexico (Baja California).
Parnopes borregoensis Telford, 1964. Univ. Calif. Pubs. Ent. 36: 9, pl. 1, fig. 2. ♂, ♀.

chrysoprasinus Smith. N. Y. south to Fla., west to Wis. and Tex. Host: *Bembix nubilipennis* Cr.; *B. americana spinolae* Lep.?, *Steniolia obliqua* (Cr.)?.
Parnopes chrysoprasinus Smith, 1874. Ent. Soc. London, Trans. p. 454, n. 8. ♂.
Parnopes aglaspidula Melander and Brues, 1902. Biol. Bul. 3: 38. ♀.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 307-308, 314-315 (life history).

concinnus Viereck. Calif. to western Tex., Nev.; Mexico (Baja California, Jalisco). Host: *Bembix multipicta* Sm.?; *Glenostictia scitula* (Fox)?; *Steniolia duplicata* Prov.?
Parnopes concinna Viereck, 1904. Amer. Ent. Soc., Trans. 30: 248. ♀.
Parnopes arizonensis Viereck, 1904. Amer. Ent. Soc., Trans. 30: 249. ♂, ♀.
Parnopes digueti du Buysson, 1904. Rev. d'Ent. Caen 23: 274. ♂.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 205, 344.

edwardsii (Cresson). Alaska to California, east to the Rocky Mts.; Mexico (Baja California). Host: *Bembix amoena* Handl.?; *B. americana comata* Prkr.; *B. americana spinolae* Lep.?; *B. pruinosa* Fox.?; *Steniolia obliqua* (Cr.).
Euchroeus Edwardsii Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. iv. ♀.
Parnopes boutheryi Brethes, 1902. Mus. Nac. Buenos Aires, An. 8 (3): 287. ♀, ♂.
Parnopes hageni Viereck, 1904. Amer. Ent. Soc., Trans. 30: 246. ♂, ♀.
Parnopes henshawi Viereck, 1904. Amer. Ent. Soc., Trans. 30: 247. ♀.

Biology: Bohart and MacSwain, 1940. Pan-Pacific Ent. 16: 92-93. —Evans and Gillaspy, 1964. Amer. Midland Nat. 72: 277, fig. 14. —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 219, 288, 315, 349.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14, pp. 42-43, pl. 13, figs. P, R (male genitalia).

excurvatus Viereck. B. C., Calif., Nev., Ariz.
Parnopes excurvata Viereck, 1904. Amer. Ent. Soc., Trans. 30: 250. "♀" = ♂.

festivus Cockerell. Colo., Ariz. to western Tex.; Mexico (Chihuahua).
Parnopes festivus Cockerell, 1894. Ent. News 5: 328. ♀.

fulvicornis atlanticus Krombein. Md., Va., N. C., ? Fla. Host: *Microbembex monodonta* (Say)?
Parnopes westcottii atlanticus Krombein, 1958. Amer. Ent. Soc., Trans. 84: 164. ♀, ♂.

Biology: Krombein, 1958. Amer. Ent. Soc., Trans. 84: 166-167.

fulvicornis fulvicornis Cameron. Idaho and Iowa south to Calif. and Tex., and further south to Guatemala. Host: *Microbembex nigrifrons* (Prov.); *M. monodonta* (Say)?

Parnopes fulvicornis Cameron, 1888. Biol. Cent.-Amer. Hym., v. 1, p. 466, pl. 20, figs. 1, 1a. ♀.

Parnopes westcottii Melander and Brues, 1902. Biol. Bul. 3: 39. ♂, ♀.

Parnopes diadema Viereck, 1904. Amer. Ent. Soc., Trans. 30: 248. ♂, ♀.

Parnopes taeniata Viereck, 1904. Amer. Ent. Soc., Trans. 30: 249. ♀.

Biology: Bohart and MacSwain, 1940. Pan-Pacific Ent. 16: 92-93 (host record for *nigrifrons* misdet. as *aurata*). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 387-388.

Family DRYINIDAE

The North American fauna is very poorly known and probably a large number of taxa remain to be collected and described. Except in the Aphelopinae the sexes are strongly dimorphic and difficult to associate except by rearing. Males appear to be extremely rare or lacking in many species. Classification of the family is based entirely on characters of the females.

These small wasps parasitize nymphs of Homoptera, principally species belonging to the Fulgoridae, Cercopidae, Membracidae and Cicadellidae. The wasp larvae develop endoparasitically in the host abdomen. In the later stages of development the parasite protrudes from the host abdomen as a cyst, formed from the moulted skins of the parasite in the Anteoninae, Dryininae and Gonatopodinae, but from the host tissues in the Aphelopinae. Pupation takes place in a cocoon spun on the host's food plant or in the soil.

Taxonomy: Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 80-102. —Kieffer, 1914. Das Tierreich, Lief. 41, pp. 7-222. —Richards, 1939. Roy. Ent. Soc. London, Trans. 89: 188-293 (British species). —Richards, 1953. Roy. Ent. Soc. London, Trans. 104: 51-70 (keys to some genera of Anteoninae and Dryininae). —Ponamarenko, 1970. Rev. d'Ent. de l'USSR 49: 423-427 (family reclassification; English translation, 1971. Ent. Rev. 49: 254-256).

Biology: Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1(1): 6-20. —Haupt, 1916. Ztschr. f. Wiss. Insektenbiol. 12: 217-223. —Fenton, 1918. Ohio Jour. Sci. 18: 182-257.

Morphology: Swezey, 1903. Ohio Naturalist 3: 448-451. —Haupt, 1932. Zool. Anz. 99: 1-18. —Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 409-412, figs. 47-50 (female, male thorax).

Subfamily ANTEONINAE

Genus ANTEON Jurine

Genus ANTEON Subgenus ANTEON Jurine

Anteon Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 302.
Type-species: *Anteon jurineanus* Latreille. First included species.

Antaeon Haliday, 1833. Ent. Mag. 1: 275. Emend.

Prosanteon Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 66.
Type-species: *Prosanteon chelogynoides* Perkins. Orig. desig.

Liodryinus Kieffer, 1913. Lab. Zool. Gen. e Agr. Portici, Bol. 7: 325.
Type-species: *Anteon doddi* Kieffer. Orig. desig.

Xenanteon Kieffer, 1913. Soc. Ent. France, Bul., p. 300.
Type-species: *Xenanteon reticulatus* Kieffer. Desig. by Muesebeck and Walkley, 1951.

Allanteon Kieffer, 1914. Das Tierreich, Lief. 41, p. 198.
Type-species: *Anteon punctatus* Kieffer. Monotypic.

arizonensis Perkins. Ariz. (Nogales). Host: Cicadellidae nymph.

Anteon arizonensis Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 51. ♂, ♀.

canadensis (Ashmead). Que., Ont., Md.

Chelogynus canadensis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 93. ♀.

hirtifrons Whittaker. B. C. (Hollyburn).
Anteon hirtifrons Whittaker, 1930. Ent. Soc. Wash., Proc. 32: 68. ♂.

minutus Ashmead. D. C.
Anteon minutus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 97. ♀.

pallidicornis Ashmead. Utah (Utah Lake).
Anteon pallidicornis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 97. ♀.

politus Ashmead. Que., Ont.
Anteon politus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 96. ♀.

popenoei (Ashmead). Kans. Assigned questionably to *Anteon*.
Dryinus popenoei Ashmead, 1888. Kans. State Col. Agr., Bul. 3: App., p. I. ♂.

puncticeps Ashmead. D. C., Va.
Anteon puncticeps Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 97. ♂.

rugosiceps Kieffer. Calif. (Santa Clara).
Anteon rugosiceps Kieffer, 1906. Berlin. Ent. Ztschr. 50: 238. ♂.

tibialis Say. D. C., Ind. Assigned questionably to *Anteon*.
Anteon tibialis Say, 1836. Boston Jour. Nat. Hist. 1: 284. ♂.

unifasciatus Ashmead. Fla. (Biscayne Bay).
Anteon unifasciatus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 95. ♀.

whittakeri Muesebeck and Walkley. B. C.
Anteon flaviscapus Whittaker, 1930. Ent. Soc. Wash., Proc. 32: 67. ♂. Preocc.
Anteon whittakeri Muesebeck and Walkley, 1951. U. S. Dept. Agr., Monog. 2: 1040. N. name.

Genus ANTEON Subgenus CHELOGYNUS Haliday

Chelogynus Haliday, 1838. Ent. Mag. 5: 518.
Type-species: *Dryinus infectus* Haliday. Desig. by Muesebeck and Walkley, 1951.
Neochelogynus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 60.
Type-species: *Neochelogynus typicus* Perkins. Orig. desig.
Lasianteon Kieffer, 1913. Soc. Ent. France, Bul. p. 200.
Type-species: *Anteon rubrifrons* Kieffer. Desig. by Muesebeck and Walkley, 1951.
Callianteon Kieffer, 1913. Soc. Ent. France, Bul., p. 300.
Type-species: *Anteon bifasciatus* Kieffer. Monotypic.

funestus Perkins. Ariz. Host: Cicadellidae nymph.
Chelogynus funestus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 48. ♀, ♂.

lusus Perkins. Ariz. (Tucson). Host: Cicadellidae nymph.
Chelogynus lusus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 50. ♀.

melanacrias Perkins. Ariz. (Nogales).
Chelogynus melanacrias Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 49. ♀.

minimus Fenton. N. Y. (Barneveld).
Chelogynus minimus Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 13. ♀.

osborni Fenton. Ohio (Sandusky). Host: *Chlorotettix unicolor* (Fitch).
Chelogynus osborni Fenton, 1918. Ohio Jour. Sci. 18: 256, 272. ♀.

rugulosus Fenton. N. B. (Saint John).
Chelogynus rugulosus Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 14. ♀.

virginiensis Fenton. Va. (Rosslyn).
Chelogynus virginiensis Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 14. ♀.

vivariensis Bradley. N. Y., R. I.
Chelogynus vivariensis Bradley, 1926. Biol. Soc. Wash., Proc. 39: 7. ♀.

xanthothorax Bradley. N. Y.
Chelogynus xanthothorax Bradley, 1926. Biol. Soc. Wash., Proc. 39: 8. ♀.

Genus DEINODRYINUS Perkins

Deinodryinus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 45.
Type-species: *Deinodryinus paradoxus* Perkins. Desig. by Muesebeck and Walkley, 1951.

atriceps (Brues). N. Y., Pa., Va., W. Va., Iowa, Kans.
Bocchus atriceps Brues, 1904. Canad. Ent. 36: 118. ♀.
Deinodryinus variabilis var. *carinatus* Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 11. ♀.

atriventris (Cresson). Tex.
Dryinus atriventris Cresson, 1872. Amer. Ent. Soc., Trans. 4: 193. ♀.

ferrugineus (Brues). Tex.
Chelogynus ferrugineus Brues, 1905. Wis. Nat. Hist. Soc., Bul. 3: 183. ♀.

grandis (Brues). Mass., N. Y., W. Va.
Chelogynus grandis Brues, 1905. Wis. Nat. Hist. Soc., Bul. 3: 184. ♀.

henshawi (Ashmead). Mass. N. Y., Wis., Nebr.
Chelogynus Henshawi Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 93. ♀.

paradoxus Perkins. Ariz. (Nogales). Host: *Cicadellidae* sp. on oak.
Deinodryinus paradoxus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 46. ♀, ♂.

pilosus Fenton. Ariz. (Chiricahua Mts.).
Deinodryinus pilosus Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 12. ♀.

quercicola Perkins. Ariz. (Nogales).
Deinodryinus quercicola Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 47. ♀.

schaefferi (Brues). Ariz., Tex.
Chelogynus schaefferi Brues, 1907. Wis. Nat. Hist. Soc., Bul. 5: 101. ♀.

variabilis Fenton. Va. (Falls Church).
Deinodryinus variabilis Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 10. ♀.

Genus PRENANTEON Kieffer

Prenanteon Kieffer, 1913. Soc. Ent. France, Bul. p. 301.
Type-species: *Anteon crassiscapus* Kieffer. Desig. by Kieffer, 1914.

americanus Kieffer. Wis.
Prenanteon americanum Kieffer, 1914. Soc. Ent. France, Bul. p. 91.

bakeri (Kieffer). Nev. (Ormsby Co.).
Anteon bakeri Kieffer, 1906. Berlin. Ent. Ztschr. 50: 239. ♀.

micropunctatus Fenton. N. B. (Nerepis).
Prenanteon micropunctatus Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 15. ♀.

Genus TRISANTEON Kieffer

Trisanteon Kieffer, 1913. Soc. Ent. France, Bul. p. 300.
Type-species: *Anteon hirticornis* Kieffer. Monotypic.

rugosus (Ashmead). Ill.
Anteon rugosus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 96. ♂.

Genus HESPERODRYINUS Perkins

Hesperodryinus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 40.
Type-species: *Hesperodryinus arizonicus* Perkins. Orig. desig.

amphiscepae Perkins. Ariz. (Nogales). Host: *Acanalonia bivittata* (Say) nymph.
Hesperodryinus amphiscepae Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 41. ♀.

arizonicus Perkins. Ariz. (Nogales). Host: *Mistharnophantia sonorana* Kirk. nymph.
Hesperodryinus arizonicus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 42. ♀.

audax Perkins. Ariz. (Nogales).
Hesperodryinus audax Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 43. ♀.

Genus BOCCHUS Ashmead

Bocchus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 91.
Type-species: *Bocchus flavicollis* Ashmead. Orig. desig.
Phorbas Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 90. Preocc.
Type-species: *Phorbas laticeps* Ashmead. Monotypic.
Eukoebeleia Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 59.
Type-species: *Eukoebeleia mirabilis* Perkins. Orig. desig.
Phorbasia kieffer, 1914. Das Tierreich, Lief. 41, p. 58. N. name.
Neoanteon Fouts, 1922. Philippine Jour. Sci. 20: 633.
Type-species: *Neoanteon rubrica* Fouts. Orig. desig.

Taxonomy: Fenton, 1918. Ohio Jour. Sci. 18: 261 (key to spp.).

arizonica (Perkins). Ariz. (Nogales). Host: *Bruchomorpha* sp.?
Eukoebeleia arizonica Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 44 ♀.

flavicollis Ashmead. Mich. (Marquette).
Bocchus flavicollis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 91. ♀.

laticeps (Ashmead). Fla.
Phorbas laticeps Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 90. ♂.

mirabilis (Perkins). Ohio. Host: *Bruchomorpha oculata* Newm.
Eukoebeleia mirabilis Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 59. ♀.

Subfamily DRYININAE

Genus MESODRYINUS Kieffer

Mesodryinus Kieffer, 1906. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 497.
Type-species: *Dryinus niger* Kieffer. Orig. desig.

alatus (Cresson). Tex.
Gonatopus (?) *alatus* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 193. ♀.

americanus (Ashmead). Fla.
Mystrophorus americanus Ashmead, 1887. Ent. Amer. 3: 128. ♀.

crawfordi Krombein. Md. (Plummers Island).
Mesodryinus crawfordi Krombein, 1962. Biol. Soc. Wash., Proc. 75: 3. ♀.

Genus TETRADRYINUS Kieffer

Tetradryinus Kieffer, 1913. Lab. Zool. Gen. e Agr. Portici, Bol. 7: 325.
Type-species: *Bocchus flavipes* Kieffer. Monotypic.

flavipes (Kieffer). Nev. (Ormsby Co.).
Bocchus flavipes Kieffer, 1906. Berlin. Ent. Ztschr. 50: 237 ♀.

Genus THAUMATODRYINUS Perkins

Thaumatodryinus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1 (1): 58.
Type-species: *Thaumatodryinus koebelei* Perkins. Orig. desig.

Taxonomy: Krombein, 1952. Amer. Ent. Soc., Trans. 78: 97-99, 1 pl. (revis. gen. diag. and key to spp.)

perkinsi Krombein. Va. (Westmoreland St. Pk.).
Thaumatodryinus perkinsi Krombein, 1952. Amer. Ent. Soc., Trans. 78: 99, figs. 2, 2a, 2b. ♀.

Genus PERODRYINUS Perkins

Perodryinus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 43.
Type-species: *Perodryinus amoenus* Perkins. Monotypic.

amoenus Perkins. Ariz. (Nogales). Host: *Acanalonia bivittata* (Say) nymph.
Perodryinus amoenus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 43. ♀, ♂.

Subfamily GONATOPODINAE

Genus NEODRYINUS Perkins

Genus NEODRYINUS Subgenus NEODRYINUS Perkins

Neodryinus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1 (1): 50.
Type-species: *Neodryinus koebelei* Perkins. Orig. desig.
Prodryinus subg. *Ctenodryinus* Arle, 1935. Rio de Janeiro, Mus. Nac., Bol. 11: 46.
Type-species: *Prodryinus* (*Ctenodryinus*) *affinis* Arle. Monotypic.

The typical subgenus does not occur in North America.

Genus NEODRYINUS Subgenus PRODRYINUS Kieffer

Neodryinus subg. *Psilodryinus* Kieffer, 1906. *In* Andre, Spec. Hym., Eur. Alg., v. 9, p. 497.
Type-species: *Dryinus acuticollis* Kieffer. Orig. desig.
Prodryinus Kieffer, 1906. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 497.
Type-species: *Dryinus brachycerus* Kieffer. Orig. desig.
Phanerodryinus Roepke, 1916. Tijdschr. v. Ent. 59: 289.
Type-species: *Phanerodryinus javanus* Roepke. Orig. desig.

Psilodryinus has line priority over *Prodryinus*, but Richards (1953), the first reviser, placed the former as a synonym of the latter.

arizonicus Perkins. Ariz. (Nogales). Host: *Ormenis septentrionalis* (Spin.) nymph.
Neodryinus arizonicus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 38. ♀.

carinatus (Fouts). Pa. (Carlisle).
Psilodryinus carinatus Fouts, 1924. Ent. Soc. Wash., Proc. 26: 160. ♀.

dubiosus Perkins. Ariz. (Nogales).
Neodryinus dubiosus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 39. ♀.

typhlocybae (Ashmead). N. Y., D. C., Ohio, Ill., Iowa, Ark., Kans., Tex. Host: *Metcalfa pruinosa* (Say), *Anormenis septentrionalis* (Spin.).
Labeo typhlocybae Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 89. ♂.
Dryinus ormenidis Ashmead, 1903. Ent. News 14: 192. ♀.
Dryinus nigrellus Brues, 1904. Canad. Ent. 36: 117. ♀.

Biology: Dean and Bailey, 1961. Jour. Econ. Ent. 54: 1104-1106, 2 figs.

Genus CYRTOGONATOPUS Kieffer

Pachygonatopus subg. *Cyrtogonatopus* Kieffer, 1907. *In* Wytsman, Gen. Ins., fasc. 54, p. 19.
Type-species: *Pachygonatopus* (*Cyrtogonatopus*) *breviforceps* (Kieffer). Monotypic.

Taxonomy: Richards, 1969. Roy. Ent. Soc. London, Proc. (B) 38: 80 (genus redescription).

clavicornis Fenton. Tex. (Brownsville).
Cyrtogonatopus clavicornis Fenton, 1927. U. S. Natl. Mus., Proc. 72(8): 3.

Genus PRISTOGONATOPUS Kieffer

Pristogonatopus Kieffer, 1913. Lab. Zool. Gen. e. Agr. Portici, Bol. 7: 325.
Type-species: *Gonatopus dentatiforceps* Kieffer. Orig. desig.

sjostedti (Kieffer). Tex.
Gonatopus sjostedti Kieffer, 1904. Arkiv. for Zool. 1: 525. ♀.

Genus DICONDYLUS Haliday

Dicondylus Haliday, 1829-30. *In* Curtis, Guide Brit. Ins., col. 110.
Type-species: *Dryinus bicolor* Haliday. Desig. by Kieffer, 1914.
Labeo Haliday, 1833. Ent. Mag. 1: 273. Preocc.
Type-species: *Labeo vitripennis* Haliday. Monotypic.
Labeola Haldeman, 1842. Acad. Nat. Sci. Phila., Proc. 1: 192. N. name.
Laberius Kieffer, 1914. Das Tierreich, Lief. 41, p. 59. N. name.
Laberinus(!) Ogloblin, 1932. Rev. de Ent. Sao Paulo 2: 266. Misspelling.

albitarsis (Kieffer). Nev.
Labeo albitarsis Kieffer, 1906. Berlin. Ent. Ztschr. 50: 2.

nasutus (Ashmead). Fla. (Jacksonville).
Embolemus nasutus Ashmead, 1887. Ent. Amer. 3: 75. ♂.

texanus (Ashmead). Tex. Assigned questionably to *Dicondylus*.
Labeo texanus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 89. ♂.

Genus PSEUDOGONATOPUS Perkins

Pseudogonatopus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 34.
Type-species: *Pseudogonatopus kurandae* Perkins. Orig. desig.

americanus Perkins. Ohio (Columbus).
Pseudogonatopus americanus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 37. ♀.

arizonicus Perkins. Ariz. (Nogales). Host: *Stobaera?* sp., nymph and adult.
Pseudogonatopus arizonicus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 36. ♀.

autoxenobius Perkins. Ariz. (Nogales). Host: *Stobaera?* sp. adult.
Pseudogonatopus autoxenobius Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 37. ♀.

iowensis Fenton. Iowa. Host: *Delphacodes lutulenta* (Van D.).
Pseudogonatopus iowensis Fenton, 1924. Ohio Jour. Sci. 24: 191. ♀.

magnus Brown. Ind. (Wawasee Lake).
Pseudogonatopus magnus Brown, 1940. Ent. News. 51: 11. ♀.

stenocrani dubiosus Perkins. Ohio.
Pseudogonatopus stenocrani var. *dubiosus* Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 39. ♀.

stenocrani stenocrani Perkins. Ohio.
Pseudogonatopus stenocrani Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 38. ♀.

Genus AGONATOPOIDES Perkins

Agonatopoides Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 33.
Type-species: *Agonatopoides synchromus* Perkins. Monotypic.

synchromus Perkins. Ariz. (Nogales). Host: *Bostaera nasuta* Ball, nymph and adult.
Agonatopoides synchromus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 33.

Genus HAPLOGONATOPUS Perkins

Haplogonatopus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 39.

Type-species: *Haplogonatopus apicalis* perkins. Orig. desig.

americanus Perkins. Va., Ohio, Iowa. Host: *Delphacodes campestris* (Van D.); *D. lutulenta* (Van D.).

Haplogonatopus americanus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt Sta., Div. Ent., Bul. 1: 40. ♀.

Genus EUCAMPTONYX Perkins

Eucamptonyx Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 28.

Type-species: *Eucamptonyx testaceus* Perkins. Monotypic.

secundus Fenton. Ohio, Fla., Md., Kans.

Eucamptonyx secundus Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 5. ♀.

testaceus Perkins. Ariz. (Nogales).

Eucamptonyx testaceus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 28. ♀.

Genus APTERODRYINUS Perkins

Apterodryinus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 14.

Type-species: *Apterodryinus torvus* Perkins. Monotypic.

torvus Perkins. Ariz. (Nogales). Host: *Mistharnophantia sonorana* Kirk.; *Acanalonia immaculata* (Kirk.).

Apterodryinus torvus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 14. ♀.

Genus PACHYGONATOPUS Perkins

Pachygonatopus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 45.

Type-species: *Pachygonatopus melanias* Perkins. Orig. desig.

minimus Fenton. S. Dak., Man. Host: *Macrosteles fascifrons* (Stal).

Pachygonatopus minimus Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 6. ♀.

Taxonomy: Barrett, Westdal and Richardson, 1965. Canad. Ent. 97: 217-219, figs. 1-10 (egg, larvae, pupa, adults).

Biology: Barrett, Westdal and Richardson, 1965. Canad. Ent. 97: 219-221 (life history).

nearcticus Fenton. Iowa (Sioux City).

Pachygonatopus nearcticus Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 6. ♀.

Genus CHALCOGONATOPUS Perkins

Chalcogonatopus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 46.

Type-species: *Chalcogonatopus gigas* Perkins. Orig. desig.

Chalcogonatopus subg. *Eugonatopus* Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 46.

Type-species: *Chalcogonatopus* (*Eugonatopus*) *pseudochromus* Perkins. Monotypic.

areolatus Fenton. Va. (Falls Church).

Chalcogonatopus areolatus Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 7. ♀.

argyrias Perkins. Ariz. (Nogales).

Chalcogonatopus argyrias Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 20. ♀.

californicus (Ashmead). Calif.

Gonatopus californicus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 85. ♀.

echo Perkins. Ariz. (Nogales).
Chalcogonatopus echo Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 23. ♀.

euprepes Perkins. Ariz. (Nogales).
Chalcogonatopus euprepes Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 18. ♀.
Chalcogonatopus euprepes var. *a* Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 19. ♀.
Chalcogonatopus cuprepes (!) Kieffer, 1914. Das Tierreich, Lief. 41, p. 99.

euprepoides Perkins. Ariz. (Nogales).
Chalcogonatopus euprepoides Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 19. ♀.
Chalcogonatopus cuprepoides (!) Kieffer, 1914. Das Tierreich, Lief. 41, p. 99.

flavifrons (Ashmead). N. Y. (Albany).
Gonatopus flavifrons Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 84, pl. 5, fig. 4. ♀.

frequens Perkins. Ariz. (Nogales).
Chalcogonatopus frequens Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 21. ♀.

harpax Krombein. W. Va. (Lost River St. Pk.).
Chalcogonatopus harpax Krombein, 1956. Ent. Soc. Wash., Proc. 58: 158, fig. 1. ♀.

herbarum Perkins. Ariz. (Nogales).
Chalcogonatopus herbarum Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 23. ♀.

koebelei Perkins. Ariz. (Nogales).
Chalcogonatopus koebelei Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 26. ♀.

leptias Perkins. Ariz. (Nogales).
Chalcogonatopus leptias Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 17. ♀.

niger Fenton. Iowa. Host: *Scaphoideus* sp., probably *immistus* Say.
Chalcogonatopus nigrus Fenton, 1924. Ohio Jour. Sci. 24: 193, fig. 3. ♀.

paraleptias Perkins. Ariz. (Nogales).
Chalcogonatopus paraleptias Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 18. ♀.

perdebilis Perkins. Ariz. (Nogales).
Chalcogonatopus perdebilis Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 27. ♀.

pseudochromus Perkins. Ohio (Columbus).
Chalcogonatopus (*Eugonatopus*) *pseudochromus* Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 48. ♀.

rapax Perkins. Ariz. (Nogales). Host: Cicadellidae nymph on willow.
Chalcogonatopus rapax Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 20. ♀.

simulator Perkins. Ariz. (Nogales).
Chalcogonatopus simulator Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 26. ♀.

solitarius Perkins. Ariz. (Nogales).
Chalcogonatopus solitarius Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 22. ♀.

unicus Perkins. Ariz. (Nogales).
Chalcogonatopus unicus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 25. ♀.

xestocephalus Perkins. Ariz. (Nogales).
Chalcogonatopus xestocephalus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 24. ♀.

Genus GONATOPUS Ljungh

Gonatopus Ljungh, 1810. Beitr. Naturk., v. 2, p. 161.
Type-species: *Gonatopus formicarius* Ljungh. Monotypic.

Revision: Richards, 1939. Roy. Ent. Soc. London, Trans. 89: 185-344 (European spp.).

Taxonomy: Fenton, 1918. Ohio Jour. Sci. 18: 265-266 (key to spp.).

Biology: Haupt, 1916. Ent. Gesell. Halle, Mitt. 10: 41-50.

Morphology: Haupt, 1932. Zool. Anz. 99: 1-18.

affinis Fenton. Ohio (Bay View). Host: *Psammotettix affinis* (G. and B.).
Gonatopus affinis Fenton, 1918. Ohio Jour. Sci. 18: 266. ♀, ♂.

agropyrus Fenton. Iowa (Ames). Host: *Psammotettix affinis* (G. and B.).
Gonatopus agropyrus Fenton, 1921. Canad. Ent. 58: 71. ♀, ♂.

ashmeadi Kieffer. Ala., Fla., Tex. Host: *Delphacodes lutulenta* (Van D.)?
Gonatopus bicolor Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 85. ♀. Preocc.
Gonatopus ashmeadi Kieffer, 1904. *In* Andre, Spec. Hym. Eur. Alg., v. 9, p. 108. N. name.

contortulus Patton. Que., Mass., Conn., Ohio. Host: *Latalus sayi* (Fitch).
Gonatopus contortulus Patton, 1879. Canad. Ent. 11: 65. ♀.

curriei Krombein. Md. (Plummers Island).
Gonatopus curriei Krombein, 1962. Biol. Soc. Wash., Proc. 75: 4. ♀.

cyphonotus Bradley. B. C. (Downie Creek, Big Bend Country).
Gonatopus cyphonotus Bradley, 1906. Canad. Ent. 38: 380. ♀.

foutsi Whittaker. B. C. (Chilliwack).
Gonatopus foutsi Whittaker, 1928. Ent. Soc. London, Trans. p. 388. ♀.

inimicis Fenton. Ohio. Host: *Endria inimica* (Say).
Gonatopus inimicis Fenton, 1918. Ohio Jour. Sci. 18: 270. ♀.

longicornis (Brues). Pa. (Saegerstown). Questionably assigned to *Gonatopus*.
Phorbas longicornis Brues, 1907. Wis. Nat. Hist. Soc., Bul. 5: 152. ♂.

peculiaris Brues. Tex. (Austin).
Gonatopus peculiaris Brues, 1903. Amer. Ent. Soc., Trans. 29: 125. ♀.

punctatus Fenton. Ohio (Columbus). Host: *Latalus sayi* (Fitch).
Gonatopus punctatus Fenton, 1918. Ohio Jour. Sci. 18: 268. ♂, ♀.

septentrionalis Whittaker. B. C. (Chilliwack).
Gonatopus septentrionalis Whittaker, 1928. Ent. Soc. London, Trans. p. 388. ♀.

similis Fenton. Iowa (Ames). Host: *Psammotettix affinis* (G. and B.).
Gonatopus similis Fenton, 1921. Canad. Ent. 53: 71. ♀.

Genus NEOGONATOPUS Perkins

Neogonatopus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 42.
Type-species: *Neogonatopus ombrodes* Perkins. Orig. desig.
Allogonatopus Haupt, 1938. Ztschr. f. Naturw. 92: 21.
Type-species: *Allogonatopus procerus* Haupt. Orig. desig.

Taxonomy: Fenton, 1918. Ohio Jour. Sci. 18: 265-266 (key to spp.).

brunnescens Perkins. Ohio.
Neogonatopus brunnescens Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 44. ♀.

erythrodes Perkins. Ohio, Iowa. Host: *Endria inimica* (Say).
Neogonatopus erythrodes Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 43. ♀.

longitarsis (Ashmead). Fla., La.
Labeo longitarsis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 88. ♂.

mimoides Perkins. Ariz., Utah.
Neogonatopus mimoides Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 34. ♀.

mimus Perkins. Ariz. (Nogales). Host: Cicadellidae.
Neogonatopus mimus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 33. ♀.

obscurissimus Perkins. Ohio (Columbus). Host: *Deltocephalus* spp.
Neogonatopus obscurissimus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 43. ♀.

ombrodes Perkins. Ohio, Colo., Calif., Conn., S. Dak. Host: *Macrosteles divisus* (Uhl.).
Neogonatopus ombrodes Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 43. ♀.

Biology: Ainslie, 1920. Ent. News 31: 169, 187.

pallidiceps Perkins. Calif. (Alameda).
Neogonatopus pallidiceps Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 45. ♀.

Genus AGONATOPUS Perkins

Agonatopus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 29.
Type-species: *Agonatopus pallidicornis* Perkins. Desig. by Richards, 1939.

dubiosus Perkins. Ariz. (Nogales).
Agonatopus pallidicornis var. *dubiosus* Perkins, 1907. Hawaii. Sugar Planters' Asoc. Expt. Sta., Div. Ent., Bul. 4: 30. ♀.

ferrugineus Perkins. Ariz. (Nogales).
Agonatopus ferrugineus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 30. ♀.

heterothorax Perkins. Ariz. (Nogales). Host: Cicadellidae nymph on grass.
Agonatopus heterothorax Perkins, 1907. Hawaii. Sugar Planters' Assoc Expt. Sta., Div. Ent., Bul. 4: 32. ♀.

innitidus Perkins. Ariz (Nogales). Host: Cicadellidae nymph on grass.
Agonatopus innitidus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 31. ♀.

pallidicornis Perkins. Ariz.
Agonatopus pallidicornis Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 29. ♀.

picescens Perkins. Ariz. (Nogales).
Agonatopus picescens Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 30. ♀.

suturalis Fenton. Ariz. (Tucson).
Agonatopus suturalis Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 9. ♀.

Genus EPIGONATOPUS Perkins

Epigonatopus Perkins, 1905. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 1: 45.
Type-species: *Epigonatopus solitarius* Perkins. Orig. desig.

americanus Fenton. Iowa (Ames).
Epigonatopus americanus Fenton, 1921. Canad. Ent. 53: 70. ♀.

plesuis Fenton. Ont., S. Dak. Host: *Macrosteles fascifrons* (Stal).
Epigonatopus plesuis Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 9. ♀.

Biology: George, 1959. Canad. Ent. 91: 256.

tenuis Fenton. Ind. (La Fayette).
Epigonatopus tenuis Fenton, 1927. U. S. Natl. Mus., Proc. 72 (8): 8. ♀.

Genus DIGONATOPUS Kieffer

Digonatopus Kieffer, 1913. Lab. Zool. Gen. e Agr. Portici, Bol. 7: 325.
Type-species: *Discondylus* (!) *javanus* Perkins. Orig. desig.

haplothorax (Perkins). Ariz. (Nogales).
Gonatopus haplothorax Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 35. ♀.

Subfamily APHELOPINAE

Genus APHELOPUS Dalman

Dryinus subg. *Aphelopus* Dalman, 1823. Analecta Ent., p. 8.
Type-species: *Aphelopus atratus* (Dalman). Desig. by Westwood, 1840.

Taxonomy: Fenton, 1918. Ohio Jour. Sci. 18: 275 (key to spp.).

Morphology: Haupt, 1932. Zool. Anz. 99: 1-18.

affinis Ashmead. Canada.
Aphelopus affinis Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 102. ♀.

albopictus Ashmead. Md., D. C., Va.
Aphelopus albopictus Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 100. ♀.

americanus Ashmead. Fla.
Aphelopus americanus Ashmead, 1887. Ent. Amer. 3: 74. ♂.

arizonicus Perkins. Ariz. (Nogales). Host: *Dikraneura* sp.
Aphelopus arizonicus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 53. ♂, ♀.

bicolor Fenton. Iowa, Ark., Del. Host: *Hymetta trifasciata* (Say).
Aphelopus bicolor Fenton, 1924. Ohio Jour. Sci. 24: 192. ♀.

comesi Fenton. Del., Ohio, Mich., Tenn., Iowa, Ark., La. Host: *Erythroneura* spp.
Aphelopus comesi Fenton, 1918. Ohio Jour. Sci. 18: 277. ♂.

dikraneuri Fenton. Ohio, Iowa. Host: *Forcipata* sp., prob. *loca* DeL. and C.
Aphelopus dikraneuri Fenton, 1918. Ohio Jour. Sci. 18: 276. ♀, ♂.

microleucus Perkins. Ariz. (Nogales). Host: *Typhlocyba* sp.
Aphelopus microleucus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 55. ♂.

microtomus Whittaker. B. C. (Chilliwack).
Aphelopus microtomus Whittaker, 1928. Ent. Soc. London, Trans. p. 389. ♀.

pilicornis Whittaker. B. C. (Chilliwack).
Aphelopus pilicornis Whittaker, 1928. Ent. Soc. London, Trans. p. 389. ♀, ♂.

pulcherrimus Perkins. Ariz. (Nogales). Host: *Erythroneura* sp.; *Typhlocyba* sp.?
Aphelopus pulcherrimus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 54. ? ♂.

rufiventris Ashmead. Fla. (Jacksonville).
Aphelopus rufiventris Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 100. ♀.

theliae Gahan. N. Y. (Cold Spring Harbor, L. I.). Host: *Thelia bimaculata* (F.).
Aphelopus theliae Gahan, 1918. Canad. Ent. 50: 151. ♀, ♂.

Biology: Kornhauser, 1919. Jour. Morph. 32: 547-554, figs. 1-4.

typhlocybae Muesebeck. N. Y., Md. Host: *Typhlocyba pomaria* McA.; *T. froggatti* Baker (in New Zealand).
Aphelopus typhlocybae Muesebeck, 1936. Ent. Soc. Wash., Proc. 37: 167. ♀, ♂.

Biology: Steiner, 1936. Jour. Econ. Ent. 29: 632. —Dumbleton, 1937. Jour. Sci. and Technol. New Zealand 18: 869.

varicornis Brues. Mass. (Woods Hole).
Aphelopus varicornis Brues, 1906. Wis. Nat. Hist. Soc., Bul. 4: 143. ♀.

viduus Perkins. Ariz. (Nogales).
Aphelopus viduus Perkins, 1907. Hawaii. Sugar Planters' Assoc. Expt. Sta., Div. Ent., Bul. 4: 54. ♂.

Unplaced Taxa of Dryinidae

Dryinus bifasciatus Say, 1828. Contrib. Maclur. Lyc. Phila. 1: 81. ♀. Ind. Possibly *Deinodryinus* Perkins.

Family EMBOLEMIDAE

Genus AMPULICOMORPHA Ashmead

Ampulicomorpha Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 79.
Type-species: *Ampulicomorpha confusa* Ashmead. Orig. desig.

confusa Ashmead. Ont., Md., Va., N. C., Ga., Wis., Mo., Colo., Sask., B. C., Calif. Host: Nymphs of *Epiptera floridae* (Wlkr.) on rotten pine and oak logs, and *E. pallida* (Say) feeding on fungi under bark.
Ampulicomorpha confusa Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 80. "♂" = ♀.

Biology: Bridwell, 1958. Ent. Soc. Wash., Proc. 60: 23-26.

Genus EMBOLEMUS Westwood

Embolemus Westwood, 1833. London and Edinb. Phil. Mag. and Jour. Sci. 2: 444.
Type-species: *Embolemus ruddii* Westwood. Monotypic.
Myrmecomorphus Westwood, 1833. Mag. Nat. Hist. 6: 496.
Type-species: *Myrmecomorphus rufescens* Westwood. Monotypic.
Embolimus Agassiz, 1846. Nomencl. Zool., Ind. Univ., p. 137. Emend.
Formila de Romand, 1846. Soc. Ent. France, Ann. (2) 4: Bul., p. XXXII.
Type-species: *Formila chevrolatii* de Romand. Monotypic.
Pedinomma Foerster, 1856. Hym. Stud., v. 2, p. 94. Unnecessarily proposed as a n. name for *Myrmecomorphus* Westwood.

Taxonomy: Richards, 1939. Roy. Ent. Soc. London, Trans. 89: 294.

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 412, figs. 51-52 (female, male thorax).

nearcticus (Brues). Mass., N. Y., Va.?
Pedinomma nearcticum Brues, 1922. Psyche 29: 7. "♂" = ♀.

Superfamily SCOLIOIDEA

By Karl V. Krombein

Taxonomy: Ashmead, 1903-1904. Canad. Ent. 35: 4-8, 39-46, 95-107, 155-158, 199-205, 303-310, 323-332; 36: 5-9 (keys to genera).

Family TIPHIIDAE

So far as is known all of the North American taxa are parasites of larvae of fossorial species. In the primitive subfamily Tiphiinae, species of *Tiphia* F. have been reported as parasites of scarabaeid larvae. A few exotic species have been liberated in North America for control of economically important pest scarab species. Hosts of the other genera of Tiphiinae are unknown. In the Myzininae, species of *Myzinum* Latr. have scarabaeid larvae as hosts; it is anticipated that our native *Pterombrus* Sm. parasitize tiger beetle larvae as do some of the Neotropical species. Biology is unknown for the Anthoboscinae and Brachycistidinae, but the species probably have as hosts deserticolous scarabaeid larvae. The Methochinae parasitize tiger beetle larvae, and the Myrmosinae are parasites of ground-nesting aculeate Hymenoptera.

Revision: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 45-115, 30 figs. (western North America species). —Allen, 1966. Amer. Ent. Soc., Trans. 92: 231-356, 40 figs., 19 maps (eastern North America species).

Taxonomy: Ashmead, 1903. Canad. Ent. 35: 4-7, 39-41, 155-156, 201-204. —Krombein, 1940. Amer. Ent. Soc., Trans. 65: 419. —Pate, 1947. N. Y. Ent. Soc., Jour. 55: 115-143.

Subfamily TIPHIINAE

Taxonomy: Hedicke, 1936. Hym. Cat., Pars. 1, Tiphiidae, pp. 1-32 (catalog of world species). —Allen, 1962. Ent. Soc. Amer., Trans. 88: 21-75, 30 figs. (redescription of types of American species in British museum).

Genus TIPHIA Fabricius

Genus TIPHIA Subgenus TIPHIA Fabricius

Tiphia Fabricius, 1775. Systema Ent., p. 553.
Type-species: *Tiphia femorata* Fabricius. Desig. by Latreille, 1810.
Tiphiana (!) Rafinesque, 1815. Analyse Nat., p. 124. Emend.

So far as is known species of this subgenus parasitize larvae of various Scarabaeidae (Coleoptera). Detailed liberation records of the Oriental species released in the United States for control of the introduced *Popillia*, *Anomala*, *Autoserica*, and *Serica* were published by

Krombein (1948, Ent. Soc. Amer., Ann. 41: 58-62). Of the liberated species only *vernalis* Rohwer, *popilliavora* Rohwer, and *asericae* Allen and Jaynes established themselves; *sternata* Parker is doubtfully established; *biseculata* Allen and Jaynes, *castaneaevora* Parker, *chosensis* Allen, *frater* Parker, *matura* Allen and Jaynes, *notopolita* var. *alleni* Roberts, *pullivora* Allen and Jaynes, and *totopunctata* Allen and Jaynes apparently did not become established.

Tiphia femorata Fabricius and *T. morio* Fabricius were introduced from Europe and liberated in New York in 1956 and 1957 for control of *Amphimallon majalis* (Raz.), the European chafer; so far as is known neither species became established.

Only the typical subgenus occurs in the New World.

Revision: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 1-24, 13 figs. (eastern species). —Allen, 1971. Amer. Ent. Soc., Trans. 97: 201-359, 147 figs., 13 maps (species of western North America).

Taxonomy: Allen, 1961. Amer. Ent. Soc., Trans. 87: 1-20 (key to species north of Mexico). —Evans, 1965. Ent. Soc. Wash., Proc. 67: 91 (larva).

alamosae Allen. Colo. (Alamosa Co.); Mexico (Chihuahua).
Tiphia alamosae Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 54, figs. 1, 6, 11. ♂, ♀.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 264, figs. 63-68, map 5. ♂, ♀.

andersoni Allen. Ariz. south in Mexico to Michoacan and Morelos.
Tiphia andersoni Allen, 1971. Amer. Ent. Soc., Trans. 97: 288, figs. 100-103, map 8. ♂, ♀.

anguis Allen. Wyo., B. C. to Calif.
Tiphia anguis Allen, 1971. Amer. Ent. Soc., Trans. 97: 278, figs. 94-98, map 7. ♂, ♀.

arcuata Allen. Ariz. (Chiricahua Mts.).
Tiphia arcuata Allen, 1971. Amer. Ent. Soc., Trans. 97: 315, figs. 127, 129, 130, map 11. ♀.

asensoria Allen. Fla. (Fort Lauderdale).
Tiphia asensoria Allen, 1966. Amer. Ent. Soc., Trans. 92: 317, map 12. ♂.

asericae Allen and Jaynes. N. Y., N. J., Pa.; Korea. Introduced from Korea. Host: *Autoserica castanea* (Arrow); *Serica peregrina* Chapin.
Tiphia asericae Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76 (17): 74. ♀, ♂.

Biology: Clausen, Jaynes, and Gardner, 1933. U. S. Dept. Agr., Tech. Bul. 366: 45-46. —Gardner and Parker, 1940. U. S. Dept. Agr., Tech. Bul. 738: 21. —Clausen, 1956. U. S. Dept. Agr., Tech. Bul. 1139: 131 (life history).

atlantis Allen. N. H. to Fla., Mich., Ill., Kans., Ariz. ?
Tiphia atlantis Allen, 1934. Amer. Ent. Soc., Trans. 60: 314. ♀.

Taxonomy: Allen, 1961. Amer. Ent. Soc., Trans. 87: 16. ♂. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 336, figs. 23, 32, map 17. ♀, ♂.

barberi Allen. Mont., Wyo., Ariz.
Tiphia barberi Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 57, figs. 13, 28, 29. ♂.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 270, figs. 75-78, map 6. ♂, ♀.

berbereti Allen. Nebr. (Ainsworth). Host: *Phyllophaga anxia* (LeC.).
Tiphia berbereti Allen, 1970. Ent. Soc. Amer., Ann. 63: 473. ♀, ♂.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 274, figs. 82-85, map 6. ♀, ♂.

Biology: Berberet and Helms, 1970. Ent. Soc. Amer., Ann. 63: 471-473 (life history).

biseculata Allen and Jaynes. Liberated in N. Y. and N. J. but not established. Introduced from Japan. Host: *Anomala orientalis* Waterh.; *Popillia japonica* Newm.
Tiphia biseculata Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76, Art. 17: 85, figs. 30, 31. ♀, ♂.

Biology: Clausen, Jaynes and Gardner, 1933. U. S. Dept. Agr., Tech. Bul. 366: 38-39 (life history).

boharti Allen. Oreg. (Bend).
Tiphia boharti Allen, 1971. Amer. Ent. Soc., Trans. 97: 287, map 8. ♂.

canamexica Rohwer. Mont., S. Dak., Colo., Utah, Calif., Ariz. south in Mexico to Chiapas and Yucatan.
Tiphia canamexica Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 452. ♀.
Tiphia dreisbachi Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 70. ♂, ♀.
Tiphia canamexicana (!) Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 85. ♀.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 243, figs. 41-43, map 3. ♂, ♀.

castaneaevora Parker. Liberated in N. J. and Pa. but not established. Introduced from Japan. Host: *Autoserica castanea* (Arrow).
Tiphia castaneaevora Parker, 1937. N. Y. Ent. Soc., Jour. 45: 288. ♀, ♂.

chosensis Allen. Liberated in Conn. and N. J. but not established. Introduced from Korea. Host: *Anomala orientalis* Waterh.
Tiphia (*Tiphia*) *chosensis* Allen, 1969. Amer. Ent. Soc., Trans. 95: 359. ♀, ♂.

Taxonomy: Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76, Art. 17: 66, figs. 2, 5, 7, 11, 24. ♀, ♂. (Misdet. as *bicarinata* Cameron).

Biology: Clausen, Jaynes and Gardner, 1933. U. S. Dept. Agr., Tech. Bul. 366: 43-44 (life history, as *bicarinata*).

cochiseae Allen. N. Mex., Ariz., south in Mexico to Jalisco and Puebla.
Tiphia cochiseae Allen, 1971. Amer. Ent. Soc., Trans. 97: 282, fig. 99, map 7. ♂.

coloradensis Allen. Colo.
Tiphia coloradensis Allen, 1971. Amer. Ent. Soc., Trans. 97: 314, fig. 126, map 11. ♀.

conformis Malloch. Mass., Mich. and Nebr. south to Fla. and Tex., Ariz.
Tiphia conformis Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 22. ♀, ♂.
Tiphia imitatrix Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 22. ♀.

Taxonomy: Frison, 1927. Ill. Nat. Hist. Survey, Bul. 16: 229 (lectotype designation *conformis*). —Allen, 1934. Amer. Ent. Soc., Trans. 60: 312. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 295, fig. 14, map 10. ♂, ♀.

convexa Allen. N. H. to N. C., Mich., Kans., Mont.
Tiphia convexa Allen, 1934. Amer. Ent. Soc., Trans. 60: 306. ♂.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 290, map 9. ♂, ♀.

crassipunctata Allen. N. C.
Tiphia crassipunctata Allen, 1934. Amer. Ent. Soc., Trans. 60: 307. ♂.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 254, map 3. ♂.

dallasae Allen. Tex. (Dallas, Victoria).
Tiphia dallasae Allen, 1966. Amer. Ent. Soc., Trans. 92: 339, fig. 9, map 17. ♀.

dawsoni Allen. Nebr., Mont., Idaho, Tex.
Tiphia dawsoni Allen, 1971. Amer. Ent. Soc., Trans. 97: 259, fig. 62, map 5. ♂.

dentonae Allen. Tex., Kans.
Tiphia dentonae Allen, 1966. Amer. Ent. Soc., Trans. 92: 300, map 10. ♂.

dryophila Krombein. N. J., N. C., Fla., Ohio.
Tiphia dryophila Krombein, 1953. Wasmann Jour. Biol. 10: 301. ♂, ♀.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 299, map 10. ♂, ♀.

egregia Viereck. N. H. to S. Dak., south to Fla. and Tex.
Tiphia eyregia (!) Viereck, 1906. Ent. News 17: 303. ♂.
Tiphia egregia Viereck, 1906. Ent. News 17: 350.
Tiphia tuberculata Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 14. ♀, ♂. Preocc.
Tiphia aterrima Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 19. ♀.
Tiphia papillata Roberts, 1930. Canad. Ent. 62: 190. N. name.
Tiphia diminuta Roberts, 1933. Kans. Ent. Soc., Jour. 6: 91. ♀, ♂.

Taxonomy: Frison, 1927. Ill. Nat. Hist. Survey, Bul. 16: 229-230 (lectotype designation *aterrima*, *tuberculata*). —Allen, 1934. Amer. Ent. Soc., Trans. 60: 312. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 325, fig. 34, map 15. ♂, ♀.

elaka Allen. Fla.
Tiphia elaka Allen, 1966. Amer. Ent. Soc., Trans. 92: 289, fig. 6, map 9. ♂.

femorata Fabricius. Liberated in N. Y. but not established. Introduced from Europe. Host: *Amphimallon majalis* (Raz.).
Tiphia femorata Fabricius, 1775. Systema Ent., p. 353. ♀.
Sphex palmipes Schrank, 1781. Enum. Ins. Austriae, p. 384.
Bethylus glabrata Fabricius, 1798. Sup. Ent. System., p. 254.
Bethylus villosa Fabricius, 1804. Systema Piezatorum, p. 236.
Bethylus pilipennis Klug, 1808. Mag. Gesell. Naturf. Freunde Berlin 2: 49. ♂.
Bethylus ater Giraud, 1856. Zool.-Bot. Ver., Verhandl. 6: 184.
Tiphia laeviceps Tournier, 1889. Soc. Ent. Belg., Ann. 33: 21. ♀.
Tiphia austriaca Tournier, 1889. Soc. Ent. Belg., Ann. 33: 24. ♀.

fenestrata Klug. N. J., N. C., Fla., Ill., Miss., La.
Bethylus fenestratus Klug, 1810. *In* Weber, Beitr. z. Naturk. 2: 193. ♀.
Tiphia confusa Allen, 1934. Amer. Ent. Soc., Trans. 60: 302. ♀.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 253. ♀. —Allen, 1972. Ent. Soc. Wash., Proc. 74: 381-383 (redescription and synonymy).

fisheri Allen. Va. (Cape Henry).
Tiphia fisheri Allen, 1966. Amer. Ent. Soc., Trans. 92: 301, map 10. ♂.

flavipennis Spinola. Calif. (?); Mexico (Guerrero).
Tiphia flavipennis Spinola, 1841. Soc. Ent. France, Ann. 10: 102. ♀.
Tiphia elegans Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 240. ♀, ♂.
Tiphia ochroptera Dalla Torre, 1897. Cat. Hym., v. 8, p. 139. N. name err. proposed for *flavipennis* Spinola, not Smith, 1857.

Taxonomy: Turner, 1908. Ann. and Mag. Nat. Hist. (8) 2: 131 (synonymy). —Allen, 1962. Amer. Ent. Soc., Trans. 88: 38 (redescription *elegans* female).

floridana flavida Allen. Central Fla.
Tiphia floridana flavida Allen, 1966. Amer. Ent. Soc., Trans. 92: 279, map 7. ♀, ♂.

floridana floridana Robertson. N. Y. to Fla.
Tiphia floridana Robertson, 1901. Amer. Ent. Soc., Trans. 27: 195. ♀, ♂.

Taxonomy: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 23. —Allen, 1934. Amer. Ent. Soc., Trans. 60: 314. —Krombein, 1953. Wasmann Jour. Biol. 10: 305. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 276, figs. 5, 33, 38, map 7. ♂, ♀.

fortistriolata Cameron. B. C. south to Calif. and N. Mex.; Mexico (Michoacan, Morelos, Veracruz).
Tiphia fortistriolata Cameron, 1907. Invertebrata Pacifica 1: 170. ♂.
Tiphia bakeri Allen, 1961. Amer. Ent. Soc., Trans. 87: 12. ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 50, 74, figs. 4, 15, 27. ♀. —Allen, 1969. Amer. Ent. Soc., Trans. 95: 433. ♂. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 229, figs. 23-27, map 1. ♂, ♀.

frater Parker. Liberated in N. J. but not established. Introduced from China.
Tiphia frater Parker, 1935. N. Y. Ent. Soc., Jour. 43: 397. ♀, ♂.

fulvicauda Cameron. Nev. (Ormsby Co.).
Tiphia fulvicauda Cameron, 1907. Invertebrata Pacifica 1: 169. ♀.

Taxonomy: Allen, 1962. Amer. Ent. Soc., Trans. 88: 24 (type redescription).

gehlsbachi Allen. Tex.
Tiphia gehlsbachi Allen, 1971. Amer. Ent. Soc., Trans. 97: 237, figs 32-34, map 2. ♂.

greenei Allen. Md. (Plummers Island).
Tiphia greenei Allen, 1966. Amer. Ent. Soc., Trans. 92: 256, fig. 31, map 3. ♂.

greeleyi Allen. Kans. (Greeley Co.).
Tiphia greeleyi Allen, 1971. Amer. Ent. Soc., Trans. 97: 258, map 5. ♂.

illinoensis Robertson. N. H., Ont., Mich., Ill. and Iowa south to Fla. and Tex.
Tiphia illinoensis Robertson, 1901. Amer. Ent. Soc., Trans. 27: 196. ♀, ♂.
Tiphia waldonii (!) Viereck, 1906. Ent. News 17: 302. ♂.
Tphia brunneicornis Viereck, 1906. Ent. News 17: 303. ♂.
Tiphia waldenii Viereck, 1906. Ent. News 17: 350.

Tiphia robertsoni Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 23. ♀.
Tiphia waldeni (!) Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 23.

Taxonomy: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 24. ♂. —Frison, 1927. Ill. Nat. Hist. Survey, Bul. 16: 230 (lectotype designation, *robertsoni*). —Allen, 1934. Amer. Ent. Soc., Trans. 60: 313. —Allen, 1961. Amer. Ent. Soc., Trans. 87: 18. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 280, figs. 4, 27, 35, map 8. ♂, ♀.

inaequalis Malloch. Mass. to Nebr., south to Ga., Ala. and Tex.
Tiphia inaequalis Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 22. ♂.

Taxonomy: Frison, 1927. Ill. Nat. Hist. Survey, Bul. 16: 229-230 (lectotype designation). —Allen, 1966. Amer. Ent. Soc., Trans. 92: 293, fig. 29, map 10. ♂.

incisurata Malloch N. C.
Tiphia incisurata Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 17. ♀.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 288, map 9. ♀.

indistincta Allen. W. Va. (Kanawha Sta.).
Tiphia indistincta Allen, 1961. Amer. Ent. Soc., Trans. 87: 14. ♀.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 254, map 3. ♀.

infossata Allen. Maine to Mich., Wis., Iowa and S. Dak., south to Fla. and Tex., Alta., Mont., Colo., Calif.
Tiphia infossata Allen, 1934. Amer. Ent. Soc., Trans. 60: 301. ♀.
Tiphia hollowayi Allen, 1934. Amer. Ent. Soc., Trans. 60: 303. ♂.

Taxonomy: Allen, 1961. Amer. Ent. Soc., Trans. 87: 19 (synonymy). —Allen, 1965. Acad. Nat. Sci., Phila., Proc. 117: 60. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 248, figs. 8, 16, 21, 36, map 2. ♀, ♂. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 275, figs. 86-89, map 6. ♀, ♂.

inornata Say. Ohio, Pa.
Tiphia inornata Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 331 ♀.

Taxonomy: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 12. —Allen, 1934. Amer. Ent. Soc., Trans. 60: 300 (redescription.) —Allen, 1966. Amer. Ent. Soc., Trans. 92: 262. ♀. (Redescription.)

intermedia Malloch. Maine and Que. south to Fla., west to N. Dak. and Calif., south to Nicaragua. Host: *Phyllophaga* spp.
Tiphia punctata Robertson, 1901. Amer. Ent. Soc., Trans. 27: 196. ♂. Preocc.
Tiphia clypeolata Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 16. ♀, ♂ (in part?).
Tiphia arida Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 20. ♀.
Tiphia punctata var. *intermedia* Malloch, 1918. Ill. Nat. Hist. Survey Bul. 13: 21. ♀.
Tiphia reticulata Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 23. ♀.
Tiphia intermedia var. *exitialis* Roberts, 1930. Canad. Ent. 62: 189. N. name.

Taxonomy: Frison, 1927. Ill. Nat. Hist. Survey, Bul. 16: 230 (lectotype designation, *punctata* var *intermedia*). —Allen, 1934. Amer. Ent. Soc., Trans. 60: 310. —Krombein, 1938. Ent. News 49: 186. —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 56. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 302, figs. 10, 12, 15, 17, 26, 37, 40, map 11. ♂, ♀. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 268, figs. 69-72, map 6. ♂, ♀.

Biology: Davis, 1919. Ill. Nat. Hist. Survey, Bul. 13: 59-68.

irfla Allen. Fla.
Tiphia irfla Allen, 1961. Amer. Ent. Soc., Trans. 87: 10. ♂, ♀.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 314, map 12.

jaynesi Allen. Que. and Vt. to Fla., La., Okla., Kans., Ill.
Tiphia jaynesi Allen, 1934. Amer. Ent. Soc., Trans. 60: 311. ♀, ♂.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 315, map 13. ♂, ♀.

krombeini Allen. N. H. and Ont. to N. C., W. Va., Mich., S. Dak., ? Tex.
Tiphia krombeini Allen, 1966. Amer. Ent. Soc., Trans. 92: 321, map 14. ♀, ♂.

letalis Roberts. N. Y. to N. C., west to S. Dak. and Kans., Miss.
Tiphia clypeata Robertson, 1901. Amer. Ent. Soc., Trans. 27: 196. ♂. Preocc.

Tiphia letalis Roberts, 1930. Canad. Ent. 62: 189. N. name.

Taxonomy: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 11. ♀, ♂. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 257, figs. 1, 3, 11, map 4. ♂, ♀.

matura Allen and Jaynes. Liberated in N. J. but not established. Introduced from India. Host: *Popillia japonica* Newm.
Tiphia matura Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76, Art. 17: 81. ♀, ♂.

micropunctata Allen. N. S. to Man., Mont. and Calif., south to Fla. and Okla.
Tiphia micropunctata Allen, 1934. Amer. Ent. Soc., Trans. 60: 297. ♀, ♂.
Tiphia dentata Allen, 1934. Amer. Ent. Soc. Trans. 60: 303. ♂.

Taxonomy: Allen, 1961. Amer. Ent. Soc., Trans. 87: 18 (synonymy). —Evans, 1965. Ent. Soc. Wash., Proc. 67: 90-91, figs. 6-10 (larva). —Allen, 1966. Amer. Ent. Soc., Trans. 92: 243, figs. 7, 13, 22, 25, map 1. ♀, ♂.

minor Provancher. B. C. (Vancouver Isl.), ? Wash., ? Oreg.
Tiphia minor Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 254. ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 65. ♂. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 294, map 8.

montana Allen. Sask., Alta., Mont., Utah, Ariz; Mexico (Jalisco).
Tiphia montana Allen, 1961. Amer. Ent. Soc., Trans. 87: 13. ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 53, fig. 22. ♂. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 234, figs. 30, 31, map 2. ♂.

morio Fabricius. Liberated in N. Y. but not established. Introduced from Europe. Host: *Amphimallon majalis* (Raz.).
Tiphia morio Fabricius, 1787. Mantissa Insectorum, v. 1, p. 280.

nebra Allen. Nebr., Ky.
Tiphia nebra Allen, 1966. Amer. Ent. Soc., Trans. 92: 261, map 3. ♀.

nevadana Cameron. B. C. south to Calif., Idaho, Wyo., Nev., Colo., Ariz., N. Mex., Tex; Mexico (Hidalgo).
Tiphia nevadana Cameron, 1906. Invertebrata Pacifica 1: 157. ♂.
Tiphia essigi Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 62, figs. 7, 9, 26. ♀, ♂.

Taxonomy: Allen, 1962. Amer. Ent. Soc., Trans. 88: 22 (type redescription). —Allen, 1971. Amer. Ent. Soc., Trans. 97: 298, figs. 115, 116, map 9. ♂, ♀.

nona Allen. Ariz. south in Mexico to San Luis Potosi and Michoacan.
Tiphia nona Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 61. ♂.
Tiphia hurdi Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 75, fig. 24. ♂, ♀.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 248, figs. 46-48, map 4. ♂, ♀.

notopolita var. **alleni** Roberts. Liberated in N. Y., but not established. Introduced from Korea and China. Host: *Anomala orientalis* Waterh.
Tiphia notopolita var. *intermedia* Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76, Art. 17: 41. ♀. Preocc.
Tiphia notopolita var. *alleni* Roberts, 1930. Canad. Ent. 62: 190. N. name.

Biology: Clausen, Jaynes and Gardner, 1933. U. S. Dept. Agr., Tech. Bul. 366: 46 (life history).

occidentata Malloch. Wash., Colo., N. Mex., Ariz. south in Mexico to Oaxaca.
Tiphia occidentata Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 17. ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 52. ♂. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 241, figs. 38-40, map 3. ♂.

odontogaster Viereck. N. Mex., Ariz.; Mexico (Durango).
Tiphia odontogaster Viereck, 1903. Amer. Ent. Soc., Trans. 29: 71. ♂.

Taxonomy: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 13. —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 51, fig. 21. ♂. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 232, figs. 28, 29, map 2.

pecosae Allen. Tex. (Pecos River at Sheffield).
Tiphia pecosae Allen, 1971. Amer. Ent. Soc., Trans. 97: 311, fig. 123. ♀.

pennsylvanica Allen. N. J. to Fla., La.
Tiphia pennsylvanica Allen, 1961. Amer. Ent. Soc., Trans. 87: 15. ♀.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 286, map 9. ♀, ♂.

popilliavora Rohwer. N. H., Mass., Conn., N. Y., N. J., Pa., Del., Md., Va., Ohio. Introduced from Japan and Korea. Host: *Popillia japonica* Newm.
Tiphia popilliavora Rohwer, 1924. Ent. Soc. Wash., Proc. 26: 89. ♀, ♂.

Taxonomy: Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76, Art. 17: 51, figs. 3, 21, 22, 27, 28. ♀, ♂.

Biology: Clausen, King, and Teranishi, 1927. U. S. Dept. Agr., Bul. 1429: 33-39. —King and Holloway, 1930. Jour. Econ. Ent. 23: 266-274. —Holloway, 1931. N. Y. Ent. Soc., Jour. 39: 555-564. —White, 1943. N. Y. Ent. Soc., Jour. 51: 213-218.

portalae Allen. Ariz., Nev.
Tiphia portalae Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 49. ♂.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 226, figs. 17, 18, map 1. ♂, ♀.

pullivora Allen and Jaynes. Liberated in Pa. but not established. Introduced from India. Host: *Popillia japonica* Newm.
Tiphia pullivora Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76, Art. 17: 83. ♀, ♂.

Biology: Clausen, Jaynes and Gardner, 1933. U. S. Dept. Agr., Tech. Bul. 366: 39-41 (life history).

puncticeps Cameron Nev.; ? Mexico (Michoacan).
Tiphia puncticeps Cameron, 1906. Invertebrata Pacifica 1: 158. ♂.

Taxonomy: Allen, 1962. Amer. Ent. Soc., Trans. 88: 23 (type redescription). —Allen, 1971. Amer. Ent. Soc., Trans. 97: 246, map 4. ♂.

pygidialis Allen. Conn., Pa., Md., W. Va., Ky., Iowa, Kans., Okla., Miss.
Tiphia pygidialis Allen, 1966. Amer. Ent. Soc., Trans. 92: 310, map 12. ♀.

raui Allen. Mo., Miss.
Tiphia raui Allen, 1934. Amer. Ent. Soc., Trans. 60: 308. ♀.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 269. ♀.

relativa Viereck. Maine to Ga., Mich., Iowa, Nebr., Kans. Host: *Cyclocephala borealis* Arrow; *Lichnathe vulpina* (Hentz).
Tiphia relativa Viereck, 1906. Ent. News 17: 304. ♂.
Tiphia winnemanae Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 23. ♂.

Taxonomy: Allen, 1961. Amer. Ent. Soc., Trans. 87: 17 (synonymy). —Allen, 1966. Amer. Ent. Soc., Trans. 92: 312, map 12. ♂, ♀.

Biology: Adams, 1949. Jour. Econ. Ent. 42: 626. —Franklin, 1950. Mass. Agr. Expt. Sta., Bul. 445, pts. 2-7: 63, 66, 67.

roda Allen. N. Mex., Ariz.
Tiphia roda Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 56. ♂.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 286, map 8. ♂.

rodeoensis Allen. N. Mex. south in Mexico to Jalisco and Morelos.
Tiphia rodeoensis Allen, 1971. Amer. Ent. Soc., Trans. 97: 336, fig. 143, map 13. ♀.

roosevelti Allen. Ariz.
Tiphia roosevelti Allen, 1971. Amer. Ent. Soc., Trans. 97: 339, figs. 145-147, map 13. ♀.

rothi Allen. Ariz. (Cochise Co.).
Tiphia rothi Allen, 1971. Amer. Ent. Soc., Trans. 97: 231, map 1. ♂.

rugulosa Malloch. Maine and Que. to Ga., west to Minn., Iowa and Kans.
Tiphia rugulosa Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 15. ♀, ♂.

Taxonomy: Frison, 1927. Ill. Nat. Hist. Survey, Bul. 16: 230 (lectotype designation). —Allen, 1966. Amer. Ent. Soc., Trans. 92: 333, fig. 30, map 16. ♂, ♀.

sayi Allen. N. H., Ont., Wis. and Iowa south to Fla. and Miss.
Tiphia sayi Allen, 1966. Amer. Ent. Soc., Trans. 92: 272, fig. 18, map 6. ♂, ♀.

schlingeri Allen. Tex., N. Mex., Ariz., Nev., Calif.
Tiphia schlingeri Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 64, fig. 12. ♂.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 311, map 10. ♂.

sculleni Allen. Ariz. (Cochise and Pima Counties).
Tiphia sculleni Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 60, fig. 25. ♂.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 291, figs. 104, 105, map 8.

similis Malloch. Maine and Que. south to Fla., west to Ont., Mich., Ill. and Kans.
Tiphia similis Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 18. ♂.
Tiphia affinis Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 19. ♀, ♂.

Taxonomy: Frison, 1927. Ill. Nat. Hist. Survey, Bul. 16: 229-230 (lectotype designations, *similis, affinis*). —Allen, 1966. Amer. Ent. Soc., Trans. 92: 318, figs. 20, 28, map 14. ♂, ♀.

sinaloae Allen. Okla., Tex., south to Costa Rica.
Tiphia sinaloae Allen, 1971. Amer. Ent. Soc., Trans. 97: 309, map 10. ♂.

sternata Parker. Liberated 1933-35 in N. Y., N. J., Pa. but has not been recovered since 1937. Introduced from Japan. Host: *Serica peregrina* Chapin.
Tiphia sternata Parker, 1935. N. Y. Ent. Soc., Jour. 43: 399. ♀, ♂.

strangulata Allen. Mont., Ariz.; ? Mexico (Puebla).
Tiphia strangulata Allen, 1971. Amer. Ent. Soc., Trans. 97: 261, fig. 73, map 5. ♂.

subcarinata Malloch. Mass. to Ga., W. Va., Mich., Ill.
Tiphia subcarinata Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 15. ♂.
Tiphia insolita Allen, 1934. Amer. Ent. Soc., Trans. 60: 316. ♂.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 330, map 16. ♂.

tarda Say. Ind.
Tiphia tarda Say, 1836. Boston Jour. Nat. Hist. 1: 300. ♂.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 351 (unrecognized).

tegulina Malloch. B. C. and Idaho to Calif. and Nev. Host: *Phyllophaga errans* LeC.
Tiphia tegulina Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 21. ♀.
Tiphia shastensis Krombein, 1942. Pan-Pacific Ent. 18: 139. ♀, ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 59. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 272, figs. 79-81, map 6. ♀, ♂.

Biology: Linsley and Michener, 1942. Pan-Pacific Ent. 18: 154.

tempeae Allen. Kans., Colo., Wash., Calif., Ariz. and N. Mex. south to Costa Rica.
Tiphia tempeae Allen, 1961. Amer. Ent. Soc., Trans. 87: 11. ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 53, 80. ♂. —Allen, 1971. Amer. Ent. Soc., Trans. 97: 263, fig. 74, map 5. ♂, ♀.

texensis Malloch. Tex., Kans., Mont.
Tiphia texensis Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 20. ♀.

Taxonomy: Allen, 1961. Amer. Ent. Soc., Trans. 87: 19. —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 66. ♀.

toddi Allen. Ariz.; Mexico (Jalisco, Morelos).
Tiphia toddi Allen, 1971. Amer. Ent. Soc., Trans. 97: 252, fig. 50, map 4. ♂.

totopunctata Allen and Jaynes. Liberated in N. Y. but not established. Introduced from Korea. Host: *Anomala orientalis* Waterh.
Tiphia totopunctata Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76, Art. 17: 35. ♀.

Biology: Clausen, Jaynes and Gardner, 1933. U. S. Dept. Agr., Tech. Bul. 366: 44 (life history).

townesi Allen. N. Y. (Shokan).
Tiphia townesi Allen, 1966. Amer. Ent. Soc., Trans. 92: 338, map 17. ♂.

transversa Say. Vt. to Kans., south to Ga., Ala. and Tex. Host: *Phyllophaga* spp.
Tiphia transversa Say, 1828. Contrib. Maclur. Lyc. Phila. 1: 83 ♂.

Taxonomy: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 11. —Allen, 1934. Amer. Ent. Soc., Trans. 60: 297. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 270, fig. 19, map 6. ♂, ♀.

Biology: Davis, 1919 Ill. Nat. Hist. Survey, Bul. 13: 68.

treherni Allen. B. C. to Calif.
Tiphia treherni Allen, 1971. Amer. Ent. Soc., Trans. 97: 329, figs. 35, 36, map 12. ♀.

truncata Cameron. Nev. (Ormsby Co.).
Tiphia truncata Cameron, 1906. Invertebrata Pacifica 1: 156. ♂.

Taxonomy: Allen, 1962. Amer. Ent. Soc., Trans. 88: 22 (type unlocated).

unica Allen. N. C. to Fla., Ala., Tenn., Kans.
Tiphia unica Allen, 1934. Amer. Ent. Soc., Trans. 60: 309. ♀.

Taxonomy: Allen, 1966. Amer. Ent. Soc., Trans. 92: 267, fig. 2, map 5. ♀, ♂.

uvaldae Allen. Tex. (Uvalde Co.).
Tiphia uvaldae Allen, 1971. Amer. Ent. Soc., Trans. 97: 313, fig. 124, map 11. ♀.

vallis Allen. Calif. (Kern and El Dorado Counties).
Tiphia vallis Allen, 1971. Amer. Ent. Soc., Trans. 97: 334, map 12. ♀.

veracruzae Allen. Southern Ariz. to Panama.
Tiphia veracruzae Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 82, fig. 5. ♂, ♀.
Tiphia litoris Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 84. ♂, ♀.

Taxonomy: Allen, 1971. Amer. Ent. Soc., Trans. 97: 295, figs. 108-114, map 9. ♂, ♀.

vernalis Rohwer. Mass., N. H., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., N. C., W. Va., Ohio; Orient. Introduced from Japan, Korea, and China. Host: *Popillia japonica* Newm.
Tiphia vernalis Rohwer, 1924. Ent. Soc. Wash., Proc. 26: 91. ♀, ♂.

Taxonomy: Allen and Jaynes, 1930. U. S. Natl. Mus., Proc. 76, Art. 17: 78, figs. 6, 16, 19, 25, 29.

Biology: Clausen, King, and Teranishi, 1927. U. S. Dept. Agr., Bul. 1429: 40-41. —Balock, 1934. Jour. Econ. Ent. 27: 491-496. —White, 1943. N. Y. Ent. Soc., Jour. 51: 213-218.

virotha Allen. Ariz. (Cochise Co.); ? Mexico (Hidalgo).
Tiphia virotha Allen, 1971. Amer. Ent. Soc., Trans. 97: 338, map 13. ♀.

vulgaris Robertson. Ill., Wis., Ind., Iowa, S. Dak., Kans., Mo., Tex. Host: *Phyllophaga* spp.
Tiphia vulgaris Robertson, 1901. Amer. Ent. Soc., Trans. 27: 195. ♀, ♂.

Taxonomy: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 12. —Allen, 1934. Amer. Ent. Soc., Trans. 60: 305. —Allen, 1961. Amer. Ent. Soc., Trans. 87: 19. —Allen, 1966. Amer. Ent. Soc., Trans. 92: 263, fig. 39, map 5. ♂, ♀.

Biology: Davis, 1919. Ill. Nat. Hist. Survey, Bul. 13: 69.

yosemitensis Allen. Nebr., Mont., Calif.
Tiphia yosemitensis Allen, 1971. Amer. Ent. Soc., Trans. 97: 330, figs. 137-139, map 12. ♀.

Genus KROMBEINIA Pate

Neotiphia subg. *Krombeinia* Pate, 1947. N. Y. Ent. Soc., Jour. 55: 132.
Type-species: *Neotiphia chiricahua* Pate. Orig. desig.

Revision: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 211-241.

chiricahua (Pate). Ariz. (Chiricahua).
Neotiphia chiricahua Pate, 1939. Ent. News 50: 221. ♂, ♀.

Taxonomy: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 233. ♂, ♀.

cristata (Allen). Ariz., N. Mex.
Neotiphia cristata Allen, 1935. Amer. Ent. Soc., Trans. 61: 59. ♀.

Taxonomy: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 238, figs. 3, 29. ♀.

jonesi Allen and Krombein. Ariz. (Douglas, Chiricahua, Huachuca Mts., Oracle).
Krombeinia jonesi Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 239, figs. 6, 65. ♂, ♀.

robusta (Allen). Tex.
Neotiphia ocellata Allen, 1935. Amer. Ent. Soc., Trans. 61: 56. ♀.
Neotiphia robusta Allen, 1935. Amer. Ent. Soc., Trans. 61: 64. ♂.

Taxonomy: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 739 (synonymy). —Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 229, figs. 2, 30. ♂, ♀.

Genus NEOTIPHIA Malloch

Neotiphia Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 9.
Type-species: *Neotiphia acuta* Malloch. Orig. desig.

Revision: Allen, 1935. Amer. Ent. Soc., Trans. 61: 53-65. —Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 211-214, 241-270.

acuta Malloch. Tex.
Neotiphia acuta Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 9. ♀, ♂.

Taxonomy: Frison, 1927. Ill. Nat. Hist. Survey, Bul. 16: 229 (lectotype designation). —Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 259, figs. 5, 46, 67. ♂.

anima Allen and Krombein. N. Mex., Ariz.
Neotiphia anima Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 262. ♀.

barbata Allen and Krombein. Ariz. (Continental, Tucson, Douglas).
Neotiphia barbata Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 264. ♂.

cockerelli Allen. Tex., N. Mex.
Neotiphia cockerelli Allen, 1935. Amer. Ent. Soc., Trans. 61: 62. ♂.

Taxonomy: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 255, fig. 50. ♂, ♀.

crawfordi Allen. Tex.
Neotiphia crawfordi Allen, 1935. Amer. Ent. Soc., Trans. 61: 60. ♀.
Neotiphia conspicua Allen, 1935. Amer. Ent. Soc., Trans. 61: 61. ♂.

Taxonomy: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 257, figs. 28, 41, 42. ♀, ♂.

flavipennis Allen and Krombein. Ariz., N. Mex. south in Mexico to Mexico and Hidalgo.
Neotiphia flavipennis Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 263. ♀.
Neotiphia parma Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 267, figs. 7, 54. ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 87 (synonymy).

luteipennis (Cresson). Colo.
Tiphia luteipennis Cresson, 1865. Ent. Soc. Phila., Proc. 4: 445. ♀.

Taxonomy: Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 10. —Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 260. ♀.

novomexicana Allen. N. Mex., Ariz.
Neotiphia novomexicana Allen, 1935. Amer. Ent. Soc., Trans. 61: 63. ♀.
Neotiphia carinata Krombein, 1938. Ent. Soc. Amer., Ann. 31: 59. ♂.

Taxonomy: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 251, figs. 4, 9, 11, 18, 21, 25, 38, 49, 55, 60, 68. ♀, ♂.

rioverdei Allen and Krombein. Ariz. (Del Rio Verde).
Neotiphia rioverdei Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 263. ♀.

rostrata Allen. Ariz.
Neotiphia rostrata Allen 1935. Amer. Ent. Soc., Trans. 61: 64. ♂.

Taxonomy: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 265, figs. 14, 53. ♂.

sulcata (Roberts). Mich., Iowa and S. Dak. south to Tex. and Ariz.; Mexico (Jalisco).
Tiphia canaliculata Malloch, 1918. Ill. Nat. Hist. Survey, Bul. 13: 10. ♂. Preocc.
Tiphia sulcata Roberts, 1930. Canad. Ent. 62: 190. N. name.
Tiphia mexicana Allen, 1935. Amer. Ent. Soc., Trans. 61: 57. ♀.

Taxonomy: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 245, figs. 1, 8, 12, 17, 20, 23, 24, 27, 34, 44, 48, 56, 58, 59, 66. ♂, ♀.

waltoni Allen. Kans. and Colo. to Tex., N. Mex. and Ariz.; Mexico (Chihuahua, Durango).
Neotiphia waltoni Allen 1935. Amer. Ent. Soc., Trans. 61: 62. ♀.
Neotiphia pima Pate, 1939. Ent. News 50: 245. ♂, (♀ misdet.).

Taxonomy: Allen and Krombein, 1964. Amer. Ent. Soc., Trans. 89: 248, 254, fig. 15, 36, 37, 47, 62. ♀, ♂ (treat *waltoni* and *pima* as discrete species). —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 87 (synonymy).

Genus PARATIPHIA Sichel

Epomidiopteron subg. *Paratiphia* Sichel, 1864. *In* Saussure and Sichel, Cat. Spec. Gen. Scol., p. 269.
Type-species: *Epomidiopteron Sumichrasti* Sichel. Monotypic.

Revision: Allen, 1968. Amer. Ent. Soc., Trans. 94: 25-109, 41 figs., 10 maps.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 89-107 (species of western U. S.).

aequalis atrata Allen. Calif., Ariz., Tex. south to El. Salvador. Typical *aequalis* Fox occurs in Baja California.
Paratiphia aequalis atrata Allen, 1963. Amer. Ent. Soc., Trans. 88: 228, figs. 5, 10, 15, 16. ♂, ♀.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 90, figs. 3, 20, 30. ♂, ♀. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 33, figs. 1-3, map 1. ♂, ♀.

albilabris (Spinola). Calif.
Tiphia albilabris Spinola, 1841. Soc. Ent. France, Ann. 10: 102. ♂.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 107 (type not located).

asotinae Allen. Wash. and Nebr. south to Calif., Kans. and N. Mex.
Paratiphia asotinae Allen, 1963. Ent. News 74: 222. ♂, ♀.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 57, map 4. ♂, ♀.

belfragei Allen. Nebr. and Idaho to Tex. and Calif., south in Mexico to Hidalgo and Jalisco.
Paratiphia belfragei Allen, 1963. Ent. Soc. Amer., Ann. 56: 575, figs. 1, 2 c, d. ♂, ♀.
Paratiphia insueta Allen, 1963. Ent. Soc. Amer., Ann. 56: 576, figs. 1, 2 e. ♂.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 66, figs. 21, 23, 24, map 6. ♂, ♀.

bridwelli Allen. Kans., Tex., Ariz.; Mexico (Tamaulipas).
Paratiphia bridwelli Allen, 1963. Amer. Ent. Soc., Trans. 88: 231, figs. 1, 6, 11, 19. ♂.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 44, map 2. ♂.

cincta Allen. Calif., Nev., Ariz.; Mexico (Baja California).
Paratiphia cincta Allen, 1962. Ent. News 73: 262. ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 98, 106, fig. 2. ♂. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 78, figs. 13, 34, map 5. ♂, ♀.

bradleyi Allen. Tex. to Ariz., south in Mexico to Baja California and Veracruz.
Paratiphia bradleyi Allen, 1963. Amer. Ent. Soc., Trans. 88: 231, figs. 2, 7, 12. ♂.
Paratiphia pachucae Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 101, fig. 17. ♂.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 49, map 3. ♂, ♀. —Betrem and Allen, 1970. Ent. Soc. Wash., Proc. 72: 71.

claripennis Cameron. B. C., Idaho, Nev., Calif. to Tex., south in Mexico to Baja California, Sinaloa and Puebla.
Paratiphia claripennis Cameron, 1905. Invertebrata Pacifica 1: 108. ♂.
Paratiphia varipunctata Cameron, 1905. Invertebrata Pacifica 1: 106. ♀.
Paratiphia fuscinerva Cameron, 1905. Invertebrata Pacifica 1: 107. ♀.
Paratiphia bakeri Cameron, 1905. Invertebrata Pacifica 1: 109. ♂.
Paratiphia ormsbyensis Cameron, 1907. Invertebrata Pacifica 1: 175. ♂.

Taxonomy: Cameron, 1907. Invertebrata Pacifica 1: 172. ♀. —Allen, 1962. Amer. Ent. Soc., Trans. 88: 29-30. —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 96. ♂. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 75, fig. 31, map 7. ♂.

dreisbachi Allen. Colo., N. Mex.
Paratiphia dreisbachi Allen, 1968. Amer. Ent. Soc., Trans. 94: 83, fig. 32, map 6. ♀.

ephippiata Allen. Kans. and Wyo. to Tex. and Ariz. south in Mexico to Zacatecas and San Luis Potosi.
Paratiphia ephippiata Allen, 1963. Ent. Soc. Amer., Ann. 56: 574, figs. 1, 2 a, b, f. ♂, ♀.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 93, fig. 19. ♂, ♀. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 50, figs. 6-10, map 3. ♂, ♀.

fossata Allen. N. Mex. and Ariz. south in Mexico to Veracruz and Oaxaca.
Paratiphia fossata Allen, 1962. Ent. News 73: 259. ♂.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 98, 103. ♂. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 64, figs. 18-20, map 4. ♂, ♀.

halli Allen. Calif. (Riverside Co.).
Paratiphia halli Allen, 1968. Amer. Ent. Soc., Trans. 94: 68, map 6. ♂.

huachucae Allen. Ariz. (Huachuca Mts.).
Paratiphia huachucae Allen, 1968. Amer. Ent. Soc., Trans. 94: 47, map 2. ♂.

irwini Allen. Ariz. (Chiricahua Mts.).
Paratiphia irwini Allen, 1968. Amer. Ent. Soc., Trans. 94: 74, map 6. ♂.

knowltoni Allen. Utah., Nev.
Paratiphia knowltoni Allen, 1968. Amer. Ent. Soc., Trans. 94: 82, fig. 35, map 6. ♀.

knulli Allen. Tex.
Paratiphia knulli Allen, 1968. Amer. Ent. Soc., Trans. 94: 60, fig. 16, map 5. ♂.

lagosae Allen. Tex. and Calif. south in Mexico to Michoacan and Hidalgo.
Paratiphia lagosae Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 101. ♂.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 37, map 1. ♂, ♀.

magna Roberts. Idaho (Pocatello).
Paratiphia magna Roberts, 1929. Psyche 36: 358. ♀.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 84, map 6. ♀.

mitchelli Allen. Tex. to Ariz. south in Mexico to Puebla.
Paratiphia mitchelli Allen, 1963. Amer. Ent. Soc., Trans. 88: 232, figs. 3, 8, 13, 18. ♂.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 46, map 2. ♂, ♀.

neomexicana Cameron. Oreg. to Nebr. south to Calif. and Tex.; Mexico (Sonora, Chihuahua).
Paratiphia neomexicana Cameron, 1907. Invertebrata Pacifica 1: 175. ♂.

Taxonomy: Allen, 1962. Amer. Ent. Soc., Trans. 88: 31 (type redescription). —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 94. ♂, ♀. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 54, figs. 11, 12, 14, map 4. ♂, ♀.

nevadensis Cameron. B. C. to Calif. and Tex., south in Mexico to Baja California and Puebla.
Paratiphia nevadensis Cameron, 1905. Invertebrata Pacifica 1: 108. ♂.
Paratiphia parvula Cameron, 1907. Invertebrata Pacifica 1: 176. ♂.
Paratiphia intermedia Cameron, 1907. Invertebrata Pacifica 1: 176. ♂.

Taxonomy: Allen, 1962. Amer. Ent. Soc., Trans. 88: 27, 32 (synonymy, type redescription). —Allen, 1963. Amer. Ent. Soc., Trans. 88: 229, figs. 4, 9, 14, 17 (redescription). —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 91, 95. ♂, ♀. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 39, fig. 5, map 2. ♂, ♀.

occidentalis Cameron. Nev. (Ormsby Co.).
Paratiphia occidentalis Cameron, 1907. Invertebrata Pacifica 1: 173. ♂.

Taxonomy: Allen, 1968. Amer. Ent. Soc., Trans. 94: 108 (type not located).

robusta Cameron. B. C., Idaho and Nebr. to Calif. and Tex.; Mexico (Baja California, Nayarit).
Paratiphia robusta Cameron, 1905. Invertebrata Pacifica 1: 106. ♀.
Paratiphia fortistriolata Cameron, 1907. Invertebrata Pacifica 1: 172. ♂.

Taxonomy: Allen, 1962. Amer. Ent. Soc., Trans. 88: 33 (type redescribed, synonymy). —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 92. ♀, ♂. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 70, figs. 22, 25-30, 41, map 6. ♀, ♂.

sculleni Allen. Oreg., Utah, Ariz., N. Mex.
Paratiphia sculleni Allen, 1968. Amer. Ent. Soc., Trans. 94: 52, map 3. ♂, ♀.

texana Cameron. Ont. and Mass. to Mont. south to Fla. and Tex.
Paratiphia texana Cameron, 1907. Invertebrata Pacifica 1: 174. ♀, ♂.
Paratiphia algonguina Viereck, 1909. Ent. Soc. Wash., Proc. 11: 45. ♀, ♂.
Paratiphia algonquina (!) Smith, 1910. N. J. State Mus., Ann. Rpt. for 1909, p. 666.

Taxonomy: Allen, 1962. Amer. Ent. Soc., Trans. 88: 25 (redescription *texana*). —Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 97. ♀, ♂. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 62, figs. 15, 17, map 5. ♂, ♀.

verna Allen. Calif., Nev., Ariz.; Mexico (Baja California).
Paratiphia verna Allen, 1963. Ent. News 74: 219. ♂, ♀.

Taxonomy: Allen, 1965. Acad. Nat. Sci. Phila., Proc. 117: 99. ♂. —Allen, 1968. Amer. Ent. Soc., Trans. 94: 80, fig. 36, map 7. ♂, ♀.

Unplaced Taxon of Paratiphia Sichel

fuscipennis Cameron. No locality given (title says n. spp. from "Nevada and Southern California").
Paratiphia fuscipennis Cameron. 1905. Invertebrata Pacifica 1: 106. ♀ (in key).

Genus EPOMIDIOPTERON Romand

Epomidiopteron Romand, 1835. Soc. Ent. France, Ann. 4: 653.
Type-species: *Epomidiopteron Julii* Romand. Monotypic.
Scoliphia Banks, 1912. Canad. Ent. 44: 201.
Type-species: *Scoliphia spilota* Banks. Orig. desig.
Epimodiopteron (!) Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 119.

julii Romand. Southern Ariz. to Peru and Argentina.
Epomidiopteron Julii Romand, 1836. Soc. Ent. France, Ann. 4: 653. ♀.
Paratiphia 12-maculata Cameron, 1904. Amer. Ent. Soc., Trans. 30: 94. ♂.
Scoliphia spilota Banks, 1912. Canad. Ent. 44: 201. ♀, ♂.
Epimodiopteron (!) *spilota* Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 119.

Taxonomy: Allen, 1966. Ent. News 77: 206, 2 figs. ♀, ♂ (synonymy and redescription). —Allen, 1972. Smithsn. Contrib. Zool. 113: 3.

Subfamily MYZININAE

Revision: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 227-292, 12 figs.

Genus MYZINUM Latreille

Myzinum Latreille, 1803. Nouv. Dict. Hist. Nat., v. 15, p. 326.
Type-species: *Tiphia maculata* Fabricius. Monotypic.
Elis Fabricius, 1805. Systema Piezatorum, p. 248.
Type-species: *Elis sexcincta* Fabricius. Desig. by Bingham, 1897.
Plesia Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 150.
Type-species: *Tiphia namea* Fabricius. Desig. by Ashmead, 1903.
Myzina (!) Rafinesque, 1815. Analyse Nat., p. 124.

In describing *Myzinum* as new, Latreille gave a vernacular as well as a scientific name, thus, *myzine, Myzinum*. Later, he and most subsequent authors incorrectly used this vernacular name rather than the properly formed scientific name.

Two North American species have been recorded as parasitizing scarabaeid larvae in the soil, a host relationship which has been recorded also for several Neotropical species.

Taxonomy: Pate, 1935. Ent. News 46: 265-267 (nomenclature). —Krombein, 1937. Ent. Soc. Amer., Ann. 30: 26-30 (key to world genera).

berlyi berlyi (Brimley). S. C., Ill., Ky., Wis., Kans., Miss., Tex.
Elis berlyi Brimley, 1927. Ent. News 38: 238. ♀.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 249-251. ♀, ♂.

berlyi parksi Krombein. La., Tex.
Myzine (!) *berlyi parksi* Krombein, 1938. Amer. Ent. Soc., Trans. 64: 251. ♀, ♂.

berlyi patei Krombein. N. J., N. C., Ga., Fla.
Myzine (!) *berlyi patei* Krombein, 1938. Amer. Ent. Soc., Trans. 64: 254. ♀, ♂.

carolinianum carolinianum (Panzer). Va. to Fla., west to Tex.
Tiphia caroliniana Panzer, 1806. Krit. Revis. Insektenf. Deutschlands, v. 2, p. i, pl. 1, figs. a-c. ♀.
Myzine (!) *flavipes* Olivier, 1811. Encycl. Meth., v. 8, p. 136. ♀.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 260-262, fig. 7. ♀, ♂.

carolinianum collare (Say). Ohio west to S. Dak., south to La. and N. Mex.
Meria collaris Say, 1837. Boston Jour. Nat. Hist. 1: 362. ♀.
Myzine (!) *thoracica* Fox, 1893. Canad. Ent. 35: 113. ♀. Preocc.
Myzine (!) *illinoisensis* Dalla Torre, 1897. Cat. Hym., v. 8, p. 124. N. name.
Elis atriventris Gahan, 1913. U. S. Natl. Mus., Proc. 40: 431. ♀, ♂.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 262-265. ♀, ♂.

confluens Cresson. Utah, Ariz., south in western Mexico to Oaxaca.
Myzine (!) *confluens* Cresson, 1865. Ent. Soc. Phila., Proc. 4: 443. ♀.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 287-288. ♀.

dubiosum Cresson. D. C. south to Fla., Ala., Ill. south to La., Colo., Ariz., south in Mexico to Veracruz, Sonora and Baja California.
Myzine (!) *dubiosa* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 200. ♀.
Myzine (!) *texana* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 200. ♀.
Plesia fulvinervis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 239. ♀.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 281-284, figs. 1, 10. ♀, ♂.

frontale Cresson. Kans., Tex., N. Mex., Colo., Ariz., Nev., Calif., south in Mexico to Baja California, Sonora and Chihuahua.
Plesia marginata Say, 1823. West. Quart. Rptr. 2: 75. ♀. Preocc.
Myzine (!) *frontalis* Cresson, 1875. Rpt. Geog. Geol. Expl. and Survey west of 100th Meridian, p. 711. ♀.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 285-287, fig. 9. ♀, ♂.

maculatum (Fabricius). Mass. to Fla., west to Nev. and Ariz., Calif. south to Guatemala and El Salvador.
Tiphia maculata Fabricius. 1793. Ent. System., p. 224. ♀.
Sapyga majorta Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. iv, pl. 2, figs. d, e. ♂.
Tiphia interrupta Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 322. ♀.
Myzine (!) *hamatus* Say, 1836. Boston Jour. Nat. Hist. 1: 300. ♂.
Meria costata Say, 1837. Boston Jour. Nat. Hist. 1: 360. ♀.
Myzine (!) *hyalina* Cresson, 1865. Ent. Soc. Phila., Proc. 4: 442. ♂.
Myzine (!) *maiorta* (!) Cresson, 1887. Amer. Ent. Soc., Trans., Sup. Vol., p. 268.
Elis floridanus Rohwer, 1920. Ent. Soc. Wash., Proc. 22: 54. ♀, ♂.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 274-281, fig. 11. ♀, ♂. —Krombein, 1949. U. S. Natl. Mus., Proc. 100: 55-56, figs. 1-3 (gynandromorph).

marginatum (Klug). Ga.
Tiphia marginata Klug, 1810. *In* Weber, Beitr. z. Naturk. 2: 184. ♂.

namea fulviceps Cameron. South. Ariz. to Guatemala.
Myzine (!) *fulviceps* Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 248, pl. 12, fig. 20. ♀.

namea namea (Fabricius). Va., N. C., S. C., Fla., Ala., Tex.
Tiphia namea Fabricius, 1805. Systema Piezatorum, p. 233. ♀.
Elis propodealis Rohwer, 1920. Ent. Soc. Wash., Proc. 22: 56. ♀.

Myzine (!) *magna* Krombein, 1938. Amer. Ent. Soc., Trans. 64: 256. ♂.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 256-259, fig. 5. ♂, ♀.

navajo Krombein. Ariz. south to El Salvador.
Myzine (!) *navajo* Krombein, 1938. Amer. Ent. Soc., Trans. 64: 272. ♀, ♂.

obscurum (Fabricius). N. Y. to Fla., west to Ill. and Tex., ? Ariz. Host: *Dyscinetus trachypygus* (Burm.). Parasite: *Dasymutilla mutata* (Bl.).
Tiphia obscura Fabricius, 1805. Systema Piezatorum, p. 233. ♀.
Plesia nigripes Guerin, 1838. Rev. Zool. 1: 57. ♀.
Plesia fuliginosa Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 574. ♂.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 246-249, fig. 3. ♀, ♂.

quinquecinctum (Fabricius). Que. to Fla., west to Wyo. and N. Mex., Calif.; Mexico (Coahuila). Host: *Phyllophaga* spp. Parasite: *Dasymutilla quadriguttata* (Say).
Tiphia 5-cincta Fabricius, 1775. Systema Ent., p. 353. ♀.
Tiphia cingulata Klug, 1810. *In* Weber, Beitr. z. Naturk. 2: 185. ♂.
Sapyga subulata Say, 1823. West. Quart. Rptr. 2: 75. ♂.
Myzine (!) *proxima* Guerin, 1837. Dict. Pitt. Hist Nat., p. 581. ♂.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 265-272, fig. 6. ♀, ♂. —Evans, 1965. Ent. Soc. Wash., Proc. 67: 92, figs. 11-14 (larva).

Biology: Flint and Sanders, 1912. Jour. Econ. Ent. 3: 490. —Davis, 1919. Ill. Nat. Hist. Survey, Bul. 13: 73.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14, p. 44, pl. 14, figs. M-S (male genitalia).

serenum (Fabricius). S. C.
Tiphia serena Fabricius, 1805. Systema Piezatorum, p. 234. ♀.

spilonotum (Cameron). Tex., N. Mex., Colo., Utah, Ariz., south in western Mexico to Oaxaca.
Plesia spilonota Cameron, 1908. Amer. Ent. Soc., Trans. 34: 240. ♀.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 288-290, fig. 12. ♀, ♂.

Genus PTEROMBRUS Smith

Pterombrus Smith, 1869. Ent. Soc. London, Trans., p. 302.
Type-species: *Pterombrus aenigmaticus* Smith. Monotypic.
Engycystis Fox, 1895. Calif. Acad. Sci., Proc. 4: 262.
Type-species: *Myzine* (!) *rufiventris* Cresson. Monotypic.
Huberia Ducke, 1907. Rev. d'Ent. 26: 5.
Type-species: *Huberia glabricollis* Ducke. Desig. by Krombein, 1937.
Pterombus (!) Williams, 1928. Hawaii. Sugar Planters' Assoc. Expt. Sta., Bul. Ent. Ser. 19: 144.

Nothing is known of the habits of our sole North American species, but some of the South American species are parasitic on larvae of two genera of Cicindelidae (Coleoptera).

rufiventris hyalinatus Krombein. West. Tex., Ariz., Calif.
Pterombrus rufiventris hyalinatus Krombein, 1949. Pan-Pacific Ent. 25: 88. ♀, ♂.

rufiventris rufiventris (Cresson). Va. south to Ga. to east. Tex.
Myzine rufiventris Cresson, 1872. Amer. Ent. Soc., Trans. 4: 201. ♂.
Myzine cressonii Dalla Torre, 1897. Cat. Hym., v. 8, p. 122. N. name for *Myzine rufiventris* Cresson, not *Meria rufiventris* Klug.

Taxonomy: Krombein, 1938. Amer. Ent. Soc., Trans. 64: 236-238, fig. 2. ♀, ♂. —Krombein, 1949. Pan-Pacific Ent. 25: 88.

Subfamily ANTHOBOSCINAE

Lalapa Pate, 1947. N. Y. Ent. Soc., Jour. 55: 126.
Type-species: *Lalapa lusa* Pate. Orig. desig.

lusa Pate. Idaho, Wash. to Calif.
Lalapa lusa Pate, 1947. N. Y. Ent. Soc., Jour. 55: 128. ♀, ♂.

Subfamily BRACHYCISTIDINAE

Brachycistidinae exhibit very pronounced sexual dimorphism, males being fully winged and females wingless and with modified thorax. Positive sex associations have been established only in *Brachycistis* Fox. Eventually there will be considerable generic synonymy because the remaining males and females are assigned to separate genera.

Revision: Bradley, 1917. Amer. Ent. Soc., Trans. 43: 252-283, pls. 20-25 (males only). —Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 1-28, pls. 1-4 (males only). —Mickel and Krombein, 1942. Amer. Midland Nat. 28: 648-679, pls. 1-3 (females only).

Taxonomy: Wasbauer, 1966. Calif. Univ. Pubs. Ent. 43: 15 (key to male genera). —Wasbauer, 1968. Pan-Pacific Ent. 44: 196-197 (key to male genera).

Biology: Rozen, 1952. Pan-Pacific Ent. 23: 91-92 (collecting techniques for females).

Genus BRACHYCISTIS Fox

Brachycistis Fox, 1893. Calif. Acad. Sci., Proc. 4 (ser. 2): 7.
Type-species: *Brachycistis petiolatus* Fox. Orig. desig.
Brachycistus (!) Cockerell and Casad, 1894. Ent. News 5: 295.
Glyptometopa Ashmead, 1898. Psyche 8: 251.
Type-species: *Glyptometopa americana* Ashmead. Orig. desig.
Glytometopa (!) Fox, 1899. Amer. Ent. Soc., Trans. 25: 289.
Brachycystis (!) Viereck, 1906. Amer. Ent. Soc., Trans. 32: 190.
Stilbopogon Mickel and Krombein, 1942. Amer. Midland Nat. 28: 658.
Type-species: *Stilbopogon alutacea* Mickel and Krombein. Orig. desig.
Astigmometopa Mickel and Krombein, 1942. Amer. Midland Nat. 28: 668.
Type-species: *Astigmometopa emarginata* Mickel and Krombein. Orig. desig.

Revision: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 1-96, 144 figs., 21 maps (males).

Taxonomy: Wasbauer, 1969 (1968). Pan-Pacific Ent. 44: 297-298 (sex association). —Wasbauer, 1971. Pan-Pacific Ent. 47: 211-212 (sex association).

Species Group Nitida

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 20.

arenivaga Bradley. Sonoran desert of Calif. and Ariz.; Mexico (Baja California, Sonora).
Brachycistis (*Brachycistis*) *arenivaga* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 269. ♂.
Brachycistis (*Brachycistis*) *eriopis* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 266. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 20-21, figs. 23, 40, 95, 96, map 1. ♂.

linsleyi Wasbauer. Mojave, Sonoran and Chihuahuan deserts, Calif., Nev., Ariz., N. Mex. and Tex.; Mexico (Baja California, Chihuahua).
Brachycistis linsleyi Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 21, figs. 16, 17, 41, 97, 98, map 2. ♂.

nitida (Cresson). Great Basin and Rocky Mt. grasslands, Nebr., Kans., Tex., Mont., Utah, N. Mex., Ariz.
Agama nitida Cresson, 1875. Rpt. Geog. Geol. Expl. and Survey west of 100th Meridian, p. 710. ♂.
Photopsis sobrinus Blake, 1886. Amer. Ent. Soc., Trans. 13: 268. ♂.
Photopsis lepidus Blake, 1886. Amer. Ent. Soc., Trans. 13: 269. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 23-25, figs. 43, 44, 99, 100, map 3. ♂.

texana Malloch. Chihuahuan desert of Tex.; Mexico (Coahuila, Nuevo Leon).
Brachycistis (*Brachycistis*) *texana* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 12. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 25-27, figs. 18, 19, 45, 46, 91, 101, 102, map 5 (not 4). ♂.

verticalis Malloch. Sonoran desert of Ariz.; Mexico (Sonora).
Brachycistis (*Brachycistis*) *verticalis* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 19. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 27-30, map 4 (not 5). ♂.

Species Group Petiolata

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 30-31.

elegantula Cockerell and Casad. Southern Mojave, Sonoran and Chihuahuan deserts of Calif., Ariz., N. Mex. and Tex.; Mexico (Baja California, Sonora).
Brachycistus (!) *elegantulus* Cockerell and Casad, 1894. Ent. News 5: 295. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 31-33, figs. 35, 47, 48, 103, 104, map 6. ♂.

imitans Malloch. Central Valley, Mojave and Sonoran deserts of Calif., Ariz.; Mexico (Baja California).
Brachycistis (*Brachycistis*) *imitans* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 23. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 33-35, figs. 39, 49, 50, 92, 105, 106, map 7. ♂. —Wasbauer, 1969 (1968). Pan-Pacific Ent. 44: 298-299. ♀.

juncea Wasbauer. Calif. (San Bernardino Co.).
Brachycistis juncea Wasbauer, 1966. Univ. Calif. Pubs., Ent. 43: 35, figs. 36, 51, 52, 107, 108. ♂.

lacustris hurdi Wasbauer. Sonoran desert of Calif., Ariz., ? Tex.
Brachycistis lacustris hurdi Wasbauer, 1966. Univ. Calif. Pubs., Ent. 43: 38, map 8. ♂.

lacustris lacustris Malloch. Mojave desert of Calif., Nev.
Brachycistis (*Brachycistis*) *lacustris* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 24. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 37, map 8. ♂.

longula Wasbauer. Calif. (Riverside Co.).
Brachycistis longula Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 39, figs. 37, 55, 56, 111, 112. ♂.

petiolata Fox. Mojave and Sonoran deserts of Calif., Nev., Ariz., also Utah, Idaho; Mexico (Baja California, Sonora).
Brachycistis petiolata Fox, 1893. Calif. Acad. Sci., Proc. (2) 4: 8. ♂.
Brachycistis gaudii Cockerell, 1901. Canad. Ent. 33: 340. ♂.
Brachycistis (*Brachycistis*) *parva* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 14. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 40-42, figs. 8, 27, 57, 58, 113, 114, map 9. ♂.

Species Group Atrata

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 43.

alcanor (Blake). Alta., Mont. and S. Dak. south to Ariz. and Tex.; Mexico (Chihuahua, Coahuila, Durango, Jalisco, Mexico, Puebla, Zacatecas).
Agama Alcanor Blake, 1871. Amer. Ent. Soc., Trans. 3: 264. ♂.
Brachycistis cremastogaster Melander, 1903. Amer. Ent. Soc., Trans. 29: 329. ♂.
Brachycistis crematogaster (!) Krombein, 1951. U. S. Dept. Agr., Monog. 2: 743.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 46-48, 75, figs. 30, 61, 62, 117, 118, map 11. ♂.

ampla (Blake). Colo., Ariz., Nev., Calif., Wash.
Agama ampla Blake, 1879. Amer. Ent. Soc., Trans. 7: 252. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 48, figs. 63, 64, 119, 120, map 12. ♂.

atrata (Blake). B. C., Wash. and Idaho south to Calif. and Ariz.; Mexico (Baja California, Sonora).
Agama atrata Blake, 1879. Amer. Ent. Soc., Trans. 7: 253. ♂.
Mutilla agama Dalla Torre, 1897. Cat. Hym., v. 8, p. 7. N. name for *Agama atrata* Blake, not *Mutilla atrata* Linnaeus.
Brachycistis nudus Fox, 1899. Amer. Ent. Soc., Trans. 25: 281. ♂.
Brachycistis nigritus Fox, 1899. Amer. Ent. Soc., Trans. 25: 282. ♂.

Brachycistis contiguus Fox, 1899. Amer. Ent. Soc., Trans. 25: 282. ♂.
Glyptometopa francisca Mickel and Krombein, 1942. Amer. Midland Nat. 28: 656. ♀.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 43-46, figs. 6, 21, 34, 59, 60, 89, 115, 116, map 10. ♂. —Wasbauer, 1969 (1968). Pan-Pacific Ent. 44: 297-298 (female synonymy).

carinata Fox. South, Calif. coastal mts.; Mexico (Baja California).
Brachycistis carinatus Fox, 1899. Amer. Ent. Soc., Trans. 25: 283. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 49-51, figs. 20, 65, 121, 122, map 13. ♂. —Wasbauer, 1971. Pan-Pacific Ent. 47: 212. ♀.

convexa Wasbauer. Calif. (Imperial Co.).
Brachycistis convexa Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 51, figs. 31, 66, 67, 94, 123, 124. ♂.

cruenta Wasbauer. Tex. (Nueces Co.); Mexico (Tamaulipas).
Brachycistis cruenta Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 53, figs. 68, 69, 125, 126. ♂.

curvata Malloch. Sonoran desert of Calif., Ariz.; Mexico (Baja California).
Brachycistis (*Brachycistis*) *curvata* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 16. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 54-56, figs. 70, 71, 127, 128, map 14. ♂.

davidi Wasbauer. Tex.; Mexico (Coahuila).
Brachycistis davidi Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 56, figs. 22, 32, 72, 73, 129, 130. ♂.

glabrella (Cresson). Alta., Oreg., Idaho, Wyo. and Nebr. to Calif. and Tex., south in Mexico to Oaxaca.
Mutilla glabrella Cresson, 1865. Ent. Soc. Phila., Proc. 4: 441. ♂.
Brachycistis (*Brachycistis*) *dentata* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 263. ♂.
Brachycistis (*Brachycistis*) *micrommata* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 265. ♂.
Brachycistis (*Brachycistis*) *utahensis* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 17. ♂.
Brachycistis (*Brachycistis*) *melanocephala* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 19. ♂.
Brachycistis (*Brachycistis*) *dakotensis* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 20. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 57-59, figs. 25, 33, 74, 75, 131, 132, map 15. ♂.

inaequalis Fox. South. Calif., Nev., Ariz. and Tex.; Mexico (Baja California).
Brachycistis inaequalis Fox, 1899. Amer. Ent. Soc., Trans. 25: 282. ♂.
Brachycistis nevadensis Fox, 1899. Amer. Ent. Soc., Trans. 25: 283. ♂.
Brachycistis nocticola Bradley, 1917. Amer. Ent. Soc., Trans. 43: 289, figs. 19, 39, 40. ♂.

Taxonomy: Krombein, 1954. Ent. Soc. Wash., Proc. 56: 85-86 (synonymy of *nocticola*). —Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 59-61, figs. 29, 76, 77, 133, 134, map 16. ♂.

indiscreta Fox. Nebr. to Tex., N. Mex., Ariz.; Mexico (Chihuahua).
Brachycistis indiscreta Fox, 1899. Amer. Ent. Soc., Trans. 25: 284. ♂.
Brachycystis (!) *stictinotus* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 190. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 61-63, figs. 26, 38, 78, 135, 136, map 17. ♂.

ioachinensis Bradley. Wash. and Mont. to Calif. and Tex. south in Mexico to Baja California and Sonora.
Brachycistis (*Brachycistis*) *ioachinensis* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 267. ♂.
Brachycistis (*Brachycistis*) *rugosa* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 11. ♂.
Brachycistis (*Brachycistis*) *subcarinata* Malloch, 1926. U. S. Natl. Mus., Proc. 68(3): 11. ♂.
Brachycistis (*Brachycistis*) *nigrifrons* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 16. ♂.
Brachycistis (*Brachycistis*) *washingtona* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 21. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 65-68, figs. 1, 12, 13, 79, 80, 137, 138, map 18. ♂.

semiatra Malloch. Wash. to northeast. Calif., to Idaho and Utah.
Brachycistis (*Brachycistis*) *semiatra* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 24. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 68-70, figs. 81, 82, 139, 140, map 19. ♂.

subquadrata Fox. Calif. (San Diego Co.).
Brachycistis subquadratus Fox, 1899. Amer. Ent. Soc., Trans. 25: 282. ♂.
Brachycistis (*Brachycistis*) *intermedia* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 18. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 64-65. ♂.

timberlakei Wasbauer. Calif., Nev., Utah, Ariz., N. Mex., Tex.
Brachycistis timberlakei Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 70, figs. 90, 141, 142, map 20. ♂.

triangularis Fox. South. Calif., Nev., Ariz., N. Mex., Tex.; Mexico (Baja California, Sonora, Chihuahua, Durango).
Brachycistis triangularis Fox, 1899. Amer. Ent. Soc., Trans. 25: 284. ♂.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 72-73, figs. 24, 83, 84, 93, 143, 144, map 21. ♂.

Unplaced Taxa of Brachycistis Fox

alutacea (Mickel and Krombein). Tex., N. Mex.
Stilbopogon alutacea Mickel and Krombein, 1942. Amer. Midland Nat. 28: 659. ♀.

americana (Ashmead). Calif. (Alameda Co.).
Glyptometopa americana Ashmead, 1898. Psyche 8: 251. ♀.

convergens (Mickel and Krombein). Calif. (Santa Monica).
Glyptometopa convergens Mickel and Krombein, 1942. Amer. Midland Nat. 28: 657. ♀.

emarginata (Mickel and Krombein). Tex. (Valentine).
Astigmometopa emarginata Mickel and Krombein, 1942. Amer. Midland Nat. 28: 668. ♀.

Taxonomy: Wasbauer, 1971. Pan-Pacific Ent. 47: 212.

protracta Bradley. Ariz. (Phoenix).
Brachycistis (*Brachycistis*) *protracta* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 270. ♂.
Brachycistis (*Brachycistis*) *protractor* (!) Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 7.

Taxonomy: Wasbauer, 1966. Univ. Calif. Pubs. Ent. 43: 74. ♂.

Genus COLOCISTIS Krombein

Colocistis Krombein, 1942. Ent. Soc. Wash., Proc. 44: 65.
Type-species: *Colocistis pilosa* Krombein. Orig. desig.

Taxonomy: Wasbauer, 1968. Pan-Pacific Ent. 44: 197, figs. 21, 23.

brevis (Fox). Ariz., Nev., Calif.
Brachycistis brevis Fox, 1899. Amer. Ent. Soc., Trans. 25: 285. ♂.

castanea (Cresson). Tex., N. Mex., Colo., Ariz., Nev., Calif.
Mutilla castanea Cresson, 1865. Ent. Soc. Phila., Proc. 4: 388. ♂.

crassa (Bradley). Tex., Colo., Ariz., Nev., Calif.
Brachycistis (*Brachycistis*) *crassa* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 277. ♂.

eremi (Bradley). Ariz., Nev., Calif.
Brachycistis (*Brachycistis*) *eremi* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 279. ♂.

pilosa Krombein. Calif. (San Diego).
Colocistis pilosa Krombein, 1942. Ent. Soc. Wash., Proc. 44: 66. ♂.

stygia (Bradley). Ariz. (Nogales).
Brachycistis (*Brachycistis*) *stygia* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 276. ♂.

thermarum (Bradley). Ariz.
Brachycistis (*Brachycistis*) *thermarum* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 274. ♂.

Genus ACANTHETROPIS Wasbauer

Acanthetropis Wasbauer, 1958. Pan-Pacific Ent. 34: 139.

Type-species: *Acanthetropis lamellatus* Wasbauer. Orig. desig.

Taxonomy: Wasbauer, 1968. Pan-Pacific Ent. 44: 197, figs. 20, 24.

aequalis (Fox). Nebr., Kans., Colo., Idaho, Nev., Ariz.
Brachycistis aequalis Fox, 1899. Amer. Ent. Soc., Trans. 25: 284. ♂.

idiotes (Cockerell). N. Mex., Calif.
Brachycistis idiotes Cockerell, 1895. Ent. News. 6: 63. ♂.

noctivaga (Bradley). Utah, Nev., Ariz., Calif.; Mexico (Sonora, Baja California).
Brachycistis (*Brachycistis*) *noctivaga* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 272. ♂.

normalis (Malloch). S. Dak., Colo., Ariz., Calif.
Brachycistis normalis Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 8. ♂.

Genus BRACHYCISTINA Malloch

Brachycistis subg. *Brachycistina* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 5, 25.
Type-species: *Brachycistis* (*Brachycistina*) *acuta* Malloch. Orig. desig.

Taxonomy: Wasbauer, 1968. Pan-Pacific Ent. 44: 197, fig. 25.

acuta (Malloch). Ariz., Nev., Calif.
Brachycistis (*Brachycistina*) *acuta* Malloch, 1926. U. S. Natl. Mus., Proc. 68 (3): 25. ♂.

Genus HADROCISTIS Wasbauer

Hadrocistis Wasbauer, 1968. Pan-Pacific Ent. 44: 185.
Type-species: *Hadrocistis bicolor* Wasbauer. Orig. desig.

bicolor Wasbauer. Calif. (Imperial Co.).
Hadrocistis bicolor Wasbauer, 1968. Pan-Pacific Ent. 44: 187, figs. 4-6, 14, 18. ♂.

slanskyae Wasbauer. Calif. (Imperial Co.).
Hadrocistis slanskyae Wasbauer, 1968. Pan-Pacific Ent. 44: 188, figs. 1-3, 13, 17. ♂.

Genus BRACHYCISTELLUS Baker

Brachycistellus Baker, 1907. Invertebrata Pacifica 1: 177.
Type-species: *Brachycistellus figitiformis* Baker. Monotypic.

Taxonomy: Wasbauer, 1968. Pan-Pacific Ent. 44: 193-195.

figitiformis Baker. Calif. (Colusa Co., Claremont).
Brachycistellus figitiformis Baker, 1907. Invertebrata Pacifica 1: 178. ♂.

Taxonomy: Wasbauer, 1968. Pan-Pacific Ent. 44: 195-196, figs. 10-12, 16, 19. ♂.

Genus QUEMAYA Pate

Quemaya Pate, 1947. N. Y. Ent. Soc., Jour. 55: 139.
Type-species: *Brachycistis* (*Brachycistellus*) *paupercula* Bradley. Orig. desig.

Taxonomy: Wasbauer, 1968. Pan-Pacific Ent. 44: 196, fig. 22.

arenicola Wasbauer. Calif. (Imperial Co.).
Quemaya arenicola Wasbauer, 1967. Biol. Soc. Wash., Proc. 80: 169, figs. 2-6. ♂.

inermis (Malloch). Ariz. (Higley).
Brachycistus (!) (*Brachycistellus*) *inermis* Malloch, 1924. Brooklyn Ent. Soc., Bul. 19: 23. ♂.

marcida (Bradley). Calif. (Calexico).
Brachycistis (*Brachycistellus*) *marcida* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 283. ♂.

paupercula (Bradley). Calif., Nev.
Brachycistis (*Brachycistellus*) *paupercula* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 282. ♂.

perpunctata (Cockerell). N. Mex., Calif.
Brachycistis perpunctatus Cockerell, 1896. Amer. Ent. Soc., Trans. 22: 291. ♂.

Taxonomy: Wasbauer, 1968. Biol. Soc. Wash., Proc. 80: 170, fig. 1.

Genus GLYPTACROS Mickel and Krombein

Glyptacros Mickel and Krombein, 1942. Amer. Midland Nat. 28: 660.
Type-species: *Glyptacros angustior* Mickel and Krombein. Orig. desig.

angustior Mickel and Krombein. Ariz.
Glyptacros angustior Mickel and Krombein, 1942. Amer. Midland Nat. 28: 660. ♀.

ashmeadi Mickel and Krombein. No locality given.
Glyptacros ashmeadi Mickel and Krombein, 1942. Amer. Midland Nat. 28: 661. ♀.

Genus XEROGLYPTA Mickel and Krombein

Xeroglypta Mickel and Krombein, 1942. Amer. Midland Nat. 28: 663.
Type-species: *Xeroglypta egregia* Mickel and Krombein. Orig. desig.

egregia Mickel and Krombein. Calif. (Palm Springs).
Xeroglypta egregia Mickel and Krombein, 1942. Amer. Midland Nat. 28: 663. ♀.

Genus AULACROS Mickel and Krombein

Aulacros Mickel and Krombein, 1942. Amer. Midland Nat. 28: 664.
Type-species: *Aulacros latior* Mickel and Krombein. Orig. desig.

latior Mickel and Krombein. Calif. (Palm Springs).
Aulacros latior Mickel and Krombein, 1942. Amer. Midland Nat. 28: 665. ♀.

Genus BRUESIELLA Mann

Bruesiella Mann, 1914. Psyche 21: 182.
Type-species: *Bruesiella formicaria* Mann. Orig. desig.
Eurycros Mickel and Krombein, 1942. Amer. Midland Nat. 28: 666.
Type-species: *Eurycros furtivus* Mickel and Krombein. Orig. desig.

Taxonomy: Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2: 325 (synonymy).

furtivus (Mickel and Krombein). Ariz. (Tucson, Avondale Ranch).
Eurycros furtivus Mickel and Krombein, 1942. Amer. Midland Nat. 28: 667. ♀.

Genus AGLYPTACROS Mickel and Krombein

Aglyptacros Mickel and Krombein, 1942. Amer. Midland Nat. 28: 669.
Type-species: *Glyptometopa eureka* Banks. Orig. desig.

eureka (Banks). Ariz. (Palmerlee).
Glyptometopa eureka Banks, 1912. Canad. Ent. 44: 202. ♀.

paxillatus Mickel and Krombein. Colo. (La Junta).
Aglyptacros paxillatus Mickel and Krombein, 1942. Amer. Midland Nat. 28: 673. ♀.

segredentatus Mickel and Krombein. Ariz. (Benson).
Aglyptacros segredentatus Mickel and Krombein, 1942. Amer. Midland Nat. 28: 671. ♀.

sulcatus Mickel and Krombein. Tex. (Valentine).
Aglyptacros sulcatus Mickel and Krombein, 1942. Amer. Midland Nat. 28: 674. ♀.

Subfamily METHOCHINAE

Genus METHOCHA Latreille

Genus METHOCHA Subgenus METHOCHA Latreille

Methocha Latreille, 1804. Nouv. Dict. Hist. Nat., v. 24, p. 179.
Type-species: *Mutilla articulata* Latreille. Monotypic.
Methoca (!) Latreille, 1804. Hist. Nat. Crust. Ins., v. 13, p. 268.
Tengyra Latreille, 1809. Gen. Crust. Ins., v. 4, p. 115.
Type-species: *Tengyra Sanvitali* Latreille. Monotypic.
Spinolia Costa, 1858. Fauna Napoli Scol., p. 21.
Type-species: *Spinolia italica* Costa. Monotypic.

Two of our native species have been reared from larvae of tiger beetles, the known host of several extralimital species.

Only the typical subgenus occurs in North America.

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 389-390, figs. 26-28 (female, male thorax).

californica Westwood. Calif., Nev., Wash. Host: *Cicindela senilis* Horn ?; cicindelid sp.; reared in laboratory on *Omus californicus* Esch.
Methoca (!) *californica* Westwood, 1881. Ent. Soc. London, Trans., p. 133. ♀.
Methoca (!) *nigrior* Fox, 1899. Amer. Ent. Soc., Trans. 25: 288. ♂.

Biology: Bridwell, 1912. Pacific Coast Ent. Soc., Proc. 1: 46-48 (host). —Burdick and Wasbauer, 1959. Wasmann Jour. Biol. 17: 75-88, 6 figs. (prey capture, oviposition, life history, egg, larva).

formosa Krombein. Fla. (Arcadia).
Methocha (*Methocha*) *formosa* Krombein, 1954. Amer. Ent. Soc., Trans. 80: 2, figs. 1, 3. ♀.

impolita Krombein. W. Va., D. C., N. Y.
Methocha (*Methocha*) *impolita* Krombein, 1958. Ent. Soc. Wash., Proc. 60: 58. ♀.

stygia (Say). General in south. Canada and U. S. Host: Cicindelid larvae.
Mutilla (*Methoca* (!)) *pacalis* Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 587. Nom. nud.
Tengyra stygia Say, 1836. Boston Jour. Nat. Hist. 1: 299. ♂.
Methoca (!) *bicolor* Say, 1836. Boston Jour. Nat. Hist. 1: 299. ♀.
Methoca (!) *canadensis* Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 67. ♂.

Taxonomy: Evans, 1965. Ent. Soc. Wash., Proc. 67: 88-90, figs. 1-5 (larva).

Biology: Williams, 1916. Psyche 23: 121-125, pl. 12.

Subfamily MYRMOSINAE

The Myrmosinae have as hosts the larvae of small ground-nesting wasps and bees. Brothers (1975) transferred this subfamily to the Mutillidae.

Revision: Krombein, 1940. Amer. Ent. Soc., Trans. 65: 415-465, pl. 24.

Taxonomy: Wasbauer, 1974 (1973). Pan-Pacific Ent. 49: 335 (key to female genera).

Genus MYRMOSA Latreille

Genus MYRMOSA Subgenus MYRMOSA Latreille

Myrmosa Latreille, 1796. Precis Caract. Gen. Ins., p. 118.
Type-species: *Myrmosa atra* Panzer. First included species.
Ischioceras Provancher, 1882. Nat. Canad. 13: 8.
Type-species: *Ischioceras rugosa* Provancher. First included species.

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 384-385, figs. 11-14 (female, male thorax).

blakei Bradley. N. Y., Va.
Myrmosa (*Myrmosa*) *blakei* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 251. ♀.

Taxonomy: Krombein, 1940. Amer. Ent. Soc., Trans. 65: 438. ♀.

bradleyi Roberts. Wash., Calif.
Myrmosa bradleyi Roberts, 1929. Psyche 36: 362. ♂.

Taxonomy: Krombein, 1940. Amer. Ent. Soc., Trans. 65: 436-438, fig. 2. ♂, ♀.

Biology: Linsley, 1960. Pan-Pacific Ent. 36: 36 (mating behavior).

peculiaris Krombein. Kans. (Onaga).
Myrmosa (*Myrmosa*) *peculiaris* Krombein, 1940. Amer. Ent. Soc., Trans. 65: 438. ♀.

unicolor Say. N. B. south to N. C., west to B. C. and Ariz. Host: *Tiphia* sp.; *Lindenius columbianus errans* (Fox) ?; *Dialictus pruinosus* (Robt.); *D. inconspicuus* (Sm.).
Myrmosa unicolor Say, 1824. *In* Keating, Narr. Long's 2nd. Exped., v. 2, p. 331. ♂.

Ischioceras rugosa Provancher, 1882. Nat. Canad. 13: 8. ♀, (♂ misdet.).
Mutilla thoracica Blake, 1886. Amer. Ent. Soc., Trans. 13: 204. Preocc.
Mutilla erythronota Dalla Torre, 1897. Cat. Hym., v. 8, p. 36. N. name.
Myrmosa (*Myrmosa*) *banksi* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 249. ♀, ♂.
Myrmosa dakotensis Weber, 1934. Psyche 41: 57. ♀.

Taxonomy: Krombein, 1940. Amer. Ent. Soc., Trans. 65: 430-436, fig. 6.

Biology: Melander and Brues, 1903. Biol. Bul. 5: 7. —Krombein, 1940. Amer. Ent. Soc., Trans. 65: 435-436. —Krombein, 1956. Ent. Soc. Wash., Proc. 58: 154 (mating behavior).

Genus MYRMOSA Subgenus MYRMOSINA Krombein

Myrmosa subg. *Myrmosina* Krombein, 1940. Amer. Ent. Soc., Trans. 65: 452.
Type-species: *Myrmosa* (*Myrmosina*) *texana* Krombein. Orig. desig.

nocturna nocturna Krombein. Md., La., Tex., Kans.
Myrmosa (*Myrmosina*) *nocturna nocturna* Krombein, 1940. Amer. Ent. Soc., Trans. 65: 454. ♂.

nocturna rufigastra Krombein. Tex., Calif.
Myrmosa (*Myrmosina*) *nocturna rufigastra* Krombein, 1940. Amer. Ent. Soc., Trans. 65: 455. ♂.

texana Krombein. Dak., Tex.
Myrmosa (*Myrmosina*) *texana* Krombein, 1940. Amer. Ent. Soc., Trans. 65: 453. ♂.

Genus LEIOMYRMOSA Wasbauer

Leiomyrmosa Wasbauer, 1974 (1973). Pan-Pacific Ent. 49: 325.
Type-species: *Leiomyrmosa spilota* Wasbauer. Orig. desig.

spilota Wasbauer. Calif. (Blythe in Riverside Co.).
Leiomyrmosa spilota Wasbauer, 1974 (1973). Pan-Pacific Ent. 49: 326, figs. 1, 2, 19, 23. ♀.

Genus MYRMOSULA Bradley

Myrmosa subg. *Myrmosula* Bradley, 1917. Amer. Ent. Soc., Trans. 43: 249.
Type-species: *Myrmosa parvula* Fox. Desig. by Bridwell, 1920.

Taxonomy: Mickel, 1940. Pan-Pacific Ent. 16: 133-134 (key to females). —Wasbauer, 1974 (1973). Pan-Pacific Ent. 49: 335-336 (key to females).

boharti Wasbauer. Calif. (Thousand Palms in Riverside Co.).
Myrmosula boharti Wasbauer, 1974 (1973). Pan-Pacific Ent. 49: 331, figs. 13, 14. ♀.

exaggerata (Krombein). Calif.
Myrmosa (*Myrmosula*) *exaggerata* Krombein, 1940. Amer. Ent. Soc., Trans. 65: 460. ♀.

Taxonomy: Mickel, 1940. Pan-Pacific Ent. 16: 133.

nasuta Wasbauer. Southern Calif. and Ariz. Ecology: Visits mat *Euphorbia* and has been collected in a kangaroo rat burrow.
Myrmosula nasuta Wasbauer, 1974 (1973). Pan-Pacific Ent. 49: 329, figs. 7, 8, 20. ♀.

pacifica (Mickel). Calif. (Antioch). Possibly a synonym of *exaggerata* Krom.
Myrmosa (*Myrmosula*) *pacifica* Mickel, 1940. Pan-Pacific Ent. 16: 134. ♀.

parvula (Fox). D. C. south to Ala., west to Mont. and Tex. Host: *Dialictus imitatus* (Sm.), *D. zephyrus* (Sm.); *Augochlorella striata* (Prov.)(?), *A. persimilis* (Vier.)(?).
Myrmosa parvula Fox, 1893. N. Y. Ent. Soc., Jour. 1: 53. ♂.
Mutilla antisemitica Dalla Torre, 1897. Cat. Hym., v. 8, p. 10. N. name for *Myrmosa parvula* fox, not *Mutilla parvula* Fabricius.
Brachycistis bimaculatus Fox, 1899. Amer. Ent. Soc., Trans. 25: 285. ♀.

Taxonomy: Krombein, 1940. Amer. Ent. Soc., Trans. 65: 457-459, figs. 5, 10. ♂, ♀.

Biology: Michener and Wille, 1961. Univ. Kans. Sci. Bul. 42: 1130 (host record). —Ordway, 1964. Kans. Ent. Soc., Jour. 37: 149 (host records). —Batra, 1965. Kans. Ent. Soc., Jour. 38: 386-387 (behavior in host nest). —Brothers, 1972. Univ. Kans. Sci. Bul. 50: 23 (host record).

peregrinatrix (Krombein). Alta., Ariz., Tex.
Myrmosa (*Myrmosula*) *peregrinatrix* Krombein, 1946. Ent. Soc. Wash., Proc. 48: 247. ♀.

rufiventris Blake. Nev., Oreg.
Myrmosa rufiventris Blake, 1879. Amer. Ent. Soc., Trans. 7: 254. ♂.
Mutilla erythrogastra Dalla Torre, 1897. Cat. Hym., v. 8, p. 36. N. name for *Myrmosa rufiventris* Blake, not *Mutilla rufiventris* Klug nor *M. rufiventris* Smith.

Taxonomy: Krombein, 1940. Amer. Ent. Soc., Trans. 65: 459-460. ♂.

rutilans (Blake). Calif. Host: *Nomadopsis scutellaris* (Fwlr.)
Mutilla rutilans Blake, 1879. Amer. Ent. Soc., Trans. 7: 248. ♀.

Taxonomy: Krombein, 1940. Amer. Ent. Soc., Trans. 65: 461-462, fig. 12. ♀.

Family SIEROLOMORPHIDAE

This is a primitive scolioid group whose closest relationship appears to be with the Tiphiidae. The family is known from the single genus *Sierolomorpha* which has six New World species ranging from North America south to Panama, one possibly adventive species in Hawaii, and two Old World species from North China and Tadzhikistan.

There is no information on host relationships, but the lack of a tarsal pecten in *Sierolomorpha* females suggests that they are not fossorial in habit.

Revision: Evans, 1961. Breviora, No. 140, 12 pp., 6 figs.

Taxonomy: Melander and Brues, 1932. Mus. Compar. Zool. Bul. 73: 500. —Schuster, 1949. Ent. Amer. (n. s.) 29: 124-125.

Genus SIEROLOMORPHA Ashmead

Sierolomorpha Ashmead, 1903. Canad. Ent. 35: 42.
Type-species: *Sierola* (?) *ambigua* Ashmead. Orig. desig.

apache Evans. Ariz.
Sierolomorpha apache Evans, 1961. Breviora, No. 140, p. 5, fig. 6. ♂.

bicolor Evans. Ariz.
Sierolomorpha bicolor Evans, 1961. Breviora, No. 140, p. 4, fig. 5. ♀, ♂.

brevicornis Evans. S. C. (Greenville).
Sierolomorpha brevicornis Evans, 1961. Breviora, No. 140, p. 8, fig. 3. ♂.

canadensis (Provancher). Alta., Ont. and Mass. south to Ariz., Tex. and Fla.
Photopsis Canadensis Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 410. ♂. Secondary homonym in *Mutilla*.
Sierola? ambigua Ashmead, 1893. U. S. Natl. Mus., Bul. 45: 56.
Mutilla tertia Dalla Torre. 1897. Cat. Hym., v. 8, p. 91. N. name.

nigrescens Evans. Yukon, Alta. and Sask. south to Calif., Ariz. and Colo.
Sierolomorpha nigrescens Evans, 1961. Breviora, No. 140, p. 9, fig. 1. ♂, ♀.

similis Evans. Conn. south to Ga., W. Va., Kans.
Sierolomorpha similis Evans, 1961. Breviora, No. 140, p. 6, fig. 4. ♂, ♀.

Family MUTILLIDAE

Females are entirely wingless and have a greatly modified thorax. Males are normally fully winged, but are brachypterous or apterous in a few species. Some females are called cowkillers or mulekillers because of their size and painful sting, or velvet ants because of the appearance of the dense pile covering the body.

Hosts are known for very few of the North American species. The stages of host attacked are limited to diapausing larvae or pupae. Most recorded North American hosts are wasps or bees which nest in the soil, in borings in wood or which build mud or resin cells or paper nests. However, there is one authenticated record of coleopterous pupae as a host. Extralimital genera have been recorded as parasitizing Lepidoptera, Coleoptera and Diptera, as well as aculeate Hymenoptera.

Brothers' important contribution on phylogeny of the Mutillidae was received too late to adopt

his classification but it will be used in the next edition. He places the Myrmosinae here rather than in the Tiphiidae. He raises the exotic Bradynobaeninae to family rank and transfers to it as subfamilies the Typhoctinae and Chyphotinae (here considered a tribe of Apterogyninae). He assigns the other North American genera as follows: Sphaeropthalminae, Pseudomethocina, *Myrmilloides*, *Pseudomethoca;* Sphaeropthalminae, Sphaeropthalmina, *Acanthophotopsis*, *Acrophotopsis*, *Dasymutilla*, *Dilophotopsis*, *Lomachaeta*, *Morsyma*, *Odontophotopsis*, *Photomorphus*, *Protophotopsis*, *Smicromutilla*, *Sphaeropthalma;* Mutillinae, Mutillini, Smicromyrmina, *Timulla;* and Mutillinae, Ephutini, *Ephuta*.

Taxonomy: Blake, 1886. Amer. Ent.. Soc., Trans. 13: 179-286, 21 figs. (N. A. spp.). —Ashmead, 1899. N. Y. Ent. Soc., Jour. 7: 52-60 (gen. of world). —Fox, 1899. Amer. Ent. Soc., Trans. 25: 219-292 (N. A. spp.). —Andre, 1903. *In* Wytsman, Gen. Ins., fasc. 11, pp. 1-77, 3 pls. (gen. of world). —Melander, 1903. Amer. Ent. Soc., Trans. 29: 291-330, pl. 4 (taxonomic notes and some revised keys). —Bradley, 1916. Amer. Ent. Soc., Trans. 42: 309-336 (spp. of east. U. S.). —Schuster, 1946. Ent. Soc. Amer., Ann. 39: 700-703 (subfam. of New World). —Schuster, 1949. Ent. Amer. (n. s.) 29: 61-64 (key to Neotrop. subfam.). —Mickel, 1970. Minn. Univ., Agr. Expt. Sta., Tech. Bul. 271: 1-77 (annotated bibliography of world literature). —Brothers, 1975. Kans. Univ. Sci. Bul. 50: 483-648, 101 figs., 7 tabs. (phylogeny).

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 375-387, figs. 1-10, 15-20 (female, male thorax). —Hinton, Gibbs and Silberglied, 1969. Jour. Ins. Physiol. 15: 549-552, 10 figs. (stridulatory file). —Sheldon, 1970. Ent. News 81: 57-61 (male adaptations for female carriage). —Debolt, 1973. Ent. Soc. Amer., Ann. 66: 100-108, 15 figs. (felt line and felt line organ).

Subfamily APTEROGYNINAE

The North American species are all nocturnal.

Tribe CHYPHOTINI

Genus CHYPHOTES Blake

Revision: Buzicky, 1941. Ent. Amer. (n. s.) 21: 201-243. —Mickel, 1967. Amer. Ent. Soc., Trans. 93: 125-234, 40 figs., 26 maps.

Genus CHYPHOTES Subgenus CHYPHOTES Blake

Chyphotes Blake, 1886. Amer. Ent. Soc., Trans. 13: 276.
Type-species: *Chyphotes elevatus* Blake. Orig. desig.
Blaketa Pate, 1948. Ent. News 59: 41. N. name for *Chyphotes* Blake, not *Cyphotes* Burmeister 1835.

aenigmus Mickel. N. Mex. to Calif.; Mexico (Sonora).
Chyphotes (*Chyphotes*) *aenigmus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 147, fig. 2, map 5. ♂.

atriceps Mickel. Wash., Idaho, Oreg., Calif., Nev., Utah, Ariz., N. Mex., west. Tex.; Mexico (Sonora, Chihuahua).
Chyphotes (*Chyphotes*) *atriceps* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 134, fig. 1, map 1. ♂.

auripilus Buzicky. Calif., Ariz.
Chyphotes auripilus Buzicky, 1941. Ent. Amer. (n. s.) 21: 232. ♀.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 174.

belfragei (Blake). Wyo., Nebr., Colo., Utah, Ariz., N. Mex.; Mexico (Baja California, Chihuahua to Nuevo Leon, south to Jalisco and Puebla).
Agama Belfragei Blake, 1871. Amer. Ent. Soc., Trans. 3: 263. ♂.
Sphaerophthalma(!) *frugala* Cameron, 1896. Biol. Cent.-Amer., Hym. 2: 394. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 151, fig. 12, map 7. ♂, ♀.

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 386-387, figs. 19-20 (male thorax).

bicolor Schuster. Calif. (San Diego).
Chyphotes bicolor Schuster, 1945. Pan-Pacific Ent. 21: 89. ♀.

calexicensis Bradley. Ariz., Calif.; Mexico (Baja California, Sonora).
Chyphotes calexicensis Bradley, 1917. Amer. Ent. Soc., Trans. 43: 284. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 144, fig. 7, map 4.

californicus Baker. Ariz., Nev., Calif.
Chyphotes californicus Baker, 1905. Invertebrata Pacifica 1: 117. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 171, fig. 23, map 14.

capitatus Mickel. Ariz.
Chyphotes (*Chyphotes*) *capitatus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 166, fig. 19, map 11. ♂.

cooki Mickel. Calif.
Chyphotes (*Chyphotes*) *cooki* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 159, fig. 17, map 9. ♂.

dubius Mickel. Calif., Ariz.; Mexico (Chihuahua).
Chyphotes (*Chyphotes*) *dubius* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 175. ♀.

elevatus Blake. N. Mex., Ariz.; Mexico (Sonora).
Chyphotes elevatus Blake, 1886. Amer. Ent. Soc., Trans. 13: 276. ♀.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 155, fig. 11, map 8. ♂, ♀.

incredulus Mickel. Southwest Tex., south. N. Mex.; Mexico (Chihuahua, Nuevo Leon, Durango).
Chyphotes (*Chyphotes*) *incredulus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 149, fig. 15, map 6. ♂.

knulli Mickel. Tex. (Davis Mts.).
Chyphotes (*Chyphotes*) *knulli* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 181. ♀.

mandibularis Mickel. Calif.
Chyphotes (*Chyphotes*) *mandibularis* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 139, fig. 3, map 2. ♂, ♀.

melaniceps (Blake). Utah, Nev., Ariz., Calif.; Mexico (Baja California).
Photopsis melaniceps Blake, 1886. Amer. Ent. Soc., Trans. 13: 264. ♂.
Chyphotes piceiceps Baker, 1905. Invertebrata Pacifica 1: 116. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 141, fig. 6, map 3.

mexicanus Mickel. West. Tex., Ariz.; Mexico (Chihuahua, Sinaloa, Nayarit).
Chyphotes (*Chyphotes*) *mexicanus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 168, fig. 20, map 12. ♂.

minusculus Mickel. Ariz., Nev., Calif.; Mexico (Baja California).
Chyphotes (*Chyphotes*) *minusculus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 163, fig. 18, map 10. ♂.

peninsularis Fox. Calif.; Mexico (Baja California).
Chyphotes peninsularis Fox, 1899. Amer. Ent. Soc., Trans. 25: 277. ♂.
Chyphotes jugatus Buzicky, 1941. Ent. Amer. (n. s.) 21: 222. ♂.
Chyphotes pilosus Buzicky, 1941. Ent. Amer. (n. s.) 21: 233. ♀.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 170, figs. 4, 21, map 13.

petiolatus Fox. Tex., Ariz., Nev., Calif.
Chyphotes petiolatus Fox, 1899. Amer. Ent. Soc., Trans. 25: 277. ♀.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 174.

pimus Mickel. Ariz. (Pima Co.).
Chyphotes (*Chyphotes*) *pimus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 181, fig. 5. ♀.

rugosus Mickel. Calif.
Chyphotes (*Chyphotes*) *rugosus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 177. ♀.

rugulosus Mickel. Ariz. (Pima Co.).
Chyphotes (*Chyphotes*) *rugulosus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 173. ♀.

testaceipes Fox. Ariz.
Chyphotes testaceipes Fox, 1899. Amer. Ent. Soc., Trans. 25: 277. ♀.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 173.

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 386-387, figs. 17-18 (thorax).

wasbaueri Mickel. Calif. (San Bernardino Co.).
Chyphotes (*Chyphotes*) *wasbaueri* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 180. ♀.

Genus CHYPHOTES Subgenus PITANTA Pate

Pitanta Pate, 1947. Notulae Nat. 192: 1.
Type-species: *Pitanta mojave* Pate. Orig. desig.

Species Group Similis

similis Baker. Calif.; Mexico (Baja California).
Chyphotes similis Baker, 1905. Invertebrata Pacifica 1: 117. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 188, fig. 8, map 15.

Species Group Nubeculus

fergusoni Mickel. Oreg., Idaho, Utah, Nev., Calif.
Chyphotes (*Pitanta*) *fergusoni* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 193, fig. 24, map 17. ♂.

nubeculus (Cresson). Mont., Wyo., Nebr., Kans., Colo., Tex., N. Mex., Ariz.; Mexico (Sonora).
Mutilla nubecula Cresson, 1865. Ent. Soc. Phila., Proc. 4: 440. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 191, fig. 22, map 16.

Species Group Heathii

bruscus Buzicky. Ariz., Calif.
Chyphotes bruscus Buzicky, 1941. Ent. Amer. (n. s.) 21: 214. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 195, fig. 26, map 19.

heathii Melander. Calif. (Pacific Grove).
Chyphotes Heathii Melander, 1903. Amer. Ent. Soc., Trans. 29: 326. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 194, fig. 25, map 18.

Species Group Pallidus

buzickyi Mickel. Calif.; Mexico (Baja California).
Chyphotes (*Pitanta*) *buzickyi* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 200, fig. 14. ♂, ♀.

marginalis Mickel. Calif. (Imperial Co.).
Chyphotes (*Pitanta*) *marginalis* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 196, fig. 27. ♂.

minimus Mickel. Ariz.; Mexico (Sonora).
Chyphotes minimus Mickel, 1963. Pan-Pacific Ent. 39: 186. ♂.

mojave (Pate). Calif.
Pitanta mojave Pate, 1947. Notulae Nat. 192: 3. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 202, fig. 29. ♂, ♀.

nitidus Mickel. Calif. (Winterhaven, Glamis).
Chyphotes nitidus Mickel, 1963. Pan-Pacific Ent. 39: 188. ♀.

Taxonomy: Mickel, 1974. Ent. Soc. Amer., Ann. 67: 461, fig. 1. ♂.

pallidus Buzicky. Ariz., Calif.
Chyphotes pallidus Buzicky, 1941. Ent. Amer. (n. s.) 21: 226. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 198, fig. 28, map 20.

Species Group Albipes

albipes (Cresson). Alta., B. C., Idaho, Wash., Oreg., Calif., Nev., Utah, Ariz.
Agama albipes Cresson, 1874. Amer. Ent. Soc., Trans. 5: 99. ♂.
Chyphotes nevadensis Baker, 1905. Invertebrata Pacifica 1: 118. ♂.

Taxonomy: Buzicky, 1941. Ent. Amer. (n. s.) 21: 215-217. ♀. —Mickel, 1967. Amer. Ent. Soc., Trans. 93: 206, fig. 34, map 21.

mickeli inyoensis Mickel. Calif. (Inyo Co.).
Chyphotes (*Pitanta*) *mickeli inyoensis* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 213, fig. 33. ♂.

mickeli mickeli Buzicky. N. Mex., Ariz., Calif.; Mexico (Baja California).
Chyphotes mickeli mickeli Buzicky, 1941. Ent. Amer. (n. s.) 21: 217. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 209, fig. 32, map 22. ♂, ♀.

mickeli polingi Buzicky. Tex., N. Mex.
Chyphotes mickeli polingi Buzicky, 1941. Ent. Amer. (n. s.) 21: 219. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 214.

Species Group Stramineus

stramineus Mickel. Ariz., Nev., Calif.; Mexico (Baja California).
Chyphotes (*Pitanta*) *stramineus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 215, fig. 30, map 23. ♂.

Species Group Mellipes

epedaphus Buzicky. Ariz., Calif.
Chyphotes epedaphus Buzicky, 1941. Ent. Amer. (n. s.) 21: 231. ♀.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 232.

evansi Mickel. N. Mex.
Chyphotes (*Pitanta*) *evansi* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 231. ♀.

gracilis Mickel. Tex.; Mexico (Nuevo Leon).
Chyphotes (*Pitanta*) *gracilis* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 225, fig. 37, map 26. ♂.

mellipes (Blake). Wash., Oreg., Idaho, Calif., Nev., Utah, Colo., west. Kans., Tex., N. Mex., Ariz.; Mexico (Chihuahua, Durango, Zacatecas, San Luis Potosi, Jalisco).
Agama attenuata Blake, 1872. Amer. Ent. Soc., Trans. 4: 76. ♂.
Photopsis mellipes Blake, 1886. Amer. Ent. Soc., Trans. 13: 262. ♂.
Photopsis picus Cockerell, 1895. Amer. Ent. Soc., Trans. 22: 289. ♂.
Mutilla picas (!) Dalla Torre, 1897. Cat. Hym., v. 8, p. 73.
Mutilla tenula Dalla Torre, 1897. Cat. Hym., v. 8, p. 91. N. name for *Agama attenuata* Blake, not *Mutilla attenuata* Spinola.
Chyphotes punctatus Fox, 1899. Amer. Ent. Soc., Trans. 25: 276. ♀.
Chyphotes striatus Buzicky, 1941. Ent. Amer. (n. s.) 21: 228. ♀.
Chyphotes segregatus Buzicky, 1941. Ent. Amer. (n. s.) 21: 229. ♀.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 216, fig. 31, map 24.

pixus Buzicky. Ariz. (Gila Bend).
Chyphotes pixus Buzicky, 1941. Ent. Amer. (n. s.) 21: 227. ♀.

sonorus Mickel. Ariz.; Mexico (Sonora).
Chyphotes (*Pitanta*) *sonorus* Mickel, 1967. Amer. Ent. Soc., Trans. 93: 223, fig. 35, map 25 ♂.

subulatus Buzicky. Ariz.
Chyphotes subulatus Buzicky, 1941. Ent. Amer. (n. s.) 21: 224. ♂.

Taxonomy: Mickel, 1967. Amer. Ent. Soc., Trans. 93: 226, fig. 39.

Subfamily TYPHOCTINAE

Revision: Krombein and Schuster, 1957. Ent. Soc. Wash., Proc. 59: 209-232, 2 pls.

All known species are diurnal insects.

Genus TYPHOCTES Ashmead

Typhoctes Ashmead, 1899. N. Y. Ent. Soc., Jour. 7: 53.
Type-species: *Mutilla peculiaris* Cresson. Orig. desig.

Anommutilla Mickel, 1936. Ent. Soc. Amer., Ann. 29: 295.
Type-species: *Anommutilla difficilis* Mickel. Orig. desig.

Taxonomy: Brothers, 1970. Kans. Ent. Soc., Jour. 43: 305 (generic redescription, female).

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 385-386, figs. 15-16 (female thorax).

peculiaris mirabilis (Cockerell). Kans., Colo., Tex., N. Mex., Ariz.; Mexico (Chihuahua).
Chyphotes mirabilis Cockerell, 1896. Canad. Ent. 28: 285. ♀.

peculiaris peculiaris (Cresson). Wash., Idaho, Utah, Ariz., Calif.
Mutilla peculiaris Cresson, 1875. Amer. Ent. Soc., Trans. 5: 119. ♀.
Anommutilla difficilis Mickel, 1936. Ent. Soc. Amer., Ann. 29: 295. ♂.

Morphology: Hermann, 1975. Ent. Soc. Amer., Ann. 68: 882-884, 5 figs. (sting).

striolatus Krombein and Schuster. Ariz. to western Tex.
Typhoctes striolatus Krombein and Schuster, 1957. Ent. Soc. Wash., Proc. 59: 223, fig. 2. ♀, ♂.

williamsi Krombein and Schuster. Southern Calif.
Typhoctes williamsi Krombein and Schuster, 1957. Ent. Soc. Wash., Proc. 59: 220, figs. 1, 4. ♂, ♀.

Subfamily MUTILLINAE

Tribe MUTILLINI

Blake (1886. Amer. Ent. Soc., Trans. 13) described three species of *Mutilla*, mislabeled as coming from Florida, from the Harris collection. Fox, 1898 (Ent. News 9: 14) stated that *M. ajax* was a synonym of the African *Psammotherma flabellata* (F.), *M. floridana* a synonym of the European *Dasylabris maura* (L.), and *M. trisignata* a synonym of the European *D. arenaria* (F.).

Genus TIMULLA Ashmead

Genus TIMULLA Subgenus TIMULLA Ashmead

Timulla Ashmead, 1899. N. Y. Ent. Soc., Jour. 7: 55.
Type-species: *Mutilla dubitata* Smith. Orig. desig.

Revision: Mickel, 1937. Ent. Amer. (n. s.) 17: 1-119 (N. Amer. spp.).

Only the typical subgenus occurs in the New World. Most species are diurnal, but a few species with enlarged ocelli, such as *ocellaria* Mick., are crepuscular or nocturnal.

barbata (Fox). Mo., La.
Mutilla barbata Fox, 1899. Amer. Ent. Soc., Trans. 25: 272. ♂.

barbigera barbigera (Bradley). Va. south to Fla., west to S. Dak. and Tex. in U. and L. Austr. Zones.
Mutilla (*Timulla*) *barbigera* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 206. ♂.

barbigera rohweri Mickel. Kans., Okla. in U. Sonor. Zone.
Timulla (*Timulla*) *barbigera rohweri* Mickel, 1937. Ent. Amer. (n. s.) 17: 58. ♂.

compressicornis Mickel. N. C. to Tex. in L. Austr. Zone.
Timulla (*Timulla*) *compressicornis* Mickel, 1937. Ent. Amer (n. s.) 17: 59. ♂.

contigua Mickel. Tex. (Brownsville).
Timulla (*Timulla*) *contigua* Mickel, 1937. Ent. Amer. (n. s.) 17: 107. ♀.

dubitata dubitata (Smith). N. Y. south to Fla., west to Okla. and Tex. in L. Austr. Zone.
Mutilla dubitata Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 60. ♀.
Mutilla dubiatta (!) Blake, 1886. Amer. Ent. Soc., Trans. 13: 201. ♀.

Biology: Sheldon, 1970. Ent. News 81: 59-60 (mating behavior).

dubitata fugitiva Mickel. N. J. south to Ga., west to Nebr. and Tex. in U. Austr. Zone.
Timulla (*Timulla*) *dubitata fugitiva* Mickel, 1937. Ent. Amer. (n. s.) 17: 39. ♂.

dubitatiformis Mickel. Mass. south to Fla., west to Mont. and Tex.
Timulla (*Timulla*) *dubitatiformis* Mickel, 1937. Ent. Amer. (n. s.) 17: 102. ♀.

euphrosyne Mickel. Fla., Tex.
Timulla (*Timulla*) *euphrosyne* Mickel, 1937. Ent. Amer. (n. s.) 17: 64. ♀.

euterpe (Blake). N. C., Fla., La., Tex.
Mutilla Euterpe Blake, 1879. Amer. Ent. Soc., Trans. 7: 249. ♀.

ferrugata (Fabricius). N. J. south to Fla., west to Okla. and Tex. in U. and L. Austr. Zones. Host: *Eumenes fraternus* Say.
Mutilla ferrugata Fabricius, 1805. Systema Piezatorum, p. 438. ♀.
Mutilla rufa Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 631. ♂.
Mutilla Promethea Blake, 1871. Amer. Ent. Soc., Trans. 3: 229. ♂.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 3 (host).

floridensis (Blake). S. C. to Tex. in L. Austr. Zone.
Mutilla floridensis Blake, 1879. Amer. Ent. Soc., Trans. 7: 249. ♂.

grotei (Blake). Colo., Utah, Tex., N. Mex., Ariz.; Mexico (Jalisco, Guanajuato).
Mutilla Grotei Blake, 1871. Amer. Ent. Soc., Trans. 3: 228. ♂.
Mutilla fulviventris Gerstaecker, 1874. Arch. Naturgesch. 40: 323. ♂.

Taxonomy: Mickel, 1937. Ent. Amer. (n. s.) 17: 78.

hollensis hollensis (Melander). Mass., N. Y., Md.
Mutilla Sayi var. *hollensis* Melander, 1903. Amer. Ent. Soc., Trans. 29: 324. ♂.

hollensis melanderi Mickel. N. J., Pa., Md., Va.
Timulla (*Timulla*) *hollensis melanderi* Mickel, 1937. Ent. Amer. (n. s.) 17: 101. ♂.

huntleyensis Mickel. Mont. (Huntley).
Timulla (*Timulla*) *huntleyensis* Mickel, 1937. Ent. Amer. (n. s.) 17: 82. ♂.

kansana Mickel. Kans.
Timulla (*Timulla*) *kansana* Mickel, 1937. Ent. Amer. (n. s.) 17: 94. ♂.

leona (Blake). Wis. south to Fla., west to Nebr. and Tex. in U. and L. Austr. Zones. Host: *Bembix troglodytes* Handl.?
Mutilla Leona Blake, 1871. Amer. Ent. Soc., Trans. 3: 230. ♀.

Biology: Evans, 1957. Studies in Compar. Ethology *Bembix*, p. 134, fig. 36 (entering burrows of *B. troglodytes*).

navasota coahuila Krombein. Tex. west of 100th Meridian, N. Mex., Ariz.
Timulla (*Timulla*) *navasota nebulosa* Mickel, 1937. Ent. Amer. (n. s.) 17: 29. ♂. Preocc. by Mickel, 1935.
Timulla (*Timulla*) *navasota coahuila* Krombein, 1951. U. S. Dept. Agr., Monog. 2: 771. N. name.

navasota navasota (Bradley). Tex. east of 100th Meridian.
Mutilla (*Timulla*) *navasota* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 213. ♂.

neobule Mickel. Ariz.
Timulla (*Timulla*) *neobule* Mickel, 1937. Ent. Amer. (n. s.) 17: 44. ♂.

nicholi Mickel. Ariz.
Timulla (*Timulla*) *nicholi* Mickel, 1937. Ent. Amer. (n. s.) 17: 47. ♀.

nitela Mickel. Ariz. (Douglas).
Timulla (*Timulla*) *nitela* Mickel, 1937. Ent. Amer. (n. s.) 17: 43. ♂.

oajaca (Blake). Tex., N. Mex., Ariz.; Mexico (Morelos, Jalisco, Colima).
Mutilla oajaca Blake, 1871. Amer. Ent. Soc., Trans. 3: 228. ♂ (♀ misdet.).
Mutilla ardens Gerstaecker, 1874. Arch. Naturgesch. 40: 323. ♂.
Mutilla mazatlanae Cameron, 1894. Biol. Cent.-Amer., Hym., v. 2, p. 294. ♂.
Mutilla nestor Fox, 1899. Amer. Ent. Soc., Trans. 25: 271. ♂.
Mutilla ornata Howard, 1901. Insect Book, pl. 8, fig. 21. ♀.

Taxonomy: Mickel, 1938. Roy. Ent. Soc. London, Trans. 87: 641.

Biology: Linsley, 1960. Pan-Pacific Ent. 36: 36 (mating behavior).

ocellaria ocellaria Mickel. Ohio, Ind., Ky., Tenn., Ga. Host: *Ligyrus gibbosus* (Deg.), pupae.
Timulla (*Timulla*) *ocellaria ocellaria* Mickel, 1937. Ent. Amer. (n. s.) 17: 91. ♂.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 5 (host record).

ocellaria rufidorsa Mickel. Miss., Ark., Mo., Kans., Okla., Tex.
Timulla (*Timulla*) *ocellaria rufidorsa* Mickel, 1937. Ent. Amer. (n. s.) 17: 93. ♂.

ornatipennis (Bradley). N. J. south to Fla. west to Tenn. and Miss.
Mutilla (*Timulla*) *ornatipennis* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 205. ♀, ♂.

rufosignata (Bradley). N. C., Ga., Fla. Host: Ground-nesting eumenid wasp.
Mutilla (*Timulla*) *rufosignata* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 212. ♂.

Taxonomy: Krombein, 1953. Ent. Soc. Wash., Proc. 55: 128. ♀.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 6 (ground-nesting host misdet. as *Odynerus erinnys* (!) Lep.).

sayi (Blake). Tex. (Plano).
Mutilla Sayi Blake, 1871. Amer. Ent. Soc., Trans. 3: 229. ♂.

subhyalina Mickel. Ill., Iowa, Minn., N. Dak., S. Dak., Nebr., Kans., Mont., Oreg., B. C.
Timulla (*Timulla*) *subhyalina* Mickel, 1937. Ent. Amer. (n. s.) 17: 97. ♂.

suspensa jonesi Mickel. Tex., Ariz.
Timulla (*Timulla*) *suspensa jonesi* Mickel, 1937. Ent. Amer. (n. s.) 17: 90. ♂.

suspensa sonora Mickel. Kans. and Colo. south to Tex. and Ariz.
Timulla (*Timulla*) *suspensa sonora* Mickel, 1937. Ent. Amer. (n. s.) 17: 84. ♀, ♂.

suspensa suspensa (Gerstaecker). Ariz.
Mutilla suspensa Gerstaecker, 1874. Arch. f. Naturgesch. 40: 299. ♀.

tolerata Mickel. Mo., Ga.
Timulla (*Timulla*) *tolerata* Mickel, 1937. Ent. Amer. (n. s.) 17: 109. ♂.

tyro Mickel. Ariz., Calif.
Timulla (*Timulla*) *tyro* Mickel, 1937. Ent. Amer. (n. s.) 17: 25. ♀, ♂.

vagans rufinota Mickel. D. C., S. C., Ga., Fla.
Timulla (*Timulla*) *vagans rufinota* Mickel, 1937. Ent. Amer. (n. s.) 17: 78. ♀, ♂.

vagans vagans (Fabricius). Vt. and Ont. south to Ala., west to B. C. and N. Mex.
Mutilla vagans Fabricius, 1798. Sup. Ent. System., p. 282. ♀.
Mutilla (*Mutilla*) *hexagona* Say, 1836. Boston Jour. Nat. Hist. 1: 295. ♂.
Mutilla ornativentris Cresson, 1865. Ent. Soc. Phila., Proc. 4: 438. ♀.
Mutilla Briaxus Blake, 1871. Amer. Ent. Soc., Trans. 3: 227. ♂.
Mutilla Canadensis Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 250. ♂. Preocc.
Mutilla secunda Dalla Torre, 1897. Cat. Hym., v. 8, p. 84. N. name for *Mutilla Canadensis* Provancher, not *Mutilla canadensis* Blake.

Biology: Fattig, 1936. Ent. News 47: 51-52 (mating behavior). —Shappirio, 1948. Brooklyn Ent. Soc., Bul. 42: 163 (mating behavior).

wileyae Mickel. Ark., La., Okla., Tex.
Timulla (*Timulla*) *wileyae* Mickel, 1937. Ent. Amer. (n. s.) 17: 41. ♀.

Tribe EPHUTINI

Genus EPHUTA Say

Revision: Bradley, 1916. Amer. Ent. Soc., Trans. 42: 187-198. —Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 1-43, 5 pls. (Part I containing only gen. diag. and key to spp.). —Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 7-84 (Part II of revis. treating Species Group Grisea).

All of the species are diurnal.

Genus EPHUTA Subgenus EPHUTA Say

Ephuta Say, 1836. Boston Jour. Nat. Hist. 1: 297.
Type-species: *Mutilla* (*Ephuta*) *scrupea* Say. Desig. by Ashmead, 1899.
Rhoptromutilla Andre, 1903. *In* Wytsman, Gen. Ins., fasc. 11, p. 43.
Type-species: *Mutilla chrysodora* Perty. Orig. desig.
Ephutopsis Ashmead, 1904. Canad. Ent. 36: 6.
Type-species: *Mutilla odontophora* Cameron. Desig. by Mickel, 1928.

The few authenticated host records indicate that species of this subgenus have various species of Pompilidae as hosts. The spider wasp hosts have diverse nesting habits. Some nest in borings in wood (*Dipogon*), some construct mud cells beneath stones (*Phanagenia*), and some nest in the ground (? *Anoplius fraternus* (Bks.)).

albiceps Schuster. Tex. (Tyler).
Ephuta albiceps Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 31 (in key). ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 75 (female description).

argenticeps Schuster. Calif.
Ephuta californica Schuster, 1951. N. Y. Ent. Soc., Jour. 59: footnote on p. 25. ♂ (On p. 15 Schuster states that there is only one sp. in Calif., and in key to females, *argenticeps* is the only sp. stated to be from Calif.).
Ephuta argenticeps Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 26, 32 (in key). ♂, ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 16 (male, female description).

auricapitis Schuster. Tex. (Edinburgh). Possibly the opposite sex of *ecarinata ecarinata* Schuster.
Ephuta auricapitis Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 31 (in key). ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 76 (female description).

baboquivari Schuster. Ariz. (Baboquivari Mts.)
Ephuta baboquivari Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 31 (in key), figs. 39, 41. ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 79 (female description).

battlei battlei Bradley. Coastal N. C., Ga., Fla.
Ephuta battlei Bradley, 1916. Amer. Ent. Soc., Trans. 42: 195. ♂.

Taxonomy: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 29, figs. 5, 44 (in key; reduced to subsp. rank).

battlei confusa Schuster. Piedmont and west. coastal plain, N. C., Ga., Ala.
Ephuta battlei confusa Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 29 (in key), fig. 44. ♂.

battlei microcellaria Schuster. N. J. (Cape May).
Ephuta battlei microcellaria Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 29 (in key), fig. 44. ♂.

battlei transitionalis Schuster. Transit. and U. Austr. Zones, Mass. to Va., Ohio.
Ephuta battlei transitionalis Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 28 (in key), fig. 44. ♂.

cephalotes Schuster. N. Dak., S. Dak., Wyo., Ariz., west. Tex. The opposite sex is possibly *minuta* Schuster.
Ephuta cephalotes Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 24 (in key), figs. 10, 20, 46. ♂.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 68 (male description).

coloradella Schuster. Colo. Possibly the opposite sex of *grisea* Bradley.
Ephuta coloradella Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 32 (in key). ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 73 (female description).

conchate Mickel. N. Y., Mich., Ill., Iowa, Minn., S. Dak., Nebr., Kans.
Ephuta conchate Mickel, 1928. Minn. State Ent., Rpt. 19: 111. ♂.

Taxonomy: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 32 (in key).

copano (Blake). Tex.; Mexico.
Mutilla Copano Blake, 1871. Amer. Ent. Soc., Trans. 3: 232. ♂.
Mutilla susura Melander, 1903. Amer. Ent. Soc., Trans. 29: 324. ♂.

Taxonomy: Schuster, 1958. *In* Krombein, U. S. Dept. Agr., Monog. 2, Sup. 1: 105 (synonymy).

ecarinata ecarinata Schuster. Tex.; Mexico. The opposite sex is possibly *sudatrix* (Melander) or *auricapitis* Schuster.
Ephuta ecarinata ecarinata Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 26 (in key). ♂.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 49 (male description).

ecarinata neomexicana Schuster. N. Mex.
Ephuta ecarinata neomexicana Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 26 (in key). ♂.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 52 (male description).

ecarinata pima Schuster. Ariz.
Ephuta ecarinata pima Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 26 (in key). ♂.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 51 (male description).

eurygnathus Schuster. N. C. (Southern Pines).
Ephuta eurygnathus Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 29 (in key), fig. 11. ♂.

floridana dietrichi Schuster. Ala., Miss.
Ephuta floridana dietrichi Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 32 (in key), figs. 35, 36. ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 40 (female description).

floridana floridana Schuster. Fla.
Ephuta floridana floridana Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 25, 32 (in key). ♂, ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 34 (male, female description).

grisea fuscosericea Schuster. Alta., Mont., Utah, N. Dak.
Ephuta grisea fuscosericea Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 27 (in key), figs. 14, 15, 42. ♂.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 14 (male description).

grisea grisea Bradley. Colo. The opposite sex is possibly *coloradella* Schuster.
Ephuta grisea Bradley, 1916. Amer. Ent. Soc., Trans. 42: 194. ♂.

Taxonomy: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 27, fig. 21 (reduced to subsp. rank). —Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 13 (male description).

margueritae margueritae Schuster. Fla.
Ephuta margueritae margueritae Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 25, 30 (in key), figs. 17, 46. ♂, ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 56 (male, female description).

margueritae xanthocephala Schuster. Pa., N. C., Tenn. Host: "cocoons under stones", presumably mud cells of *Phanagenia bombycina* (Cr.) or of a species of *Auplopus*.
Ephuta margueritae xanthocephala Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 25, 30 (in key), figs. 25, 46. ♂, ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 63 (male, female description).

Biology: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 14 (rearing note).

minuta minuta Schuster. Tex. (Brownsville, Fedor, College Sta.). Possibly the opposite sex of *cephalotes* Schuster.
Ephuta minuta minuta Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 33 (in key). ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 71 (tentative sex association).

minuta modesta Schuster. Ariz. (Tempe).
Ephuta minuta modesta Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 32 (in key), figs. 31, 32. ♀.

pauxilla pauxilla Bradley. Minn. to Ala., east to Maine and Fla. Host: *Dipogon s. sayi* Bks. Almost certainly the male of *puteola* (Blake).
Ephuta pauxilla Bradley, 1916. Amer. Ent. Soc., Trans. 42: 197. ♂.

Taxonomy: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 29, figs. 1, 12, 37, 43 (in key; reduced to subsp. rank).

Biology: Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 104 (host record).

pauxilla texanella Schuster. Tex., La., Miss.
Ephuta pauxilla texanella Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 29 (in key), figs. 13, 43. ♂.

psephenophila Schuster. Ga. (Stone Mt.) The opposite sex is possibly *tentativa* Schuster.
Ephuta psephenophila Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 25 (in key). ♂.

Ephuta ocellaria Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 36, fig. 18. MS name changed to *psephenophila* (teste R. M. Schuster).

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 44 (male description; tentative sex association).

puteola (Blake). Mass. south to Fla., west to Iowa, Tex. Possibly the opposite sex of *p. pauxilla* Brad.
Mutilla puteola Blake, 1879. Amer. Ent. Soc., Trans. 7: 252. ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 40 (female description in key; putative sex association).

rufisquamis (Andre). Ariz., south Calif. The opposite sex is possibly *tumacacori* Schuster.
Rhoptromutilla rufisquamis Andre, 1905. Ztschr. System. Hym. Dipt. 5: 366. ♂.

Taxonomy: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 24 (in key). —Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 65 (male description; tentative sex association).

sabaliana fattigi Schuster. Ga. (Tifton).
Ephuta sabaliana fattigi Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 28 (in key). ♂.

sabaliana sabaliana Schuster. Fla. Host: *Anoplius fraternus* (Bks.)?
Ephuta sabaliana sabaliana Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 28 (in key). ♂.

Biology: Krombein, 1955. Ent. Soc. Wash. Proc. 57: 225-226.

scrupea (Say). N. J. south to Ga. and Ala., Mich., Wis., Ohio, W. Va., Mo., Ark., Tex. Host: *Phanagenia bombycina* (Cr.).
Mutilla (*Ephuta*) *scrupea* Say, 1836. Boston Jour. Nat. Hist. 1: 297. ♂.

Taxonomy: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 25, 34, figs. 2-4, 27-30, 42 (male, female in key). —Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 26 (male, female description).

slossonae monochroa Schuster. Tex. (Rock Island).
Ephuta slossonae monochroa Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 34 (in key). ♀.

slossonae slossonae (Fox). Fla.
Mutilla Slossonae Fox, 1899. Amer. Ent. Soc., Trans. 25: 273. ♂.

Taxonomy: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 34 (in key; reduced to subsp. rank).

spinifera Schuster. N. J. to Ga.
Ephuta spinifera Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 27, 34 (in key). ♂, ♀.

stenognatha psephenophora Schuster. North. Fla.
Ephuta stenognatha psephenophora Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 28. ♂.

stenognatha stenognatha Schuster. Cent. and south. Fla.
Ephuta stenognatha stenognatha Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 28 (in key), figs. 7, 8. ♂.

sudatrix (Melander). Tex. (Fedor). Possibly the opposite sex of *ecarinata ecarinata* Schuster.
Mutilla sudatrix Melander, 1903. Amer. Ent. Soc., Trans. 29: 325. ♀.

Taxonomy: Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 30 (in key). —Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 54 (female description; tentative sex association).

tegulicia Bradley. Tex., Ariz. Possibly a syn. or subsp. of *idiasta* (Cameron) from Mexico.
Ephuta tegulicia Bradley, 1916. Amer. Ent. Soc., Trans. 42: 193. ♂.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 47 (male description).

tentativa Schuster. Ga. (Atlanta, Ochlochnee). Possibly the opposite sex of *psephenophila* Schuster.
Ephuta tentativa Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 34 (in key). ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 42 (female description; tentative sex association).

tumacacori Schuster. Ariz. (Tumacacori Mts.). Possibly the opposite sex of *rufisquamis* (Andre).
Ephuta tumacacori Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 30 (in key). ♀.

Taxonomy: Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 82 (female description; tentative sex association).

Genus EPHUTA Subgenus XENOCHILE Schuster

Ephuta subg. *Xenochile* Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 8.
Type-species: *Ephuta* (*Xenochile*) *krombeini* Schuster. Orig. desig.

krombeini Schuster. Ariz. (Ramsey Canyon in Huachuca Mts.).
Ephuta (*Xenochile*) *krombeini* Schuster, 1957. N. Y. Ent. Soc., Jour. 64: 9. ♂.

Subfamily SPHAEROPTHALMINAE

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 1-26, 7 figs. (males of Nevada Test Site).

Tribe SPHAEROPTHALMINI

Taxonomy: Schuster, 1958. Ent. Amer. (n. s.) 37: 1-130, 7 pls. (Part II of a tribal revision of males containing keys to genera and subgenera and revisions of *Acrophotopsis* Schuster, *Dilophotopsis* Schuster and *Acanthophotopsis* Schuster).

The majority of species in this tribe are nocturnal, but all members of *Morsyma* Fox, *Sphaeropthalma* subg. *Sphaeropthalma* Blake, and *Protophotopsis* Schuster, and most species of *Photomorphus* subg. *Photomorphus* Viereck, are diurnal.

Genus MORSYMA Fox

Morsyma Fox, 1899. Amer. Ent. Soc., Trans. 25: 287.
Type-species: *Morsyma Ashmeadii* Fox. Orig. desig.

ashmeadii Fox. Calif.
Morsyma Ashmeadii Fox, 1899. Amer. Ent. Soc., Trans. 25: 287. "♀" = ♂.

Taxonomy: Krombein, 1940. Amer. Ent. Soc., Trans. 65: 420.

Genus ACROPHOTOPSIS Schuster

Acrophotopsis Schuster, 1958. Ent. Amer. (n. s.) 37: 4 (in key), 61.
Type-species: *Acrophotopsis eurygnathus* Schuster. Orig. desig.

campylognathus Schuster. Calif. (Riverside Co.); Mexico (Baja California).
Acrophotopsis campylognathus Schuster, 1958. Ent. Amer. (n. s.) 37: 11 (in key), 69. ♂.

eurygnathus Schuster. Ariz., Nev.
Acrophotopsis eurygnathus Schuster, 1958. Ent. Amer. (n. s.) 37: 10 (in key), 65, pl. 1, figs. 1, 2. ♂.

Genus DILOPHOTOPSIS Schuster

Dilophotopsis Schuster, 1958. Ent. Amer. (n. s.) 37: 5 (in key), 71.
Type-species: *Mutilla concolor* Cresson. Orig. desig.

concolor concolor (Cresson). Kans. to Colo. and Wyo., Tex., N. Mex., Ariz.; Mexico (Zacatecas, Durango, Jalisco).
Mutilla concolor Cresson, 1865. Ent. Soc. Phila., Proc. 4: 390. ♂.
Odontophotopsis alamonis Viereck, 1904. Amer. Ent. Soc., Trans. 30: 87. ♂.

Taxonomy: Schuster, 1958. Ent. Amer. (n. s.) 37: 84 (reduction to subsp. rank and syn.).

concolor crassa (Viereck). B. C., Mont., southwest. Idaho, west. Colo., Nev., Utah, Ariz., Calif., Wash.
Odontophotopsis crassus Viereck, 1924. Canad. Ent. 56: 112. ♂.
Dilophotopsis concolor utahensis Schuster, 1958. Ent. Amer. (n. s.) 37: 84 (in key), 87. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 8 (synonymy).

concolor laredo Schuster. Tex. (Winterhaven, Laredo, Cotulla).
Dilophotopsis concolor laredo Schuster, 1958. Ent. Amer. (n. s.) 37: 84 (in key), 86. ♂.

concolor paron (Cameron). Nev., Ariz., Calif.; Mexico (Sonora, Baja California).
Sphaerophthalma (!) *paron* Cameron, 1896. Biol. Cent.-Amer., Hym., v. 2, p. 381. ♂.
Dilophotopsis concolor sonorensis Schuster, 1958. Ent. Amer. (n. s.) 37: 84 (in key), 88. ♂.

Taxonomy: Mickel, 1965. Ent. Soc. Wash., Proc. 67: 1 (synonymy).

stenognatha Schuster. Ariz. (Tucson).
Dilophotopsis stenognatha Schuster, 1958. Ent. Amer. (n. s.) 37: 11 (in key), 74. ♂.

Taxonomy: Mickel, 1963. Pan-Pacific Ent. 39: 184 (female description).

Genus ACANTHOPHOTOPSIS Schuster

Acanthophotopsis Schuster, 1958. Ent. Amer. (n. s.) 37: 5 (in key), 88.
Type-species: *Acanthophotopsis falciformis* Schuster. Orig. desig.

bequaertii Schuster. Ariz. (Hereford).
Acanthophotopsis bequaertii Schuster, 1958. Ent. Amer. (n. s.) 37: 12 (in key), 101. ♂.

bifurca Schuster. Okla., Tex., N. Mex.
Acanthophotopsis bifurca Schuster, 1958. Ent. Amer. (n. s.) 37: 13 (in key), 98, pl. 3, fig. 3. ♂.

dorophora Schuster. Ariz. (Tucson, Yuma).
Acanthophotopsis dorophora Schuster, 1958. Ent. Amer. (n. s.) 37: 13 (in key), 104, pl. 2, fig. 1, pl. 3, fig. 2. ♂.

evansii Schuster. Tex. (Alpine and Chisos Mts.); Mexico (Durango).
Acanthophotopsis evansii Schuster, 1958. Ent. Amer. (n. s.) 37: 12 (in key), 93, pl. 3, fig. 1. ♂.

falciformis falciformis Schuster. Nev., Calif.; Mexico (Zacatecas).
Acanthophotopsis falciformis falciformis Schuster, 1958. Ent. Amer. (n. s.) 37: 13 (in key), 108, pl. 2, figs. 2, 3. ♂.

falciformis furcisterna Schuster. Ariz. (Tucson, Phoenix, Ajo).
Acanthophotopsis falciformis furcisterna Schuster, 1958. Ent. Amer. (n. s.) 37: 14 (in key), 111. ♂.

Genus SPHAEROPTHALMA Blake

In addition to the host records cited under several species in this genus, Parker and Bohart, 1968 (Pan-Pacific Ent. 44: 2) record an unidentified species of *Sphaeropthalma* from a twig nest of *Leptochilus washo* Parker, and Hurd and Powell, 1958 (Pan-Pacific Ent. 34: 152-153) record an unidentified female of this species as leaving a burrow of *Colletes stepheni* Timb.

Genus SPHAEROPTHALMA Subgenus MICROMUTILLA Ashmead

Micromutilla Ashmead, 1899. N. Y. Ent. Soc., Jour. 7: 59.
Type-species: *Photopsis nanus* Ashmead. Orig. desig.

acontia (Fox). N. Mex., Ariz., Nev.
Photopsis nanus Ashmead, 1896. Amer. Ent. Soc., Trans. 23: 181. ♂. Preocc.
Mutilla acontius Fox, 1899. Amer. Ent. Soc., Trans. 25: 266. ♂.
Mutilla Ashmeadii Fox, 1899. Amer. Ent. Soc., Trans. 25: 289. N. name.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 9 (synonymy).

becki Ferguson. Nev., Calif.
Sphaeropthalma (*Micromutilla*) *becki* Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 9, fig. 5. ♂.

bellerophon (Fox). Tex., N. Mex., Ariz.
Mutilla bellerophon Fox, 1899. Amer. Ent. Soc., Trans. 25: 254. ♂.

brachyptera Schuster. Calif., Nev., Ariz.; Mexico (Sonora).
Photopsis brachyptera Schuster, 1945. Pan-Pacific Ent. 21: 149. ♂.
Sphaeropthalma (*Micromutilla*) *yavapai* Schuster, 1958. Ent. Amer. (n. s.) 37: 19. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 11 (synonymy).

difficilis (Baker). Calif., Nev., Ariz., N. Mex.; Mexico (Baja California). Host: *Auplopus architectus metallicus* (Bks.).
Photopsis difficilis Baker, 1905. Invertebrata Pacifica 1: 114. ♂.
Sphaeropthalma (*Micromutilla*) *maricopella purismella* Schuster, 1958. Ent. Amer. (n. s.) 37: 17. ♂.

Sphaeropthalma (*Micromutilla*) *maricopella maricopella* Schuster, 1958. Ent. Amer. (n. s.) 37: 17. ♂.

Sphaeropthalma (*Micromutilla*) *maricopella castanea* Schuster, 1958. Ent. Amer. (n. s.) 37: 17. ♂.

Sphaeropthalma (*Micromutilla*) *californiense californiense* Schuster, 1958. Ent. Amer. (n. s.) 37: 18. ♂.

Sphaeropthalma (*Micromutilla*) *californiense fuscatella* Schuster, 1958. Ent. Amer. (n. s.) 37: 18. ♂.

Sphaeropthalma (*Micromutilla*) *quijotoa quijotoa* Schuster, 1958. Ent. Amer. (n. s.) 37: 18. ♂.

Sphaeropthalma (*Mcromutilla*) *quijotoa parrasia* Schuster, 1958. Ent. Amer. (n. s.) 37: 18. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 11 (synonymy).

Biology: Ferguson, 1962. Univ. Calif. Pubs. Ent. 27: tab. 10 (host record).

hyalina (Blake). Tex.

Agama hyalina Blake, 1871. Amer. Ent. Soc., Trans. 3: 263. ♂.

Agama minuta Blake, 1872. Amer. Ent. Soc., Trans. 4: 76. ♂.

macswaini Ferguson. Nev., Calif.

Sphaeropthalma (*Micromutilla*) *macswaini* Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 12, fig. 6. ♂.

mesillensis (Cockerell). N. Mex. (Mesilla).

Photopsis mesillensis Cockerell, 1897. Entomologist 30: 137. ♂.

pallida (Blake). Tex., N. Mex., Ariz., Nev.

Agama pallida Blake, 1871. Amer. Ent. Soc., Trans. 3: 263. ♂.

Sphaeropthalma (*Micromutilla*) *arizonae* Schuster, 1958. Ent. Amer. (n. s.) 37: 16. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 13 (synonymy).

parapenalis Ferguson. Wash., Oreg., Idaho, Calif., Nev., Utah, Ariz., Tex.; Mexico (Chihuahua, Coahuila, Durango, Zacatecas).

Sphaeropthalma (*Micromutilla*) *parapenalis* Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 14, fig. 7. ♂.

pateli Schuster. Ariz. (Hereford).

Sphaeropthalma (*Micromutilla*) *pateli* Schuster, 1958. Ent. Amer. (n. s.) 37: 15. ♂.

reducta Schuster. Ariz.

Sphaeropthalma (*Micromutilla*) *reducta* Schuster, 1958. Ent. Amer. (n. s.) 37: 18. ♂.

sabino Schuster. Ariz.

Sphaeropthalma (*Micromutilla*) *sabino* Schuster, 1958. Ent. Amer. (n. s.) 37: 19. ♂.

sonora Schuster. Ariz., Nev., Calif.

Sphaeropthalma (*Micromutilla*) *sonora* Schuster, 1958. Ent. Amer. (n. s.) 37: 16. ♂.

sublobata Schuster. Idaho.

Sphaeropthalma (*Micromutilla*) *sublobata* Schuster, 1958. Ent. Amer. (n. s.) 37: 16. ♂.

uvaldella Schuster. Tex.

Sphaeropthalma (*Micromutilla*) *uvaldella* Schuster, 1958. Ent. Amer. (n. s.) 37: 19. ♂.

yumaella Schuster. Nev., Ariz., Calif.; Mexico (Baja California).

Sphaeropthalma (*Micromutilla*) *yumaella* Schuster, 1958. Ent. Amer. (n. s.) 37: 19. ♂.

Genus SPHAEROPTHALMA Subgenus PHYSETAPSIS Schuster

Sphaeropthalma subg. *Physetapsis* Schuster, 1958. Ent. Amer. (n. s.) 37: 9 (in key), 20. Type-species: *Sphaeropthalma* (*Physetapsis*) *papaga* Schuster. Orig. desig.

borealis Schuster. Sask.

Sphaeropthalma (*Physetapsis*) *borealis* Schuster, 1958. Ent. Amer. (n. s.) 37: 20. ♂.

ecarinata Schuster. Calif.

Sphaeropthalma (*Physetapsis*) *ecarinata* Schuster, 1958. Ent. Amer. (n. s.) 37: 20. ♂.

papaga ephysetos Schuster. Southwestern Ariz., southern Calif.
Sphaeropthalma (*Physetapsis*) *papaga ephysetos* Schuster, 1958. Ent. Amer. (n. s.) 37: 20. ♂.

papaga papaga Schuster. Southeastern Ariz., Calif. (Imperial Co.).
Sphaeropthalma (*Physetapsis*) *papaga papaga* Schuster, 1958. Ent. Amer. (n. s.) 37: 20, pl. 6, fig. 3. ♂.

subcarinata Schuster. N. Mex.
Sphaeropthalma (*Physetapsis*) *subcarinata* Schuster, 1958. Ent. Amer. (n. s.) 37: 20. ♂.

Genus SPHAEROPTHALMA Subgenus PHOTOPSIS Blake

Agama Blake, 1871. Amer. Ent. Soc., Trans. 3: 258. Preocc.
Type-species: *Agama imperialis* Blake. Automatic desig. by Ashmead, 1899.
Photopsis Blake, 1886. Amer. Ent. Soc., Trans. 13: 179. N. name.
Type-species: *Agama imperialis* Blake. Desig. by Ashmead, 1899.
Pyrrhomutilla Ashmead, 1899. N. Y. Ent. Soc., Jour. 7: 56.
Type-species: *Sphaerophthalma* (!) *anthophorae* Ashmead. Orig. desig.
Neophotopsis Ashmead, 1903. Canad. Ent. 35: 306.
Type-species: *Mutilla pluto* Fox. Orig. desig.

In addition to the host records cited under several species in this subgenus, Parker and Bohart, 1968 (Pan-Pacific Ent. 44: 2, 3 and 5) record several unidentified species of *Sphaeropthalma* (*Photopsis*) from the following hosts from nests in twigs: *Ancistrocerus catskill* (Sauss.); *Odynerus erythrogaster* Bohart; *Pisonopsis birkmanni* Rohwer; *Anthocopa hypostomalis* Michener; *Hoplitis fulgida* (Cresson); *H. sambuci* Titus; and *Proteriades bullifacies* (Michener). Ferguson, 1962 (Univ. Calif. Pubs. Ent. 27: tab. 9) states that Davidson reared an unidentified species of *Sphaeropthalma* (*Photopsis*) from a nest of *Hoplitis producta* (Cresson) in a hollow plant stem.

Biology: Ferguson, 1962. Univ. Calif. Pubs. Ent. 27: 1-92, 7 pls., 2 text figs. (life history, hosts).

albopilosa (Blake). Tex. (Comal Co.).
Mutilla (*Sphaeropthalma*) *albopilosa* Blake, 1872. Amer. Ent. Soc., Trans. 4: 74. ♀.

anaspasia (Cockerell and Rohwer). Colo. (Boulder).
Photopsis anaspasia Cockerell and Rohwer, 1908. Psyche 15: 5. ♀.

angulifera Schuster. Calif., Nev.
Sphaeropthalma (*Photopsis*) *angulifera* Schuster, 1958. Ent. Amer. (n. s.) 37: 32. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 17 (distribution).

arenicola Schuster. Ariz.
Sphaeropthalma (*Photopsis*) *arenicola* Schuster, 1958, Ent. Amer. (n. s.) 37: 25. ♂.

arota (Cresson). Calif. (San Diego).
Mutilla Arota Cresson, 1875. Amer. Ent. Soc., Trans. 5: 120. ♀.

baboquivari Schuster. Ariz.
Sphaeropthalma (*Photopsis*) *baboquivari* Schuster, 1958. Ent. Amer. (n. s.) 37: 24, pl. 4, figs. 1-6. ♂.

bisetosa Schuster. Tex., N. Mex., Ariz.
Sphaeropthalma (*Photopsis*) *bisetosa* Schuster, 1958. Ent. Amer. (n. s.) 37: 36. ♂.

blakeii (Fox). Nev., Ariz., N. Mex., Calif.; Mexico (Baja California). Host: *Diadasia vallicola* Timb.
Photopsis Blakeii Fox, 1893. Calif. Acad. Sci., Proc. (2) 4: 6. ♂.
Mutilla Gautschii Dalla Torre, 1897. Cat. Hym. 8: 43. N. name erroneously proposed for *blakeii* Fox, thought to be preocc. by Cameron, 1894.
Mutilla ceyx Fox, 1899. Amer. Ent. Soc., Trans. 25: 262. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 17 (synonymy).

Biology: Ferguson, 1962. Univ. Calif. Pubs. Ent. 27: 10-15, pls. 2, 3, 4, 5, 7, tab. 9 (life history).

capricornis (Rohwer). Colo. (Boulder).
Photopsis capricornis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 131. ♀.

ceres (Fox). Ariz., Colo., Utah.
Mutilla ceres Fox, 1899. Amer. Ent. Soc., Trans. 25: 257. ♀.

ceyxoides Schuster. Ariz.
Sphaeropthalma (*Photopsis*) *ceyxoides* Schuster, 1958. Ent. Amer. (n. s.) 37: 25. ♂.

clara clara (Cresson). N. Mex., Colo. to Wyo. and Idaho. This subsp. is transitional to *Sphaeropthalma* subg. *Physetapsis* Schuster.
Mutilla clara Cresson, 1865. Ent. Soc. Phila., Proc. 4: 439. ♂.

Taxonomy: Schuster, 1958. Ent. Amer. (n. s.) 37: 27.

clara cleomella Schuster. Mont. This subsp. is transitional to *Sphaeropthalma* subg. *Physetapsis* Schuster.
Sphaeropthalma (*Photopsis*) *clara cleomella* Schuster, 1958. Ent. Amer. (n. s.) 37: 27. ♂.

coaequalis Cameron. Mont. and Oreg. to N. Mex. and north. Ariz., Kans., Tex.; north. Mexico.
Sphaerophthalma (!) *coaequalis* Cameron, 1896. Biol. Cent.-Amer., Hym., v. 2, p. 379. ♂.
Mutilla albicincta Fox, 1899. Amer. Ent. Soc., Trans. 25: 255. ♂.
Sphaeropthalma (*Photopsis*) *albicincta piceoceps* Schuster, 1958. Ent. Amer. (n. s.) 37: 35. ♂.
Sphaeropthalma (*Photopsis*) *albicincta flavipes* Schuster, 1958. Ent. Amer. (n. s.) 37: 36. ♂.

Taxonomy: Mickel, 1965. Ent. Soc. Wash., Proc. 67: 1 (synonymy).

danaus (Blake). Kans., Tex., N. Mex.; Mexico.
Agama Danaus Blake, 1871. Amer. Ent. Soc., Trans. 3: 261. ♂.

dentifera Schuster. S. Dak., Minn.
Sphaeropthalma (*Photopsis*) *dentifera* Schuster, 1958. Ent. Amer. (n. s.) 37: 24. ♂.

diomeda (Fox). Tex.
Mutilla diomeda Fox, 1899. Amer. Ent. Soc., Trans. 25: 257. ♀.

dirce (Fox). Ariz., Utah, Tex.
Mutilla dirce Fox, 1899. Amer. Ent. Soc., Trans. 25: 258. ♀.

edwardsii edwardsii (Cresson). Oreg., Idaho.
Mutilla Edwardsii Cresson, 1875. Amer. Ent. Soc., Trans. 5: 119. ♂.

edwardsii flammifera Schuster. Calif.
Sphaeropthalma (*Photopsis*) *edwardsii flammifera* Schuster, 1958. Ent. Amer. (n. s.) 37: 36. ♂.

erato (Blake). Tex.
Mutilla Erato Blake, 1879. Amer. Ent. Soc., Trans. 7: 251. ♀.

erigone (Fox). Colo.
Mutilla erigone Fox, 1899. Amer. Ent. Soc., Trans. 25: 268. ♀.

facilis (Cameron). N. Mex., Ariz.; Mexico (Durango).
Sphaerophthalma (!) *facilis* Cameron, 1896. Biol. Cent.-Amer., Hym., v. 2, p. 392. ♂.
Mutilla Hubbardii Fox, 1899. Amer. Ent. Soc., Trans. 25: 256. ♂.
Sphaeropthalma (*Photopsis*) *piceogaster* Schuster, 1958. Ent. Amer. (n. s.) 37: 27. ♂.

ferruginea (Blake). Nev., Calif. Host: *Isodontia elegans* (Smith).
Agama ferruginea Blake, 1879. Amer. Ent. Soc., Trans. 7: 254. ♂.
Mutilla ferruginosa Dalla Torre, 1897. Cat. Hym., v. 8, p. 40. N. name for *Agama ferruginea* Blake, not *Mutilla ferruginea* Smith.

Biology: Davidson, 1899. Ent. News 10: 180 (host).

ferruginopsis Schuster. Ariz., Calif.
Sphaeropthalma (*Photopsis*) *ferruginopsis* Schuster, 1958 Ent. Amer. (n. s.) 37: 29. ♂.

fuscipes Schuster. Ariz.; Mexico (Durango). This sp. is transitional to *Sphaeropthalma* subg. *Physetapsis* Schuster.
Sphaeropthalma (*Photopsis*) *fuscipes* Schuster, 1958. Ent. Amer. (n. s.) 37: 21. ♂.

halcyone (Fox). Kans. (Hamilton Co.).
Mutilla halcyone Fox, 1899. Amer. Ent. Soc., Trans. 25: 257. ♀.

helicaon (Fox). Nev., Ariz., Calif.; Mexico (Baja California, Coahuila).
Mutilla helicaon Fox. 1899. Amer. Ent. Soc., Trans. 25: 254. ♂.
Photopsis lingulatus Viereck, 1903. Acad. Nat. Sci. Phila., Proc. 54: 737. ♂.
Sphaeropthalma (*Photopsis*) *carinata* Schuster, 1958. Ent. Amer. (n. s.) 37: 34. ♂.
Sphaeropthalma (*Photopsis*) *helicaon coahuilae* Schuster, 1958. Ent. Amer. (n. s.) 37: 34. ♂.
Sphaeropthalma (*Photopsis*) *helicaon diegueno* Schuster, 1958. Ent. Amer. (n. s.) 37: 35. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., Biol. Ser. 8, no. 4: 17 (synonymy).

hypermnestra (Fox). Calif. (Poway).
Mutilla hypermnestra Fox, 1899. Amer. Ent. Soc., Trans. 25: 268. ♀.

ignacio Schuster. Southern Calif.; Mexico (Baja California).
Sphaeropthalma (*Photopsioides*) *amphion ignacio* Schuster, 1958. Ent. Amer. (n. s.) 37: 38. ♂.

imperialiformis imperialiformis (Viereck). Tex. to Kans. and Colo.
Mutilla (*Photopsis*) *imperialiformis* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 189. ♂.

imperialiformis maricopae Schuster. Ariz. to Wash.
Sphaeropthalma (*Photopsis*) *imperialiformis maricopae* Schuster, 1958. Ent. Amer. (n. s.) 37: 34. ♂.

imperialis (Blake). Tex.
Agama imperialis Blake, 1871. Amer. Ent. Soc., Trans. 3: 260. ♂.

insignis (Baker). Calif. (Claremont); Mexico (Baja California).
Photopsis insignis Baker, 1905. Invertebrata Pacifica 1: 115. ♂.

jacala Schuster. Ariz.; Mexico (Jacala).
Sphaeropthalma (*Photopsis*) *jacala* Schuster, 1958. Ent. Amer. (n. s.) 37: 21. ♂.

juxta (Blake). Iowa, Kans., Tex., N. Mex., Ariz.
Agama juxta Blake, 1872. Amer. Ent. Soc., Trans. 4: 76. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci. Bul., ser. 8, no. 4: 15.

laodamia (Fox). Ariz.
Mutilla laodamia Fox, 1899. Amer. Ent. Soc., Trans. 25: 258. ♀.

luiseno Schuster. Calif.
Sphaeropthalma (*Photopsis*) *luiseno* Schuster, 1958. Ent. Amer. (n. s.) 37: 23. ♂.

marpesia (Blake). Kans., Utah.
Mutilla Marpesia Blake, 1879. Amer. Ent. Soc., Trans. 7: 247. ♀.
Sphaerophthalma (!) *luteola* Blake, 1886. Amer. Ent. Soc., Trans. 13: 235. ♀.

megagnathos aurifera Schuster. Calif., Ariz.
Sphaeropthalma (*Photopsis*) *megagnathos auriferus* Schuster, 1958. Ent. Amer. (n. s.) 37: 36. ♂.

megagnathos megagnathos Schuster. Calif., Ariz.
Sphaeropthalma (*Photopsis*) *megagnathos megagnathos* Schuster, 1958. Ent. Amer. (n. s.) 37: 36. ♂.

militaris Schuster. Ariz., Calif.
Sphaeropthalma (*Photopsis*) *militaris* Schuster, 1958. Ent. Amer. (n. s.) 37: 27, pl. 5, fig. 2. ♂.

minutella (Mickel). Calif. (Lassen Co.).
Photopsis minutella Mickel, 1938. Pan-Pacific Ent. 14: 183. ♀.

nanula (Dalla Torre). Tex., Colo., Nev., Idaho. Host: *Tachysphex* sp.
Mutilla pygmea Blake, 1879. Amer. Ent. Soc., Trans. 7: 250. ♀. Preocc.
Mutilla nanula Dalla Torre, 1897. Cat. Hym., v. 8, p. 65. N. name.
Mutilla pygmaea (!) Dalla Torre, 1897. Cat. Hym., v. 8, p. 65.

Biology: Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 102 (host).

neomexicana Schuster. N. Mex.
Sphaeropthalma (*Photopsis*) *neomexicana* Schuster, 1958. Ent. Amer. (n. s.) 37: 30. ♂.

noctivaga (Melander). Nebr. and Wyo. south to Tex. and Ariz.
Mutilla noctivaga Melander, 1903. Amer. Ent. Soc., Trans. 29: 318. ♂.

Sphaeropthalma (*Photopsis*) *noctivaga infuscata* Schuster, 1958. Ent. Amer. (n. s.) 37: 32. ♂.

nokomis nokomis (Blake). Ariz.
Agama Nokomis Blake, 1871. Amer. Ent. Soc., Trans. 3: 260. ♂.

nokomis ruficeps Schuster. Ariz.
Sphaeropthalma (*Photopsis*) *nokomis ruficeps* Schuster, 1958. Ent. Amer. (n. s.) 37: 35. ♂.

ordae Schuster. Tex.
Sphaeropthalma (*Photopsis*) *ordae* Schuster, 1958. Ent. Amer. (n. s.) 37: 23. ♂.

orestes (Fox). Wash. to Calif., Nev.; Mexico (Baja California). Host: *Anthidium c. collectum* Huard; *Euodynerus a auranus* (Cam.); *Tachysphex tenuipunctus* Fox.
Mutilla orestes Fox, 1899. Amer. Ent. Soc., Trans. 25: 256. ♂.
Mutilla Pattersonae Melander, 1903. Amer. Ent. Soc., Trans. 29: 309. ♂.
Photopsis indigens Baker, 1905. Invertebrata Pacifica 1: 112. ♂.
Photopsis uniformis Baker, 1905. Invertebrata Pacifica 1: 113. ♂.
Photopsis pedatus Baker, 1905. Invertebrata Pacifica 1: 115. ♂.
Photopsis ingenuus Baker, 1905. Invertebrata Pacifica 1: 116. ♂.
Photopsis salmani Mickel, 1938. Pan-Pacific Ent. 14: 178. ♀, ♂.
Sphaeropthalma (*Photopsis*) *salmani fresnoensis* Schuster, 1958. Ent. Amer. (n. s.) 37: 30. ♂.
Sphaeropthalma (*Photopsis*) *salmani oregana* Schuster, 1958. Ent. Amer. (n. s.) 37: 31. ♂.

Taxonomy: Schuster, 1958. Ent. Amer. (n. s.) 37: 30 (synonymy). —Ferguson, 1962. Univ. Calif. Pubs. Ent. 27: 10 (synonymy).

Biology: Ferguson, 1962. Univ. Calif. Pubs. Ent. 27: 6-10, pls. 1, 6, tabs. 1, 9 (life history).

pallidipes Schuster. Ariz.
Sphaeropthalma (*Photopsis*) *pallidipes pallidipes* Schuster, 1958. Ent. Amer. (n. s.) 37: 27. ♂.
Sphaeropthalma (*Photopsis*) *pallidipes gila* Schuster, 1958. Ent. Amer. (n. s.) 37: 28. ♂.

parkeri Schuster. Ariz., Calif.
Sphaeropthalma (*Photopsis*) *parkeri* Schuster, 1958. Ent. Amer. (n. s.) 37: 28. ♂.

pervaga (Melander). Tex. (Fedor).
Mutilla pervaga Melander, 1903. Amer. Ent. Soc., Trans. 29: 321. ♀.

pinalea Schuster. N. Dak. to Tex., Ariz.; Mexico (Coahuila, Durango).
Sphaeropthalma (*Photopsis*) *pinalea pinalea* Schuster, 1958. Ent. Amer. (n. s.) 37: 32. ♂.
Sphaeropthalma (*Photopsis*) *pinalea texanella* Schuster, 1957. Ent. Amer. (n. s.) 37: 32. ♂.

pinales Schuster. Ariz.
Sphaeropthalma (*Photopsis*) *pinales* Schuster. 1958. Ent. Amer. (n. s.) 37: 36. ♂.

pluto (Fox). Tex., N. Mex., Ariz.
Mutilla pluto Fox, 1899. Amer. Ent. Soc., Trans. 25: 255. ♂.
Mutilla palamedes Fox, 1899. Amer. Ent. Soc., Trans. 25: 264. ♂.

rubriventris Schuster. Tex., N. Mex., Ariz.; Mexico (Tamaulipas).
Sphaeropthalma (*Photopsis*) *facilis rubriventris* Schuster, 1958. Ent. Amer. (n. s.) 37: 26. ♂.

sanctaefeae (Cockerell). N. Mex. (Santa Fe).
Mutilla sanctae-feae Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 137. ♀.

scudderi Schuster. Ariz.
Sphaeropthalma (*Photopsis*) *scudderi* Schuster, 1958. Ent. Amer. (n. s.) 37: 23. ♂.

seminanula Rohwer. Colo. (Boulder).
Photopsis seminanula Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 130. ♀.

similis Schuster. Calif.
Sphaeropthalma (*Photopsis*) *similis* Schuster, 1958. Ent. Amer. (n. s.) 37: 30. ♂.

spinifera Schuster. Kans., Okla., Colo.
Sphaeropthalma (*Photopsis*) *spinifera* Schuster, 1958. Ent. Amer. (n. s.) 37: 23. ♂.

tetracuspis Schuster. Calif. (Riverside Co.); Mexico (Baja California).
Sphaeropthalma (*Photopsis*) *tetracuspis* Schuster, 1958. Ent. Amer. (n. s.) 37: 31. ♂.

triangularis (Blake). Tex., N. Mex., Ariz., Nev., Calif.; Mexico (Baja California).
Agama triangularis Blake, 1871. Amer. Ent. Soc., Trans. 3: 262. ♂.

tuberculifera Schuster. Calif. (?).
Sphaeropthalma (*Photopsis*) *tuberculifera* Schuster, 1958. Ent. Amer. (n. s.) 37: 25. ♂.

unicolor (Cresson). U. S. west of Rocky Mts.; Mexico (Baja California del Norte). Host: *Isodontia elegans* (Sm.); *Anthidium c. collectum* Huard, *Callanthidium illustre* (Cr.), *Ashmeadiella c. californica* (Ashm.); *Anthophora abruptella* Ckll., *A. bomboides neomexicana* Ckll., *A. linsleyi* Timb., *A. montana* Cr.?, *A. occidentalis* Cr., *Diadasia bituberculata* (Cr.), *Melissodes robustior* Ckll., *Xeromelecta californica* (Ashm.).
Mutilla unicolor Cresson, 1865. Ent. Soc. Phila., Proc. 4: 389. ♂.
Agama mendica Blake, 1871. Amer. Ent. Soc., Trans. 3: 259. ♂.
Mutilla auraria Blake, 1879. Amer. Ent. Soc., Trans. 7: 248. ♀.
Mutilla Aspasia Blake, 1879. Amer. Ent. Soc., Trans. 7: 250. ♀.
Mutilla Phaedra Blake, 1879. Amer. Ent. Soc., Trans. 7: 251. ♀.
Agama rustica Blake, 1879. Amer. Ent. Soc., Trans. 7: 252. ♂.
Photopsis nebulosus Blake, 1886. Amer. Ent. Soc., Trans. 13: 275. ♂.
Sphaeropthalmia (!) *anthophora* Ashmead, 1897. *In* Davidson, South. Calif. Acad. Sci., Proc. 1: 5. ♀, ♂.
Mutilla monochroa Dalla Torre, 1897. Cat. Hym., v. 8, p. 63. N. name for *Mutilla unicolor* Cresson, not *Myrmosa unicolor* Say.
Dasymutilla sumneriella Cockerell, 1915. Entomologist 48: 249. ♀.
Sphaeropthalma (*Photopsis*) *rustica ocellaria* Schuster, 1958. Ent. Amer. (n. s.) 37: 32. ♂.

Biology: Davidson, 1894. Ent. News 5: 170 (host records). —Davidson, 1897. South. Calif. Acad. Sci., Proc. 1: 4-5 (host records). —Davidson, 1899. Ent. News 10: 180 (host record). —Linsley and MacSwain, 1942. Amer. Midland Nat. 27: 409 (host records). —Ferguson, 1962. Univ. Calif. Pubs. Ent. 27: 15-22, pls. 3, 5, 7, tab. 9 (life history, host records).

virguncula (Blake). N. Mex.
Sphaeropthalma (!) *virguncula* Blake, 1886. Amer. Ent. Soc., Trans. 13: 253. ♀.

zenobia (Blake). Calif., ? Tex.
Mutilla zenobia Blake, 1879. Amer. Ent. Soc., Trans. 7: 250. ♀.

zephyritis (Fox). Calif. (Los Angeles).
Mutilla zephyritis Fox, 1899. Amer. Ent. Soc., Trans. 25: 269. ♀.

NOMEN NUDUM IN SPHAEROPTHALMA SUBGENUS PHOTOPSIS BLAKE

Sphaeropthalma (*Photopsis*) *nixonensis* Parker and Bohart, 1966. Pan-Pacific Ent. 42: 98. Nev. Host: *Proteriades* sp.

Genus SPHAEROPTHALMA Subgenus PHOTOPSIOIDES Schuster

Sphaeropthalma subg. *Photopsioides* Schuster, 1958. Ent. Amer. (n. s.) 37: 10 (in key), 36. Type-species: *Agama uro* Blake. Orig. desig.

In addition to the host records cited below under *uro* (Blake), Ferguson, 1962 (Univ. Calif. Pubs. Ent. 27: tab. 10) records *Sceliphron caementarium* (Dru.) as the host of an unidentified species of this subgenus.

abdominalis (Blake). Kans., Tex., Colo., Ariz., Utah. Host: *Trypargilum t. tridentatum* (Pack.).
Photopsis abdominalis Blake, 1886. Amer. Ent. Soc., Trans. 13: 275. ♂.
Mutilla coloradensis Dalla Torre, 1897. Cat. Hym., v. 8, p. 25. N. name for *Photopsis abdominalis* Blake, not *Mutilla abdominalis* Westwood.

amphion (Fox). Ariz., Nev., Calif., Oreg.; Mexico (Baja California). Host: *Sapyga aculeata* Cr.; *Leptochilus chiricahua* Prkr., *Ancistrocerus c. catskill* (Sauss.); *Trypargilum t. tridentatum* (Pack.); *Hoplitis bullifacies* Mich., *H. f. fulgida* (Cr.), *H. g. grinnelli* Ckll., *H. hypostomalis* Mich., *H. sambuci* Titus, *Anthocopa copelandica* (Ckll.), *Ashmeadiella m. meliloti* (Ckll.), *Stelis* spp.
Mutilla amphion Fox, 1899. Amer. Ent. Soc., Trans. 25: 263. ♂.
Photopsis abstrusa Baker, 1905. Invertebrata Pacifica 1: 113. ♂.
Photopsis nudata Baker, 1905. Invertebrata Pacifica 1: 114. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ., Sci. Bul., ser. 8, no. 4: 20 (synonymy).

Biology: Parker, 1975. Pan-Pacific Ent. 51: 116 (host).

contracta (Blake). Nev., Oreg.
Agama contracta Blake, 1879. Amer. Ent. Soc., Trans. 7: 253. ♂.
Mutilla contrahenda Dalla Torre, 1897. Cat. Hym., v. 7, p. 27. N. name for *Agama contracta* Blake, not *Mutilla contracta* Say.

uro (Blake). Kans., Tex., N. Mex., Ariz. Host: *Pachodynerus astraeus* (Cam.), eumenid sp.; *Trypargilum t. tridentatum* (Pack.); *Dianthidium curvatum sayi* Ckll.
Agama uro Blake, 1879. Amer. Ent. Soc., Trans. 7: 253. ♂.
Photopsis melanderi Baker, 1905. Invertebrata Pacifica 1: 112. ♂.
Sphaeropthalma (*Photopsioides*) *uro stenognatha* Schuster, 1958. Ent. Amer. (n. s.) 37: 38. ♂.

Biology: Fischer, 1951. Kans. Ent. Soc., Jour. 24: 49 (host record). —Ferguson, 1962. Univ. Calif. Pubs. Ent. 27: tab. 10 (host records). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (host record). —Krombein, 1967. Trap-nesting wasps and bees, pp. 478-479 (life history).

Genus SPHAEROPTHALMA Subgenus SPHAEROPTHALMA Blake

Sphaeropthalma Blake, 1871. Amer. Ent. Soc., Trans. 3: 232.
Type-species: *Mutilla* (*Sphaeropthalma*) *scaeva* Blake. Automatic desig. by Ashmead, 1899 (=*Sphaeropthalma pensylvanica scaeva* (Blake)).
Sphaerophthalma (!) Blake, 1886. Amer. Ent. Soc., Trans. 13: 179. Emend.
Type-species: *Mutilla* (*Sphaeropthalma*) *scaeva* Blake. Desig. by Ashmead, 1899 (=*Sphaeropthalma pensylvanica scaeva* (Blake)).

Revision: Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 141-147.

auripilis auripilis (Blake). Kans., Okla., Tex. Host: *Chalybion californicum* (Sauss.), *Sceliphron caementarium* (Drury), *Trypoxylon* sp.; solitary eumenid in old clay cell of *Sceliphron*.
Mutilla (*Sphaeropthalma*) *auripilis* Blake, 1871. Amer. Ent. Soc., Trans. 3: 233. ♂.
Sphaerophthalma (!) *albiplumosa* Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 145. ♀.

Biology: Rau, 1940. Ent. Soc. Amer., Ann. 33: 594 (host).

auripilis fasciventris Schuster. Tex. (Edinburg).
Sphaeropthalma (*Sphaeropthalma*) *auripilis fasciventris* Schuster, 1958. Ent. Amer. (n. s.) 37: 39. ♂.

Taxonomy: Mickel, 1974. Ent. Soc. Amer., Ann. 67: 466. ♀.

boweri Schuster. Tex. (College Station).
Sphaerophthalma (!) *boweri* Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 143. ♂.

pensylvanica floridensis Schuster. South. Fla.
Sphaerophthalma (!) *pennsylvanica*(!) *floridensis* Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 142. ♀.

Taxonomy: Mickel, 1974. Ent. Soc. Amer., Ann. 67: 466. ♂.

pensylvanica pensylvanica (Lepeletier). N. C., Ga., cent. Fla., La., Mo., Kans., Tex. Host: *Sceliphron caementarium* (Drury), *Trypargilum politum* (Say), *T. clavatum* (Say); anthidiine sp.
Mutilla pensylvanica Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 628. ♂.
Mutilla (*Sphaeropthalma*) *pennsylvanica* (!) Blake, 1871. Amer. Ent. Soc., Trans. 3: 233. ♂.
Mutilla (*Sphaeropthalma*) *balteola* Blake, 1871. Amer. Ent. Soc., Trans. 3: 248. ♀.

Taxonomy: Bradley, 1916. Amer. Ent. Soc., Trans. 42: 331.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 7 (host). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 437 (host).

pensylvanica scaeva (Blake). Mass. to N. C., Ohio, Ill., Mo., Kans., Tex. Host: *Auplopus a. architectus* (Say), *A. m. mellipes* (Say); *Trypargilum clavatum* (Say), *T. collinum*

rubrocinctum (Pack.), *T. politum* (Say), *T. lactitarse* (Sauss.), *Sceliphron caementarium* (Dru.). Parasite: *Melittobia chalybii* Ashm.

Mutilla (*Sphaeropthalma*) *scaeva* Blake, 1871. Amer. Ent. Soc., Trans. 3: 232. ♂.

Taxonomy: Bradley, 1916. Amer. Ent. Soc., Trans. 42: 331.

Biology: Rau and Rau, 1918. Wasp studies afield, pp. 88-89 (host). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24, no. 7: 8 (host). —Krombein, 1951. U. S. Dept. Agr., Monog. 2: 752 (hosts). —Krombein, 1967. Trap-nesting wasps and bees, pp. 476-478, figs. 135-139 (life history).

Genus PHOTOMORPHUS Viereck

Taxonomy: Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 147-151 (east spp. only). —Krombein, 1954. Amer. Ent. Soc., Trans. 80: 6-7 (key to eastern females).

Genus PHOTOMORPHUS Subgenus PHOTOMORPHINA Schuster

Photomorphus subg. *Photomorphina* Schuster, 1952. Brooklyn Ent. Soc., Bul. 47: 53.
Type-species: *Photomorphus* (*Photomorphina*) *aurifera* Schuster. Orig. desig.

Photomorphus subg. *Photomorphina* Schuster, 1958. Ent. Amer. (n.s.) 37: 8 (in key), 39.
Preocc. by *Photomorphus* subg. *Photomorphina* Schuster, 1952, and a syn. of it.
Type-species: *Photomorphus* (*Photomorphina*) *quadriangulata* Schuster. Orig. desig.

aurifer Schuster. Ariz.

Photomorphus (*Photomorphina*) *aurifera* Schuster, 1952. Brooklyn Ent. Soc., Bul. 47: 53. ♂.

Photomorphus (*Photomorphina*) *aurifera* Schuster, 1958. Ent. Amer. (n. s.) 37: 44. ♂.
Preocc. by and a syn. of *Photomorphus* (*Photomorphina*) *aurifera* Schuster, 1952.

auriventris Schuster. Tex.

Photomorphus (*Photomorphina*) *auriventris* Schuster, 1958. Ent. Amer. (n. s.) 37: 40. ♂.

bequaertii (Schuster), n. comb. (W. E. Ferguson). Tex.

Odontophotopsis (*Odontophotopsis*) *bequaertii* Schuster, 1958. Ent. Amer. (n. s.) 37: 52. ♂.

californicus Schuster. Calif.

Photomorphus (*Photomorphina*) *californica* Schuster, 1958. Ent. Amer. (n. s.) 37: 44. ♂.

clandestinus (Viereck). Tex., N. Mex.

Odontophotopsis clandestinus Viereck, 1903. Acad. Nat. Sci. Phila., Proc. 54: 740. ♂.

cobabi Schuster. Ariz.; Mexico (Sonora, Baja California).

Photomorphus (*Photomorphina*) *cobabi* Schuster, 1958. Ent. Amer. (n. s.) 37: 41. ♂.

cochisae Schuster. Ariz.; Mexico.

Photomorphus (*Photomorphina*) *cochisae* Schuster, 1958. Ent. Amer. (n. s.) 37: 43. ♂.

coloradellus Schuster. Colo.

Photomorphus (*Photomorphina*) *coloradella* Schuster, 1958. Ent. Amer. (n. s.) 37: 44. ♂.

comobabi Schuster. Ariz.; Mexico.

Photomorphus (*Photomorphina*) *comobabi* Schuster, 1958. Ent. Amer. (n. s.) 37: 45. ♂.

crepusculus (Viereck). Kans. (Morton Co.).

Mutilla (*Photomorphus?*) *crepuscula* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 188. ♂.

dichrous Schuster. Ariz.

Photomorphus (*Photomorphina*) *dichrous* Schuster, 1958. Ent. Amer. (n. s.) 37: 41. ♂.

hebes (Melander). Tex., N. Mex., Ariz.; Mexico (Sonora, Coahuila, Tamaulipas).

Mutilla hebes Melander, 1903. Amer. Ent. Soc., Trans. 29: 311. ♂.

Photomorphus (*Photomorphina*) *taeniatus* Schuster, 1958. Ent. Amer. (n. s.) 37: 42. ♂.

Photomorphus (*Photomorphina*) *taeniatus parksi* Schuster, 1958. Ent. Amer. (n. s.) 37: 42. ♂.

imperialoides Schuster. Ariz.

Photomorphus (*Photomorphina*) *imperialoides* Schuster, 1958. Ent. Amer. (n. s.) 37: 40. ♂.

jason (Fox). Tex., Okla.

Mutilla jason Fox, 1899. Amer. Ent. Soc., Trans. 25: 250. ♂.

juanita Schuster. Tex.; Mexico (Tamaulipas).
Photomorphus (*Photomorphina*) *juanita* Schuster, 1952. Brooklyn Ent. Soc., Bul. 47: 57. ♂.
Photomorphus (*Photomorphina*) *juanita* Schuster, 1958. Ent. Amer. (n. s.) 37: 43. ♂.
Preocc. by and a syn. of *Photomorphus* (*Photomorphina*) *juanita* Schuster, 1952.

minimus Schuster. Ariz. (Wellton).
Photomorphus (*Photomorphina*) *minima* Schuster, 1958. Ent. Amer. (n. s.) 37: 43. ♀.

myrmicoides (Cockerell). Ala., Tex., Ill., Iowa, Kans., S. Dak.
Mutilla parvula Blake, 1886. Amer. Ent. Soc., Trans. 13: 206. ♀. Preocc.
Sphaerophthalma (!) *myrmicoides* Cockerell, 1895. Ent. News 6: 62. ♀.
Mutilla impar Melander, 1903. Amer. Ent. Soc., Trans. 29: 321. ♀.
Odontophotopsis subtenuis Viereck, 1904. Amer. Ent. Soc., Trans. 30: 85. ♂.

Taxonomy: Bradley, 1916. Amer. Ent. Soc., Trans. 42: 336. ♂. —Mickel, 1934. Ent. Soc. Amer., Ann. 27: 611. ♀, ♂. —Mickel, 1965. Ent. Soc. Wash., Proc. 67: 3-4 (synonymy).

nanullus Schuster. Ariz.
Photomorphus (*Photomorphina*) *nanulla* Schuster, 1958. Ent. Amer. (n. s.) 37: 44. ♂.

obscurus Schuster. Calif., Ariz.
Photomorphus (*Photomorphina*) *obscura* Schuster, 1958. Ent. Amer. (n. s.) 37: 45. ♂.

quadriangulatus Schuster. Ariz.; Mexico (Sonora).
Photomorphus (*Photomorphina*) *quadriangulata* Schuster, 1958. Ent. Amer. (n. s.) 37: 42. ♂.

sarpedon (Fox). Tex.; Mexico (Coahuila).
Mutilla sarpedon Fox, 1899. Amer. Ent. Soc., Trans. 25: 267. ♂.

spinci (Bradley). N. C. to Fla., Ala.
Photopsis (*Odontophotopsis*) *spinci* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 335. ♂.
Photopsis (*Odontophotopsis*) *spinci floridensis* Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 155. ♂.

spinciformis Schuster. Tex.
Photomorphus (*Photomorphina*) *spinciformis* Schuster, 1958. Ent. Amer. (n. s.) 37: 44. ♂.

thamyras (Fox). Tex.
Mutilla thamyras Fox, 1899. Amer. Ent. Soc., Trans. 25: 267. ♂.

trunculus (Viereck). Kans., Okla., Tex., Ariz.
Mutilla simpliciventris Melander, 1903 (Oct.). Amer. Ent. Soc., Trans. 29: 315. ♂. Preocc. by Andre, July, 1903.
Odontophotopsis trunculus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 85. ♂.
Odontophotopsis melanderella Krombein, 1951. U. S. Dept. Agr., Monog. 2: 757. N. name.

wheeleri (Melander). Tex. (Austin).
Mutilla Wheeleri Melander, 1903. Amer. Ent. Soc., Trans. 29: 316. ♂.

vegas Schuster. N. Mex., Ariz., Utah.
Photomorphus (*Photomorphina*) *vegas* Schuster, 1958. Ent. Amer. (n. s.) 37: 42. ♂.

Genus PHOTOMORPHUS Subgenus PHOTOMORPHUS Viereck

Photomorphus Viereck, 1903. Ent. News 14: 249.
Type-species: *Photomorphus Johnsoni* Viereck. Orig. desig.

alogus Viereck. Ga., Fla., Miss.
Photomorphus alogus Viereck, 1903. Ent. News 14: 251. ♂.

Taxonomy: Krombein, 1954. Amer. Ent. Soc., Trans. 80: 3. ♀.

banksi (Bradley). N. J. south to Fla., Ala.
Sphaerophthalma (!) (*Photomorphus*) *banksi* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 331. ♂.

bradleyi (Schuster). S. C. (Clemson).
Photopsis bradleyi Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 152. ♀.

johnsoni johnsoni Viereck. N. Y. to Ga., Okla.
Photomorphus Johnsoni Viereck, 1903. Ent. News 14: 249. ♂.

Photomorphus johnsoni var. *argentipilis* Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 148. ♂.

johnsoni natchitoches Schuster. La.
Photomorphus (*Photomorphus*) *johnsoni natchitoches* Schuster, 1958. Ent. Amer. (n. s.) 37: 46. ♂.

paulus (Bradley). Ga., Fla.
Photopsis (*Odontophotopsis*) *paula* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 333. ♂.

Taxonomy: Schuster, 1944. Brooklyn Ent. Soc., Bul. 39: 154. ♂.

quintilis (Viereck). Iowa, Kans., La.
Mutilla (*Photomorphus*) *quintilis* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 187. ♂.

rubroscutellatus (Bradley). Va. (Falls Church).
Sphaerophthalma (!) (*Photomorphus*) *rubroscutellatus* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 332. ♂.

Genus ODONTOPHOTOPSIS Viereck

Revision: Viereck, 1904. Amer. Ent. Soc., Trans. 30: 81-92.

Genus ODONTOPHOTOPSIS Subgenus ODONTOPHOTOPSIS Viereck

Odontophotopsis Viereck, 1903. Acad. Nat. Sci. Phila., Proc. 54: 738.
Type-species: *Odontophotopsis exogyrus* Viereck. Orig. desig.
Tetraphotopsis Ashmead, 1903. Canad. Ent. 35: 305.
Type-species: *Tetraphotopsis Hubbardi* Ashmead. Orig. desig. (Not *Mutilla Hubbardii* Fox as cited by Mickel, 1928. U. S. Natl. Mus., Bul. 143: 37).

acmaea Viereck. Ariz., south. Calif.; Mexico (Sonora).
Odontophotopsis acmaeus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 84. ♂.

adonis (Fox). N. Mex. (Las Cruces).
Mutilla adonis Fox, 1899. Amer. Ent. Soc., Trans. 25: 265. ♂.

alemon (Fox). Tex., N. Mex.
Mutilla alemon Fox, 1899. Amer. Ent. Soc., Trans. 25: 266. ♂.
Mutilla trita Melander, 1903. Amer. Ent. Soc., Trans. 29: 317. ♂.
Odontophotopsis crucis Viereck, 1904. Amer. Ent. Soc., Trans. 30: 86. ♂.

annulata Baker. Calif. (Claremont).
Odontophotopsis annulatus Baker, 1905. Invertebrata Pacifica 1: 94. ♂.

anomala Schuster. Tex.
Odontophotopsis (*Odontophotopsis*) *anomala* Schuster, 1958. Ent. Amer. (n. s.) 37: 60. ♂.

appacheorum appacheorum Schuster. Tex.
Odontophotopsis (*Odontophotopsis*) *appacheorum appacheorum* Schuster, 1958. Ent. Amer. (n. s.) 37: 55. ♂.

appacheorum rostrata Schuster. Ariz.
Odontophotopsis (*Odontophotopsis*) *appacheorum rostratus* Schuster, 1958. Ent. Amer. (n. s.) 37: 55. ♂.

argentipilis (Provancher). Published type locality Fla. is erroneous.
Sphaerophthalma (!) *argentipilis* Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 251. ♂.

armata Schuster. Nev.
Odontophotopsis (*Odontophotopsis*) *armata* Schuster, 1958. Ent. Amer. (n. s.) 37: 60. ♂.

augusta Viereck. N. Mex. (St. Augustine).
Odontophotopsis augustus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 90. ♂.

bicolor (Blake). Tex., Ariz.
Agama bicolor Blake, 1879. Amer. Ent. Soc., Trans. 7: 252. ♂.
Mutilla Madejskii Dalla Torre, 1897. Cat. Hym., v. 8, p. 56. N. name for *Agama bicolor* Blake, not *Mutilla bicolor* Pallas.

Taxonomy: Fox, 1899. Amer. Ent. Soc., Trans. 25: 259-260. ♂ (in key to group *imperialis*).

biramosa Schuster. Calif. (Holtville).
Odontophotopsis (*Odontophotopsis*) *biramosa* Schuster, 1952. Brooklyn Ent. Soc., Bul. 47: 43, fig. 1. ♂.

braccata Schuster. Tex., N. Mex.
Odontophotopsis (*Odontophotopsis*) *braccatus* Schuster, 1958. Ent. Amer. (n. s.) 37: 54. ♂.

clypeata Schuster. Ariz., Nev., Calif.
Odontophotopsis (*Odontophotopsis*) *clypeatus* Schuster, 1958. Ent. Amer. (n. s.) 37: 59. ♂.

cockerelli (Melander). Tex. (Cuero).
Mutilla Cockerelli Melander, 1903. Amer. Ent. Soc., Trans. 29: 307. ♂.

conifera Schuster. Ariz.
Odontophotopsis (*Odontophotopsis*) *coniferus* Schuster, 1958. Ent. Amer. (n. s.) 37: 48. ♂.

cookii Baker. Calif., Nev.
Odontophotopsis cookii Baker, 1905. Invertebrata Pacifica 1: 93. ♂.

delodonta Viereck. Ariz.
Odontophotopsis delodontus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 91. ♂.

edentata distans Schuster. Tex. (Devils River).
Odontophotopsis (*Odontophotopsis*) *edentata distans* Schuster, 1958. Ent. Amer. (n. s.) 37: 53. ♂.

edentata edentata Schuster. Ariz.
Odontophotopsis (*Odontophotopsis*) *edentata edentata* Schuster, 1958. Ent. Amer. (n. s.) 37: 53. ♂.

erebus (Melander). Kans., Okla., Tex., N. Mex., Ariz., Utah; Mexico (Tamaulipas).
Mutilla Erebus Melander, 1903. Amer. Ent. Soc., Trans. 29: 312. ♂.
Odontophotopsis avellanus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 88. ♂.

eubule (Cameron). N. Mex.; Mexico (Sonora). Host: Probably *Evaniella neomexicana* (Ashm.) in ootheca of *Arenivaga genitalis* Caud., or, less likely, the ootheca itself.
Sphaerophthalma (!) *eubule* Cameron, 1896. Biol. Cent.-Amer., Hym., v. 2, p. 383. ♂.
Mutilla hamata Melander, 1903. Amer. Ent. Soc., Trans. 29: 314. ♂.

Taxonomy: Mickel, 1965. Ent. Soc. Wash., Proc. 67: 1 (synonymy).

Biology: Mickel, 1974. Ent. Soc. Amer., Ann. 67: 468 (host).

exogyra Viereck. Calif. (La Jolla).
Odontophotopsis exogyrus Viereck., 1903. Acad. Nat. Sci. Phila., Proc. 54: 738. ♂.

fallax Viereck. Nev.
Odontophotopsis fallax Viereck, 1904. Amer. Ent. Soc., Trans. 30: 89. ♂.
Odontophotopsis ocellatus Baker, 1905. Invertebrata Pacifica 1: 98. ♂.

grandiceps Schuster. Ariz. (Globe).
Odontophotopsis (*Odontophotopsis*) *grandiceps* Schuster, 1958. Ent. Amer. (n. s.) 37: 53. ♂.

grata (Melander). N. Mex. (La Cueva).
Mutilla grata Melander, 1903. Amer. Ent. Soc., Trans. 29: 308. ♂.

hexadonta Schuster. Calif.
Odontophotopsis (*Odontophotopsis*) *hexadontus* Schuster, 1958. Ent. Amer. (n. s.) 37: 51. ♂.

inconspicua brunnea Schuster. Ariz.
Odontophotopsis (*Odontophotopsis*) *inconspicua brunnea* Schuster, 1958. Ent. Amer. (n. s.) 37: 54. ♂.

inconspicua inconspicua (Blake). Calif., Nev.
Photopsis inconspicuus Blake, 1886. Amer. Ent. Soc., Trans. 13: 272. ♂.
Mutilla infelix Dalla Torre, 1897. Cat. Hym., v. 8, p. 50. N. name for *Photopsis inconspicuus* Blake, not *Mutilla inconspicua* Smith.

lamellifera Schuster. Ariz.
Odontophotopsis (*Odontophotopsis*) *lamellifera* Schuster, 1958. Ent. Amer. (n. s.) 37: 56. ♂.

melicausa melicausa (Blake). B. C., Mont., Calif., Ariz., Tex.
Agama melicausa Blake, 1871. Amer. Ent. Soc., Trans. 3: 261. ♂.
Mutilla brevicornis Fox, 1899. Amer. Ent. Soc., Trans. 25: 255. ♂.
Odontophotopsis mellicornis Baker, 1905. Invertebrata Pacifica 1: 96. ♂.

Taxonomy: Schuster, 1958. Ent. Amer. (n. s.) 37: 58 (synonymy).

melicausa piceipes Schuster. Mont.
Odontophotopsis (*Odontophotopsis*) *mellicausa* (!) *piceipes* Schuster, 1958. Ent. Amer. (n. s.) 37: 58. ♂.

melicausa westcottii (Melander). Tex., N. Mex.
Mutilla Westcottii Melander, 1903. Amer. Ent. Soc., Trans. 29: 310. ♂.
Odontophotopsis indotatus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 89. ♂.

microdonta Ferguson. Nev., Calif.
Odontophotopsis (*Odontophotopsis*) *microdonta* Ferguson, 1967. Brigham Young Univ. Sci., Bul., Ser. 8, no. 4: 22. ♂.

obliqua Viereck. B. C., Mont., Idaho, Wash., Nev., Calif.; Mexico (Baja California).
Odontophotopsis obliquus Viereck, 1925. Canad. Ent. 56: 112. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci., Bul., Ser. 8, no. 4: 23 (redescription).

parksiana Schuster. Tex.
Odontophotopsis (*Odontophotopsis*) *parksiana* Schuster, 1958. Ent. Amer. (n. s.) 37: 57. ♂.

parva Schuster. Ariz. (Arlington).
Odontophotopsis (*Odontophotopsis*) *parva* Schuster, 1958. Ent. Amer (n. s.) 37: 55. ♂.

pudica (Melander). Wash., Calif.
Mutilla pudica Melander, 1903. Amer. Ent. Soc., Trans. 29: 309. ♂.
Odontophotopsis atripes Mickel, 1938. Pan-Pacific Ent. 14: 182. ♂.

quadridentata Schuster. Calif.
Odontophotopsis (*Odontophotopsis*) *quadridentata* Schuster, 1958. Ent. Amer. (n. s.) 37: 51. ♂.

quadrispinosa Schuster. Nev., Calif.; Mexico (Baja California).
Odontophotopsis (*Odontophotopsis*) *quadrispinosa* Schuster, 1958. Ent. Amer. (n. s.) 37: 51. ♂.

Taxonomy: Ferguson, 1967. Brigham Young Univ. Sci., Bul., Ser. 8, no. 4: 24 (redescription).

serca Viereck. Nev., Calif.; Mexico (Baja California). Host: *Anthophora linsleyi* Timberlake.
Odontophotopsis sercus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 87. ♂.

Biology: Linsley and MacSwain, 1942. Amer. Midland Nat. 27: 409 (host).

setifera Schuster. South. Calif., Nev., Ariz.
Odontophotopsis (*Odontophotopsis*) *setifera* Schuster, 1952. Brooklyn Ent. Soc., Bul. 47: 47. ♂.

succinea Viereck. Calif.
Odontophotopsis succineus Viereck, 1903. Acad. Nat. Sci. Phila., Proc. 54: 741. ♂.

tapajos aulus (Blake). Tex.
Agama Aulus Blake, 1872. Amer. Ent. Soc., Trans. 4: 75. ♂.

tapajos tapajos (Blake). Tex., Ariz.
Agama Tapajos Blake, 1871. Amer. Ent. Soc., Trans. 3: 262. ♂.
Agama Astyanax Blake, 1879. Amer. Ent. Soc., Trans. 7: 254. ♂.

tenuiptera Schuster. Ariz.; Mexico.
Odontophotopsis (*Odontophotopsis*) *tenuiptera* Schuster, 1958. Ent. Amer. (n. s.) 37: 47. ♂.

territa obscura Schuster. Ariz.
Odontophotopsis (*Odontophotopsis*) *territa obscura* Schuster, 1958. Ent. Amer. (n. s.) 37: 59. ♂.

territa territa (Cockerell). N. Mex. (Las Cruces).
Photopsis territus Cockerell, 1894. Ent. News 5: 200. ♂.

unicornis Schuster. Ariz., Calif.
Odontophotopsis (*Odontophotopsis*) *unicornis* Schuster, 1958. Ent. Amer. (n. s.) 37: 52. ♂.

venusta (Blake). Ariz.
Photopsis venustus Blake, 1886. Amer. Ent. Soc., Trans. 13: 270. ♂.
Mutilla pretiosissima Dalla Torre, 1897. Cat. Hym., v. 8, p. 74. N. name for *Photopsis venustus* Blake, not *Mutilla venusta* Smith.
Tetraphotopsis Hubbardi Ashmead, 1903. Canad. Ent. 35: 305. ♂.

Taxonomy: Schuster, 1958. Ent. Amer. (n. s.) 37: 54 (synonymy).

viereckii Baker. Nev. (Ormsby Co.).
Odontophotopsis viereckii Baker, 1905. Invertebrata Pacifica 1: 97. ♂.

Genus ODONTOPHOTOPSIS Subgenus PERIPHOTOPSIS Schuster

Odontophotopsis subg. *Periphotopsis* Schuster, 1958. Ent. Amer. (n. s.) 37: 8 (in key), 60.
Type-species: *Odontophotopsis* (*Periphotopsis*) *mamatus* Schuster. Orig. desig.

mamata Schuster. Ariz., Nev., Calif.
Odontophotopsis (*Periphotopsis*) *mamatus* Schuster, 1958. Ent. Amer. (n. s.) 37: 60. ♂.

Genus PROTOPHOTOPSIS Schuster

Genus PROTOPHOTOPSIS Subgenus PROTOPHOTOPSIS Schuster

Protophotopsis Schuster, 1947. Ent. Soc. Amer., Ann. 39: 693.
Type-species: *Protophotopsis scudderi* Schuster. Orig. desig.

Only the typical subgenus occurs in North America.

Taxonomy: Schuster, 1949. Ent. Amer. (n. s.) 29: 82-85.

scudderi Schuster. Kans., Tex., Colo.
Protophotopsis scudderi Schuster, 1947. Ent. Soc. Amer., Ann. 39: 694. ♂.

venenaria (Melander). Kans., Tex., Calif. Possibly the opposite sex of *scudderi* Schuster.
Mutilla venenaria Melander, 1903. Amer. Ent. Soc., Trans. 29: 320. ♀.

Taxonomy: Schuster, 1949. Ent. Amer. (n. s.) 29: 83.

Tribe PSEUDOMETHOCINI

All species are diurnal. The authenticated host records suggest that members of this tribe are parasitic on various kinds of ground-nesting bees, principally halictids belonging to the subfamilies Halictinae and Nomiinae. Fattig, 1943 (Emory Univ. Mus. Bul. 1: 4) records *frigida* (Smith) as having been reared from mud cells of the eumenid wasp *Ancistrocerus lutonidus* Boh.; this may be based on a misidentification.

Revision: Mickel, 1924. U. S. Natl. Mus., Proc. 64(15): 1-51, pls. 1-4. —Mickel, 1935. Amer. Ent. Soc., Trans. 61: 383-398.

Genus PSEUDOMETHOCA Ashmead

Pseudomethoca Ashmead, 1896. Amer. Ent. Soc., Trans. 23: 181.
Type-species: *Photopsis Cressoni* Fox. Orig. desig. (=*Pseudomethoca frigida* (Smith)).
Nomiaephagus Ashmead, 1899. N. Y. Ent. Soc., Jour. 7: 56.
Type-species: *Mutilla* (*Sphaeropthalma*) *Sanbornii* Blake. Orig. desig.

albicoma Mickel. Tex. (Rio Grande in Brewster Co.).
Pseudomethoca albicoma Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 29. ♂.

anthracina (Fox). Oreg., Calif.
Sphaerophthalma (!) *anthracina* Fox, 1892. Ent. News 3: 172. ♂.
Mutilla anthracicolor Dalla Torre, 1897. Cat. Hym., v. 8, p. 9. N. name for *Sphaerophthalma* (!) *anthracina* Fox, not *Mutilla anthracina* Gerstaecker.
Mutilla harpalyce Fox, 1899. Amer. Ent. Soc., Trans. 25: 227. ♀.

Taxonomy: Hurd, 1951. Pan-Pacific Ent. 27: 156 (synonymy).

athamas (Fox). Oreg., Calif.
Mutilla athamas Fox, 1899. Amer. Ent. Soc., Trans. 25: 225. ♂.

aureovestita Bradley. N. Mex., Ariz.
Pseudomethoca aureovestita Bradley, 1924. *In* Mickel, U. S. Natl. Mus., Proc. 64 (15): 22. ♀, ♂.

bequaerti Mickel. Tex., N. Mex., Ariz., Colo., Mont.
Pseudomethoca bequaerti Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 13. ♀.

brazoria (Blake). Okla., Tex.
Mutilla (*Sphaeropthalma*) *brazoria* Blake, 1871. Amer. Ent. Soc., Trans. 3: 255. ♀.

carbonaria Mickel. Tex.
Pseudomethoca carbonaria Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 43. ♂.

cephalargia Mickel. Ariz. (Santa Catalina Mts.).
Pseudomethoca cephalargia Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 17. ♀.

connectens (Cresson). Calif.
Mutilla connectens Cresson, 1865. Ent. Soc. Phila., Proc. 4: 387. ♀.

contumax (Cresson). Iowa, S. Dak., Nebr., Kans., Tex., Colo., Ariz.; Mexico.
Mutilla contumax Cresson, 1865. Ent. Soc. Phila., Proc. 4: 437. ♀.
Mutilla microphthalma Gerstaecker, 1874. Arch. Naturgesch. 40: 64. ♂.

contumeliosa Mickel. Utah, Idaho, Calif.
Pseudomethoca contumeliosa Mickel, 1935. Amer. Ent. Soc., Trans. 61: 393. ♀.

damia (Cameron). Ariz.; Mexico (Guerrero).
Sphaerophthalma (*!*) *damia* Cameron, 1894. Biol. Cent.-Amer., Hym., v. 2, p. 383. ♂.
Mutilla sphaerophthalmica Dalla Torre, 1897. Cat. Hym., v. 8, p. 87. N. name.

dentifrontalis Bradley. Oreg., Calif.
Pseudomethoca dentifrontalis Bradley, 1924. *In* Mickel, U. S. Natl. Mus., Proc. 64 (15): 11. ♀.

dentigula Mickel. Tex. (Trans-Pecos).
Pseudomethoca dentigula Mickel, 1935. Amer. Ent. Soc., Trans. 61: 391. ♀.

donaeanae (Cockerell). Tex., N. Mex., Ariz., Calif.
Sphaerophthalma (!) *donae-anae* Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 127. ♀.

flammigera Mickel. Ariz.
Pseudomethoca flammigera Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 21. ♀.

flavida (Blake). Tex.
Mutilla (*Sphaeropthalma*) *flavida* Blake, 1871. Amer. Ent. Soc., Trans. 3: 249. ♂.

frigida (Smith). Southern Canada and U. S. east of Rocky Mts. Host: *Dialictus zephyrus* (Sm.), *D. coeruleus* (Robt.), *D. rohweri* (Ellis)?, *D. laevissimus* (Sm.)?, *D. versatus* (Robt.), *D. imitatus* (Sm.)?, *Evylaeus cinctipes* (Prov.), *Augochlorella striata* (Prov.)?
Mutilla frigida Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 60. ♀.
Mutilla (*Sphaeropthalma*) *canadensis* Blake, 1871. Amer. Ent. Soc., Trans. 3: 252. ♀.
Photopsis Cressoni Fox, 1890. Ent. News 1: 138. ♂.
Sphaerophthalma (!) *alveolata* Provancher, 1895. Nat. Canad. 22: 110. ♀.
Mutilla neojerseiensis Dalla Torre, 1897. Cat. Hym., v. 8, p. 65. N. name for *Phytopsis* (!) *Cressoni* Fox, not *Mutilla Cressoni* Blake.

Taxonomy: Brothers, 1972. Kans. Univ. Sci. Bul. 50: 25-31, figs. 11-40 (egg, larvae, pupae).

Biology: Melander and Brues, 1903. Biol. Bul. 5: 4-7, fig. 4 (behavior in host nest). —Krombein, 1938. Brooklyn Ent. Soc., Bul. 33:14-15 (behavior in host nest). —Fattig, 1943. Emory Univ. Mus. Bul. 1: 4 (questionable host record). —Shappirio, 1947. Brooklyn Ent. Soc., Bul. 42: 163 (mating behavior). —Michener and Wille, 1961. Kans. Univ. Sci. Bul. 42: 1129-1130 (behavior in host nests). —Lin, 1964. Ins. Sociaux 11: 187-192 (behavior in host nests). —Batra, 1965. Kans. Ent. Soc., Jour. 38: 383-386, figs. 6 a-c, 7 a-b (life history, behavior). —Michener, 1966. Kans. Ent. Soc., Jour. 39: 196-197 (host record). —Knerer and Atwood, 1967. Ent. Soc. Ontario, Proc. 97: 106 (host record). —Brothers, 1972. Kans. Univ. Sci. Bul. 50: 1-25, figs. 1-10 (life history, behavior).

gila (Blake). Tex. (Brownsville).
Mutilla (*Sphaeropthalma*) *Gila* Blake, 1871. Amer. Ent. Soc., Trans. 3: 250. ♂.

ilione (Fox). Tex., Okla.
Mutilla ilione Fox, 1899. Amer. Ent. Soc., Trans. 25: 268. ♀.
Mutilla aprica Melander, 1903. Amer. Ent. Soc., Trans. 29: 322. ♀.

Taxonomy: Mickel, 1965. Ent. Soc. Wash., Proc. 67: 2 (synonymy).

klotsi Mickel. Colo. (Hugo).
Pseudomethoca klotsi Mickel, 1935. Amer. Ent. Soc., Trans. 61: 389. ♀.

manca Mickel. Utah.
Pseudomethoca manca Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 45. ♂.

meritoria Mickel. Tex.
Pseudomethoca meritoria Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 27. ♀.

mulaiki Mickel. Tex. (Cameron Co.).
Pseudomethoca mulaiki Mickel, 1938. Ent. Soc. Amer., Ann. 31: 150. ♀.

nephele (Fox). Tex.
Mutilla nephele Fox, 1899. Amer. Ent. Soc., Trans. 25: 223. ♀.

nigricula Mickel. Ariz.
Pseudomethoca nigricula Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 26. ♂.

nudula Mickel. N. Mex. (Pecos). Host: Possibly *Calliopsis* sp.
Pseudomethoca nudula Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 15. ♀.

oceola (Blake). N. J. south to Fla., west to S. Dak. and Ariz.
Mutilla (*Sphaeropthalma*) *Oceola* Blake, 1871. Amer. Ent. Soc., Trans. 3: 248. ♂.
Mutilla hippodamia Fox, 1899. Amer. Ent. Soc., Trans. 25: 227. ♀.

oculata (Banks). N. C., Ga., Fla.
Nomiaephagus oculatus Banks, 1921. Ent. Soc. Amer., Ann. 14: 24. ♀.

oculissima Mickel. N. Mex. (Pecos).
Pseudomethoca oculissima Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 14. ♀.

paludata Mickel. Nebr., Kans., Wyo., Colo., N. Mex., Ariz.
Pseudomethoca paludata Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 29. ♀.
Pseudomethoca scrupulosa Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 31. ♂.

pigmentata Mickel. Tex.
Pseudomethoca pigmentata Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 24. ♀.

praeclara (Blake). Ariz., Calif.
Sphaerophthalma (!) *praeclara* Blake, 1886. Amer. Ent. Soc., Trans. 13: 252. ♀.
Mutilla aegaeon Fox, 1899. Amer. Ent. Soc., Trans. 25: 229. ♂.
Nomiaephagus acuum Cockerell, 1915. Entomologist 48: 250. ♀.
Pseudomethoca (*Nomiaephagus*) *aegeon* (!) Bradley, 1916. Amer. Ent. Soc., Trans. 42: 321. ♂.

propinqua (Cresson). Minn. south to Tex., west to Alta. and Ariz. Host: *Nomia m. melanderi* Ckll.
Mutilla propinqua Cresson, 1865. Ent. Soc. Phila., Proc. 4: 433. ♂.
Mutilla montivaga Cresson, 1865. Ent. Soc. Phila., Proc. 4: 436. ♀.
Pseudomethoca sacatona Caldwell, 1939. Pan-Pacific Ent. 15: 94. ♀.

Biology: Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 103 (host record).

quadrinotata Mickel. Ariz. (Tucson).
Pseudomethoca quadrinotata Mickel, 1938. Ent. Soc. Amer., Ann. 31: 149. ♀.

russeola Mickel. Tex. (San Diego).
Pseudomethoca russeola Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 44. ♂.

sanbornii aeetis (Fox). ?Conn., N. C. south to Fla., west to Tex. in L. Austr. Zone.
Mutilla aeetis Fox, 1899. Amer. Ent. Soc., Trans. 25: 228. ♀.
Pseudomethoca (*Nomiaephagus*) *aetis* (!) Bradley, 1916. Amer. Ent. Soc., Trans. 42: 312, 316. ♀.

Taxonomy: Krombein, 1953. Wasmann Jour. Biol. 10: 308 (reduced to subsp. rank).

sanbornii sanbornii (Blake). Mass. south to Fla., west to Nebr. and Tex. in Transition and U. Austr. Zones. Host: *Nomia pattoni* Cockerell.
Mutilla (*Sphaeropthalma*) *Sanbornii* Blake, 1871. Amer. Ent. Soc., Trans. 3: 248. ♂.

Biology: Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 38 (host).

scaevolella (Cockerell and Casad). Tex., N. Mex.
Sphaerophthalma (!) *scaevolella* Cockerell and Casad, 1895. Amer. Ent. Soc., Trans. 22: 298. ♀.

simillima (Smith). Mass. south to Fla., west to Nebr. and Tex.
Mutilla simillima Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 62. ♀.

Mutilla geryon Fox, 1899. Amer. Ent. Soc., Trans. 25: 255. ♂.
Mutilla Henshawi Melander, 1903. Amer. Ent. Soc., Trans. 29: 303. ♂.
Mutilla daeckei Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 49. ♂.
Pseudomethoca simillima Mickel, 1924. U. S. Natl. Mus., Proc. 64 (15): 32. ♀ (♂ misdet.).

Taxonomy: Krombein, 1948. Ent. News 59: 187-189.

Biology: Shappirio, 1947. Brooklyn Ent. Soc., Bul. 42: 163 (mating behavior).

torrida Krombein. Fla.
Pseudomethoca frigida torrida Krombein, 1954. Amer. Ent. Soc., Trans. 80: 7, fig. 7. ♀, ♂.

toumeyi (Fox). Tex., Ariz.; Mexico (Sonora).
Sphaerophthalma (!) *toumeyi* Fox, 1894. Ent. News 5: 297. ♀.

Taxonomy: Mickel, 1974. Ent. Soc. Amer., Ann. 67: 468. ♂.

vanduzei Bradley. Va., S. C., Ga., Fla., Tex. Host: *Nomia maneei* Ckll.
Pseudomethoca (*Nomiaephagus*) *vanduzei* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 321. ♂.
Pseudomethoca fattigi Mickel, 1938. Ent. Soc. Amer., Ann. 31: 147. ♀.
Pseudomethoca vanduzeei (!) Krombein, 1951. U. S. Dept. Agr., Monog. 2: 761. Emend.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 6 (host record).

wickhami (Cockerell and Casad). Tex. (Fedor).
Sphaerophthalma (!) *wickhami* Cockerell and Casad, 1895. Amer. Ent. Soc., Trans. 22: 297. ♀.

Genus MYRMILLOIDES Andre

Myrmilloides Andre, 1903. *In* Wytsman, Gen. Ins., fasc. 11, p. 26.
Type-species: *Mutilla* (*Sphaeropthalma*) *grandiceps* Blake. Orig. desig.

grandiceps (Blake). Iowa, Nebr., Colo., Kans., Mo., Okla., Ark., Tex., La., Tenn. Host: *Dialictus zephyrus* (Sm.)?, *Augochlorella striata* (Prov.)?, *A. persimilis* (Vier.)?
Mutilla (*Sphaeropthalma*) *grandiceps* Blake, 1872. Amer. Ent. Soc., Trans. 4: 74. ♀, ♂.

Biology: Melander, 1903. Amer. Ent. Soc., Trans. 29: 293 (host record). —Ordway, 1964. Kans. Ent. Soc., Jour. 37: 149 (host records).

Tribe DASYMUTILLINI

Members of this tribe are diurnal except for a few species of *Dasymutilla*.

Genus DASYMUTILLA Ashmead

Dasymutilla Ashmead, 1899. N. Y. Ent. Soc., Jour. 7: 57.
Type-species: *Mutilla* (*Sphaeropthalma*) *Gorgon* Blake. Orig. desig.
Bruesia Ashmead, 1903. Canad. Ent. 35: 306.
Type-species: *Mutilla harmonia* Fox. Orig. desig.
Pycnomutilla Ashmead, 1904. Canad. Ent. 36: 8.
Type-species: *Mutilla* (*Sphaeropthalma*) *Waco* Blake. Orig. desig.

Revision: Mickel, 1928. U. S. Natl. Mus., Bul. 143: 1-351, 5 pls., 28 text figs. —Mickel, 1936. Ent. Soc. Amer., Ann. 29: 29-60, 3 figs. (revised key to spp.).

Taxonomy: Hurd, 1951. Calif. Ins. Survey Bul. 1: 89-118, 1 pl. (Calif. spp.)
Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14, p. 43, pl. 14 A-F (male genitalia).

albiceris Mickel. Calif. (San Bernardino Co.); Mexico (Baja California).

Dasymutilla albiceris Mickel, 1936. Pan-Pacific Ent. 12: 91. ♀.

alesia Banks. Mass. south to Fla., west to Ill. and Okla.
Dasymutilla alesia Banks, 1921. Ent. Soc. Amer., Ann. 14: 24. ♀.

angulata Krombein. Mich., Ill., Iowa, Mo., S. Dak., Nebr., Kans.
Mutilla anguliceps Fox, 1899. Amer. Ent. Soc., Trans. 25: 240. ♀. Preocc. by Andre, 1897.
Dasymutilla angulata Krombein, 1951. U. S. Dept. Agr., Monog. 2: 762. N. name.

apicalata (Blake). Tex., Ariz.; Mexico (Guerrero).
Mutilla (*Sphaeropthalma*) *apicalata* Blake, 1871. Amer. Ent. Soc., Trans. 3: 238. ♂.
Sphaerophthalma (!) *perfidiosa* Cameron, 1895. Biol. Cent.-Amer., Hym., v. 2, p. 368. ♂. Preocc. in *Mutilla*.
Sphaerophthalma (!) *guerreroensis* Cameron, 1895. Biol. Cent.-Amer., Hym., v. 2, p. 369. ♂.
Mutilla perfida Dalla Torre, 1897. Cat. Hym., v. 8, p. 72. N. name.

Taxonomy: Mickel, 1965. Ent. Soc. Wash., Proc. 67: 2 (synonymy).

arcana Mickel. Nebr., Okla., Tex., N. Mex., Colo.
Dasymutilla arcana Mickel, 1928. U. S. Natl. Mus., Bul. 143: 217. ♂.

arenivaga Mickel. Ariz., Calif. *D. megalophthalma* Mick. may be the male.
Dasymutilla arenivaga Mickel, 1928. U. S. Natl. Mus., Bul. 143: 278. ♀.

arenivaga var. **unicolor** Mickel. Ariz. (Ft. Mojave).
Dasymutilla arenivaga var. *unicolor* Mickel, 1936. Ent. Soc. Amer., Ann. 29: 59. ♀.

asopus asopus (Cresson). Man., Minn., N. Dak., Mont., S. Dak., Nebr., Kans., Colo., Tex. Host: *Dianthidium* sp.?
Mutilla Asopus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 435. ♂.
Ephuta sparsiformis Cockerell and Rohwer, 1908. Psyche 15: 4. ♀.

Biology: Hicks, 1926. Colo. Univ., Studies, p. 249. —Mickel, 1928. U. S. Natl. Mus., Bul. 143: 61.

asopus bexar (Blake). Mass. south to Fla., Miss., Tex., Mo., Ind. Host: *Anthophora abrupta* Say, *A. ursina* Cr.; *Dianthidium curvatum sayi* Ckll., *Paranthidium j. jugatorium* Say.
Mutilla (*Sphaeropthalma*) *Bexar* Blake, 1871. Amer. Ent. Soc., Trans. 3: 238. ♂.
Mutilla harmonia Fox, 1899. Amer. Ent. Soc., Trans. 25: 229. ♀.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 4-5 (host records). —Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 103 (host record). —Michener, 1975. Kans. Ent. Soc., Jour. 48: 199 (host).

asopus cassandra Mickel. Fla.
Dasymutilla cassandra Mickel, 1928. U. S. Natl. Mus., Bul. 143: 64. ♂.

asteria Mickel. Ariz. (Pima Co.). Host: *Microbembex nigrifrons* (Prov.).
Dasymutilla asteria Mickel, 1936. Ent. Soc. Amer., Ann. 29: 57. ♀.

Biology: Haddock, 1967. *In* Krombein, U. S. Dept. Agr., Monog. 2, Sup. 2: 339 (host record).

atricauda Mickel. Calif., Ariz.
Dasymutilla atricauda Mickel, 1936. Pan-Pacific Ent. 12: 92. ♀.

atrifimbriata Mickel. Kans., Ark., Okla., Tex., Ariz.
Dasymutilla atrifimbriata Mickel, 1928. U. S. Natl. Mus., Bul. 143: 169. ♀.

atrifulva Mickel. Ariz.
Dasymutilla atrifulva Mickel, 1928. U. S. Natl. Mus., Bul. 143: 290. ♂.

aureola (Cresson). Nev., Oreg., Calif. Host: *Anthophora stanfordiana* Ckll., *Melissodes* sp.
Mutilla aureola Cresson, 1865. Ent. Soc. Phila., Proc. 4: 386. ♀.
Sphaerophthalma (!) *parmosa* Blake, 1886. Amer. Ent. Soc., Trans. 13: 210. ♀.
Sphaerophthalma (!) *mollissima* Blake, 1886. Amer. Ent. Soc., Trans. 13: 215. ♂.

Biology: Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 103 (host records).

aureola var. **pacifica** (Cresson). B. C., Calif.
Mutilla pacifica Cresson, 1875. Amer. Ent. Soc., Trans. 5: 120. ♀.

biguttata (Cockerell). Miss., La., Tex., Ark., Kans., Ariz.
Sphaerophthalma (!) *quadriguttata* var. *biguttata* Cockerell, 1895. Ent. News 6: 63. ♀.

bioculata (Cresson). Man. south to La., west to B. C. and N. Mex. Host: *Bembix pruinosa* Fox, *B. americana spinolae* Lep.?, *Microbembex monodonta* (Say).
Mutilla bioculata Cresson, 1865. Ent. Soc. Phila., Proc. 4: 431. ♂.
Mutilla Aegina Cresson, 1865. Ent. Soc. Phila., Proc. 4: 435. ♀.
Mutilla chlamydata Melander, 1903. Amer. Ent. Soc., Trans. 29: 299. ♀.

Biology: Mickel, 1924. Ent. News 35: 236-242. —Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 103 (host record). —Cottrell, 1972. *In* Brothers, Kans. Univ. Sci. Bul. 50: 31-36, figs. 41-42 (life history).

birkmani (Melander). Nebr., Wyo., Kans., Okla., Tex.
Mutilla Birkmani Melander, 1903. Amer. Ent. Soc., Trans. 29: 313. ♀.

bollii (Fox). Miss., La., Tex., Okla., Kans.
Mutilla Bollii Fox, 1899. Amer. Ent. Soc., Trans. 25: 242. ♀.
Dasymutilla blawana Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 461. ♀.

bonita Mickel. Ariz.
Dasymutilla bonita Mickel, 1928. U. S. Natl. Mus., Bul. 143: 208. ♀.
Dasymutilla poliothrix Mickel, 1928. U. S. Natl. Mus., Bul. 143: 285. ♂.

californica (Radoszkowski). B. C., Oreg., Utah, Calif.
Mutilla Californica Radoszkowski, 1861. Soc. Ent. Rossica, Horae 1: 86. ♀.
Dasymutilla abdita Mickel, 1928. U. S. Natl. Mus., Bul. 143: 293.

californica var. **clio** (Blake). B. C., Idaho, Nev., Calif.
Mutilla Clio Blake, 1879. Amer. Ent. Soc., Trans. 7: 251. ♀.

calorata Mickel. Kans., Okla., Tex., N. Mex., Colo.
Dasymutilla calorata Mickel, 1928. U. S. Natl. Mus., Bul. 143: 227. ♀.

campanula Mickel. Kans., Colo.
Dasymutilla campanula Mickel, 1928. U. S. Natl. Mus., Bul. 143: 178. ♀.

candida Mickel. Ariz (Douglas).
Dasymutilla candida Mickel, 1928. U. S. Natl. Mus., Bul. 143: 296. ♂.

canella (Blake). Mass. to Pa., west to Man. and Tex. Host: *Dialictus pruinosus* (Robt.)?
Mutilla (*Sphaeropthalma*) *canella* Blake, 1871. Amer. Ent. Soc., Trans. 3: 239. ♂.
Mutilla rugulosa Fox, 1899. Amer. Ent. Soc., Trans. 25: 240. ♀.
Mutilla infensa Melander and Brues, 1903. Biol. Bul. 5: 24. ♀.

Biology: Viereck, 1902. Ent. News 13: 72. —Melander and Brues, 1903. Biol. Bul. 5: 25 (putative host).

caneo (Blake). Minn., N. Dak., south to Tex. and N. Mex., west to Alta. and B. C.
Mutilla caneo Blake, 1879. Amer. Ent. Soc., Trans. 7: 250. ♀.
Mutilla mixtura Blake, 1879. Amer. Ent. Soc., Trans. 7: 251. ♀.
Mutilla myrrha Fox, 1899. Amer. Ent. Soc., Trans. 25: 258. ♀.

castor (Blake). S. C., Ga., Fla., Ala., Miss., La., Tex. Host: *Polistes fuscatus* (F.).
Mutilla (*Sphaeropthalma*) *castor* Blake, 1871. Amer. Ent. Soc., Trans. 3: 237. ♂.
Dasymutilla mediatoria Mickel, 1938. Ent. Soc. Amer., Ann. 31: 152. ♀.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 6 (host record).

chattahoochei Bradley. N. C. south to Fla.
Dasymutilla (*Dasymutilla*) *chattahoochei* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 324. ♀.
Dasymutilla (*Dasymutilla*) *arenerronea* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 324. ♀.

Taxonomy: Krombein, 1954. Amer. Ent. Soc., Trans. 80: 9, fig. 5 (description male).

chiron (Blake). Tex.
Mutilla (*Sphaeropthalma*) *Chiron* Blake, 1872. Amer. Ent. Soc., Trans. 4: 72. ♂.
Mutilla Ursula var. *texana* Cresson, 1875. Amer. Ent. Soc., Trans. 5: 120. ♂.

chiron var. **ursula** (Cresson). B. C. south to Ariz. and Calif. and southeast to Tex.
Mutilla Ursula Cresson, 1875. Amer. Ent. Soc., Trans. 5: 120. ♂.

chisos Mickel. Tex.
Dasymutilla chisos Mickel, 1928. U. S. Natl. Mus., Bul. 143: 284. ♂.

clotho (Blake). Okla., Tex.
Mutilla (*Sphaeropthalma*) *Clotho* Blake, 1872. Amer. Ent. Soc., Trans. 4: 72. ♀.

clytemnestra (Fox). Oreg., Calif.
Mutilla clytemnestra Fox, 1899. Amer. Ent. Soc., Trans. 25: 246. ♀.

coccineohirta (Blake). Idaho, Nev., Calif., Oreg., Wash.
Mutilla (*Sphaeropthalma*) *coccineohirta* Blake, 1871. Amer. Ent. Soc., Trans. 3: 235. ♂.

Mutilla ochracea Blake, 1879. Amer. Ent. Soc., Trans. 7: 247. ♂.
Sphaerophthalma (!) *venifica* Blake, 1886. Amer. Ent. Soc., Trans. 13: 210. ♀.
Mutilla progne Fox, 1899. Amer. Ent. Soc., Trans. 25: 247. ♀.
Dasymutilla aletina Cockerell, 1915. Entomologist 48: 249. ♂.

columbiana Mickel. B. C. (Nicola).
Dasymutilla columbiana Mickel, 1928. U. S. Natl. Mus., Bul. 143: 119. ♂.

connectens (Cameron). Ariz.; Mexico (Chihuahua, Jalisco, Baja California).
Sphaerophthalma (!) *connectens* Cameron, 1895. Biol. Cent.-Amer., Hym., v. 2, p. 362. ♀.
Secondary homonym in *Mutilla*.
Mutilla eggeri Dalla Torre, 1897. Cat. Hym., v. 8, p. 33. N. name.
Dasymutilla helva Mickel, 1928. U. S. Natl. Mus., Bul. 143: 259. ♀.

Taxonomy: Mickel, 1965. Ent. Soc. Wash., Proc. 67: 2 (synonymy).

corcyra Mickel. Tex.
Dasymutilla corcyra Mickel, 1928. U. S. Natl. Mus., Bul. 143: 180. ♀.

cotulla Mickel. Tex.
Dasymutilla cotulla Mickel, 1928. U. S. Natl. Mus., Bul. 143: 75. ♂.

creon (Blake). Tex., Ark.
Mutilla (*Sphaeropthalma*) *Creon* Blake, 1872. Amer. Ent. Soc., Trans. 4: 73. ♂.

creusa (Cresson). Ark., Tex., Okla., Kans., Nebr., Colo., N. Mex.
Mutilla Creusa Cresson, 1865. Ent. Soc. Phila., Proc. 4: 431. ♀.

creusa var. **bellona** (Cresson). Ark., Kans., Nebr., Wyo., Colo. Host: *Bembix amoena* Handl.
Possibly a synonym of *bioculata* (Cr.).
Mutilla Bellona Cresson, 1865. Ent. Soc. Phila., Proc. 4: 434. ♀.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, p. 288 (host record).

curialis Mickel. N. Mex. (Jemez Springs).
Dasymutilla curialis Mickel, 1928. U. S. Natl. Mus., Bul. 143: 274. ♂.

curticeps Mickel. Kans., Tex.
Dasymutilla curticeps Mickel, 1928. U. S. Natl. Mus., Bul. 143: 173. ♀.

cypris (Blake). N. J., W. Va., Ga., Fla., Miss., Mo., Minn. Host: *Bembix cinerea* Handl.
Mutilla (*Sphaeropthalma*) *Cypris* Blake, 1871. Amer. Ent. Soc., Trans. 3: 246. ♀.
Dasymutilla mutata miamensis Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 462. ♀.
Dasymutilla hora Mickel, 1928. U. S. Natl. Mus., Bul. 143: 196. ♂.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 4, 7 (host record, mating behavior).

dammersi Mickel. Calif. (Palm Springs).
Dasymutilla dammersi Mickel, 1936. Pan-Pacific Ent. 12: 94. ♀.

dawsoni Mickel. Nebr. (Halsey).
Dasymutilla dawsoni Mickel. 1936. Ent. Soc. Amer., Ann. 29: 40. ♀.

digressa Mickel. N. Mex. (Pecos).
Dasymutilla digressa Mickel, 1928. U. S. Natl. Mus., Bul. 143: 273. ♂.

dilucida Mickel. Ariz.
Dasymutilla dilucida Mickel, 1928. U. S. Natl. Mus., Bul. 143: 267. ♀.

dionysia Mickel. Ariz.
Dasymutilla dionysia Mickel, 1928. U. S. Natl. Mus., Bul. 143: 104. ♀.

dorippa Mickel. Nev. (Ormsby Co.).
Dasymutilla dorippa Mickel, 1928. U. S. Natl. Mus., Bul. 143: 297. ♂.

dugesii (Cockerell and Casad). Kans., Colo., Tex., Ariz. Host: *Anthophora occidentalis* Cr.
Sphaerophthalma (!) *dugesii* Cockerell and Casad. 1894. Ent. News 5: 294. ♀.
Ephuta (*Ephuta*) *Dugesi* (!) Andre, 1903. *In* Wytsman, Gen. Ins., fasc. 11, p. 59.

Biology: Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2: 339 (host record).

electra (Blake). Tex., Okla.
Mutilla Electra Blake, 1872. Amer. Ent. Soc., Trans. 4: 75. ♀.

eminentia Mickel. Ariz., Calif.; Mexico (Baja California).
Dasymutilla eminentia Mickel, 1928. U. S. Natl. Mus., Bul. 143: 79. ♂.

errabunda Mickel. Ariz., Calif.
Dasymutilla errabunda Mickel, 1928. U. S. Natl. Mus., Bul. 143: 269. ♂.

eurynome Mickel. Tex. (Valentine in Presidio Co.).
Dasymutilla eurynome Mickel, 1928. U. S. Natl. Mus., Bul. 143: 209. ♀.

fasciventris Mickel. Ariz. (Globe).
Dasymutilla fasciventris Mickel, 1938. Ent. Soc. Amer., Ann. 31: 155. ♂.

ferruginea (Smith). Ariz.; Mexico (Puebla, Oaxaca).
Mutilla ferruginea Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 226. ♀.
Dasymutilla chrysocoma Mickel, 1928. U. S. Natl. Mus., Bul. 143: 266. ♀.

Taxonomy: Mickel, 1965. Ent. Soc. Wash., Proc. 67: 3 (synonymy).

flammifera Mickel. Idaho, Oreg., Calif., Ariz.
Dasymutilla flammifera Mickel, 1928. U. S. Natl. Mus., Bul. 143: 240. ♀.

foxi (Cockerell). N. Mex., Ariz. Host: *Diadasia diminuta* (Cr.).
Sphaerophthalma (!) *foxi* Cockerell, 1894. Ent. News 5: 199. ♂.
Sphaerophthalma (!) *heterochroa* Cockerell and Casad, 1894. Ent. News 5: 298. ♀.
Sphaerophthalma (!) *foxi* var. *arizonica* Cockerell, 1900. Entomologist 33: 65. ♀.

Biology: Cockerell, 1896. Nature 54: 461.

fulgida Mickel. Ariz. Possibly a synonym of *erythrina* (Say) from Mexico.
Dasymutilla fulgida Mickel, 1928. U. S. Natl. Mus., Bul. 143: 76. ♀.

Taxonomy: Mickel, 1974. Ent. Soc. Amer., Ann. 67: 470. ♂.

furina Mickel. Ariz. (Douglas).
Dasymutilla furina Mickel, 1928. U. S. Natl. Mus., Bul. 143: 82. ♀.

gentilis Mickel. Kans., Tex., Rocky Mts.
Dasymutilla gentilis Mickel, 1928. U. S. Natl. Mus., Bul. 143: 199. ♂.

gibbosa (Say). N. H. south to Ga., west to Minn. and Mo.
Mutilla (*Ephuta*) *gibbosa* Say, 1836. Boston Jour. Nat. Hist. 1: 298. ♂.
Mutilla cariniceps Fox, 1899. Amer. Ent. Soc., Trans. 25: 241. ♀.
Dasymutilla scrobinata Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 462. ♀.
Dasymutilla carniceps (!) Fattig, 1943. Emory Univ. Mus. Bul. 1: 9, 16. ♀.

gloriosa (Saussure). Tex., Utah, Nev., Ariz., Calif.; Mexico (Baja California). Host: *Microbembex nigrifrons* (Prov.)
Mutilla gloriosa Saussure, 1868 (1867). Soc. Ent. France, Ann. (4) 7: 359. ♀.
Mutilla tecta Cresson, 1875. Amer. Ent. Soc., Trans. 5: 119. ♀.
Dasymutilla reperticia Mickel, 1928. U. S. Natl. Mus., Bul. 143: 287. ♂.

Taxonomy: Mickel, 1936. Ent. Soc. Amer., Ann. 29: 56 (synonymy).

Biology: Haddock, 1967. *In* Krombein, U. S. Dept. Agr., Monog. 2, Sup. 2: 339 (host record).

glycera Mickel. Ariz. (Florence).
Dasymutilla glycera Mickel, 1928. U. S. Natl. Mus., Bul. 143: 299. ♂.

gorgon (Blake). La., Okla., Tex., N. Mex.
Mutilla (*Sphaeropthalma*) *Gorgon* Blake, 1871. Amer. Ent. Soc., Trans. 3: 233. ♀.
Mutilla Tisiphone Blake, 1879. Amer. Ent. Soc., Trans. 7: 249. ♀.
Dasymutilla gorgons (!) Ashmead, 1899. N. Y. Ent. Soc., Jour. 7: 57, 60. ♀, ♂.

hector (Blake). Iowa, Nebr., Kans., Colo.
Mutilla (*Sphaeropthalma*) *Hector* Blake, 1871. Amer. Ent. Soc., Trans. 3: 237. ♂.

heliophila (Cockerell). Ariz., Calif.
Sphaerophthalma (!) *heliophila* Cockerell, 1900. Entomologist 33: 65. ♀.
Dasymutilla welltonensis Bradley and Bequaert, 1923. Amer. Mus. Novitates 82: 1. ♀.

hersilia Mickel. Tex. (Bexar Co.).
Dasymutilla hersilia Mickel, 1936. Ent. Soc. Amer., Ann. 29: 51. ♂.

hispidaria Mickel. Tex. (Hondo).
Dasymutilla hispidaria Mickel, 1936. Ent. Soc. Amer., Ann. 29: 55. ♀.

homole Mickel. N. Mex. (Organ Mts.).
Dasymutilla homole Mickel, 1928. U. S. Natl. Mus., Bul. 143: 72. ♀.

intermixta Mickel. N. Mex., Ariz.
Dasymutilla intermixta Mickel, 1928. U. S. Natl. Mus., Bul. 143: 256. ♂.

interrupta Banks. Mass. south to Ga., west to N. Dak. and Colo.
Dasymutilla cypris var. *interrupta* Banks, 1921. Ent. Soc. Amer., Ann. 14: 24. ♀.

Taxonomy: Krombein, 1953. Wasmann Jour. Biol. 10: 310. ♂.

klugii (Gray). Kans. south to Tex., west to Utah and Ariz. Host: *Sphecius grandis* (Say).
Mutilla Klugii Gray, 1872. *In* Griffith, Cuvier's Animal Kingdom 15 (Insecta 2), p. 516. ♀.
Mutilla Orcus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 428. ♀, ♂.

Biology: Bradley, 1920. Ent. News 31: 112-113 (host record).

klugioides Mickel. Okla., Tex.
Dasymutilla klugioides Mickel, 1936. Ent. Soc. Amer., Ann. 29: 54. ♀.

leda (Blake). S. Dak. south to Tex., Colo., N. Mex.
Mutilla (*Sphaeropthalma*) *Leda* Blake, 1872. Amer. Ent. Soc., Trans. 4: 72. ♀.
Mutilla prognoides Viereck, 1906. Amer. Ent. Soc., Trans. 32: 186. ♀.

lepeletierii (Fox). Mass. south to Fla., west to Iowa and Tex.
Mutilla fenestrata Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 627. ♂. Preocc.
Mutilla Lepeletierii Fox, 1899. Amer. Ent. Soc., Trans. 25: 244. N. name.
Mutilla vierecki Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 49. ♀.
Dasymutilla ferrugata var. *balabetei* Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 456. ♀.
Dasymutilla georgiana Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 456. ♀.
Dasymutilla plesia Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 456. ♀.
Dasymutilla (*Dasymutilla*) *ferrugata* var. *ballabetei* (*!*) Bradley, 1916. Amer. Ent. Soc., Trans. 42: 327. ♀.

Biology: Shappirio, 1948. Brooklyn Ent. Soc., Bul. 42: 163 (mating).

macilenta (Blake). Ga., Fla., Tex.
Mutilla (*Sphaeropthalma*) *macilenta* Blake, 1871. Amer. Ent. Soc., Trans. 3: 239. ♂.

macra (Cresson). N. Dak. south to Ark., west to Alta. and N. Mex.
Mutilla macra Cresson, 1865. Ent. Soc. Phila., Proc. 4: 429. ♂.
Sphaeropthalma (!) *hispida* Blake, 1886. Amer. Ent. Soc., Trans. 13: 226. ♂.

magna (Cresson). Ariz., Calif.; Mexico (Baja California).
Mutilla magna Cresson, 1865. Ent. Soc. Phila., Proc. 4: 385. ♀.

magnifica Mickel. N. Mex., Ariz., Nev., Calif.; Mexico (Baja California).
Dasymutilla magnifica Mickel, 1928. U. S. Natl. Mus., Bul. 143: 234. ♀, ♂.

medea (Cresson). Colo., N. Mex. Host: *Microbembex monodonta* (Say)?
Mutilla Medea Cresson, 1865. Ent. Soc. Phila., Proc. 4: 432. ♀.

Biology: Melander, 1903. Amer. Ent. Soc., Trans. 29: 297 (host ?).

megalophthalma Mickel. Ariz., Calif. *D. arenivaga* Mick. may be the female.
Dasymutilla megalophthalma Mickel, 1928. U. S. Natl. Mus., Bul. 143: 282. ♂.

melanippe Mickel. Tex.
Dasymutilla melanippe Mickel, 1928. U. S. Natl. Mus. Bul. 143: 152. ♀.
Dasymutilla lauta Mickel, 1928. U. S. Natl. Mus., Bul. 143: 154. ♀.

Taxonomy: Mickel, 1936. Ent. Soc. Amer., Ann. 29: 46 (synonymy).

melanippe var. **conformis** Mickel. Tex.
Dasymutilla melanippe var. *conformis* Mickel, 1928. U. S. Natl. Mus., Bul. 143: 153. ♀.

meracula Mickel. Kans., Okla., Tex.
Dasymutilla meracula Mickel, 1928. U. S. Natl. Mus., Bul. 143: 201. ♂.

monticola (Cresson). Minn. south to Kans., west to B. C. and Ariz.
Mutilla monticola Cresson, 1865. Ent. Soc. Phila., Proc. 4: 430. ♂.
Mutilla eximia Blake, 1886. Amer. Ent. Soc., Trans. 13: 200. ♂.
Ephuta boulderensis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 133. ♂.

montivagoides (Viereck). Kans. (Hamilton Co.).
Mutilla (*Timulla*) *montivagoides* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 185. ♀.

mutata (Blake). N. Y. south to Fla., west to Mo. and Tex. Host: *Myzinum obscurum* (F.).
Mutilla (*Sphaeropthalma*) *mutata* Blake, 1871. Amer. Ent. Soc., Trans. 3: 247. ♀.
Dasymutilla allardi Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 463. ♀.
Dasymutilla rubricosa Mickel, 1928. U. S. Natl. Mus., Bul. 143: 192. ♂.

Taxonomy: Mickel, 1938. Ent. Soc. Amer., Ann. 31: 152. ♀.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 4, 7 (host record, mating).

myrice Mickel. Nebr., Kans., Okla., Tex., Colo.
Dasymutilla myrice Mickel, 1928. U. S. Natl. Mus., Bul. 143: 121. ♂.

nigricauda (Viereck). Kans., Okla., Tex.
Mutilla (*Timulla*) *nigricauda* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 187. ♀.

nigripes (Fabricius). Mass. to Fla., west to Alta. and Ariz. Host: *Philanthus gibbosus* (F.)?, *Cerceris f. flavofasciata* Sm.
Mutilla nigripes Fabricius, 1787. Mantissa Insectorum, v. 1, p. 313. ♀.
Mutilla sparsa Fox, 1899. Amer. Ent. Soc., Trans. 25: 240. ♀.
Dasymutilla blawa Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 457. ♀.
Dasymutilla segregata Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 459. ♀.
Dasymutilla segregata finni Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 459. ♀.
Dasymutilla bruneri Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 460. ♀.
Dasymutilla champlaini Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 461. ♀.
Dasymutilla hirticula Mickel, 1923. Minn. State Ent. Rpt. 19: 107. ♂.

Taxonomy: Mickel, 1936. Ent. Soc. Amer., Ann. 29: 43-44 (synonymy).

Biology: Shappirio, 1948. Brooklyn Ent. Soc., Bul. 42: 163 (mating behavior). —Shappirio, 1949. Brooklyn Ent. Soc., Bul. 43: 158 (host record). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 198 (host record). —Evans and Miller, 1969. Mich. Ent. 2: 74 (adult female overwintering). —Evans, Miller and Bartlett, 1973. Kans. Ent. Soc., Jour. 46: 343-346 (host searching range).

nitidula Mickel. Kans., Okla., Tex.
Dasymutilla nitidula Mickel, 1928. U. S. Natl. Mus., Bul. 143: 174. ♀.

nitidula var. **nigridia** Mickel. Tex.
Dasymutilla nitidula var. *nigridia* Mickel, 1936. Ent. Soc. Amer., Ann. 29: 47. ♀.

nocturna Mickel. Calif., Nev.
Dasymutilla nocturna Mickel, 1928. U. S. Natl. Mus., Bul. 143: 279. ♀.

nogalensis Mickel. Ariz.
Dasymutilla nogalensis Mickel, 1928. U. S. Natl. Mus., Bul. 143: 258. ♀.

nupera Mickel. Tex., N. Mex.
Dasymutilla nupera Mickel, 1928. U. S. Natl. Mus., Bul. 143: 103. ♀.

occidentalis comanche (Blake). Iowa and S. Dak., south to Tex., Colo., Ariz., west to Idaho and Oreg.
Mutilla (*Sphaeropthalma*) *Comanche* Blake, 1871. Amer. Ent. Soc., Trans. 3: 234. ♀, ♂.

occidentalis occidentalis (Linnaeus). Conn. south to Fla., west to Mo. and Tex. Host: *Bombus fraternus* Smith.
Mutilla occidentalis Linnaeus, 1758. Syst. Nat., ed. 10, v. 1, p. 582. ♀.
Mutilla bifasciata Swederus, 1787. Svensk. Vetensk. Akad. Handl. 8: 285. ♀.
Mutilla coccinea Fabricius, 1793. Ent. System. 2: 366. ♀.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 5 (host).

ocydrome Mickel. Ariz.
Dasymutilla ocydrome Mickel, 1928. U. S. Natl. Mus., Bul. 143: 292. ♂.

paenulata Mickel. Ariz., Calif.
Dasymutilla paenulata Mickel, 1928. U. S. Natl. Mus., Bul. 143: 206. ♀.

paranocturna Barr and Hurd. Calif.
Dasymutilla paranocturna Barr and Hurd, 1947. Pan-Pacific Ent. 23: 88. ♀.

parksi Mickel. Tex. (Bexar Co.).
Dasymutilla parksi Mickel, 1936. Ent. Soc. Amer., Ann. 29: 50. ♀.

perilla Mickel. Tex.
Dasymutilla perilla Mickel, 1928. U. S. Natl. Mus., Bul. 143: 300. ♂.

perilla var. **gentilicia** Mickel. Kans., Colo.
Dasymutilla perilla var. *gentilicia* Mickel, 1928. U. S. Natl. Mus., Bul. 143: 301. ♂.

phaon (Fox). Tex., N. Mex., Ariz., Utah.
Mutilla phaon Fox, 1899. Amer. Ent. Soc., Trans. 25: 243. ♂.

phaon var. **fimbrialis** Mickel. Utah, Ariz., Calif.
Dasymutilla phaon var. *fimbrialis* Mickel, 1928. U. S. Natl. Mus., Bul. 143: 302. ♂.

phoenix (Fox). Ariz., Calif. Host: *Ptilothrix sumichrasti* (Cr.).
Mutilla phoenix Fox, 1899. Amer. Ent. Soc., Trans. 25: 247. ♀.

Biology: Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 104 (host record).

polia Mickel. Ariz.
Dasymutilla polia Mickel, 1928. U. S. Natl. Mus., Bul. 143: 215. ♂.

praegrandis Mickel. Tex.
Dasymutilla praegrandis Mickel, 1928. U. S. Natl. Mus., Bul. 143: 148. ♀, ♂.

praegrandis var. **russata** Mickel. Tex.
Dasymutilla praegrandis var. *russata* Mickel, 1928. U. S. Natl. Mus., Bul. 143: 152. ♂.

pseudopappus (Cockerell). Colo., N. Mex., Ariz., Calif.
Sphaerophthalma (!) *gloriosa* var. *pseudopappus* Cockerell, 1895. Psyche 7(sup.): 6. ♀.

pyrrhus (Fox). Ga., Fla. Host: Sp. of Bembicini.
Mutilla pyrrhus Fox, 1899. Amer. Ent. Soc., Trans. 25: 243. ♂.

Biology: Krombein, 1964. Amer. Mus. Novitates 2201: 2-4, fig. 1 (host record).

quadriguttata (Say). Ill., Minn., and S. Dak. south to Miss. and Tex. Host: *Myzinum quinquecinctum* (F.).
Mutilla quadriguttata Say, 1823. West. Quart. Rptr. 2: 74. ♀.
Dasymutilla permista Mickel, 1923. Minn. State Ent. Rpt. 19: 108. ♂.

Taxonomy: Remington, 1944. Ent. Soc. Amer., Ann. 37: 198-200 (synonymy).

Biology: Swezey, 1915. Hawaii Ent. Soc., Proc. 3: 72 (host record; misdet. as *castor* Blake.) —Hayes, 1924. Brooklyn Ent. Soc., Bul. 19: 153 (host).

reclusa Mickel. S. Dak. south to Tex., Mont., Wyo.
Dasymutilla reclusa Mickel, 1928. U. S. Natl. Mus., Bul. 143: 219. ♂.

rubicunda Bradley. Ga., Fla.
Dasymutilla (*Dasymutilla*) *rubicunda* Bradley, 1916. Amer. Ent. Soc., Trans. 42: 325. ♀.
Dasymutilla beameri Mickel, 1936. Ent. Soc. Amer., Ann. 29: 48. ♀.

sackenii (Cresson). Oreg., Calif., Nev.; Mexico (Baja California). Host: *Bembix occidentalis beutenmulleri* Fox.
Mutilla Sackenii Cresson, 1865. Ent. Soc. Phila., Proc. 4: 385. ♀.
Mutilla erudita Cresson, 1875. Amer. Ent. Soc., Trans. 5: 120. ♀.

Biology: Bohart and MacSwain, 1939. South. Calif. Acad. Sci., Bul. 38: 89, pl. 16, figs. 11-14 (life history).

saetigera Mickel. Ariz. (Baboquivari Mts.).
Dasymutilla saetigera Mickel, 1928. U. S. Natl. Mus., Bul. 143: 211. ♀.

satanas Mickel. Ariz., Nev., Calif.; Mexico (Baja California).
Dasymutilla satanas Mickel, 1928. U. S. Natl. Mus., Bul. 143: 239. ♀.
Dasymutilla mimula Mickel, 1928. U. S. Natl. Mus., Bul. 143: 255. ♂.

Taxonomy: Barr and Hurd, 1947. Pan-Pacific Ent. 23: 86. ♀, ♂.

scaevola (Blake). Mass. south to Ga., west to Mont. and Ariz. Host: *Cerceris clypeata* Dahlb.?, *C. finitima* Cr.?
Mutilla (*Sphaeropthalma*) *obscura* Blake, 1871. Amer. Ent. Soc., Trans. 3: 239. ♂. Preocc.
Mutilla (*Sphaeropthalma*) *scaevola* Blake, 1871. Amer. Ent. Soc., Trans. 3: 247. ♀.
Mutilla (*Sphaeropthalma*) *admetus* Blake, 1872. Amer. Ent. Soc., Trans. 4: 74. ♂.
Sphaerophthalma (!) *macer* (!) Blake, 1886. Amer. Ent. Soc., Trans. 13: 227. ♂.
Sphaerophthalma (!) *macerata* Blake, 1886. Amer. Ent. Soc., Trans. 13: 286. Emend.

Mutilla macera (!) Dalla Torre, 1897. Cat. Hym., v. 8, p. 56.
Mutilla (*Dasymutilla*) *apachea* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 386. ♂.

Biology: Shappirio, 1948. Brooklyn Ent. Soc., Bul. 42: 162-163 (host record). —Shappirio, 1949. Brooklyn Ent. Soc., Bul. 43: 157-158 (host records).

scitula Mickel. Utah, Nev., Calif.
Dasymutilla scitula Mickel, 1928. U. S. Natl. Mus., Bul. 143: 244. ♀, ♂.

serenitas Mickel. Tex. (Cotulla, Eastland Co.).
Dasymutilla serenitas Mickel, 1928. U. S. Natl. Mus. , Bul. 143: 289. ♂.

sicheliana (Saussure). Ariz.; Mexico (Durango).
Mutilla Sicheliana Saussure, 1868 (1867). Soc. Ent. France, Ann. (4) 7: 360. ♀.
Sphaerophthalma (!) *prunotincta* Cockerell, 1895. Ent. News 6: 60. ♀.
Sphaerophthalma (!) *thera* Cameron, 1895. Biol. Cent.-Amer., Hym., v. 2, p. 358. ♀. Preocc. in *Mutilla*.
Mutilla gynaecologica Dalla Torre, 1897. Cat. Hym., v. 8, p. 45. N. name.

Taxonomy: Mickel, 1965. Ent. Soc. Wash., Proc. 67: 3 (synonymy).

snoworum (Cockerell). Nebr. south to Tex., west to Mont. and Ariz.
Sphaerophthalma (!) *snoworum* Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 135. ♂.
Mutilla poecilonota Melander, 1903. Amer. Ent. Soc., Trans. 29: 301. ♀.

sophrona Mickel. Ariz.
Dasymutilla sophrona Mickel, 1928. U. S. Natl. Mus., Bul. 143: 271. ♂.

stevensi Mickel. Iowa, N. Dak., south to Tex., Colo., Utah, N. Mex., Ariz.
Dasymutilla stevensi Mickel, 1928. U. S. Natl. Mus., Bul. 143: 99. ♀.
Dasymutilla medora Mickel, 1928. U. S. Natl. Mus., Bul. 143: 101. ♂.

Taxonomy: Mickel, 1936. Ent. Soc. Amer., Ann. 29: 44 (synonymy).

subhyalina Mickel. Calif. (Andrade).
Dasymutilla subhyalina Mickel, 1928. U. S. Natl. Mus., Bul. 143: 281. ♂.

sulcatulla Mickel. Tex. (Rio Grande in Brewster Co.).
Dasymutilla sulcatulla Mickel, 1928. U. S. Natl. Mus., Bul. 143: 155. ♀.

testaceiventris (Fox). Oreg., Calif.
Mutilla testaceiventris Fox, 1899. Amer. Ent. Soc., Trans. 25: 242. ♂.

texanella Mickel. Kans., Tex., Colo.
Mutilla texana Blake, 1879. Amer. Ent. Soc., Trans. 7: 250. ♀. Preocc.
Dasymutilla texanella Mickel, 1928. U. S. Natl. Mus., Bul. 143: 96. ♀. N. name.

thetis (Blake). Ariz.
Sphaerophthalma (!) *thetis* Blake, 1886. Amer. Ent. Soc., Trans. 13: 214. ♀.

vandala Mickel. Tex.
Dasymutilla vandala Mickel, 1928. U. S. Natl. Mus., Bul. 143: 74. ♂.

vesta errans Rohwer. S. Dak. south to Tex., Colo.
Dasymutilla errans Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 457. ♀.
Dasymutilla bosquensis Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 457. ♀.
Dasymutilla texensis Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 460. ♀.

vesta sappho (Fox). N. C. south to Fla., Miss. Host: *Bembix cinerea* Handl.
Mutilla sappho Fox, 1899. Amer. Ent. Soc., Trans. 25: 239. ♀.

Biology: Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 104 (host).

vesta vesta (Cresson). East of Rocky Mts. in Canada and U. S. Host: *Trypargilum politum* (Say); *Nomia m. melanderi* Ckll.
Mutilla Vesta Cresson, 1865. Ent. Soc. Phila., Proc. 4: 436. ♀.
Scolia unicincta Provancher, 1882. Nat. Canad. 13: 6. ♂ (♀ misdet.).
Mutilla monozona Dalla Torre, 1897. Cat. Hym., v. 8, p. 64. N. name for *Scolia unicincta* Provancher, not *Mutilla unicincta* Lucas.
Mutilla agenor Fox, 1899. Amer. Ent. Soc., Trans. 25: 245. ♂.
Mutilla zella Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 50. ♀.
Pycnomutilla harmoniiformis Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 455. ♂.

Dasymutilla ferrugatella Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 458. ♀.
Dasymutilla coloradella Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 458. ♀.
Dasymutilla coloradella virginica Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 459. ♀.
Dasymutilla coloradella kamloopsensis Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 459. ♀.
Dasymutilla mesillae Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 461. ♀.
Dasymutilla carolina Rohwer, 1912. U. S. Natl. Mus., Proc. 41 462. ♀.

Biology: Fattig, 1943. Emory Univ. Mus. Bul. 1: 4 (host record). —Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 104 (host record).

vestita (Lepeletier). N. Dak. south to Tex., west to Alta. and Calif., south in Mexico to Oaxaca.
Host: *Anthophora occidentalis* (Cr.), *Diadasia enavata* (Cr.); *Megachile perihirta* Ckll.
Mutilla vestita Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 634. ♀, ♂.
Mutilla Montezumae Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 634. ♀.
Mutilla fulvohirta Cresson, 1865. Ent. Soc. Phila., Proc. 4: 433. ♂.
Sphaerophthalma (!) *townsendi* Cockerell, 1894. Ent. News 5: 199. ♂.
Sphaerophthalma (!) *aspasia* Cameron, 1895. Biol. Cent.-Amer., Hym., v. 2, p. 370. ♂.
Preocc. in *Mutilla*.
Mutilla aspasioides Dalla Torre, 1897. Cat. Hym., v. 8, p. 12. N. name.
Ephuta californica var. *euchroa* Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 513. ♀.

Taxonomy: Mann, 1915. Psyche 22: 178, fig. 1 (gynandromorph).

Biology: Mickel, 1928. U. S. Natl. Mus., Bul. 143: 72. —Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 104 (host records).

waco (Blake). Tex.
Mutilla (*Sphaeropthalma*) *Waco* Blake, 1871. Amer. Ent. Soc., Trans. 3: 238. ♀.

wileyae Mickel. Tex.
Dasymutilla wileyae Mickel, 1928. U. S. Natl. Mus., Bul. 143: 177. ♀.

zelaya (Blake). Okla., Tex., N. Mex., Ariz.
Mutilla (*Sphaeropthalma*) *Zelaya* Blake, 1871. Amer. Ent. Soc., Trans. 3: 234. ♂.

Genus LOMACHAETA Mickel

Lomachaeta Mickel, 1936. Ent. Soc. Amer., Ann. 29: 289.
Type-species: *Lomachaeta hicksi* Mickel. Orig. desig.

Revision: Mickel, 1940. Pan-Pacific Ent. 16: 127-131.

coloradensis Mickel. Colo. (Boulder Co.).
Lomachaeta coloradensis Mickel, 1936. Ent. Soc. Amer., Ann. 29: 292. ♂.

formosula Mickel. Ga. (Clarke Co.); Mexico (Coahuila).
Lomachaeta formosula Mickel, 1940. Pan-Pacific Ent. 16: 130. ♂.

hicksi Mickel. Calif.
Lomachaeta hicksi Mickel, 1936. Ent. Soc. Amer., Ann. 29: 289. ♀, ♂.

minutula Mickel. Okla., Tex. (Type from Tenn., Mo. or Ark.).
Lomachaeta minutula Mickel, 1936. Ent. Soc. Amer., Ann. 29: 294. ♀.

punctinota Mickel. Ill. (Carbondale).
Lomachaeta punctinota Mickel, 1936. Ent. Soc. Amer., Ann. 29: 293. ♂.

variegata Mickel. Wash., Calif., Nev., Ariz., N. Mex. Host: *Solierella plenoculoides similis* (Brid.), *S. blaisdelli* (Brid.), nesting in stems of *Eriogonum elatum*.
Lomachaeta variegata Mickel, 1940. Pan-Pacific Ent. 16: 128. ♀, ♂.

Biology: Parker, 1962. Pan-Pacific Ent. 38: 116 (host records). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (host records).

Genus SMICROMUTILLA Mickel

Smicromutilla Mickel, 1964. Pan-Pacific Ent. 40: 108.
Type-species: *Smicromutilla powelli* Mickel. Orig. desig.

powelli Mickel. Calif. (San Luis Obispo Co.). Host: *Diodontus occidentalis* Fox?
Smicromutilla powelli Mickel, 1964. Pan-Pacific Ent. 40: 108, 1 fig. ♂, ♀.

UNPLACED TAXA OF MUTILLIDAE

Mutilla contracta Say, 1836. Boston Jour. Nat. Hist. 1: 295. ♂. Type destroyed.
Mutilla exulans Fabricius, 1775. Systema Ent., p. 397. ♀. Described from Drury coll.; type probably lost.
Mutilla versicolor Fabricius, 1775. Systema Ent., p. 398. ♀. Described from Drury coll.; type probably lost.
Mutilla vigilans Say, 1836. Boston Jour. Nat. Hist. 1: 296. ♂. Type destroyed.

Family SCOLIIDAE

The scoliid wasps are external parasites of larvae of Scarabaeidae in the soil or in debris of wood-rat nests. Members of some exotic genera parasitize scarabaeid larvae in decaying wood.

Morphology: Betrem, 1972 (1971). Nederland. Ent. Ver., Monog. 6: 13-20, 6 figs. (adults).

SUBFAMILY CAMPSOMERINAE

Revision: Betrem, 1972 (1971). Nederland. Ent. Ver., Monog. 6: 1-326, 6pls. (African species; erects tribal classification).

TRIBE TRIELIDINI

Taxonomy: Bradley, 1950. Eos, Tomo extraord., pp. 427-438 (primitive character of group). —Betrem, 1972 (1971). Nederland. Ent. Ver., Monog. 6: 26.

Genus TRIELIS Saussure

Revision: Bradley, 1928. Amer. Ent. Soc., Trans. 54: 195-214, 4 text figs., pl. 22.

Taxonomy: Betrem, 1962. Ent. News 73: 146.

Genus TRIELIS Subgenus TRIELIS Saussure

Trielis Saussure, 1863. Soc. Ent. France, Ann. (4) 3: 18.
Type-species: *Elis xantiana* Saussure. Monotypic.
Campsoscolia Betrem, 1933. Stettin. Ent. Ztg. 94: 240.
Type-species: *Scolia sexmaculata* Fabricius. Orig. desig.

Only the typical subgenus occurs in North America. Our species belong to Species Group Interrupta which is found also in the Palaearctic Region.

Taxonomy: Betrem, 1962. Ent. News 73: 146 (type species).

octomaculata hermione (Banks). Austrorip., N. J. to Fla., Ala., Ill.
Trielis hermione Banks, 1912. Canad. Ent. 44: 200. ♂.

octomaculata octomaculata (Say). U. Austr. Zone west of Allegheny Mts. and east of 100th Meridian.
Scolia viii-maculata Say, 1823. West. Quart. Rptr. 2: 74. ♀.
Scolia octo-maculata Say, 1825. American Entomology, pl. 29. Emend.

octomaculata texensis (Saussure). U. and L. Sonoran Zones.
Elis texensis Saussure, 1858. Soc. Ent. France, Ann. (3) 6: 224. ♂.
Scolia regina Cresson, 1865. Ent. Soc. Phila., Proc. 4: 447. ♀.
Scolia consors Cresson, 1865. Ent. Soc. Phila., Proc. 4: 449. ♂. Preocc.
Scolia flavosignata Cresson, 1865. Ent. Soc. Phila., Proc. 4: 449. ♂.
Elis (*Trielis*) *zonaria* Cresson, 1868. Amer. Ent. Soc., Trans. 1: 378. N. name.
Elis lupina Cresson, 1872. Amer. Ent. Soc., Trans. 4: 202. ♀.

pollenifera (Viereck). Kans., N. Mex., Ariz.
Elis (*Trielis*) *pollenifera* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 190. ♀.
Elis (*Trielis*) *pollenifera* var. *a* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 191. ♀, ♂.

Genus CRIOSCOLIA Bradley

Crioscolia Bradley, 1950. Eos, Tomo extraord., p. 431.
Type-species: *Campsomeris* (*Trielis*) *flammicoma* Bradley. Orig. desig.

Only the typical subgenus occurs in North America.

alcione (Banks). U. Sonoran Zone.
Trielis alcione Banks, 1917. Mus. Compar. Zool., Bul. 61: 112. ♂.

flammicoma (Bradley). L. Sonoran Zone.
Campsomeris (*Trielis*) *flammicoma* Bradley, 1928. Amer. Ent. Soc., Trans. 54: 209. ♀, ♂.

Tribe CAMPSOMERINI

Taxonomy: Betrem, 1972 (1971). Nederland. Ent. Ver., Monog. 6: 76.

Genus CAMPSOMERIS Guerin

Taxonomy: Bradley, 1957. Amer. Ent. Soc., Trans. 83: 65-77 (subgeneric reclassification Amer. spp.). —Bradley, 1964. Ent. News 75: 101-108 (added notes on subgenera and spp.).

Genus CAMPSOMERIS Subgenus CAMPSOMERIS Guerin

Campsomeris Guerin, 1838. *In* Duperrey, Voy. Coquille, Zool., v. 2, p. 247.
Type-species: *Scolia atrata* Fabricius. Desig. by Bequaert, 1926.
Colpa Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 534.
Type-species: *Colpa peregrina* Lepeletier. Desig. by Betrem, 1928.

The typical subgenus does not occur in North America.

Genus CAMPSOMERIS Subgenus DIELIS Saussure and Sichel

Elis subg. *Dielis* Saussure and Sichel, 1864. Cat. Spec. Gen. Scol., p. 14.
Type-species: *Scolia radula* Fabricius. Desig. by Betrem, 1928.

Revision: Bradley, 1928. Acad. Nat. Sci. Phila., Proc. 80: 313-337, 2 text figs., pl. 26.

Taxonomy: Betrem, 1962. Ent. News 73: 207 (type of *Dielis*).

Species Group Plumipes

Taxonomy: Bradley, 1957. Amer. Ent. Soc., Trans. 83: 69.

plumipes confluenta (Say). U. Austr. between Allegheny and Rocky Mts. Ecology: On flowers of *Rubus*, *Arabis*, *Melilotus*, *Solidago*, and *Cephalanthus*. Host: *Catalpa lanigera* (L.).
Scolia confluenta Say, 1823. West. Quart. Rptr. 2: 74. ♀.

Biology: Kurczewski, 1963. Ent. News 74: 21-24 (host record). —Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 156 (host record). —Kurczewski, 1967. Kans. Ent. Soc., Jour. 40: 208-209 (host record).

plumipes fossulana (Fabricius). Austrorip. from Md. to Fla., west to Tex.
Scolia fossulana Fabricius, 1805. Systema Piezatorum, p. 242. ♀.
Campsomeris szetschwanensis forma *D* Betrem, 1932. Ent. Ber. 9: 414. ♂.

Taxonomy: Betrem, 1964. *In* Bradley, Spolia. Zool. Mus. Hauniensis 21: 35 (synonymy).

plumipes plumipes (Drury). Carol. Zone from Mass. to Ga., Ky.
Sphex plumipes Drury, 1770. Illus. Nat. Hist., v. 1, p. 104, pl. 44, fig. 5. ♀.
Scolia radula Fabricius, 1775. Systema Ent., p. 355. N. name for *plumipes*. Preocc. in *Campsomeris* by *Tiphia radula* Fabricius, 1775, p. 354.
Scolia quadricincta Klug, 1805. *In* Weber and Mohr, Beitr. z. Naturk. 1: 37. ♀.

Taxonomy: Bradley, 1964. Spolia Zool. Mus. Hauniensis 21: 23 (nomenclature *radula*). —Betrem, 1964. *In* Bradley, Spolia Zool. Mus. Hauniensis 21: 34-35 (*radula* specimens in Fabricius' collection). —Bradley, 1967. *In* Bradley and Betrem, Deut. Ent. Ztschr. 15: 331 (lectotype *quadricincta*).

tolteca (Saussure). Tex., Ariz., Calif., south into Mexico, Haiti.
Elis tolteca Saussure, 1857. Rev. Mag. Zool. (2) 9: 282. ♀.
Elis dives Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 410. ♀.
Elis 4-cincta Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 411. ♂.

trifasciata nassauensis Bradley. Fla. (Key Vaca); Bahamas.
Campsomeris (*Campsomeris*) *trifasciata nassauensis* Bradley, 1928. Acad. Nat. Sci. Phila., Proc. 80: 322. ♀, ♂.

trifasciata trifasciata (Fabricius). Fla. (Miami) and Greater Antilles.
Tiphia trifasciata Fabricius, 1793. Ent. System., v. 2, p. 226. ♀.
Colpa Alexandri Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 543. ♂.

Taxonomy: Bradley, 1964. Spolia Zool. Mus. Hauniensis 21: 26 (holotype *trifasciata*).

Species Group Pilipes

Bradley (1964. Ent. News 75: 102) notes that a new subgenus will be described for this species group.

Taxonomy: Bradley, 1957. Amer. Ent. Soc., Trans. 83: 69-70.

pilipes (Saussure). U. and L. Sonor. Zones.
Elis pilipes Saussure, 1858. Soc. Ent. France, Ann. (3) 6: 246. ♀.

Biology: Linsley, 1946. Jour Econ. Ent. 39: 27-28 (pollinating alfalfa; misdet. as *plumipes*).

Genus CAMPSOMERIS Subgenus XANTHOCAMPSOMERIS Bradley

Campsomeris subg. *Xanthocampsomeris* Bradley, 1957. Amer. Ent. Soc., Trans. 83: 70.
Type-species: *Tiphia tricincta* Fabricius. Orig. desig.

Revision: Rohwer, 1927. Wash. Acad. Sci., Jour. 17: 150-154.

completa completa Rohwer. Ariz. (Chiricahua and Santa Rita Mts.), Tex. (Hidalgo Co.); Mexico to El Salvador. Another subsp. occurs in Mexico.
Campsomeris (*Campsomeris*) *completa* Rohwer, 1927. Wash. Acad. Sci., Jour. 17: 151. ♀.

fulvohirta (Cresson). Fla. (Miami); Cuba.
Scolia (*Elis*) *fulvohirta* Cresson, 1865. Ent. Soc. Phila., Proc. 4: 119. ♀, ♂.
Campsomeris (*Campsomeris*) *fulvhirta* (!) Rohwer, 1927. Wash. Acad. Sci., Jour. 17: 154. ♀, ♂.

limosa (Burmeister). Ariz.; Mexico.
Scolia limosa Burmeister, 1853. Naturf. Gesell. Halle, Abhandl. 1 (4): 28. ♀, ♂.
Dielis fulvopilosa Banks, 1912. Canad. Ent. 44: 200. ♀.

Taxonomy: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 776 (synonymy). —Bradley, 1966. *In* Bradley and Betrem, 1966. Beitr. z. Ent. 16: 76 (lectotype *limosa*).

Genus CAMPSOMERIS Subgenus PYGODASIS Bradley

Campsomeris subg. *Pygodasis* Bradley, 1957. Amer. Ent. Soc., Trans. 83: 72.
Type-species: *Scolia quadrimaculata* Fabricius. Orig. desig.

Species Group Quadrimaculata

quadrimaculata (Fabricius). Largely L. Austr. from Mass. south to Fla., west to Okla. and Tex.
Vespa maculata Drury, 1773. Illustr. Nat. Hist. 2: 74, pl. 39, fig. 2. ♀. Preocc.
Scolia quadrimaculata Fabricius, 1775. Syst. Ent., p. 355. ♀.
Scolia quatuormaculata Christ, 1791. Naturgesch. Class. Nomencl. Ins., p. 267. N. name.
Scolia quadrinotata Fabricius, 1805. Systema Piezatorum, p. 240. ♀.
Scolia Abotii Klug, 1810. *In* Weber and Mohr, Beitr. z. Naturk. 2: 213. ♂.
Colpa Pensylvanica Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 546. ♂.
Elis quadrignttata (!) Viereck, 1906. Amer. Ent. Soc., Trans. 32: 222.
Campsomeris druryi Cockerell, 1907. Entomologist 40: 50. N. name.

Taxonomy: Bradley, 1964. Spolia Zool. Mus. Hauniensis 21: 21-22 (*quadrinotata* nomenclature; notes that it is a variety of *quadrimaculata*). —Bradley, 1967. *In* Bradley and Betrem, Deut. Ent. Ztschr. 15: 324 (holotype *abotii*).

Species Group Ephippium

ephippium ephippium (Say). Tex. (Victoria, Seguin); south to northern South America. Another subsp. occurs in South America.
Scolia ephippium Say, 1837. Boston Jour. Nat. Hist. 1: 333. ♂.
Scolia Petitii Guerin, 1838. *In* Duperrey, Voy. Coquille, Zool., v. 2, p. 249.

Taxonomy: Bradley, 1945. Ent. Venez., Bul. 4: 18 (notes on type series *pettitii* (!)). —Krombein, 1949. U. S. Natl. Mus., Proc. 100: 56-57, figs. 4-12 (gynandromorph).

Genus MICROMERIELLA Betrem

Micromeris Betrem, 1967. *In* Bradley and Betrem, Brit. Mus. (Nat. Hist.), Bul., Ent. 20: 294. Preocc.
Type-species: *Scolia marginella* Klug. Orig. desig.
Micromeriella Betrem, 1972 (1971). Nederland. Ent. Ver., Monog. 6: 116. N. name.

This genus is not a member of the Nearctic fauna.

marginella modesta (Smith). Liberated in N. J., Conn., but not established; Philippines. Introduced from Hawaii where it had been successfully established from the Philippines. Host: *Anomala orientalis* Waterh.
Scolia modesta Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 91. ♀, (♂ misdet.).
Scolia manilae Ashmead, 1904. N. Y. Ent. Soc., Jour 12: 8. ♀.

Genus CAMPSOMERIELLA Betrem

Campsomeris subg. *Campsomeriella* Betrem, 1941. Notes d'ent. Chin. 8, fasc. 4: 86.
Type-species: *Scolia thoracica* Fabricius. Orig. desig.

This genus is not a member of the Nearctic fauna.

Genus CAMPSOMERIELLA Subgenus ANNULIMERIS Betrem

Campsomeriella subg. *Annulimeris* Betrem, 1967. Ent. Ber. 27: 28.
Type-species: *Tiphia annulata* Fabricius. Orig. desig.

annulata (Fabricius). Liberated in N. J. but not established. Introduced from China and Japan. Host: *Popilla japonica* Newm.
Tiphia annulata Fabricius, 1793. Ent. System., v. 2, p. 225. ♀.
Campsomeris Servillei Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 501. ♀. Preocc. (secondary homonym).

Biology: Clausen, King and Teranishi, 1927. U. S. Dept. Agr., Bul. 1429: 31-33 (life history). —Clausen, Jaynes and Gardner, 1933. U. S. Dept. Agr., Tech. Bul. 366: 28-30 (life history).

Subfamily SCOLIINAE

Genus SCOLIA Fabricius

Revision: Bartlett, 1912. Ent. Soc. Amer., Ann. 5: 293-340, 2 pls.

Taxonomy: Hurd, 1952. Calif. Ins. Survey, Bul. 1: 141-152, 2 pls. (Calif. spp.).

Genus SCOLIA Subgenus SCOLIA Fabricius

Scolia Fabricius, 1775. Systema Ent., p. 355.
Type-species: *Scolia quadripunctata* Fabricius. Desig. by Latreille, 1810.
Lacosi Guerin, 1838. *In* Duperrey, Voy. Coquille, Zool., v. 2, p. 247.
Type-species: *Scolia quadripunctata* Fabricius. Desig. by Bequaert, 1926.
Lisoca Costa, 1858. Fauna Napoli Scoliid., p. 8.
Type-species: *Scolia quadripunctata* Fabricius. Desig. by Krombein, 1951.

The typical subgenus does not occur in North America.

Genus SCOLIA Subgenus DISCOLIA Saussure

Scolia subg. *Discolia* Saussure, 1863. Soc. Ent. France, Ann. (4) 3: 18.
Type-species: *Scolia nobilitata* Fabricius. Desig. by Betrem and Bradley, 1964.

bicincta Fabricius. U. and L. Austr. Zones, east of 100th Meridian.
Scolia bicincta Fabricius, 1775. Systema Ent., p. 356.
Scolia obscura Klug, 1805. *In* Weber and Mohr., Beitr. z. Naturk. 1: 33.
Scolia undata Klug, 1810. *In* Weber and Mohr, Beitr. z. Naturk. 2: 212. ♀.

Taxonomy: Brimley, 1920. Ent. News 31: 261-262. —Bradley, 1964. Spolia Zool. Mus. Hauniensis 21: 10 (type series *bicincta*).

consors Saussure. Colo.; Mexico (Baja California).
Scolia consors Saussure, 1863. Soc. Ent. France, Ann. (4) 3: 18. ♂.
Scolia amoena Cresson, 1865. Ent. Soc. Phila., Proc. 4: 447. ♂.

dubia dubia Say. U. and L. Austr. Zones, Mass. to Fla., west to Colo. and Ariz. Host: *Cotinis nitida* (L.)?
Scolia dubia Say, 1837. Boston Jour. Nat. Hist. 1: 364.
Scolia aulica Burmeister, 1853. Naturf. Gesell. Halle, Abhandl. 1 (4): 33. ♀, ♂.
Discolia thalia Banks, 1912. Canad. Ent. 44: 199. ♂.

Taxonomy: Bradley, 1966. *In* Bradley and Betrem, Beitr. z. Ent. 16: 74 (lectotype *aulica*).

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 129-133. —Rau, 1932. Brooklyn Ent. Soc., Bul. 27: 59-62.

dubia haematodes Burmeister. Tex., N. Mex., Ariz., Calif.
Scolia haematodes Burmeister, 1853. Naturf. Gesell. Halle, Abhandl. 1 (4): 33. ♀, ♂.
Elis Americana Saussure, 1857. Rev. Mag. Zool. (2) 9: 282. ♂.

Taxonomy: Bradley, 1966. *In* Bradley and Betrem, Beitr. z. Ent. 16: 76 (lectotype *haematodes*).

guttata Burmeister. Tex.; Mexico.
Scolia guttata Burmeister, 1853. Naturf. Gesell. Halle, Abhandl. 1 (4): 36. ♀.
Discolia Hecate Kirby, 1889. Ent. Soc. London, Trans., p. 449. ♂.

Taxonomy: Bradley, 1966. *In* Bradley and Betrem, Beitr. z. Ent. 16: 76 (lectotype *guttata*).

mexicana Saussure. West. Tex., N. Mex., Ariz.; Mexico. Host: *Cotinis texana* Casey.
Scolia (*Lacosi*) *mexicana* Saussure, 1858. Soc. Ent. France, Ann. (3) 6: 219. ♀.
Scolia monticola Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 223. ♀, ♂.
Scolia nigrescens Bartlett, 1912. Ent. Soc. Amer., Ann. 5: 331.

Taxonomy: Bradley, 1964. *In* Betrem and Bradley, Zool. Meded. 40: 96 (synonymy).

nobilitata nobilitata Fabricius. U. and L. Austr. Zones, Mass. to Fla., west to Colo. and Tex.
Scolia nobilitata Fabricius, 1805. Systema Piezatorum, p. 244.
Scolia tricolor Klug, 1805. *In* Weber and Mohr, Beitr. z. Naturk. 1: 35.
Scolia maculata Guerin, 1838. *In* Duperrey, Voy. Coquille, Zool., v. 2, p. 255. ♀. Preocc.
Scolia ornata Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 96. N. name.

nobilitata otomita Saussure. Calif., Nev., Ariz.; Mexico. Host: Scarabaeid larvae in debris of wood-rat nest.
Scolia otomita Saussure, 1858. Soc. Ent. Fance, Ann. (3) 6: 223. ♂.
Scolia fulviventris Bartlett, 1912. Ent. Soc. Amer., Ann. 5: 323. ♀.

Taxonomy: Bradley, 1964. *In* Betrem and Bradley, Zool. Meded. 40: 96 (subspecific status).

Biology: Ryckman, 1956. Pan-Pacific Ent. 32: 180 (host record).

nobilitata tricincta Say. West. Kans. and Tex., Colo., N. Mex., Ariz.
Scolia tricincta Say, 1823. West. Quart. Rptr. 2: 74. ? ♂.
Scolia Ridingsii Cresson, 1865. Ent. Soc. Phila., Proc. 4: 445. ♀.
Scolia inconstans Cresson, 1865. Ent. Soc. Phila., Proc. 4: 446. ♂.
Scolia (*Discolia*) *Lecontei* Cresson, 1868. Amer. Ent. Soc., Trans. 1: 376. ♀.
Scolia (*Discolia*) *flavocostalis* Cresson, 1868. Amer. Ent. Soc., Trans. 1: 377. ♂.
Scolia Lewisii (!) Cresson, 1868. Amer. Ent. Soc., Trans. 1: 377. Lapsus for *lecontei*.
Scolia flavicostalis (!) Banks, 1912. Canad. Ent. 44: 200.

Unplaced Taxon of Scolia Subgenus Discolia Saussure

bifasciata (Swederus). N. Y.
Sphex (*Scolia*) *bifasciata* Swederus, 1787. Svensk. Vetensk.-Akad., Handl. 8: 281. This is possibly the same as typical *nobilitata* (F.).

Genus TRISCOLIA Saussure

Scolia subg. *Triscolia* Saussure, 1863. Soc. Ent. France, Ann. (4) 3: 17.
Type-species: *Scolia* (*Triscolia*) *badia* Saussure. Monotypic.

Taxonomy: Betrem and Bradley, 1964. Zool. Meded. 39: 436-437 (description).

ardens (Smith). Tex., N. Mex., Ariz., Calif., ?Oreg., south into Mexico.
Scolia fervida Burmeister, 1853. Naturf. Gesell. Halle, Abhandl. 1 (4): 20. ♀, ♂. Preocc.
Scolia ardens Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 112. N. name.
Scolia Montezumae Saussure, 1857. Rev. Mag. Zool. (2) 9: 281. ♀.

Taxonomy: Bradley, 1966. *In* Bradley and Betrem, 1966, Beitr. z. Ent. 16: 75-76 (lectotype *fervida*).

Family SAPYGIDAE

All of the known records confirm that members of this family are parasitic in the nests of other aculeate Hymenoptera. The sapygid egg is apparently inserted through the cell closure in the host nest and usually hatches before the host egg. The newly hatched larvae of *Sapyga centrata* Say, *S. louisi* Krombein and *S. pumila* Cresson destroy the host egg and then develop on the pollen stored by the host bee; the larvae of *S. confluenta* Cresson and of *Eusapyga rubripes proxima* (Cresson) feed on the host larva after the latter has spun its cocoon. Development to the adult stage appears to be concurrent with that of the host. Sapygids parasitic on vernal bees transform to adults late in the summer, as do the host bees, and overwinter in the cocoons, emerging in the spring.

Revision: Pate, 1947. Acta Zool. Lilloana (Tucuman) 4: 396-402.

Taxonomy: Pate, 1946. Ent. News 57: 219-221 (list of type-species). —Tobias, 1965. Zool. Zhur. (Moscow) 44: 706-715, 4 figs. (family classification).

Subfamily FEDTSCHENKIINAE

This subfamily includes only the primitive fossorial genus *Fedtschenkia* Sauss. It has a disjunct distribution in xeric Holarctic areas, the five described species being known from Turkmenia, Uzbekistan, Tadzhikistan, Iran, Lebanon, Israel and western United States. Modern European workers have considered that *Fedtschenkia* constitutes a separate family based on the erroneous assumption that it is a free-living fossorial form, probably parasitic on soil-dwelling larvae as in the Scoliidae. The single North American species of *Fedtschenkia* is a parasite of the ground-nesting eumenid wasp, *Pterochilus trichogaster* Bohart.

Genus FEDTSCHENKIA Saussure

Fedtschenkia Saussure, 1880. *In* Fedtschenko, Reise in Turkestan, II, Zool. Th., 13 Hymenoptera: Scoliidae, p. 13.
Type-species: *Fedtschenkia grossa* Saussure. Monotypic.
Cosilella Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 237.
Type-species: *Cosila plutonis* Banks. Orig. desig.

Taxonomy: Bradley, 1955. Ent. News 66: 230-233.

anthracina (Ashmead). Wash., Calif., Colo., N. Mex. Ecology: Visits flowers of *Chaenactis*, *Chorizanthe*, *Cryptantha*, *Eriogonum*, *Eriophyllum*, *Melilotus* and *Wislizenia*. Host: *Pterocheilus trichogaster* Bohart in soil.
Telephoromyia anthracina Ashmead, 1898. Psyche 8: 251. ♂.
Plesia (*Myzine*) *nigropilosella* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 237. ♀.
Cosila plutonis Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 237. ♀.

Biology: Bohart and Schuster, 1972. Pan-Pacific Ent. 48: 149 (host record).

Subfamily SAPYGINAE

North American species have been reared only from megachilid bees. However, extralimital species have been reared from *Odynerus* sens. lat., *Anthophora* and *Xylocopa* as well as from Megachilidae.

Genus SAPYGA Latreille

Sapyga Latreille, 1796. Precis Caract. Ins., p. 134.
Type-species: *Scolia quinquepunctata* Fabricius. Desig. by Latreille, 1802.
Hellus Fabricius, 1805. Systema Piezatorum, p. xiii.
Type-species: *Sapyga sexpunctata* (Fabricius). Desig. by Shuckard, 1837.

aculeata Cresson. Minn., Wyo., Colo., Alta, Oreg., Calif. in Transit. Zone. Host: *Hoplitis producta* (Cr.), *H. producta gracilis* (Mich.), *H. fulgida platyura* (Ckll.), *H. hypocrita* (Ckll.), *H. sambuci* Titus. Parasite: *Sphaeropthalma amphion* (Fox).
Sapyga aculeata Cresson, 1865. Ent. Soc. Phila., Proc. 4: 450. ♀.
Eusapyga aciculata (!) Hicks, 1934. Univ. Colo. Studies 21: 268.

Biology: Davidson, 1896. Ent. News 7: 218. —Hicks, 1934. Univ. Colo., Studies 21: 268. —Linsley and Michener, 1942. Pan-Pacific Ent. 18: 28. —Linsley, 1944. Brooklyn Ent. Soc., Bul. 39: 54. —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 96-97. —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 5.

angustata Cresson. Wyo., Colo., Utah, Ariz., Nev., Wash., Oreg., Calif. in Transit. and U. and L. Sonor. Zones. Host: *Osmia atrocyanea* Ckll., *O. pikei* Ckll., *O. lignaria* Say., *Megachile angelarum* Ckll.
Sapyga angustata Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xxi. ♂.
Sapyga moesta Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♂.
Sapyga obscura Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xxi. ♀.
Sapyga fulvicornis Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xxi. ♂.
Sapyga maesta (!) Dalla Torre, 1897. Cat. Hym., v. 8, p. 192.
Sapyga russellensis Roberts, 1929. Psyche 36: 360. ♀.

Biology: Linsley and Michener, 1942. Pan-Pacific Ent. 18: 28. —Linsley, 1944. Brooklyn Ent. Soc., Bul. 39: 54. —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 97.

centrata Say. Ont. south to S. C., W. Va., Ill., Tex. Host: *Osmia bucephala* Cr., *O. pumila* Cr., *Hoplitis truncata* (Cr.)?
Sapyga centrata Say, 1836. Boston Jour. Nat. Hist. 1: 301.
Sapyga americana Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♀.
Sapyga pelopaei Ashmead, 1896. Amer. Ent. Soc., Trans. 23: 179. ♂.

Biology: Krombein, 1952. Ent. Soc. Wash., Proc. 54: 175. —Krombein, 1967. Trap-nesting wasps and bees, pp. 479-481 (life History). —Medler, 1967. Ent. Soc. Amer., Ann. 60: 342 (host record).

confluenta Cresson. N. H., Colo. Host: *Osmia hesperella* Ckll., *O. lignaria propinqua* Cr., *O. cordata* Robt.
Sapyga confluenta Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♂.
Sapyga emarginata Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♀.

Biology: Hicks, 1934. Univ. Colo., Studies 21: 267-268.

elegans Cresson. Colo., Nev., Idaho, Calif., Oreg., U. Sonor. and Transit. Zones. Ecology: Visits flowers of *Arctostaphylos nevadensis*.
Sapyga elegans Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xxi. ♂, ♀.
Sapyga coloradensis Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xxi. ♂.
Sapyga truncata Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xxi. ♂.

Biology: Linsley and Michener, 1942. Pan-Pacific Ent. 18: 28.

interrupta Roberts. Colo.
Sapyga interrupta Roberts, 1929. Psyche 36: 359. ♀.

louisi Krombein. N. Y., N. J., Fla., Mich., Tex. Host: *Heriades carinata* Cr.
Sapyga louisi Krombein, 1938. Ent. Soc. Amer., Ann. 31: 467. ♂, ♀.

Biology: Matthews, 1965. Amer. Ent. Inst., Contrib. 1, no. 3: 24-26 (life history).

maculata Provancher. Que.
Sapyga maculata Provancher, 1882. Nat. Canad. 13: 9. ♀.

martinii Smith. Canada, N. H., Colo., Utah, Wyo., Wash.
Sapyga martinii Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 117. ♂, ♀.

nevadica Cresson. Tex., Utah, Nev., Idaho, Wash., Oreg., Calif. Host: *Dianthidium dubium dilectum* Timb.
Sapyga nevadica Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xxi. ♂.
Sapyga montana Cresson, 1880. amer. Ent. Soc., Tans. 8: Proc., p. xxi. ♀.

Biology: Hurd and Linsley, 1950. N. Y. Ent. Soc., Jour. 58: 247.

pumila Cresson. Nebr., Colo., N. Mex., Utah, Nev., Alta., Calif. Host: *Ashmeadiella aridula* Ckll., *A. meliloti* Ckll., *Anthocopa copelandica* (Ckll.), *Dianthidium consimile* (Ashm.), *Megachile rotundata* (F.), *Osmia* sp., *Heriades variolosa* (Cr.).
Sapyga pumila Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♀.
Sapyga minor Roberts, 1933. Kans. Ent. Soc., Jour. 6: 96. ♂.

Biology: Hicks, 1934. Univ. Colo., Studies 21: 268. —Linsley, 1944. Brooklyn Ent. Soc., Bul. 39: 54. —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 96-97. —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 3-4. —Torchio, 1972. Melanderia 10: 1-30, 60 figs. (life history, control). —Parker, 1975. Pan-Pacific Ent. 51: 119 (host).

Morphology: Torchio, 1972. Melanderia 10: 8-10, figs. 26-55 (larval instars, pupa).

Genus EUSAPYGA Cresson

Eusapyga Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx.
Type-species: *Sapyga rubripes* Cresson. Desig. by Ashmead, 1903.

Host records include only the megachilid genus *Dianthidium*.

californica (Cresson). Calif.
Sapyga californica Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♂.

intermedia Roberts. Calif. Host: *Dianthidium* sp.
Eusapyga intermedia Roberts, 1929. Psyche 36: 361. ♀.

nigripes (Cresson). Nev.
Sapyga nigripes Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♂.

rubripes carolina Banks. N. C.
Eusapyga carolina Banks, 1912. Canad. Ent. 44: 203. ♂.

rubripes proxima (Cresson). Colo., Wyo., Mont. Host: *Dianthidium pudicum* (Cr.), probably subsp. *decorum* Timb.
Sapyga proxima Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♂.

Biology: Hicks, 1927. Psyche 34: 193.

rubripes rubripes (Cresson). Tex., Colo. Host: *Dianthidium pudicum* (Cr.), probably subsp. *decorum* Timb.
Sapyga rubripes Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♂, ♀.

Biology: Hicks, 1934. Univ. Colo., Studies 21: 268.

verticalis (Cresson). Nev., Calif. in Transit. Zone. Host: *Dianthidium consimile* (Ashm.), *D. u. ulkei* (Cr.).
Sapyga verticalis Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xx. ♀.

Biology: Hicks, 1934. Univ. Colo., Studies 21: 268. —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 96.

Superfamily FORMICOIDEA

By David R. Smith

Family FORMICIDAE

Ants are social insects that live in colonies in various ecological situations, most commonly in the soil, rotting wood, and plant cavities. They are practically ubiquitous being extremely prolific in numbers of individuals even though relatively low in numbers of species. Although most ants are free-living, some are parasites on other species of ants or live as inquilines in the nests of other ants. Most ants are omnivorous, but many have a more highly specialized food requirement. A number of forms are of concern to man because of their feeding, nesting, or stinging habits. The species that nest in or near houses or other buildings are sometimes considerably annoying to man. Because of the adaptive ability of many species and their habits of nesting in plants and soil, many forms have been spread throughout the world by commerce. A number of these tramp species are found in North America.

A colony of ants is usually composed of one or more reproductive females (queens) and workers. At certain times of the year a nest also contains males and virgin females. There are three distinct castes of ants, the female, males, and workers. The female is winged but loses her wings soon after finding a suitable place to begin a new colony; her main purpose is reproduction. The male is winged and is short-lived; he dies soon after mating. The workers are not winged, and their main functions are to build the nest, feed the colony, care for the young, and defend the nest. In some cases, workers are also reproductive forms. Many ants are monomorphic, that is, the workers are all the same size. Other ants are polymorphic, in which case the workers vary considerably in size. In polymorphic species, the largest workers are commonly termed soldiers or maxims and the smaller workers termed minors or minims. The size of a colony of ants, depending on the species and age of the colony, varies and may contain only a few dozen to many thousands of individuals.

The literature on ants in voluminous. It is impossible to cite every reference on the subject. The following list contains some of the more significant works on a variety of subjects. Further references may be found in the literature cited sections of these citations. There have been many local or state faunal lists and treatments of ants; many of these are given by Smith (1947) who listed 84 publications by states. They are not repeated here.

I appreciate the cooperation of the following myrmecologists who have reviewed all or parts of this section: A. C. Cole, University of Tennessee, Knoxville; A. Francoeur, Universite du Quebec a Chicoutimi; M. R. Smith, Arlington, Virginia; R. R. Snelling, Los Angeles County Museum, California; and J. F. Watkins II, Baylor University, Waco, Texas. This section is based in large part on the Formicidae sections of the first Hymenoptera Catalog (1951) and its supplements (1958, 1967) by M. R. Smith.

Revision: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 1-585, 57 pls. (keys to genera and species of N. Amer.).

Taxonomy: Dalla Torre, 1893. Cat. Hym., v. 7, 289 pp. (world cat.). —Emery, 1910. *In* Wytsman, Gen. Ins., fasc. 102, 34 pp. (Dorylinae, world cat.). —Emery, 1911. *In* Wytsman, Gen. Ins., fasc. 118, 124 pp. (Ponerinae, world cat.). —Wheeler, 1911. N. Y. Acad. Sci., Ann. 21: 157-175 (type-species). —Emery, 1912. *In* Wytsman, Gen. Ins., fasc. 137, 50 pp. (Dolichoderinae, world cat.). —Wheeler, 1920. Psyche 27: 46-55 (subfamilies). —Emery, 1921. *In* Wytsman, Gen. Ins., fasc. 174, 379 pp. (Myrmicinae, world cat.). —Wheeler, 1922. Amer. Mus. Nat. Hist., Bul. 45: 631-710 (keys to world genera and subgenera). —Emery, 1925. *In* Wytsman, Gen. Ins., fasc. 183, 302 pp. (Formicinae, world cat.). —Carpenter, 1930. Harvard Univ., Mus. Comp. Zool., Bul. 70: 1-66 (fossil ants of N. Amer.). —Donisthorpe, 1943. Ann. and Mag. Nat. Hist. (11) 10: 617-648, 649-688, 721-737 (type-species). —Smith, 1943. Amer. Midland Nat. 30: 273-321 (key to N. Amer. genera based on males). —Smith, 1947. Amer. Midland Nat. 37: 521-647 (key to N. Amer. genera based on workers; list of publications on ants by states). —Van Pelt, 1948. Fla. Ent. 30: 57-67 (spp. of Alachua Co., Fla.). —Brown, 1954. Insectes Sociaux 1: 21-31 (phylogeny and subfamily classification). —Van Pelt, 1956. Amer. Midland Nat. 56: 358-387 (spp. of Welaka Reserve, Fla.). —Kannowski, 1956. Amer. Midland Nat. 56: 168-185 (spp. of Ramsey Co., N. Dak.). —Van Pelt, 1958. Amer. Midland Nat. 59: 1-57 (list of spp. of Welaka Reserve, Fla.). —Wenner, 1959. Amer. Midland Nat. 62: 174-182 (spp. of Bidwell Park, Chico, Calif.). —Wheeler and Wheeler, 1960. Psyche 67: 87-94 (techniques for study of larvae). —Carter, 1962. Elisha Mitchell Sci. Soc., Jour. 78: 150-204 (N. C.). —Carter, 1962. Elisha Mitchell Sci. Soc., Jour. 78: 1-18 (N. C. Piedmont). —Wheeler and Wheeler, 1963. Ants of N. Dak., Univ. N. Dak. Press, Grand Forks, 326 pp. —Gregg, 1963. Ants of Colo., Univ. Colo. Press, Boulder, 792 pp. —Wilson, 1964. Breviora 210: 1-14 (ants of Fla. Keys). —Young and Howell, 1964. Okla. Agr. Expt. Sta. MP 71 (spp. of Okla.). —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7 (3): 1-27 (spp. of Nev. Test Site). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 1-109 (spp. of Polynesia). —Wilson, Carpenter, and Brown, 1967. Psyche 74: 1-19 (first Mesozoic ant; a new subfamily). —Warren and Rouse, 1969. Ark. Univ., Agr. Expt. Sta., Div. Agr. Bul. 742, 67 pp. (spp. of Ark.). —Ross, Rotramel, and LaBerge, 1971. Ill. Nat. Hist. Survey, Biol. Notes No. 71, 22 pp. (common and economic ants of Ill.). —Wheeler and Wheeler, 1972. Ent. Soc. Wash., Proc. 74: 35-45 (subfamilies). —Kempf, 1972. Studia Ent. 15: 3-344 (cat. of Neotropical ants). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, Philip L. Boyd Deep Canyon Research Center, Univ. Calif., Riverside, 159 pp. —Brown, 1973. *In* Meggers, *et al.*, Tropical forest ecosystems in Africa and S. Amer., Smithsn. Inst. Press, Wash., D. C., pp. 161-185 (list of world generic and subgeneric names; suggested synonymy). —Wheeler and Wheeler, 1976. Ent. Soc. Wash., Mem. 7, 108 pp. (ant larvae: review and synthesis).

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causing worker development). —Flanders, 1953. Sci. Monthly 76: 142-148 (caste determination). —Talbot, 1953. Mich. Univ., Contrib. Lab. Vertebrate Biol. 63, 13 pp. (fauna and populations). —Wilson, 1953. Psyche 60: 15-20 (caste determination). —Simeone, 1954. State Univ. N. Y., Syracuse, Col. Forestry Bul. 34, 19 pp. (carpenter ants and their control). —Chapman, 1954. Pan-Pacific Ent. 30: 93-102 (swarming of ants on mountain summits). —Gosswald, 1955. Rev. Suisse de Zool. 62: 372-386 (caste determination). —O'Rourke, 1956. Insectes Sociaux 3: 107-118 (medical and veterinary importance). —Wilson and Eisner, 1957. Insectes Sociaux 4: 157-166 (liquid transmission of food). —Talbot, 1957. Insectes Sociaux 4: 375-384 (populations). —Brian, 1957. Ann.Rev. Ent. 2: 107-120 (caste determination). —Weber, 1958 (1956). Tenth Internat. Cong. Ent., Proc. 2: 459-473 (evolution of ants and feeding habits). —Eisner and Wilson, 1958 (1956). Tenth Internat. Cong. Ent., Proc. 2: 509-513 (food transmission). —Kannowski, 1959. Insectes Sociaux 6: 115-162 (flight activities and colony founding of bog ants in Mich.). —Wilson, 1959. Anat. Rec. 134: 653 (pheromones in organization of ant societies). —Bartlett, 1961. Ent. Soc. Amer., Ann. 54: 543-551 (influence of ants on parasites, predators, and scale insects). —Downey, 1962. Ent. News 73: 57-66 (association with larvae of a lycaenid butterfly). —Ayre, 1962. N. Y. Ent. Soc., Jour. 70: 159-167 (use of Lincoln Index for estimating size of colonies). —Reid, 1962. Ga. Agr. Expt. Sta. and Univ. Ga. Handbook, 71 pp. (as intermediate hosts of chicken and turkey tapeworms). —Van Pelt, 1963. Amer. Midland Nat. 69: 205-223 (distribution in south. Blue Ridge Mtns.). —Way, 1963. Ann. Rev. Ent. 8: 307-344 (mutualism between ants and honeydew producing Homoptera). —Kincaid, 1963. Amer. Micros. Soc., Trans. 82: 101-105 (pollination of plants). —Wilson, 1963. Ann. Rev. Ent. 8: 345-368 (social biology). —Wilson, 1963. Evolution 17: 249-253 (social modification). —Ayre, 1963. Canad. Ent. 95: 712-715 (feeding habits). —Wilson and Bossert, 1963. Recent Progress 19: 673-716 (chemical communication). —Orlog, 1964 (1963). Ent. Expt. and Appl. 6: 95-106 (plant virus transmission). —Talbot, 1965. Insectes Sociaux 12: 19-47 (populations in a low field). —Brian, 1965. Social insect populations, Academic Press, London and N. Y., 135 pp. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, 105 pp. (house-infesting ants of east. U. S.). —Janzen, 1966. Evolution 20: 249-275 (coevolution of mutualism between ants and acacias). —Beck, Allred, and Despain, 1967. Great Basin Nat. 27: 67-78 (predaceous-scavenger ants in Utah). —Sudd, 1967. An introduction to the behavior of ants, St. Martin's Press, N. Y., 200 pp. —Markin, 1968. Jour. Econ. Ent. 61: 1744-1745 (handling techniques for large quantities of ants). —Wilson, 1971. The insect societies, Belknap Press of Harvard Univ., 548 pp. —Lettendre, *et al.*, 1971. Nat. Canad. 98: 591-606 (spp. from St. Hippolyte, Que.). —Payne and Mason, 1971. Ent. Soc. Wash., Proc. 73: 135-136, 138 (ants associated with pig carrion). —Jennings, 1971. Ent. Soc. Amer., Ann. 64: 384 (ants preying on jack-pine budworm larvae). —Finnegan, 1971. Canad. Ent. 103: 1489-1493 (indigenous ants as limiting agents of forest pests in Que.). —Bhatkar and Whitcomb, 1970. Fla. Ent. 53: 229-232 (artificial diet for rearing various spp.). —Nielsson, *et al.*, 1971. Fla. Ent. 54: 245-248 (ants associated with aphids in Fla.). —Whitcomb, *et al.*, 1972. Fla. Ent. 55: 129-142 (ants of Fla. soybean fields). —Gregg, 1972. Canad. Ent. 104: 1073-1091 (northward distribution of ants in N. Amer.). —Hickman, 1974. Science 184: 1290-1292 (pollination by ants: a low-energy system). —Lettendre and Pilon, 1973. Nat. Canad. 100: 195-235 (ant fauna of Laurentide, Que.). —Finnegan, 1974. Entomophaga 7: 53-59 (ants as predators of forest pests). —Gurney, 1975. Insect World Digest 2 (5): 19-25 (stinging ants).

Morphology: Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 367-446 (thorax of wingless and short-winged Hymenoptera). —Brown and Nutting, 1950. Amer. Ent. Soc., Trans. 75: 113-132 (wing venation). —Wilson, 1953. Quart. rev. Biol. 28: 136-156 (polymorphism). —Wilson, 1954. Insectes Sociaux 1: 75-80 (polymorphism). —Eisner, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 439-490 (studies of the proventriculus). —Glockner, 1957. Insectes Sociaux 4: 83-90 (effect of hormones on metamorphosis). —Eisner and Brown, 1958 (1956). Tenth Internat. Cong. Ent., Proc. 2: 503-508 (evolution and social significance of the proventriculus). —Nachtweg, 1961. Insectes Sociaux 8: 369-381. —Tulloch, Shapiro, and Hershenov, 1962. Brooklyn Ent. Soc., Bul. 77: 91-101 (ultrastructure of metasternal glands). —Roth and Eisner, 1962. Ann. Rev. Ent. 7: 107-136 (chemical defenses). —Wilson, 1963. Sci. Amer. 208: 100-106 (pheromones). —Nachtweg, 1963. Insectes Sociaux 10: 43-57

(sound organs). —Nachtweg, 1964 (1963) Insectes Sociaux 10: 359-378 (acoustics). —Etterschank and Brown, 1964. Ent. Monthly Mag. 100: 5-7 (Malphigian tubules as meristic characters). —Williams and Williams, 1964. Soc. Expt. Biol. Med. 116: 161-163 (toxicity studies of ant venom). —Cavil and Robertson, 1965. Science 149: 1337-1345 (ant venoms, attractants and repellants). —Law, Wilson, and McCloskey, 1965. Science 149: 544-546 (biochemical polymorphism). —Brown, 1968. Amer. Nat. 102: 188-191 (function of metapleural glands). —Gotwald, 1969. Cornell Univ., Agr. Expt. Sta. Mem. 408, 150 pp. (mouthparts). —Hermann, 1969. Ga. Ent. Soc., Jour. 4: 123-141 (poison apparatus). —Blum, 1969. Ann. Rev. Ent. 14: 57-80 (alarm pheromones).

Subfamily DORYLINAE

Members of this subfamily are known as army ants and are sometimes referred to as legionary ants in the New World and driver ants in the Old World. They are predaceous and are known for their foraging expeditions the size of which are sometimes exaggerated. Army ants exhibit a number of morphological and biological pecularities not common to most ants such as wasplike males, wingless termitelike females, blind workers, and their raiding and emigrating behavior. Rettenmeyer (1963) outlined the following traits in which they differ from other ants: (1) They feed almost exclusively on animal prey which is collected by large groups of raiding workers; (2) their raiding columns usually connect to the nest by at least one continuous column; (3) the entire colony periodically and frequently emigrates to new nest sites; (4) emigrations are largely dependent on the size, caste, age, and range of ages of the brood (or broods); and (5) the colonies are founded by division of an entire colony into two (or possibly several) daughter colonies. Other ants may possess some of these traits, but not all of them.

Much of the biological work on army ants has been done in Central America on the terrestrial species of *Eciton* which bivouac in large clusters above the ground and whose colonies may number up to a million individuals. Most of the army ants, however, are subterranean in habit, though the raiding columns of some may appear above ground. Raiding may be in columns only several ants wide or in swarms of a fan-shaped pattern. Most of the prey is other Arthropods, only occasionally vertebrates. All species have nomadic and statary activity cycles where the entire colony moves from one area to another, a unique behavior studied by Schneirla and Rettenmeyer in the papers listed below.

Borgmeier's revision of 1955 is the most definitive taxonomic work on this subfamily for the New World. He recognized 137 species in 5 genera and 2 tribes. Only the tribe Ecitonini is found in the United States; the other tribe, Cheliomyrmicini, includes a single genus of several species found from Mexico to Brazil. In the United States, most species are found in the Southwest, though several reach the Atlantic coast and range north to Iowa, Ohio, and Virginia. Most of the taxonomy is based on males and workers, and for some species only one caste is known. Further study and association of castes may result in some synonymy, especially in *Neivamyrmex*.

Revision: Smith, 1942. Amer. Midland Nat. 27: 537-590 (U. S.). —Borgmeier, 1955. Studia Ent. 3: 1-716 (New World). —Watkins, 1976. The identification and distribution of New World army ants, Baylor Univ. Press 102 pp. (keys to genera and spp. of workers and males; distribution maps).

Taxonomy: Wheeler, 1943. Ent. Soc. Amer., Ann. 36: 319-332 (larvae). —Borgmeier, 1953. Studia Ent. 2: 1-51. —Borgmeier, 1958. Studia Ent. 1(n. s.): 197-208 (Ecitonini; identification of females to genus). —Wheeler and Wheeler, 1964. Ent. Soc. Wash., Proc. 66: 129-137 (larvae). —Watkins 1972. Kans. Ent. Soc., Jour. 45: 347-372 (U. S. *Neivamyrmex*).

Biology: Wheeler, 1900. Amer. Nat. 34: 563-574. —Wheeler, 1910. Ants, pp. 246-266. —Schneirla, 1933. Jour. Comp. Psychology 15: 267-299 (in Panama). —Schneirla, 1934. Nat. Acad. Sci., Proc. 20: 316-321 (raiding and other phenomena). —Schneirla, 1938. Jour. Comp. Psychology 25: 51-90 (theory of army ant behavior). —Schneirla, 1940. Jour. Comp. Psychology 29: 401-460 (mass organization in the swarm-raiders). —Schneirla, 1944. N. Y. Ent. Soc., Jour. 52: 153-192 (reproductive functions of queen as pace-makers of group behavior). —Schneirla 1944. Amer. Phil. Soc. Proc. 87: 438-457 (nomadism in *Eciton burchelli* (Westwood)). —Schneirla, 1945. Biol. Bul. 88: 166-193 (nomad-statary relations in swarmers; migration). —Schneirla, 1947. Amer. Mus. Novitates 1336: 1-20 (life and

behavior under dry season conditions with reference to reproductive functions). —Schneirla, 1948. Zoologica (N. Y.) 33: 89-112 (life and behavior under dry season conditions, appearance and date of males). —Schneirla, 1948. Sci. Amer. 178: 16-23 (general). —Schneirla, 1949. Amer. Mus. Nat. Hist., Bul. 94: 1-82 (life and behavior under dry season conditions, course of reproduction and colony behavior). —Schneirla, 1950. (Mex.) Inst. de Biol., An. 20: 371-384 (environmental adaptations). —Schneirla and Brown, 1950. Amer. Mus. Nat. Hist., Bul. 95: 269-233 (life and behavior under dry season conditions, cyclic processes in behavioral and reproductive functions). —Schneirla and Brown, 1952. Zoologica (N. Y.) 37: 5-32 (sexual broods and production of young queens). —Schneirla, 1953. Insectes Sociaux 1: 29-41 (army ant queen). —Schneirla, Brown and Brown, 1954. Ecol. Monog. 24: 269-296. (bivouac or temporary nest as adaptive factor in terrestrial species). —Tafuri, 1955. N. Y. Ent. Soc., Jour. 63: 21-41 (growth and polymorphism of larva of *Eciton hamatum* (F.)). —Schneirla, 1956. Insectes Sociaux 3: 49-69 (colony division and related processes). —Schneirla, 1956. Smithsn. Inst. Ann. Rpt., 1955 pp. 379-406 (army ants, general). —Schneirla, 1957. Insectes Sociaux 4: 259-298 (comparison of functional patterns in army ants). —Schneirla, 1957. Amer. Phil. Soc., Proc. 101: 106-133 (theoretical consideration of cyclic processes). —Schneirla, 1958. Insectes Sociaux 5: 215-255 (behavior and biology of *Neivamyrmex nigrescens* (Cresson) and *N. opacithorax* (Emery)). —Brown, 1960. Psyche 66: 25-27 (alarm and attack behavior). —Schneirla, 1960. Smithsn. Treasury of Science. Simon and Schuster, N. Y., pp. 664-696 (army ants, general). —Schneirla, 1961. Ztschr. f. Tierpsychol. 18: 1-32 (sexual broods and colony division of *Neivamyrmex nigrescens* (Cresson)). —Rettenmeyer, 1961. Kans. Univ., Sci. Bul. 42: 993-1066 (biology and taxonomy of flies over swarms of army ants). —Rettenmeyer, 1963. Univ. Kans., Sci. Bul. 44: 287-465 (behavioral studies of army ants in Canal Zone and Kansas). —Schneirla, 1963. Animal Behavior 11: 583-595 (springtime resurgence of cyclic function, Arizona species). —Rettenmeyer, 1960. XI. Internat. Kong. fur Ent., Wien. 1960, 1: 610-612 (mites associated with army ants). —Rettenmeyer, 1962. Kans. Ent. Soc., Jour. 35: 377-384 (millipedes associated with army ants). —Rettenmeyer, 1963. Ent. Soc. Amer., Ann. 56: 170-174 (Thysanura associated with army ants). —Watkins, 1964. Kans. Ent. Soc., Jour. 37: 22-28 (trail following). —Watkins and Cole, 1966. Tex. Jour. Sci. 18: 254-265 (attraction of workers to secretion of queens). —Akre and Rettenmeyer, 1966. Kans. Ent. Soc., Jour. 39: 745-782 (Staphylinidae associated with army ants). —Watkins, Cole, and Baldridge, 1967. Kans. Ent. Soc., Jour. 40: 146-151 (trail following and trail preference). —Akre and Rettenmeyer, 1968. Kans. Ent. Soc., Jour. 41: 165-174 (trail following by guests of army ants). —Akre, 1968. Pan-Pacific Ent. 44: 87-101 (Histeridae associated with army ants). —Rettenmeyer and Akre, 1968. Ent. Soc. Amer., Ann. 61: 1317-1326 (ectosymbiosis between phorid flies and army ants.). —Kannowski, 1969. Internat. Union for study of social insects, VI Cong., Proc. 6: 77-83 (daily and seasonal periodicities in nuptial flights). —Torgerson and Akre, 1970. Melanderia 5: 1-28 (persistence of army ant chemical trails and their significance in Ecitonine-Ecitophile association). —Torgerson and Akre, 1970. Kans. Ent. Soc., Jour. 43: 395-404 (interspecific responses to trail and alarm pheromones). —Schneirla, 1971. Army Ants: A Study in Social Organization. W. H. Freeman, San Francisco. 349 pp. —Topoff, 1971. Amer. Nat. 105: 529-548 (polymorphism related to division of labor and colony cyclic behavior).

Morphology: Hagen, 1954. Amer. Mus. Novitates 1663: 1-12 (anatomy of queen of *Eciton*). —Hagen, 1954. Amer. Mus. Novitates 1664: 1-17 (Reproductive system of queen of *Eciton*). —Hagen, 1954. Amer. Mus. Novitates 1665: 1-20 (oocyte cycle). —Lappano, 1958. Insectes Sociaux 5: 31-66 (morphological study of larval development in all worker broods of *Eciton burchelli* (Westwood). —Whelden, 1963. N. Y. Ent. Soc., Jour. 71: 158-178 (reproductive system of worker and female of *Eciton hamatum*(*F.*) and *Eciton burchelli* (Westwood)). —Whelden, 1963. N. Y. Ent. Soc., Jour. 71: 246-261 (antennae and legs of *E. hamatum* and *E. burchelli*).

Tribe ECITONINI

Genus LABIDUS Jurine

Labidus Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 282.
Type-species: *Labidus latreillii* Jurine. Monotypic.

Nycteresia Roger, 1861. Berlin. Ent. Ztschr. 5: 21.
Type-species: *Formica coeca* Latreille. Monotypic.
Pseudodicthadia Andre, 1885. Spec. Hym. Eur. Alg. 2: 838.
Type-species: *Pseudodicthadia incerta* Andre. Monotypic.

A neotropical genus of 8 species, one of which reaches the United States.

Revision: Borgmeier, 1955. Studia Ent. 3: 80-134.

Taxonomy: Wheeler and Wheeler, 1964. Ent. Soc. Wash., Proc. 66: 134 (larvae).

Biology: Rettenmeyer, 1963. Kans. Univ., Sci. Bul. 44: 403-424 (behavioral studies in Canal Zone).

coecus (Latreille). S. Ark., La., Okla., Tex. s. to Argentina. Ecology: The large colonies, usually with many thousands of individuals, are found in more or less temporary nests in decayed logs and stumps or in ground beneath objects. They are subterranean and nocturnal. Food consists of other arthropods, small mammals, birds, and nuts. Workers are highly predaceous and are known to feed on injurious insects such as the immature stages of the screwworm (*Cochliomyia hominivorax* (Coquerel)) and the secondary screwworm (*C. macellaria* (F.)).

Formica omnivora Olivier, 1791. Encycl. Meth. Hist. Nat. 6: 496. ☿. Preocc. by Linnaeus, 1758.
Formica coeca Latreille, 1802. Hist. Nat. Fourmis, v. 9, p. 270. ☿.
Labidus latreillii Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 283. ♂.
Labidus jurini Shuckard, 1840. Ann. Nat. Hist. 5: 198. ♂.
Labidus servillei Westwood, 1842. Arcana Ent., v. 1, p. 75. ♂.
Mutilla (*Labidus*) *fulvescens* Blanchard, 1849. *In* Cuvier, Regne Animale, ed. 3, v. 2, pl. 118, fig. 2.
Labidus saji (!) Haldeman, 1852. *In* Stanbury, Exped. Great Salt Lake, p. 367. ♂.
Labidus atriceps Smith, 1859. Cat. Hym. Brit. Mus., v. 7, p. 5. ♂.
Labidus pilosus Smith, 1859. Cat. Hym. Brit. Mus., v. 7, p. 7. ♂.
Labidus panzeri Smith, 1859. Cat. Hym. Brit. Mus., v. 7, p. 72. ♂.
Eciton vastator Smith, 1860. Jour. Ent., London 1: 71. ☿.
Eciton erratica Smith, 1860. Jour. Ent., London 1: 71. ☿.
Myrmica rubra Buckley, 1867. Ent. Soc. Phila., Proc. 6: 335. ☿. Preocc. in *Myrmica* by Linnaeus, 1758.
Pseudodicthadia incerta Andre, 1885. Spec. Hym. Eur. Alg. 2: 838. ♀.
Eciton smithii Dalla Torre, 1892. Cat. Hym., v. 7, p. 6. N. name for *L. pilosus* Smith.
Eciton coecum var. *biloba* Emery, 1901. Soc. Ent. Belg., Ann. 45: 51. ♂.
Eciton nigrita Emery, 1901. Soc. Ent. Belg., Ann. 45: 52. ♂.
Eciton coecum var. *kulowi* Forel, 1901. Mitt. Nat. Mus. Hamburg 18: 47. ♂.
Eciton selysi Forel, 1904. Soc. Ent. Belg., Ann. 48: 169. ☿.
Eciton grassator Forel, 1911. Deut. Ent. Ztschr., p. 288. ☿.
Eciton (*Labidus*) *coecum servillei* var. *hostilis* Santschi, 1920. Soc. Ent. France, Ann. 88: 368. ♂.
Eciton (*Labidus*) *coecum* var. *opacifrons* Wheeler, 1921. Amer. Acad. Arts and Sci., Proc. 56: 310. ☿.
Eciton (*Labidus*) *coecum* var. *elsbethae* Forel, 1922. Rev. Suisse Zool. 30: 91. ♂.
Eciton (*Labidus*) *serpentis* Weber, 1938. Ent. Soc. Amer., Ann. 31: 209. ☿.

Taxonomy: Weber, 1941. Amer. Midland Nat. 26: 238 (queen). —Wheeler, 1943. Ent. Soc. Amer., Ann. 36: 332 (larva). —Wheeler and Wheeler, 1964. Ent. Soc. Wash., Proc. 66: 135 (larva).

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 408-409. —Lindquist, 1942. Jour. Econ. Ent. 35: 850 (as predators of screwworms). —Hess, 1958. Field and Lab. 26: 35-37. —Kempf, 1961. Studia Ent. 4(n.s.): 551-552 (as a cave ant). —Rettenmeyer, 1963. Kans. Univ., Sci. Bul. 44: 418-424. —Smith, 1965. U. S. Dept. Agr. Tech. Bul. 1326, pp. 17-18. —Watkins and Cole, 1966. Tex. Jour. Sci. 18: 254-265 (attraction of workers to secretion of queens). —Watkins, Cole, and Baldridge, 1967. Kans. Ent. Soc., Jour. 40: 146-151 (trail following and trail preference).

Morphology: Borgmeier, 1957. Rev. Brasil. Biol. 17: 390 (maxillary and labial palps). —Gotwald, 1969. N. Y. Agr. Expt. Sta. (Cornell Univ.) Mem. 408, p. 127 (mouthparts).

Genus NOMAMYRMEX Borgmeier

Eciton subg. *Nomamyrmex* Borgmeier, 1936. Inst. Biol. Veg. Arq. 3: 55.
Type-species: *Eciton crassicorne* Smith. Orig. desig.

A genus of two species, a subspecies of only one reaching the United States. They are subterranean though carrying on terrestrial raids. Raiding is in columns of several ants wide and a few meters long and is sometimes done during the daylight hours.

Revision: Borgmeier, 1955. Studia Ent. 3: 135-161.

Taxonomy: Borgmeier, 1953. Studia Ent. 2: 4. —Borgmeier, 1958. Studia Ent. 1 (n. s.): 201-203.

Biology: Rettenmeyer, 1963. Kans. Univ. Sci. Bul. 44: 424-432 (behavioral studies in Canal Zone; *esenbeckii crassicornis* (Smith)).

Morphology: Borgmeier, 1957. Rev. Brasil. Biol. 17: 390 (maxillary and labial palps).

esenbeckii wilsoni (Santschi). Extreme s. Tex. to Costa Rica. *N. esenbeckii esenbeckii* (Westwood) is South American. Literature references for *esenbeckii* (Westwood) and *crassicornis* (Smith) from Texas pertain to *wilsoni*.
Eciton (*Labidus*) *Esenbecki Wilsoni* Santschi, 1919. Soc. Ent. France, Ann. 88: 366. ♂.
Eciton (*Holopone*) *crassicornis mordax* Santschi, 1928. Deut. Ent. Ztschr., p. 415. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 409 (male).

Genus NEIVAMYRMEX Borgmeier

Eciton subg. *Acamatus* Emery, 1894. Soc. Ent. Ital., Bol. 26: 181. Preocc. by Schoenherr, 1833.
Type-species: *Eciton* (*Acamatus*) *schmitti* Emery. Desig. by Wheeler, 1911.
Eciton subg. *Neivamyrmex* Borgmeier, 1940. Rev. de Ent. 11: 606. N. name for *Acamatus* Emery.
Woitkowskia Enzmann, 1952. Iowa Acad. Sci., Proc. 59: 443.
Type-species: *Woitkowskia connectens* Enzmann. Orig. desig.

About 115 species are known for this New World genus, but only 23 are found north of Mexico. Most species are found in the southwestern states with a few ranging east to the Atlantic coast and as far north as Virginia, Ohio, Illinois, and Iowa. The species are hypogaeic and are found in the soil under objects, though some have been reported from rotten logs and stumps. Some may carry on their foraging and emigrating activities during daylight, but most are apparently nocturnal in their activities. Most colonies have one functional queen, and new colonies are produced by fission. The cyclic pattern of nomadic and statary phases is similar to the tropical species, but in most Nearctic species the activity stops in the autumn and resumes again in the spring. Because many of the species listed below were described from a single caste, future study and caste association may reveal that fewer species actually exist.

Revision: Smith, 1942. Amer. Midland Nat. 27: 537-590 (U. S. species). —Borgmeier, 1955. Studia Ent. 3: 277-651 (New World species).

Taxonomy: Borgmeier, 1950. Rev. de Ent. 21: 624. —Watkins, 1971. Kans. Ent. Soc., Jour. 44: 93-103 (key to major workers and queens of U. S.). —Watkins, 1972. Kans. Ent. Soc., Jour. 45: 347-372 (keys for each caste and distribution of U. S. species).

Biology: Schneirla, 1958. Insectes Sociaux 5: 215-255 (last part of functional season, s.e. Ariz.). —Schneirla, 1961. Ztschr. f. Tierpsychologie 18: 1-32 (sexual broods and colony division). —Schneirla, 1963. Animal Behaviour 11: 583-595 (spring resurgence of cyclic function, s.e. Ariz.). —Rettenmeyer, 1963. Kans. Univ., Sci. Bul. 44: 433-452 (behavioral studies). —Watkins, 1964. Kans. Ent. Soc., Jour. 37: 22-28 (trail following). —Watkins and Cole, 1966. Tex. Jour. Sci. 18: 254-265 (attraction of workers to secretions of queens). —Watkins, Cole, and Baldridge, 1967. Kans. Ent. Soc., Jour. 40: 146-151 (trail following and

trail preference). —Plsek, Kroll, and Watkins, 1969. Kans. Ent. Soc., Jour. 42: 452-456 (association with carabids).

Morphology: Borgmeier, 1957. Rev. Brasil. Biol. 17: 392-393 (maxillary and labial palps).

agilis Borgmeier. S. Ariz.; Mexico. Only the worker is known.
Neivamyrmex agilis Borgmeier, 1953. Studia Ent. 2: 45. ☿.

andrei (Emery). N. Mex., Ariz.; Mexico. Only the male is known.
Eciton andrei Emery, 1901. Soc. Ent. Ital., Bol. 33: 53. ♂.
Eciton (*Acamatus*) *oslari* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 415. ♂.

baylori Watkins. Tex. (Waco).
Neivamyrmex baylori Watkins, 1973. Kans. Ent. Soc., Jour. 46: 430-433. ♂.

californicus (Mayr). Utah, Nev., Calif. Only the worker and queen are known.
Eciton californicum Mayr, 1870. Zool.-Bot. Gesell. Wien., Verh. 20: 969. ☿.
Eciton (*Acamatus*) *californicum* var. *obscura* Forel, 1914. Soc. Vaud. Sci. Nat., Bul. 50: 265. ☿.

Taxonomy: Watkins, 1972. Kans. Ent. Soc., Jour. 45: 363-366 (queen, distribution).

Biology: Mallis, 1938. Sci. Monthly 47: 220-226. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 62.

carolinensis (Emery). Va., N. C., S. C., Ga., Fla., Ohio, Tenn., Ala., Miss., La., Nebr., Kans., N. Mex., Ariz. All castes are known.
Eciton (*Acamatus*) *carolinense* Emery, 1894. Soc. Ent. Ital., Bol. 26: 184. ☿.

Biology: Smith, 1928. Ent. News 39: 245. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 278, 304. —Watkins, 1964. Kans. Ent. Soc., Jour. 37: 22-28 (trail following). —Watkins and Rettenmeyer, 1967. Psyche 74: 228-233 (effect of queen on longevity of workers).

fallax Borgmeier. La., Kans., Tex., N. Mex., Ariz.; Mexico; Guatemala. Only the worker is known. Literature references for *commutatum* (Emery) for N. Amer. north of Mexico should be referred to *fallax*.
Neivamyrmex fallax Borgmeier, 1953. Studia Ent. 2: 48. ☿.

fuscipennis (Wheeler). Kans., e. Tex. Only the male is known.
Acamatus fuscipennis Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 417. ♂. Misdet. as *spoliator* Forel, but *fuscipennis* validated by pl. 26, fig. 12.

Taxonomy: Watkins, 1975. Southwest. Nat. 20: 85-90 (relationship to *N. macropterus* Borgmeier; lectotype).

harrisii (Haldeman). Okla., Tex., N. Mex., Ariz.; Mexico. All castes are known. Records citing this species from Utah are probably incorrect.
Labidus harrisii Haldeman, 1852. *In* Stanbury, Exped. Great Salt Lake, p. 367. ♂.
Eciton wheeleri Emery, 1901. Soc. Ent. Ital., Bol. 33: 65. ☿.
Eciton (*Acamatus*) *wheeleri dubia* Creighton, 1932. Psyche 39: 75. ☿, ♀.

Taxonomy: Watkins, 1968. Amer. Midland Nat. 80: 273-275 (association of castes). —Borgmeier, 1958. Studia Ent. 1: 206-207.

Biology: Watkins and Cole, 1966. Tex. Jour. Sci. 12: 254-265 (attraction of workers to secretion of queens). —Watkins, Cole, and Baldridge, 1967. Kans. Ent. Soc., Jour. 40: 146-151 (trail following and trail preference). —Plsek, Kroll, and Watkins, 1969. Kans. Ent. Soc., Jour. 42: 452-456 (carabids in raiding columns).

Morphology: Forbes and Do-Van-Quy, 1965. N. Y. Ent. Soc., Jour. 73: 95-111 (male reproductive system).

leonardi (Wheeler). Okla., Tex., Calif.; Mexico. Only the worker is known.
Eciton (*Acamatus*) *leonardi* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 392. ☿.
Eciton (*Acamatus*) *peninsulare* Mann, 1926. Psyche 33: 98. ☿.

Taxonomy: Borgmeier, 1953. Studia Ent. 2: 10. —Watkins, 1971. Kans. Ent. Soc., Jour. 44: 101-103 (worker; biological notes).

Biology: Watkins and Cole, 1966. Tex. Jour. Sci. 18: 254-265 (=*pauxillus* of authors, not Wheeler; attraction of workers to secretion of queens). —Watkins, Cole, and Baldridge, 1967. Kans. Ent. Soc., Jour. 40: 146-151 (=*pauxillus* of authors, not Wheeler; trail following and trail preference).

macropterus Borgmeier. W. Tex., N. Mex., Ariz.; Mexico. only the male is known.
Neivamyrmex macropterus Borgmeier, 1953. Studia Ent. 2: 40. ♂.

Taxonomy: Watkins, 1975. Southwest. Nat. 20: 85-89 (relationship to *fuscipennis* (Wheeler)).

melanocephalus (Emery). S. Ariz. to Honduras. Only the worker is known.
Eciton (*Acamatus*) *melanocephalum* Emery, 1895. Zool. Jahrb. Abt. f. System. 8: 260. ☿.
Eciton (*Acamatus*) *melanocephalum xipe* Wheeler, 1914. N. Y. Ent. Soc., Jour. 22: 41. ☿.

melsheimeri (Haldeman). La., Okla., Tex.; s. to Costa Rica. Only the male is known. Records citing this species from Utah are probably incorrect.
Labidus melshaemeri(!) Haldeman, 1852. *In* Stanbury, Exped. Great Salt Lake, p. 368. ♂.

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 418.

microps Borgmeier. Ariz. (Phoenix). Only the male is known.
Neivamyrmex microps Borgmeier, 1955. Studia Ent. 3: 635. ♂.

minor (Cresson). Kans., Okla., Tex., N. Mex., Ariz., Nev., Calif.; Mexico. Only the male is known. One of the smallest of our legionary ants.
Labidus minor Cresson, 1872. Amer. Ent. Soc., Trans. 4: 195. ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 418 (male).

Biology: Wheeler and Long, 1901. Amer. Nat. 35: 165. —Cole, 1966. Brigham Young Univ., Sci. Bul. 7: 26.

mojave (Smith). Calif. (Mojave Desert). Only the male is known.
Eciton (*Neivamyrmex*) *mojave* Smith, 1943. Lloydia 6: 196. ♂.

moseri Watkins. La., Tex. Ecology: Collected from a nest of *Atta texana* (Buckley) in La. Only the worker and queen are known.
Neivamyrmex moseri Watkins, 1968. Kans. Ent. Soc., Jour. 41: 528-531. ☿.

Taxonomy: Watkins, 1971. Kans. Ent. Soc., Jour. 44: 95-99 (worker, queen; also biological notes).

nigrescens (Cresson). W. Va., Ky., Tenn., Ga., Ala., Miss., Ill., Iowa, Mo., Ark., La., Nebr., Kans., Okla., Tex., Colo., N. Mex., Ariz., Calif.; Mexico. Ecology: Temporary nesting sites are in decayed logs or stumps or in the ground beneath stones and other objects. Many foraging activities take place in daylight, and they are highly predaceous on other insects. Large colonies contain 150,000 to 250,000 workers. Each colony has one functional queen, and new colonies are formed by splitting. All castes are known.
Labidus nigrescens Cresson, 1872. Amer. Ent. Soc., Trans. 4: 194. ♂.
Eciton (*Acamatus*) *Schmitti* Emery, 1894. Soc. Ent. Ital, Bol. 26: 183. ☿.

Taxonomy: Wheeler, 1943. Ent. Soc. Amer., Ann. 36: 331 (larva). —Watkins, 1972. Kans. Ent. Soc., Jour. 45: 358-363 (worker, distribution).

Biology: Wheeler, 1900. Amer. Nat. 34: 565-574 (*sumichrasti*, not Norton). —Smith, 1927. Ent. Soc. Amer., Ann. 20: 401-404. —Cole, 1953. Tenn. Acad. Sci., Jour. 28: 84. —Schneirla, 1958. Insectes Sociaux 5: 215-255. —Rettenmeyer, 1963. Univ. Kans., Sci. Bul. 44: 446-452. —Gregg, 1963. Ants of Colo., pp. 286-288. —Watkins, 1964. Kans. Ent. Soc., Jour. 37: 22-28 (trail following). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 18-19. —Watkins and Cole, 1966. Tex. Jour. Sci. 18: 254-265 (attraction of workers to secretion of queens). —Watkins, Cole, and Baldridge, 1967. Kans. Ent. Soc., Jour. 40: 146-151 (trail following and trail preference). —Watkins, Gehlbach, and Baldridge, 1967. Southwest. Nat. 12: 455-462 (blind snake follows pheromone trails of *nigrescens*). —Watkins, Gehlbach, and Kroll, 1969. Ecology 50: 1098-1102 (attractant, repellant secretions). —Plsek, Kroll, and Watkins, 1969. Kans. Ent. Soc., Jour. 42: 452-456 (carabids in raiding columns). —Topoff, 1969. N. Y. Ent. Soc., Jour. 77: 273-274 (communication). —Topoff, 1969. Psyche 76: 375-381 (predatory association between carabids and *nigrescens*). —Topoff, 1970. N. Y. Ent. Soc., Jour. 78: 239-240 (cyclic behavior). —Watkins, Gehlbach, and Plsek, 1972. Tex. Jour. Sci. 23: 34. (behavior of blind snakes in response to raiding columns).

Morphology: Borgmeier, 1957. Rev. Brasil. Biol. 17: 393 (maxillary and labial palpi).

opacithorax (Emery). Va., N. C., S. C., Ga., Fla., Tenn., Ala., Mo., Ark., Kans., Okla., Tex., N. Mex., Ariz., Calif.; Mexico to Costa Rica. Ecology: Habits are similar to those of *nigrescens* (Cresson). All castes are known.

Eciton (*Acamatus*) *californicum opacithorax* Emery, 1894. Soc. Ent. Ital., Bol. 26: 184. ☿.
Eciton (*Acamatus*) *opacithorax castaneum* Borgmeier, 1939. Rev. de Ent. 10: 416. ☿.

Biology: Wheeler and Long, 1901. Amer. Nat. 35: 163, 172. —Smith, 1924. Ent. News 35: 84. —Cole, 1953. Tenn. Acad. Sci., Jour. 28: 84. —Schneirla, 1958. Insectes Sociaux 5: 215-255. —Rettenmeyer, 1963. Univ. Kans., Sci. Bul. 44: 437-446. —Watkins, 1964. Kans. Ent. Soc., Jour. 37: 22-28 (trail following). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 19-20. —Watkins and Cole, 1966. Tex. Jour. Sci. 18: 254-265 (attraction of workers to secretion of queens). —Watkins, Cole, and Baldridge, 1967. Kans. Ent. Soc., Jour. 40: 146-151 (trail following and trail preference). —Watkins, Gehlbach, and Baldridge, 1967. Southwest. Nat. 12: 455-462 (a blind snake follows pheromone trails of *opicithorax*).

Morphology: Borgmeier, 1957. Rev. Brasil. Biol. 17: 393 (maxillary and labial palpi).

pauxillus (Wheeler). Tex.; Mexico. Only the worker and queen are known.

Eciton (*Acamatus*) *pauxillum* Wheeler, 1903. Psyche 10: 93. ☿.

Taxonomy: Watkins, 1971. Kans. Ent. Soc., Jour. 44: 99-101 (worker, queen; biological notes).

Biology: Smith, 1938. Ent. Soc. Wash., Proc. 40: 158.

pilosus mandibularis (Smith). N. Mex., Ariz. Only the male is known. *N. pilosus pilosus* (Smith) is found in S. Amer.

Eciton (*Neivamyrmex*) *pilosum mandibulare* Smith, 1942. Amer. Midland Nat. 27: 543, 548. ♂.

pilosus mexicanus (Smith). Miss., Ark., La., Okla., Tex., Calif., s. to Colombia. All castes are known.

Labidus Mexicanus Smith, 1859. Cat. Hym. Brit. Mus., v.7, p. 7. ♂.
Eciton clavicornis Norton, 1868. Amer. Ent. Soc., Trans. 2: 46. ☿.
Eciton (*Labidus*) *subsulcatum* Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36: 440. ♂.
Eciton (*Acamatus*) *aztecum* Forel, 1901. Mitt. Nat. Mus. Hamburg 18: 49. ☿.
Eciton (*Labidus*) *spininode militarium* Santschi, 1929. Wien Ent. Ztg. 46: 85. ☿.

Taxonomy: Borgmeier, 1936. Inst. Biol. Veg. Arq. 3: 60. —Reichensperger, 1939. Zool. Jahrb. Abt. f. System. 73: 297-300.

Biology: Smith, 1924. Ent. News 35: 85. —Watkins and Cole, 1966. Tex. Jour. Sci. 18: 254-265 (attraction of workers to secretion of queens). —Watkins, Cole, and Baldridge, 1967. Kans. Ent. Soc., Jour. 40: 146-151 (trail following and trail preference).

rugulosus Borgmeier. S. Ariz.; Mexico. Only the worker is known.

Neivamyrmex rugulosus Borgmeier, 1953. Studia Ent. 2: 49. ☿.

swainsonii (Shuckard). La., Tex., N. Mex., Ariz., Calif.; s. to Argentina. Only the male is known.

Labidus swainsonii Shuckard, 1840. Ann. Nat. Hist. 5: 201. ♂.
Eciton (*Acamatus*) *arizonense* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 414. ♂.

texanus Watkins. Va., N. C., S. C., Ga., Fla., Tex., Colo., N. Mex., Ariz.; Mexico. All castes are known.

Neivamyrmex texanus Watkins, 1972. Kans. Ent. Soc., Jour. 45: 353-358. ☿, ♀, ♂.

Taxonomy: Wheeler and Long, 1901. Amer. Nat. 35: 161 (male described as *schmitti*). —Borgmeier, 1955. Studia Ent. 3: 496 (male described as *nigrescens*).

Unplaced Taxon of Dorylinae

Myrmica (*Monomarium*(*!*)) *coeca* Buckley, 1867. Ent. Soc. Phila., Proc. 6: 339. ☿. Tex. (San Saba Co.).

Subfamily CERAPACHYINAE

This small subfamily, found in the tropical regions of the world, exhibits a blending of doryline and ponerine traits both morphologically and biologically. Only three species are known from north of Mexico. Little is known concerning the behavior of the New World forms, but they are predaceous and carnivorous and the colonies are small. Wilson (1958) studied the behavior of several species from Melanesia and Australia and found them all to be myrmecophagous, feeding on the broods and sometimes adults of other species of ants. He suggested that these ants carry on an alternating, group foraging and raiding behavior pattern by which the colony efficiently exploits the surrounding territory.

After this section was completed, Brown (1975) published on the Cerapachyinae and regarded the Cerapachyini and Acanthostichini as tribes of the Ponerinae, consequently not recognizing the Cerapachyinae as a subfamily.

Revision: Brown, 1975. Search, Agr., Ent. (Ithaca) 15, 5 (1): 14-36 (Cerapachyini and Acanthostichini as tribes of Ponerinae; biol. notes; keys to world genera and species).

Taxonomy: Wheeler, 1920. Psyche 27: 50-51. —Donisthorpe, 1921. London Ent. Soc., Proc., pp. xlv-xlvii. —Wheeler, 1922. Amer. Mus. Nat. Hist., Bul. 45: 51-52. —Morley, 1939. Soc. Ent. France, Bul. 44: 114-118. —Reid, 1941. Roy. Ent. Soc. London, Trans. 91: 421-422. —Creighton, 1950. Harvard Univ., Mus. Compar. Zool., Bul. 104: 56-59. —Wheeler, 1950. Psyche 57: 102-113 (larvae). —Kuznezov, 1952. Dusenia 3: 115. —Brown, 1954. Insectes Sociaux 1: 26-27. —Wheeler and Wheeler, 1964. Ent. Soc. Wash., Proc. 66: 65-71 (larvae). —Wheeler and Wheeler, 1973. Psyche 80: 204-211 (larvae).

Biology: Wilson, 1958. Insectes Sociaux 5: 129-140 (behavior of certain Melanesian and Australian species).

Tribe CERAPACHYINI

Genus CERAPACHYS Smith

Cerapachys Smith, 1858. Linn. Soc. London, Jour. 2: 74.
Type-species: *Cerapachys antennatus* Smith. Monotypic.
Syscia Roger, 1861. Berlin. Ent. Ztschr. 5: 19.
Type-species: *Syscia typhla* Roger. Monotypic.
Parasyscia Emery, 1882. *In* Andre, Spec. Hym. Eur. Alg. 2: 235.
Type-species: *Parasyscia piochardi* Emery. Monotypic.

A pantropical genus with about 8 New World species, two of which are found in southwestern United States. For additional generic synonymy, see Brown, 1975 Search, Agr., Ent. (Ithaca) 15, 5 (1): 18-19.

Taxonomy: Kempf, 1972. Studia Ent. 15: 76 (generic synonymy).

augustae Wheeler. Tex., Ariz.; Mexico. The type colony from Austin, Tex., was found 6 inches below the surface of soil containing limestone chips; 10 workers and a female were found. Other specimens were found in the stomach of an armadillo.
Cerapachys (*Parasyscia*) *augustae* Wheeler, 1902. Biol. Bul. 3: 182. ☿, ♀.

Taxonomy: Smith, 1942. Ent. Soc. Wash., Proc. 44: 63 (male). —Wheeler, 1950. Psyche 57: 106-107 (larva).

Biology: Wheeler, 1903. Psyche 10: 205-209.

davisi Smith. Tex. (Ft. Davis, 5,000 ft.).
Cerapachys (*Parasyscia*) *davisi* Smith, 1942. Ent. Soc. Wash., Proc. 44: 64. ♂.

Tribe ACANTHOSTICHINI

Genus CTENOPYGA Ashmead

Ctenopyga Ashmead, 1905. Canad. Ent. 37: 382. Nom. nud.
Ctenopyga Ashmead, 1906. Ent. Soc. Wash., Proc. 8: 29.
Type-species: *Ctenopyga townsendi* Ashmead. Monotypic.

texanus (Forel). Tex.; Mexico.
Acanthostichus texanus Forel, 1904. Soc. Ent. Belg., Ann. 48: 168. ♀.
Ctenopyga townsendi Ashmead, 1906. Ent. Soc. Wash., Proc. 8: 29-30. ♀, ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 400 (female). —Smith, 1955. Brooklyn Ent. Soc., Bul. 50: 48-50 (synonymy).

Subfamily PONERINAE

One of the smaller subfamilies of ants, with most species found in the tropical regions of the world. Most of the North American forms are either northern extensions of Neotropical taxa or have been introduced by commerce from other parts of the world. These are primitive ants which nest in small colonies of a few hundred individuals or less, mostly in soil or rotting wood. They are predaceous and carnivorous.

Taxonomy: Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 111-144 (larvae). —Wheeler and Wheeler, 1964. Ent. Soc. Amer., Ann. 57: 443-462 (larvae). —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1197-1217 (larvae). —Wheeler and Wheeler, 1974. Ent. Soc. Wash., Proc. 76: 278-281 (larvae). —Wheeler and Wheeler, 1976. Amer. Ent. Soc., Trans. 102: 41-64 (supplementary studies on larvae).

Biology: Wheeler, 1910. Ants, pp. 225-245. —Wilson, 1958. Evolution 12: 24-31 (beginnings of nomadic and group-predatory behavior).

Tribe AMBLYOPONINI

Revision: Brown, 1960. Harvard Univ., Mus. Comp. Zool., Bul. 122: 145-230.

Genus AMBLYOPONE Erichson

Amblyopone Erichson, 1842. Arch. f. Naturgesch. 8: 260.
Type-species: *Amblyopone australis* Erichson. Monotypic.
Stigmatomma Roger, 1859. Berlin Ent. Ztschr. 3: 250.
Type-species: *Stigmatomma denticulatum* Roger. Desig. by Bingham, 1903.
Arotropus Provancher, 1881. Nat. Canad. 12: 205.
Type-species: *Arotropus binodosus* Provancher. Monotypic.
Amblyopopona Schulz, 1906. Spolia Hym., p. 154. Emend.
Stigmatomma subg. *Xymmer* Santschi, 1914. Bol. Lab. Zool. Gen. e Agr. Portici 8: 311.
Type-species: *Stigmatomma* (*Xymmer*) *muticum* Santschi. Monotypic.
Stigmatomma subg. *Fulakora* Mann, 1919. Harvard Univ., Mus. Comp. Zool., Bul. 63: 279.
Type-species: *Stigmatomma* (*Fulakora*) *celata* Mann. Orig. desig.
Amblyopone subg. *Neoamblyopone* Clark, 1927. *In* Wheeler, Amer. Acad. Arts and Sci., Proc. 62: 1.
Type-species: *Amlyopone* (*Neoamblyopone*) *clarki* Wheeler. Monotypic.
Amblyopone subg. *Protamblyopone* Clark, 1927. *In* Wheeler, Amer. Acad. Arts and Sci., Proc. 62: 1.
Type-species: *Amblyopone* (*Protamblyopone*) *aberrans* Wheeler. Monotypic.
Lithomyrmex Clark, 1928. Roy. Soc. W. Australia, Jour. 14: 30.
Type-species: *Lithomyrmex glauerti* Clark. Orig. desig.
Ericapelta Kusnezov, 1955. Zool. Anz. 154: 273.
Type-species: *Ericapelta egregia* Kusnezov, Monotypic.

This genus is represented in the tropical and temperate regions of the world though it is more highly developed in the Australian Region than elsewhere. The Nearctic forms commonly occur in wooded areas, especially those that are well shaded. They are subterranean, and the workers are timid and slow of movement. The female of *pallipes* forages for food during the period of nest founding, an archaic habit in ants.

Revision: Creighton, 1940. Amer. Mus. Novitates 1079: 1-8. —Brown, 1960. Harvard Univ., Mus. Comp. Zool., Bul. 122: 155-169.

Taxonomy: Brown, 1949. Psyche 56: 81-88. —Wheeler and Wheeler, 1964. Ent. Soc. Amer., Ann. 57: 444-446 (larvae).

Biology: Haskins and Haskins, 1951. Amer. Midland Nat. 45: 432-445 (colony founding of *A. australis* Erichson).

Morphology: Eisner, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 476 (proventriculus).

oregonense (Wheeler). B. C., Wash., Oreg., Calif. Ecology: Usually at low elevations in the coastal mountains.

Stigmatomma pallipes oregonense Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 389. ☿, ♀.

Taxonomy: Brown, 1960. Harvard Univ., Mus. Comp. Zool., Bul. 122: 169, 183.

pallipes (Haldeman). Ont., Que. s. to Ga. w. to Wis., Iowa, Okla., Colo., Tex., Ariz. Ecology: The small colonies are most common in areas of heavy cover and considerable precipitation. Chilopods appear to be the main food source.

Typhlopone pallipes Haldeman, 1844. Acad. Nat. Sci. Phila., Proc. 2: 54. ☿.
Stigmatomma serratum Roger, 1859. Berlin. Ent. Ztschr. 3: 251. ☿.
Arotropus binodosus Provancher, 1881. Nat. Canad. 12: 206. ♀.
Stigmatomma pallidipes(!) var. *Wheeleri* Santschi, 1913. Soc. Ent. Belg., Ann. 57: 429. ☿, ♀, ♂.
Stigmatomma pallipes arizonense Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 389. ☿.
Stigmatomma pallipes montigena Creighton, 1940. Amer. Mus. Novitates 1079: 2, 7. ☿, ♀.
Stigmatomma pallipes subterranea Creighton, 1940. Amer. Mus. Novitates 1079: 3, 8. ☿.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 261-262 (each caste). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 114 (larva). —Brown, 1960. Harvard Univ., Mus. Comp. Zool., Bul. 122: 169, 183-185. —Francoeur and Beique, 1966. Canad. Ent. 98: 141 (Provancher types).

Biology: Wheeler, 1900. Biol. Bul. 2: 56-64. —Haskins, 1928. N. Y. Ent. Soc., Jour. 36: 179-184. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 279. —Cole, 1953. Tenn. Acad. Sci., Jour. 28: 84. —Gregg, 1963. Ants of Colo., pp. 279-282.

Morphology: Whelden, 1957. N. Y. Ent. Soc., Jour. 65: 1-21 (anatomy). —Gotwald, 1969. N. Y. Agr. Expt. Sta. (Cornell Univ.), Mem. 408: 25-42 (mouthparts).

trigonignatha Brown. N. C. (Concord). Ecology: Sifted from leaf mold in Berlese funnel.

Amblyopone (*Stigmatomma*) *trigonignatha* Brown, 1949. Psyche 56: 81-84. ☿.

Taxonomy: Brown, 1960. Harvard Univ., Mus. Comp. Zool., Bul. 122: 169, 185.

Genus PRIONOPELTA Mayr

Prionopelta Mayr, 1866. Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 53: 503.
Type-species: *Prionopelta punctulata* Mayr. Monotypic.
Renea Donisthorpe, 1947. Ann. and Mag. Nat. Hist. (11) 14: 183. Preocc. by Nevill, 1880.
Type-species: *Renea testacea* Donisthorpe. Orig. desig.
Examblyopone Donisthorpe, 1949. Ann. and Mag. Nat. Hist. (12) 2: 401.
Type-species: *Examblyopone churchilli* Donisthorpe. Orig. desig.

A tropicopolitan genus of small, soil-inhabiting ants.

Revision: Brown, 1960. Harvard Univ., Mus. Comp. Zool., Bul. 122: 173-178.

Taxonomy: Brown, 1951. Brooklyn Ent. Soc., Bul. 46: 102. —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 120 (larvae). —Brown, 1953. Breviora 11: 11. —Wheeler and Wheeler, 1964. Ent. Soc. Amer., Ann. 57: 447 (larvae; *Prinopelta*(*!*)).

antillana Forel. Fla. (Juniper Springs, Marion Co.); W. Indies, Central America to Brazil, Bolivia (?). Ecology: Specimens have been found in soil.

Prionopelta punctulata antillana Forel, 1909. Deut. Ent. Ztschr., p. 239. ☿.

Taxonomy: Brown, 1960. Harvard Univ., Mus. Comp. Zool., Bul. 122: 178.

Biology: Kempf, 1961. Studia Ent. 4: 489-490 (in soil samples in Surinam).

Tribe PLATYTHYREINI

Revision: Brown, 1975. Search, Agr., Ent. (Ithaca) 15, 5 (1): 4-11 (world genera and species).

Taxonomy: Brown, 1952. Breviora 6: 1-6.

Genus PLATYTHYREA Roger

Platythyrea Roger, 1863. Berlin Ent. Ztschr. 7: 172.
Type-species: *Pachycondyla punctata* Smith. Desig. by Bingham, 1903.

A tropicopolitan genus with 8 Neotropical species, only one of which reaches the United States.

Taxonomy: Brown, 1952. Breviora 6: 4 (in key). —Wheeler and Wheeler, 1964. Ent. Soc. Amer., Ann. 57: 446 (larvae). —Wheeler and Wheeler, 1976. Amer. Ent. Soc., Trans. 102: 41 (revised characterization of larvae).

punctata (Smith). S. Fla. and s. Tex., s. to W. Indies, Central Amer., and Brazil. Ecology: Nests in small colonies up to a few hundred individuals each, usually in rotten logs and stumps or under the bark of trees in shady situations. Workers are active, forage singly, and are carnivorous and predatory.
Pachycondyla punctata Smith, 1858. Cat. Hym. Brit. Mus., v. 6, p. 108. ☿, ♂.
Platythyrea pruinosa Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 962. ☿.

Taxonomy: Forel, 1893. Ent. Soc. London, Trans., p. 358 (worker, female). —Mann, 1916. Harvard Univ., Mus. Comp. Zool., Bul. 60: 403. —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 119 (larva).

Biology: Forel, 1899. Rev. Suisse Zool. 9: 335 (in Barbados). —Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 80 (in Bahamas). —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 824 (in Puerto Rico). —Brown, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 229 (in Mexico).

Tribe ECTATOMMINI

Revision: Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 175-362.

Genus ECTATOMMA Smith

Ectatomma Smith, 1859. Cat. Hym. Brit. Mus., v. 6, p. 102.
Type-species: *Formica tuberculata* Olivier. Desig. by Bingham, 1903.

A Neotropical genus of about 14 species, none of which are native to the United States. One species was introduced into southern Texas for biological control purposes, but the attempt failed.

Revision: Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 206-211, 295-299.

Taxonomy: Wheeler and Wheeler, 1964. Ent. Soc. Amer., Ann. 57: 449 (larvae).

Biology: Weber, 1946. Ent. Soc. Wash., Proc. 48: 1-16 (*E. tuberculatum* (Olivier) and *E. ruidum* (Roger).

tuberculatum (Olivier). S. Tex. (?); Mexico to n. Argentina. Ecology: Nests are in the soil and are composed of several hundred individuals. Workers are predatory and carnivorous and also attend membracids and aphids on plants. Introduced into Victoria Co., Texas from Guatemala in 1904-1905 to combat the cotton boll weevil. The attempted introduction led to a fiery confrontation between O. F. Cook, instigator of the experiment, and W. M. Wheeler. Known as the kelep.
Formica tuberculata Olivier, 1791. Encycl. Meth., Dict. Ins., v. 6, p. 498. ☿.
Formica tridentata Fabricius, 1804. Systema Piezatorum, p. 42. ☿.
Ectatomma ferrugineus Norton, 1868. Comm. Essex Institute 6: 5. ☿, ♂.
Ectatomma tuberculatum var. *punctigerum* Emery, 1890. Soc. Ent. France, Ann. 10: 56. ☿.
Ectatomma tuberculatum var. *acrista* Forel, 1909. Deut. Ent. Ztschr., p. 254. ☿, ♀.
Ectatomma tuberculatum var. *irregularis* Santschi, 1921. Soc. Vaud. Nat. des Sci., Bul. 54: 83. ☿.

Taxonomy: Lever, 1930. Ent. Monthly Mag. 66: 214 (female). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 129-133 (larva). —Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 209, 211, 298-299. —Kempf, 1962. Studia Ent. 5: 2-3.

Biology: Cook, 1904. U. S. Dept. Agr., Div. Ent., Bul. 49: 1-15. —Cook, 1904. Science 19: 862-864. —Cook, 1904. Science 20: 310-312 (pupation). —Wheeler, 1904. Science 20: 437-440 (pupation; feasibility of introduction). —Cook, 1904. Science 20: 611-612. —Wheeler, 1904. Science 20: 766-768. —Cook, 1905. U. S. Dept. Agr., Bur. Ent., Tech. Ser. 10: 1-55. —Wheeler, 1905. Science 21: 706-710 (criticism of Cook's work). —Cook, 1906. Science 23: 187-189. —Wheeler, 1906. Science 23: 348-350. —Weber, 1946. Ent. Soc. Wash., Proc. 48: 1-16 (biology and economic significance).

Morphology: Haskins and Enzmann, 1938. N. Y. Acad. Sci., Ann. 37: 100-162 (physiology). —Gotwald, 1969. N. Y. Agr. Expt. Sta. (Cornell Univ.), Mem. 408: 25-42 (mouthparts).

Genus GNAMPTOGENYS Roger

Gnamptogenys Roger, 1863. Berlin Ent. Ztschr. 7: 174.
Type-species: *Ponera tornata* Roger. Desig. by Emery, 1911.
Ectatomma subg. *Stictoponera* Mayr, 1887. Zool.-Bot. Gesell. Wien, Verh. 37: 539.
Type-species: *Ectatomma coxale* Roger. Desig. by Bingham, 1903.
Ectatomma subg. *Holcoponera* Mayr, 1887. Zool.-Bot. Gesell. Wien, Verh. 37: 540.
Type-species: *Gnamptogenys striatula* Mayr. Desig. by Emery, 1911.
Alfaria Emery, 1896. Soc. Ent. Ital., Bul. 28: 41.
Type-species: *Alfaria simulans* Emery. Monotypic.
Ectatomma subg. *Poneracantha* Emery, 1897. Mus. Civ. Stor. Nat. Genova, Ann. 38: 547.
Type-species: *Ectatomma* (*Holcoponera?*) *bispinosum* Emery. Monotypic.
Rhopalopone Emery, 1897. Mus. Civ. Stor. Nat. Genova, Ann. 38: 549.
Type-species: *Rhopalopone epinotalis* Emery. Monotypic.
Emeryella Forel, 1901. Soc. Ent. Belg., Ann. 45: 334.
Type-species: *Emeryella schmitti* Forel. Monotypic.
Ectatomma subg. *Mictoponera* Forel, 1901. Soc. Ent. Belg., Ann. 45: 372.
Type-species: *Ectatomma* (*Mictoponera*) *diehli* Forel. Monotypic.
Ectatomma subg. *Parectatomma* Emery, 1911. *In* Wytsman, Gen. Ins., fasc. 118, p. 44.
Type-species: *Ectatomma* (*Gnamptogenys*) *triangulare* Mayr. Orig. desig.
Spaniopone Wheeler and Mann, 1914. Amer. Mus. Nat. Hist., Bul. 33: 11.
Type-species: *Spaniopone haytiana* Wheeler and Mann. Monotypic.
Wheeleripone Mann, 1919. Harvard Univ., Mus. Comp. Zool., Bul. 63: 282.
Type-species: *Wheeleripone albiclava* Mann. Orig. desig.
Opisthoscyphus Mann, 1922. U. S. Natl. Mus., Proc. 61: 4.
Type-species: *Opisthoscyphus scabrosus* Mann. Monotypic.
Ectatomma subg. *Commateta* Santschi, 1929. Zool. Anz. 82: 476.
Type-species: *Ectatomma* (*Parectatomma*) *bruchi* Santschi. Orig. desig.
Ectatomma subg. *Tammoteca* Santschi, 1929. Zool. Anz. 82: 476.
Type-species: *Ectatomma concinna* Smith. Orig. desig.
Emeryella subg. *Barbourella* Wheeler, 1930. New England Zool. Club, Proc. 12: 10.
Type-species: *Emeryella* (*Barbourella*) *banksi* Wheeler. Orig. desig.

Brown (1958) treated 81 species of which about 64 are found in the New World tropics and divided the genus into four species groups. The question has been raised as to whether our only species is native or adventive.

Revision: Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 211-241, 299-330.

Taxonomy: Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 133-134 (larvae). —Wheeler and Wheeler, 1964. Ent. Soc. Amer., Ann. 57: 540 (larvae). —Wheeler and Wheeler, 1976. Amer. Ent. Soc., Trans. 102: 43 (revised characterization of larvae).

hartmani (Wheeler). La. (Lucky), Tex. (Huntsville); Honduras. Ecology: Specimens have been taken from soil under banana trees in Honduras and from nests of *Trachymyrmex septentrionalis* (McCook) in La.
Ectatomma (*Parectatomma*) *hartmani* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 390. ☿.

Taxonomy: Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 228, 230, 234, 302. —Brown, 1961. Psyche 68: 69 (from Honduras; single worker from Tex. described by Wheeler possibly a locality error or adventive specimen).

Biology: Echols, 1964. Ent. Soc. Amer., Ann. 57: 137 (La.; first reproductive colonies taken in U. S.).

Genus PROCERATIUM Roger

Proceratium Roger, 1863. Berlin. Ent. Ztschr. 7: 171.
Type-species: *Proceratium silaceum* Roger. Monotypic.
Sysphingta Roger, 1863. Berlin. Ent. Ztschr. 7: 175.
Type-species: *Sysphingta micrommata* Roger. Monotypic.
Sysphincta Mayr, 1865. Reise d. Novara, Zool. 1 (1) Formicidae, p. 12. Emend.

About 24 world species are known, most of which are found in the warmer parts of the northern temperate region of the world. They are hypogaeic, and the small colonies of two or three dozen individuals are found in well-rotted, moist wood such as that of logs and stumps. A constant, high moisture content is essential. Toward the cooler areas they may be under the deepest rocks. Workers are sluggish and carnivorous, apparently feeding almost exclusively on the eggs of other Arthropods.

Revision: Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 264-266. —Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 241-248.

Taxonomy: Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 135-137. (larvae). —Wheeler and Wheeler, 1964. Ent. Soc. Amer., Ann. 57: 451 (larvae). —Snelling, 1967. Los Angeles Co. Mus., Contrib. Sci. 124: 1-10 (key to New World species). —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1202 (larvae).

Biology: Brown, 1958. Psyche 65: 115 (predation of arthropod eggs).

californicum Cook. Calif. Found in several scattered localities from Sutter Co. to Los Angeles Co. The worker is unknown.
Procratium(!) *californicum* Cook, 1953. The Ants of Calif., pp. 45-46. ♂.

Taxonomy: Snelling, 1967. Los Angeles Co. Mus., Contrib. Sci. 124: 1-10 (female, male).

croceum (Roger). Va. to Fla. w. to Ill., Tex.
Ponera crocea Roger, 1860. Berlin Ent. Ztschr. 4: 288. ♀.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 264 (worker, female). —Smith, 1930. Ent. Soc. Amer., Ann. 23: 390-392 (male). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 135 (larva).

Biology: Haskins, 1930. N. Y. Ent. Soc., Jour. 38: 121-126. —Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 246-247.

melinum (Roger). "Carolina"; Europe. A European species that doubtfully occurs in North America and has not been collected here since it was originally described; types may have been mislabeled.
Ponera melina Roger, 1860. Berlin. Ent. Ztschr. 4: 291. ☿, ♀, ♂.
Sysphingta Europaea Forel, 1886. Soc. Ent. Belg., Ann. (C. R.) 30: CLXIII. ☿.
Sysphincta europaea rossica Arnoldi, 1930. Zool. Anz. 91: 144. ☿, ♀.
Sysphincta fialai Kratochvil, 1944. *In* "Mohelno." Arch. Svaz. ochr. prir. dom. Morave, Svazek 6: 54, 86.

Taxonomy: Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 243, 246-248, 334 (doubtful in N. Amer.; also biological notes).

pergandei (Emery). Mass. to Fla. w. to Iowa, Ark., La.
Sysphincta pergandei Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 264. ☿.

Taxonomy: Smith, 1928. Ent. News 39: 242-243 (male). —Cole, 1940. Amer. Midland Nat. 24: 36. —Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 243, 246, 247-248, 336 (also biological notes).

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31: 276, 304. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 90-91 (ate only inside of gaster of dead workers of other ants.)

silaceum Roger. Mass., s. Ont. (Pelee Is. and vicinity) s. to n. Fla., w. to Ill., Ark., Okla.
Proceratium silaceum Roger, 1863. Berlin. Ent. Ztschr. 7: 172. ☿.
Proceratium crassicorne Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 265. ☿.
Proceratium crassicorne var. *vestitum* Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 266. ☿.
Proceratium silaceum rugulosum Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 390. ☿, ♀.

Taxonomy: Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 137 (larva). —Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 241, 245-248, 336 (also biology).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 373, 375. —Wheeler, 1916. Ind. Acad. Sci., Proc. 26: 460. —Smith, 1928. Ent. News 29: 244. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 272, 273, 276, 304. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 91.

Morphology: Kennedy and Talbot, 1939. Ind. Acad. Sci., Proc. 48: 206-210 (each caste; also biological notes).

Genus DISCOTHYREA Roger

Discothyrea Roger, 1863. Berlin. Ent. Ztschr. 7: 176.
Type-species: *Discothyrea testacea* Roger. Monotypic.
Pseudosysphincta Arnold, 1916. South. Afr. Mus., Ann. 14: 161.
Type-species: *Pseudosysphincta poweri* Arnold. Orig. desig.
Prodiscothyrea Wheeler, 1916. Roy. Soc. South. Aust., Trans. 60: 33.
Type-species: *Prodiscothyrea velutina* Wheeler. Monotypic.
Pseudosphincta Wheeler, 1922. Amer. Mus. Nat. Hist., Bul. 45: 645, 762. Variant spelling of *Pseudosysphincta*.

Most of the 26 species of this genus are found in the tropical and southern temperate regions of the world. Because of their small size and cryptobiotic habits, they are not commonly collected and their biology is poorly known. The colonies are small and a number of forms have been collected from leaf litter, humus, and rotten logs.

Revision: Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 248-253.

Taxonomy: Borgmeier, 1949. Rev. Brasil. Biol. 9: 205. —Borgmeier, 1957. Acad. Brasil. de Cien., An. 29: 124-125 (male). —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1202 (larvae).

Biology: Brown, 1958. Psyche 64: 115 (as predators of eggs of other arthropods).

testacea Roger. N. C. to Fla.; Okla. Ecology: Some have been found in pine forest litter and in soil.
Discothyrea testacea Roger, 1863. Berlin. Ent. Ztschr. 7: 177. ☿, ♀.

Taxonomy: Weber, 1939. Ent. Soc. Amer., Ann. 32: 99 (worker, female). —Smith and Wing, 1954. N. Y. Ent. Soc., Jour. 62: 110-112 (worker, female). —Smith, 1955. Brooklyn Ent. Soc., Bul. 50: 98 (probable type locality; collector). —Brown, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 118: 253, 341-342.

Tribe PONERINI

Taxonomy: Brown, 1963. Breviora 190: 1-10.

Genus PACHYCONDYLA Smith

Pachycondyla Smith, 1858. Cat. Hym. Brit. Mus., v. 6, p. 105.
Type-species: *Formica crassinoda* Latreille. Desig. by Emery, 1901.
Neoponera Emery, 1901. Soc. Ent. Belg., Ann. 45: 40, 43.
Type-species: *Formica villosa* Fabricius. Orig. desig.
Euponera subg. *Trachymesopus* Emery, 1911. *In* Wytsman, Gen. Ins., fasc. 118, p. 84.
Type-species: *Formica stigma* Fabricius. Orig. desig.

Brown (1973) has synonymized *Neoponera*, *Trachymesopus*, and several other genera with *Pachycondyla*. This is a large genus in the tropical regions of the world, but only three species reach the United States.

Revision: Emery, 1890. Soc. Ent. France, Ann. 10: 71-74 (*Pachycondyla*).

Taxonomy: Wilson, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 119: 352 (*Trachymesopus* not a subgenus of *Euponera*). —Kempf, 1960. Studia Ent. 3: 423-428 (New World species of *Trachymesopus*). —Kempf, 1961. Rev. Brasil. Ent. 10: 89-204 (Brazilian species of *Pachycondyla*). —Brown, 1963. Breviora 190: 6-8 (three species groups of *Trachymesopus*). —Kempf, 1964. Studia Ent. 7: 49-52 (key to species of *Pachycondyla*). —Brown, 1973. *In* Meggers, *et al.*, Tropical forest ecosystems in Africa and S. Amer., pp. 178-185 (generic synonymy).

harpax (Fabricius). La., Tex. s. to Brazil; W. Indies. Ecology: Colonies of about 150 individuals are found in rotten logs and stumps or in soil beneath objects. Workers avoid direct sunlight and forage in the morning and in shade for other insects and myriapods on which they feed. There are both ergatoid and normal females.

Formica harpax Fabricius, 1804. Systema Piezatorum, p. 401. ☿.
Pachycondyla Montezumia Smith, 1858. Cat. Hym. Brit. Mus., v. 6, p. 108. ♀, ♂.
Pomera(!) *amplinoda* Buckley, 1866. Ent. Soc. Phila., Proc. 6: 171. ☿.
Pachycondyla Orizabana Norton, 1868. Amer. Nat. 2: 64. ☿.
Pachycondyla harpax var. *dibullana* Forel, 1901. Rev. Suisse Zool. 9: 347. ☿.
Pachycondyla harpax var. *irina* Wheeler, 1925. Arkiv for Zool. 17A: 5. ☿.
Pachycondyla harpax var. *concinna* Wheeler, 1925. Arkiv for Zool. 17A: 5. ☿, ♀.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 401-403 (each caste). —Brown, 1950. Wasmann Jour. Biol. 8: 247-248 (species synonymy). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 617-618 (larva). —Kempf, 1961. Rev. Brasil. Ent. 10: 194.

Biology: Wheeler, 1900. Biol. Bul. 2: 1-31. —Haskins and Enzmann, 1938. N. Y. Acad. Sci., Ann. 37: 150-151 (formation of new colony; in Canal Zone).

stigma (Fabricius). Fla.; W. Indies, Mexico s. to n. Argentina; S. China to Samoa, n. Queensland. Ecology: They prefer to nest in moist, dead logs or stumps, occasionally under stones. Apparently a tramp species distributed by commerce outside the New World. Whether or not it is endemic or adventive to Florida is unknown.

Formica stigma Fabricius, 1804. Systema Piezatorum, p. 400. ♀.
Ponera quadridentata Smith, 1859. Linn. Soc. London, Jour. Zool. 3: 143. ♀.
Ponera Americana Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 13: 722. ☿.
Euponera (*Trachymesopus*) *nixoni* Donisthorpe, 1943. Ann. and Mag. Nat. Hist., ser. 11, 10: 441. ♀.
Euponera (*Trachymesopus*) *brunneus* Donisthorpe, 1947. Ann and Mag. Nat. Hist., ser. 11, 14: 300-301. ☿, ♀.
Euponera (*Trachymesopus*) *sexdentatus* Donisthorpe, 1949. Ann. and Mag. Nat. Hist., ser. 12, 1: 746. ☿.

Taxonomy: Smith, 1934. Ent. Soc. Amer., Ann. 27: 561-564. —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 627 (larva). —Wilson, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 119: 355 (synonymy and distribution). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 22 (Polynesia). —Wheeler and Wheeler, 1976. Amer. Ent. Soc., Trans. 102: 55-58 (descriptions of larvae from different localities; as *Mesoponera stigma*).

Biology: Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 824. —Haskins and Enzmann, 1938. N. Y. Acad. Sci., Ann. 37: 151 (colony formation; Canal Zone). —Kempf, 1960. Studia Ent. 3: 427-428. —Wilson, 1959. Evolution 13: 128 (distribution; ecology).

villosa (Fabricius). S. Tex. (as far north as San Antonio) s. to n. Argentina. Ecology: Colonies occur in the soil and in logs and stumps. Workers run rapidly in the bright sun in search of insects on which they feed. They can sting severely. The largest ponerine ant in the U. S.

Formica villosa Fabricius, 1804. Systema Piezatorum, p. 409. ☿.
Ponera bicolor Guerin, 1845. Iconogr. Regne Anim., Ins., v. 7, p. 242. ☿.
Ponera pilosa Smith, 1858. Cat. Hym. Brit. Mus., v. 6, p. 95. ♂.

Ponera pedunculata Smith, 1858. Cat. Hym. Brit. Mus., v. 6, p. 96. ☿.

Taxonomy: Roger, 1861. Berlin Ent. Ztschr. 5: 1 (worker, male). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 615 (larva). —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1205 (larva).

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 404.

Genus BRACHYPONERA Emery

Euponera subg. *Brachyponera* Emery, 1901. Soc. Ent. Belg., Ann. 45: 43.
Type-species: *Ponera sennaarensis* Mayr. Orig. desig.

A small genus found in the Old World. The one species in North America is adventive.

Taxonomy: Wilson, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 119: 346 (not a subgenus of *Euponera*). —Brown, 1958. Acta Hym. 1: 21.

solitaria (Smith). Va., N. C., Ga.; Japan, China, and adjacent areas. Ecology: The small colonies are found in moist, rotten wood or in soil beneath objects; they prefer dark, damp places. Food consists of small arthropods. Accidentally introduced into N. Amer.
Ponera solitaria Smith, 1874. Ent. Soc. London, Trans., p. 404. ☿.

Taxonomy: Smith, 1934. Ent. Soc. Amer., Ann. 27: 558-561 (description; first record for N. Amer.). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 49: 629 (larva). —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1207 (larva).

Biology: Smith, 1934. Ent. Soc. Amer., Ann. 27: 560-561.

Genus CRYPTOPONE Emery

Cryptopone Emery, 1892. Soc. Ent. France, Bul. 61: CCLXXV.
Type-species: *Amblyopone? testacea* Motschulsky. Monotypic.

Most species of this genus are found in Southeast Asia and vicinity; only one, apparently endemic species occurs in the United States.

Taxonomy: Wilson, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 119: 357-361. —Brown, 1963. Breviora 190: 6.

gilva (Roger). Ga., Tenn., Ala., Miss., Ark., La., Tex. Ecology: The small colonies nest in moist dead logs or stumps, preferring loose frass under bark.
Ponera gilva Roger, 1863. Berlin. Ent. Ztschr. 7: 170. ☿.
Euponera (*Trachymesopus*) *gilva harnedi* Smith, 1929. Ent. Soc. Amer., Ann. 22: 543. ☿.

Taxonomy: Smith, 1934. Ent. Soc. Amer., Ann. 27: 561-563. —Creighton and Tulloch, 1930. Psyche 37: 73-79 (each caste). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 625-627 (larva). —Brown, 1963. Breviora 190: 6.

Biology: Haskins, 1931. N. Y. Ent. Soc., Jour. 39: 507-521. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 277, 304.

Genus PONERA Latreille

Ponera Latreille, 1804. Nouv. Dict. Hist. Nat. 24: 179.
Type-species: *Formica contracta* Latreille. Desig. by Latreille, 1805.
Pseudocryptopone Wheeler, 1933. Amer. Mus. Novitates 672: 12-13.
Type-species: *Cryptopone tenuis* Emery. Orig. desig.
Selenopone Wheeler, 1933. Amer. Mus. Novitates 672: 19.
Type-species: *Ponera selenophora* Emery. Orig. desig.

Taylor (1967) treated 28 world species and divided the genus into several species groups. Most species are found in the Indo-Australian area. The only two New World species are North American. Most forms are found in forested areas where they nest in small colonies in rotten wood or stumps or in the soil beneath cover. The workers are carnivorous.

Revision: Smith, 1936. Ent. Soc. Amer., Ann. 29: 420-430 (in part; U. S.). —Taylor, 1967. Pacific Ins. Monog. 13: 1-112 (world).

Taxonomy: Wilson, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 356-357. —Brown, 1958. Acta Hym. 1: 22-23. —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1208 (larvae).

Species Group Leae

exotica Smith. N. C., Okla. Ecology: Specimens are all from Berlese samples of leaf litter or leaf mold. Possibly introduced. Affinities are with the Indo-Australian fauna.
Ponera exotica Smith, 1962. Acta Hym. 1: 378-382. ☿, ♀.

Taxonomy: Taylor, 1967. Pacific Ins. Monog. 13: 96-97.

Species Group Coarctata

pennsylvanica Buckley. N. S., Que. s. to Fla. w. to Ont., N. Dak., Colo., Utah, N. Mex. Ecology: Most abundant in the eastern deciduous forests, east of the 97th meridian, with only scattered records in the western states. Nests are found under rotting logs, in rotting stumps, small fragments of wood, acorns and other objects, or in soil or leaf mold. In drier habitats they may nest under stones. Workers forage in or on the ground and are carnivorous. Only occasionally a household pest.
Ponera Pennsylvanica Buckley, 1866. Ent. Soc. Phila., Proc. 6: 171. ♀.

Taxonomy: Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 631 (larva). —Taylor, 1967. Pacific Ins. Monog. 13: 29-38 (also biology, ecology). —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1210 (larva).

Biology: Wheeler, 1900. Biol. Bul. 2: 22-23, 43-56. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 581. —Haskins and Enzmann, 1938. N. Y. Acad. Sci., Ann. 37: 152-155 (colony formation). —Headley, 1952. Ent. Soc. Amer., Ann. 45: 436-438. —Kannowski, 1959. Insectes Sociaux 6: 118 (colony founding). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 91-92. —Gregg, 1963. Ants of Colo., pp. 281-282, 284.

Morphology: Gotwald, 1969. N. Y. Agr. Expt. Sta. (Cornell Univ.) Mem. 408: 25-42 (mouthparts).

Genus HYPOPONERA Santschi

Ponera subg. *Hypoponera* Santschi, 1938. Soc. Ent. France, Bul. 43: 79.
Type-species: *Ponera abeillei* Andre. Orig. desig.

A large cosmopolitan genus whose habits are similar to those of species of *Ponera*. Prior to Taylor, 1967, the species below were assigned to the genus *Ponera*.

Revision: Smith, 1936. Ent. Soc. Amer., Ann. 29: 420-430 (in part, as *Ponera;* U. S.).

Taxonomy: Taylor, 1967. Pacific Ins. Monog. 13: 9-14 (a distinct genus). —Taylor, 1968. Ent. News 79: 63-66 (list of N. Amer. species). —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1210 (larvae).

gleadowi (Forel). Md. (Priest Bridge); Asia. Apparently a widespread tramp species. Possibly introduced. No other confirmed records from the U. S.
Ponera Gleadowi Forel, 1895. R. Accad. Sci. Bologna, Mem. 5: 292-293. ☿.
Ponera japonica formosae Forel, 1913. Arch. f. Naturgesch. 79: 186.
Ponera oblongiceps Smith, 1939. Ent. Soc. Wash., Proc. 41: 76-78. ☿, ♀, apterous ergatoid ♂.

Taxonomy: Wilson, 1958. Harvard Univ., Mus. Comp. Zool., Bul. 119: 326 (Melanesia; provisional synonymy). —Taylor, 1967. Pacific Ins. Monog. 13: 11, 12, 76. —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 29 (unknown from Polynesia; synonymy given for *gleadowi* by Wilson, 1958 provisionally transferred to synonymy of *punctatissima* (Roger)). —Taylor, 1968. Ent. News 79: 65 (U. S.).

inexorata (Wheeler). S. C. to Fla. w. to Tex., Ariz.; s. to Central Amer.
Ponera inexorata Wheeler, 1903. Psyche 10: 94. ☿, ♀.

Taxonomy: Taylor, 1968. Ent. News 79: 65.

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 406.

opaciceps (Mayr). S. C. to Fla. w. to Colo., Ariz.; s. to Argentina, W. Indies; s. e. Asia, Polynesia. Probably spread from New World to Old World by commerce.
Ponera opaciceps Mayr, 1887. Zool.-Bot. Gesell. Wien., Verh. 37: 536. ☿.
Ponera perkinsi Forel, 1899. Fauna Hawaiiensis, p. 117. ☿, ♀, ♂.
Ponera andrei Emery, 1900. Termes. Fuzetek 23: 318. ☿.

Taxonomy: Smith, 1929. Ent. Soc. Amer., Ann. 22: 545-546. —Smith and Haug, 1931. Ent. Soc. Amer., Ann. 24: 507-509 (ergatandrous form). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 364 (larva). —Kempf, 1962. Studia Ent. 5: 7-9. —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 28 (Polynesia). —Taylor, 1968. Ent. News 79: 65. —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1210 (larva).

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 125, 404. —Smith, 1927. Ent. News 38: 308-309. —Kempf, 1960. Studia Ent. 3: 391. —Gregg, 1963. Ants of Colo., pp. 283-284.

opacior (Forel). Va. to Fla. w. to Ohio, Iowa, Colo., Tex.; Oreg., Calif.; Mexico s. to Chile, Argentina; W. Indies. More sporadically distributed west of Tex. than in eastern states.
Ponera trigona var. *opacior* Forel, 1893. Ent. Soc. London, Trans., p. 363. ☿, ♀.

Taxonomy: Taylor, 1968. Ent. News 79: 65.

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31: 272, 274, 277, 304 (Tenn.) —Cole, 1940. Amer. Midland Nat. 24: 37 (Smoky Mts.). —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 63 (Calif.). —Potts, 1948. Pan-Pacific Ent. 24: 26 (Calif.). —Gregg, 1963. Ants of Colo., pp. 284-286.

punctatissima (Roger). Fla., Tex., N. Mex., Ariz., Calif.; s. to Central Amer., W. Indies; Europe, N. Africa. Ecology: Nearly cosmopolitan in warmer parts of world. Possibly introduced; probably of African origin.
Ponera punctatissima Roger, 1859. Berlin. Ent. Ztschr. 3: 246-248. ☿, ♀.
Ponera androgyna Roger, 1859. Berlin. Ent. Ztschr. 3: 254. Ergatoid ♂.
Ponera ergatandria Forel, 1893. Ent. Soc. London, Trans., p. 365. ☿, ♀, apterous ergatoid ♂.
Ponera punctatissima schauinslandi Emery, 1899. Zool. Jahrb., Abt. f. System 12: 439. ♀.

Taxonomy: Smith, 1936. Ent. Soc. Amer., Ann. 29: 422, 425-426 (female, worker, apterous ergatoid male). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 28-29 (Polynesia; synonymy under *gleadowi* (Forel) listed by Wilson, 1958, Harvard Univ., Mus. Comp. Zool., Bul. 119: 328-329 provisionally transferred to *punctatissima*. This synonymy is not listed above). —Taylor, 1968. Ent. News 79: 65.

Biology: Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 825. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 63.

Genus LEPTOGENYS Roger

Only a single species of this tropicopolitan genus is known to occur in the United States.

Taxonomy: Wheeler and Wheeler, 1976. Amer. Ent. Soc., Trans. 102: 49 (revised characterization of larvae).

Genus LEPTOGENYS Subgenus LEPTOGENYS Roger

Leptogenys Roger, 1861. Berlin. Ent. Ztschr. 5: 41.
Type-species: *Leptogenys falcigera* Roger. Desig. by Bingham, 1903.
Dorylozelus Forel, 1915. Arkiv for Zool. 9: 24-25.
Type-species: *Dorylozelus joebergi* Forel. Monotypic.
Microbolbos Donisthorpe, 1948. Entomologist 81: 170.
Type-species: *Microbolbos testaceus* Donisthorpe. Orig. desig.

Not known to occur in the Nearctic Region.

Genus LEPTOGENYS Subgenus LOBOPELTA Mayr

Lobopelta Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12: 733.
Type-species: *Ponera diminuta* Smith. Desig. by Bingham, 1903.

Revision: Wheeler, 1923. Amer. Mus. Novitates 90: 1-16.

elongata elongata (Buckley). La., Tex. Ecology: The small colonies are found in the soil. The workers apparently forage singly and feed largely, if not exclusively, on pillbugs. There is no typical female as with most ants, reproduction being carried on by a wingless, slightly modified worker form with an enlarged gaster.

Ponera Texana Buckley, 1866. Ent. Soc. Phila., Proc. 6: 170. ☿. A questionable synonym.
Ponera elongata Buckley, 1866. Ent. Soc. Phila., Proc. 6: 172. ☿.
Lobopelta septentrionalis Mayr, 1866. Zool.-Bot. Gesell. Wien, Verh. 36: 438. ☿.

Taxonomy: Wheeler, 1904. Biol. Bul. 6: 257-259 (worker, gynaecoid female, male). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 641 (larva). —Wheeler, 1900. Biol. Bul. 2: 1-31.

Morphology: Hermann, 1969. Kans. Ent. Soc., Jour. 42: 239-243 (poison apparatus).

elongata manni Wheeler. Fla.

Leptogenys (*Lobopelta*) *elongata manni* Wheeler, 1923. Amer. Mus. Novitates 90: 14-15. ☿.

Tribe ODONTOMACHINI

Genus ODONTOMACHUS Latreille

Odontomachus Latreille, 1804. Nouv. Dict. Hist. Nat. 24: 179.
Type-species: *Formica haematoda* Linnaeus. Monotypic.

Four forms of this tropicopolitan genus reach the southern portions of the United States. All of these have previously been considered as subspecies of the Neotropical *O. haematodus* (L.). Most colonies are small and are found in soil or in rotting logs and stumps. Workers are predaceous and carnivorous. Species of this genus have elongated, linear mandibles and long hairs which arise between the bases of the mandibles and point forward. These hairs act as triggers when the mandibles are open. When the hairs are touched, the mandibles snap shut resulting in a clicking sound. If the mandibles close suddenly on a small object, the object may be cut in two; if they close suddenly on a large object and the mandibles slide over it, the ant is thrown in a series of leaps by the force of its closing mandibles.

Revision: Smith, 1939. N. Y. Ent. Soc., Jour. 47: 125-130 (U. S.).

Taxonomy: Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 646 (larvae). —Wheeler and Wheeler, 1964. Ent. Soc. Amer., Ann. 57: 455-456 (larvae). —Wheeler and Wheeler, 1971. Ent. Soc. Amer., Ann. 64: 1212 (larvae). —Wheeler and Wheeler, 1976. Amer. Ent. Soc., Trans. 102: 61 (revised characterization of larvae).

Biology: Wheeler, 1900. Biol. Bul. 2: 1-31. —Wheeler, 1922. Amer. Mus. Nat. Hist., Bul. 45: 99-103. —Weyer, 1930. Zool. Anz. 90: 49-55 (leaping habits).

Morphology: Eisner, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 475-476 (proventriculus).

clarus Roger. La., Tex.; Mexico, Clarion Is., W. Indies. Ecology: Found in semi-desert regions where colonies occur in coarse, gravelly soil, fully exposed to the sun.

Odontomachus clarus Roger, 1861. Berlin. Ent. Ztschr. 5: 26. ☿.
Odontomachus texana Buckley, 1867. Ent. Soc. Phila., Proc. 6: 355. ☿.
Odontomachus haematoda clarionensis Wheeler, 1934. Pan-Pacific Ent. 10: 141. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 407 (worker, female, male). —Wheeler and Wheeler, 1952. Amer. Midland Nat. 48: 648-650 (larva). —Taylor and Wilson, 1961. Psyche 68: 142.

Biology: Wheeler, 1900. Biol. Bul. 2: 1-31. —Haskins and Enzmann, 1938. N. Y. Acad. Sci., Ann. 37: 100-143.

coninodis Wheeler. Ariz. (Huachuca Mtns.). Ecology: Small colonies are in coarse gravelly soil under stones at high elevations, usually over 5000 ft.

Odontomachus haematoda coninodis Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 391. ☿, ♀.

desertorum Wheeler. N. Mex., Ariz.; Mexico. Ecology: Small colonies are in coarse gravelly soil under stones. Found at lower elevations than *coninodis*.
Odontomachus haematoda desertorum Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 391. ♀.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27: 394.

insularis Guerin. Ga., Fla., Ala.; Mexico to Brazil, W. Indies, Cocos Is., Clipperton Is. Ecology: Colonies may be in soil or in rotting logs and stumps. Possibly adventive in the U. S., distributed by commerce.
Odontomachus insularis Guerin, 1844. Iconogr. Regne Anim. Ins., v. 7, p. 423. ♀.

Taxonomy: Roger, 1861. Berlin. Ent. Ztschr. 5: 26 (worker, male). —Taylor and Wilson, 1961. Psyche 68: 142 (distribution).

Biology: Haskins and Enzmann, 1938. N. Y. Acad. Sci., Ann. 37: 149 (formation of new colonies).

Subfamily PSEUDOMYRMECINAE

A small subfamily with one genus in the New World and several genera in the Old World tropics. M. R. Smith (1951) named this subfamily Leptaleinae based on the genus *Leptalea* Erichson, but later (1952) found an earlier valid generic name, *Pseudomyrmex* Lund, and changed the subfamily name to Pseudomyrmecinae which has become widely established.

Taxonomy: Smith, 1951. U. S. Dept. Agr., Agr. Monog. 2: 788 (Leptaleinae). —Smith, 1952. Ent. Soc. Wash., Proc. 54: 97-98 (Pseudomyrmecinae). —Wheeler and Wheeler, 1973. Psyche 80: 204-211 (larvae).

Genus PSEUDOMYRMEX Lund

Pseudomyrme Lund, 1831 (June). Ann. Sci. Nat. Zool. 23: 137. Latreille ms.; vernacular.
Pseudomyrmex Lund, 1831 (November). Notizen aus dem Gebiete der Natur und Heilkunde 32(7): 106. Latreille ms.
Type-species: *Formica gracilis* Fabricius. Desig. by Smith, 1952.
Leptalea Erichson, 1839. Arch. f. Naturgesch. 5: 309. Klug ms.
Type-species: *Formica gracilis* Fabricius. Desig. by Wheeler, 1911.
Myrmex Guerin, 1844. Iconogr. Regne Anim., Ins., v. 7, p. 427. Preocc. by Sturm, 1826.
Type-species: *Formica* (*Myrmex*) *perboscii* Guerin. Monotypic.
Pseudomyrma Guerin, 1844. Iconogr. Regne Anim., Ins., v. 7, p. 427. emend.
Leptalaea Spinola, 1851. Accad. Sci. Torino, Mem. 13: 68. Emend.

Over 190 forms of *Pseudomyrmex* have been described, but only five reach the southern portions of the United States. These ants prefer to nest almost exclusively in preformed plant cavities such as twigs and branches of trees, stems of plants, acacia thorns, and in culms of sedges and grasses. Some species may be restricted to one species of plant or even to one part of the plant. Among these are the acacia nesting species which nest in the swollen bases of the larger spines. Janzen (1967) studied a case of obligatory mutualism between a species of *Pseudomyrmex* and *Acacia* in Mexico and found that the ant is dependent on the acacia for food and the acacia is dependent on the ant for a substantial part of its life in order to produce seeds and become part of the reproductive population. The ant colony protects the plant from damaging factors such as defoliators and thereby assures its own survival on the plant which is its only food source.

Revision: Mayr, 1870. Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 61: 406-413.

Taxonomy: Smith, 1952. Ent. Soc. Wash., Proc. 54: 97-98 (correct generic name). —Creighton, 1955. N. Y. Ent. Soc., Jour. 63: 19-20 (key to workers of U. S.). —Wheeler and Wheeler, 1956. Ent. Soc. Amer., Ann. 49: 376-379 (larvae). —Kempf, 1958. Studia Ent. (n. s.) 1: 434 (*gracilis* (Fabricius) group).

Biology: Wheeler, 1913. 2nd Internatl. Cong. Ent., Oxford, Trans. 2: 109-139 (observations on Central American *Acacia* ants). —Wheeler and Bailey, 1920. Amer. Phil. Soc., Trans. (n. s.) 22: 235-279 (feeding habits). —Brown, 1960. Ecology 41: 589-592 (ants, acacias and

browsing mammals). —Janzen, 1966. Evolution 20: 249-275 (coevolution of mutualism between ants and acacias in Central America). —Janzen, 1967. Kans. Univ., Sci. Bul. 48: 315-558 (interaction of the bull's-horn acacia with an ant inhabitant (*Pseudomyrmex ferruginea* Smith) in eastern Mexico). —Janzen, 1967. Ecology 48: 26-35 (fire, vegetation structure and the ant acacia interaction in Central America). —Janzen, 1969. The Condor 71: 240-256 (the ant acacia interaction and birds in Central America.).

Morphology: Eisner, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 452-453 (proventriculus). —Gotwald, 1969. N. Y. Agr. Expt. Sta (Cornell Univ.), Mem. 408: 128 (mouthparts).

apache Creighton. S. Tex., s. N. Mex., s. Ariz., s. Calif.; n. Mexico. Ecology: Most colonies have been found in sizeable limbs or trunks of species of *Quercus* and *Prosopis*.
Pseudomyrmex apache Creighton, 1952. Psyche 59: 134-139. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1956. Ent. Soc. Amer., Ann. 49: 380 (larva).

Biology: Creighton, 1954. Psyche 61: 9-15. —Creighton, 1963. Amer. Mus. Novitates 2156: 1-4 (high mortality during cold snap).

brunneus (Smith). N. C. to Fla. w. to Tex. s. to Central Amer.; W. Indies. Ecology: Colonies have been found in dead twigs of various plants and in culms of grasses and sedges.
Pseudomyrma brunnea Smith, 1877. Ent. Soc. London, Trans., p. 63. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 420-421. —Wheeler and Wheeler, 1956. Ent. Soc. Amer., Ann. 49: 382 (larva).

Biology: Mitchell and Pierce, 1912. Ent. Soc. Wash., Proc. 14: 69. —Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 3.

elongatus (Mayr). Fla., Tex. s. to S. Amer.; W. Indies. Ecology: Colonies have been found in twigs of trees and in culms of grasses and sedges.
Pseudomyrma elongata Mayr, 1870. Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 61: 408, 413. ☿.
Pseupomyrma elongata var. *cubaensis* Forel, 1901. Soc. Ent. Belg., Ann. 45: 342 ♀.
Pseudomyrma elongata var. *tandem* Forel, 1906. Soc. Ent. Belg., Ann. 50: 228. ♀.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 85-87 (each caste). —Creighton, 1955. N. Y. Ent. Soc., Jour. 63: 17-20. —Wheeler and Wheeler, 1956. Ent. Soc. Amer., Ann. 49: 384 (larva).

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 4.

gracilis mexicanus (Roger). Fla., Tex. s. to Central Amer. Ecology: Colonies have been found in dead limbs of live oaks, in live oak twig galls, in shrubs, hollow stems of composites, and cavities in other plants. Probably accidentally introduced into Florida. *P. gracilis gracilis* (Fabricius) is found in Central and S. Amer.
Pseudomyrma mexicana Roger, 1863. Berlin. Ent. Ztschr. 7: 178. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 421 (worker, female). —Wheeler and Wheeler, 1956. Ent. Soc. Amer., Ann. 49: 385-386 (larva). —Brown, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 235.

Biology: Wheeler, 1901. Soc. Ent. Belg., Ann. 45: 204. —Mitchell and Pierce, 1912. Ent. Soc. Wash., Proc. 14: 69. —Whitcomb, Denmark, Buren, and Carroll, 1972. Fla. Ent. 55: 31-33 (in Florida).

pallidus (Smith). N. C. to Fla. w. to Ariz., Calif. s. to S. Amer.; W. Indies. Ecology: Colonies have been found in twigs and branches of various plants and in culms of grasses and sedges. Some of the early western records of this species may actually refer to *apache* Creighton. References to *P. flavidulus* (Smith) for the U. S. pertain to this species; *flavidulus* was described from S. Amer. and its correct status is not known (see Creighton, 1950).
Pseudomyrma pallida Smith, 1855. Ent. Soc. London, Trans., 3: 160. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 419-420. —Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 83-85 (each caste). —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 80-82. —Wheeler and Wheeler, 1956. Ent. Soc. Amer., Ann. 49: 386 (larva).

Biology: Mitchell and Pierce, 1912. Ent. Soc. Wash., Proc. 14: 69. —Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 4.

Morphology: Blum and Callahan, 1963. Psyche 70: 69-74 (morphology and physiology of poison glands and venom).

Unplaced Taxon of Pseudomyrmecinae

Ponera (*Ectatoma*(*!*)) *Lincecumii* Buckley, 1866. Ent. Soc. Phila., Proc. 6: 172. ♀. Cent. Tex.

Subfamily MYRMICINAE

This is the largest subfamily of ants and is found throughout the world. In North America, the Myrmicinae are better represented in the central and southern United States with their incidence rapidly decreasing northwards where the Formicinae become the dominant subfamily. Members of this subfamily are recognized by the two-segmented petiole and the frontal carinae which are distant from each other and each of which usually bears a lobe concealing the antennal insertions.

Taxonomy: Wheeler and Wheeler, 1960. Ent. Soc. Amer., Ann. 53:98-110 (larvae). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:1-32 (larvae). —Ettershank, 1966. Austral. Jour. Zool. 14:73-171 (generic revision of world Myrmicinae related to *Solenopsis* and *Pheidologeton*). —Wheeler and Wheeler, 1973. Psyche 80: 204-211 (supp. studies on larvae). —Wheeler and Wheeler, 1973. Psyche 80: 70-82 (larvae of four tribes, 2nd supp.; Leptothoracini, Ocymyrmecini, Tetramoriini, Cryptocerini). —Wheeler and Wheeler, 1973. Ga. Ent. Soc., Jour. 8: 27-39 (larvae of six tribes, 2nd supp.).

Morphology: Blum, 1974. N. Y. Ent. Soc., Jour. 82: 141-147 (Myrmicine trail pheromones: specificity, source, and significance). —McCluskey, 1974. N. Y. Ent. Soc., Jour. 82: 93-102 (generic diversity in phase of rhythm in Myrmicine ants).

Tribe MYRMICINI

Genus MYRMICA Latreille

Myrmica Latreille, 1804. Nouv. Dict. Hist. Nat. 24:179.
Type-species: *Formica rubra* Linnaeus. Desig. by Latreille, 1810.

This holarctic genus is found as far north as Labrador and Alaska in North America and is restricted to higher elevations in the southern parts of its range. There are apparently no subtropical or xerophilous representatives. The moderate sized colonies nest in soil, rotten wood, or under cover of various objects. Workers are carnivorous but also feed on honeydew of Homoptera and exudates of plants. Workers of some species differ from each other very slightly and males are sometimes needed for determination. Some species are closely related to Palearctic forms and have been regarded as subspecies of them by some authors.

Revision: Weber, 1947. Ent. Soc. Amer., Ann. 40:437-474. —Weber, 1948. Ent. Soc. Amer., Ann. 41:267-308. —Weber, 1950. Ent. Soc. Amer., Ann. 43:189-226.

Taxonomy: Wheeler, 1907. Wis. Nat. Hist. Soc., Bul. 5:73-83 (varieties of *M. brevinodis*). —Wheeler and Wheeler, 1952. Psyche 59:112-123 (larvae). —Yarrow, 1955. Roy. Ent. Soc. London, Proc., Ser. B: Taxonomy 24:113-115 (type-species). —Collingwood, 1958. Roy Ent. Soc. London, Proc., Ser. A 33:65-75 (Britain). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 94-108. —Collingwood, 1974. Soc. Brit. Ent., Trans. 16:96-101 (Britain).

Biology: Brian, 1957. Insectes Sociaux 4:177-190 (growth and development of colonies). —Weir, 1958. Insectes Sociaux 5:97-128, 316-339 (polyethism in workers). —Weir, 1958. Jour. Ins. Physiol. 1:352-360 (effect of temperature variation on queen oviposition and colony formation). —Kannowski, 1959. Insectes Sociaux 6:143-144 (flight activities and colony founding). —Weir, 1959. Insectes Sociaux 6:271-290 (influence of worker age on trophogenic larval dormancy). —Weir, 1959. Insectes Sociaux 6:167-201 (egg masses and early larval growth). —Weir, 1959. Physiol. Zool. 32:63-77 (interrelation of queen and worker oviposition). —Carr, 1962. Insectes Sociaux 9:177-211 (influence of queen). —Brian and Hibble, 1963. Insectes Sociaux 10:71-82 (larval size and influence of queen on growth).

—Kannowski, 1970. Ent. Soc. Amer., N. Central Branch, Proc. 25:119-125 (colony populations of 5 species).

Morphology: Weir, 1957. Quart. Jour. Micros. Sci. 98:499-506 (functional anatomy of mid-gut of larvae). —Weir, 1959. Insectes Sociaux 6:375-386 (changes in the rectro-cerebral endocrine system of larvae and their relation to larval growth and development). —Crewe and Blum, 1970. Ztschr. f. Vergleich. Physiol. 70:363-373 (alarm pheromones of 9 species).

americana Weber. Que., Maine s. to N. C., Tenn., w. to Man., Colo., Utah, Ariz. Ecology: More common on east slopes of Rocky Mtns.; records from west of the Rockies are rare. Commonly found in grasslands where nests are in soil in open or under objects; food is varied, consisting of animal matter and plant juices. Sometimes considered as a subspecies of the Palearctic *Myrmica sabuleti* Meinert.

Myrmica sabuleti americana Weber, 1939. Lloydia 2:144. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1952. Psyche 59:116 (larva).

Biology: Wheeler, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22:587. —Buren, 1944. Iowa State Col., Jour. Sci. 18:282-283. —Kannowski, 1956. Amer. Midland Nat. 56:175. —Kannowski and Kannowski, 1957. Ohio Jour. Sci. 57:371-374 (mating activities). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 96-99. —Gregg, 1963. Ants of Colo., pp. 308-310. —Ayre, 1963. Canad. Ent. 95:712-715 (feeding habits). —Burns, 1964. Ent. Soc. Amer., Ann. 57:138 (association with tuliptree scale). —Ayre, 1968. Canad. Ent. 100:165-172 (prey finding, capture, and transport). —Ayre, 1969. Canad. Ent. 101:118-128 (trail formation and group foraging). —Ayre, 1971. Ztschr. f. Angew. Ent. 68:295-299 (foraging and nesting habits).

brevispinosa brevispinosa Wheeler. N. Dak., Nebr. s. to Colo., N. Mex., w. to Alta., Idaho. Ecology: Prefers to nest in stream valleys or on shores of permanent bodies of water.

Myrmica rubra brevinodis var. *brevispinosa* Wheeler, 1907. Wis. Nat. Hist. Soc., Bul. 5:74. ☿, ♀, ♂.

Myrmica rubra brevinodis var. *decedens* Wheeler, 1907. Wis. Nat. Hist. Soc., Bul. 5:75. ☿, ♂.

Taxonomy: Wheeler and Wheeler, 1952. Psyche 59:117 (larva). —Kannowski, 1956. Amer. Midland Nat. 56:176. —Gregg, 1961. N. Y. Ent. Soc., Jour. 69:211.

Biology: Weber, 1942. Canad. Ent. 74:62. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11:241. —Gregg, 1963. Ants of Colo., pp. 296-297, 299. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 101-103 (subspecies not recognized).

brevispinosa discontinua Weber. Newfoundland, N. S. w. to mtns. of Wyo., Colo., N. Mex. Ecology: Apparently more tolerant than the typical subspecies of higher altitudes in Rockies where the two subspecies overlap.

Myrmica brevinodis discontinua Weber, 1939. Lloydia 2:150. ☿.

Biology: Cole, 1953. Tenn. Acad. Sci., Jour. 28:243 (N. Mex.). —Gregg, 1963. Ants of Colo., pp. 298-300.

emeryana emeryana Forel. Newfoundland s. to Ga., w. to Man., Idaho, Colo., Ariz. Ecology: Nests are usually in woodlands in moist, shady situations under stones or other objects. Sometimes considered as a subspecies of the Palearctic *M. schencki* Emery.

Myrmica scabrinodis schencki var. *emeryana* Forel, 1914. Deut. Ent. Ztschr., p. 617. ☿, ♀, ♂.

Myrmica schencki latifrons Starcke, 1927. Tijdschr. v. Ent. 70:84. ☿.

Taxonomy: Wheeler and Wheeler, 1952. Psyche 59:114, 117 (larva). —Smith, 1954. Brooklyn Ent. Soc., Bul. 49:138-140 ☿, ♀ (worker, female; type - locality). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:233 (larva).

Biology: Wheeler, 1915. Psyche 22:206. —Talbot, 1945. Ent. Soc. Amer., Ann. 38:365-372 (population studies). —Kannowski, 1959. Insectes Sociaux 6:121. —Medler, 1958. Ent. Soc. Wash., Proc. 60:258 (swarming). —Peterson and Davies, 1960. Canad. Jour. Zool. 38:15 (predation on *Simulium;* behavior). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 103-104. —Gregg, 1963. Ants of Colo., pp. 311-312, 314.

emeryana tahoensis Wheeler. Mont., Wyo., Utah, Ariz. w. to B. C., Oreg., Nev., Calif. Ecology: Mostly in mountains at higher elevations.
Myrmica scabrinodis schencki var. *tahoensis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:504. ☿, ♀, ♂.

Biology: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7 (3):3-4 (Nevada Test Site).

hamulata hamulata Weber. Colo., N. Mex., Utah, Ariz. Ecology: Apparently prefers to nest in upland plateaus from 7,000 to 8,000 ft.
Myrmica sabuleti hamulata Weber, 1939. Lloydia 2:146. ☿, ♀, ♂.

Biology: Gregg, 1963. Ants of Colo., pp. 300-301.

hamulata trullicornis Buren. Iowa. The exact status of this form will remain uncertain until a male can be associated with the workers.
Myrmica sabuleti trullicornis Buren, 1944. Iowa State Col., Jour. Sci. 18:281. ☿, ♀.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool. Bul. 104:99-100.

incompleta incompleta Provancher. Labrador s. to N. J., w. to Rocky Mtns., Colo., Utah, N. Mex. Ecology: Widely distributed with wide elevational tolerance. Prefers moist, grassy habitats where it usually nests under objects. Host of the inquiline *Leptothorax provancheri* Emery.
Myrmica incompleta Provancher, 1881. Nat. Canad. 12:359. ☿, ♀, ♂.
Myrmica rubra brevinodis Emery, 1895. Zool. Jahrb., Abt. f. System 8:312. ☿, ♂.
Myrmica rubra brevinodis var. *canadensis* Wheeler, 1907. Wis. Nat. Hist. Soc., Bul. 5:76. ☿, ♀, ♂.
Myrmica rubra brevinodis var. *subalpina* Wheeler, 1907. Wis. Nat. Hist. Soc., Bul. 5:77. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1952. Psyche 59:116 (larva). —Francoeur and Beique, 1966. Canad. Ent. 98:141 (Provancher types).

Biology: Wheeler, 1907. Wis. Nat. Hist. Soc., Bul. 5:73, 77-83. —Wheeler, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22:587. —Kannowski, 1959. Insectes Sociaux 6:121, 155 (pleometrosis). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 99-101. —Gregg, 1963. Ants of Colo., pp. 291-292, 294.

incompleta kuschei Wheeler. Alaska.
Myrmica brevinodis var. *kuschei* Wheeler, 1917. Harvard Univ., Mus. Comp. Zool., Bul. 61:17. ☿, ♀.
Myrmica brevinodis var. *alaskensis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:503. ☿.

incompleta sulcinodoides Emery. S. Dak., Colo., N. Mex. w. to Alta., Alaska, B. C., Oreg., Calif. Some authors do not consider this a valid subspecies.
Myrmica rubra brevinodis var. *sulcinodoides* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:313. ☿.
Myrmica rubra brevinodis var. *frigida* Forel, 1902. Ent. Soc. London, Trans., p. 699. ☿.
Myrmica rubra brevinodis var. *whymperi* Forel, 1904. Soc. Ent. Belg., Ann. 48:154. ♀.

Biology: Wheeler, 1915. Psyche 22:206. —Cole, 1934. Psyche 41:223. —Gregg, 1963. Ants of Colo., pp. 293-295, 297.

lampra Francoeur. Que. (Parc des Laurentides). Ecology: Apparently parasitic, taken from nest of another *Myrmica*. Host: *Myrmica* sp.
Myrmica lampra Francoeur, 1968. Nat. Canad. 95:729. ♀, ♂.

lobicornis fracticornis Emery. Newfoundland s. to Tenn., Ohio w. to Rocky Mtns. Colo., N. Mex., Utah, Ariz. Ecology: Nests are usually near a stream or slough, under stones or wood. Host of the inquiline *Leptothorax provancheri* Emery. *M. lobicornis lobicornis* Nylander is Palearctic.
Myrmica rubra scabrinodis var. *fracticornis* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:313. ☿.
Myrmica rubra scabrinodis var. *detrinodis* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:316. ☿. A questionable synonym.

Taxonomy: Wheeler and Wheeler, 1952. Psyche 59:117 (larva). —Cole, 1953. Tenn. Acad. Sci., Jour. 28:242-243.

Biology: Wheeler, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22:587-588. —Eidmann, 1933. Zool. Anz. 101:203. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:288, 305. —Weber, 1941. Canad. Ent. 73:140-141 (effect of drouth on nesting habits in prairie states and provinces). —Weber, 1942. Canad. Ent. 74: 62. —Kannowski, 1957. Psyche 64: 1-5 (host of *Leptothorax provancheri* Emery). —Kannowski, 1959. Insectes Sociaux 6:121-124, 155-156 (flight activities, colony founding). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 104-106. —Gregg, 1963. Ants of Colo., pp. 300, 302-303.

lobicornis lobifrons Pergande. Colo., N. Mex., Utah, Ariz., n. w. to Alaska. Ecology: In mountains at high elevations. Some authors consider this a synonum of *fracticornis*.
Myrmica sabuleti var. *lobifrons* Pergande, 1900. Wash. Acad. Sci., Proc. 2: 521. ☿.
Myrmica rubra scabrinodis var. *glacialis* Forel, 1904. Soc. Ent. Belg., Ann. 48: 154. ☿.

Biology: Gregg, 1963. Ants of Colo., pp. 303-307.

mexicana Wheeler. Ariz., Mexico.
Myrmica mexicana Wheeler, 1914. N. Y. Ent. Soc., Jour. 22: 52. ☿, ♀, ♂.

Taxonomy: Gregg, 1961. N. Y. Ent. Soc., Jour. 69: 211.

monticola Wheeler. Que., Mich. w. to Man., N. Dak., Colo. Ecology: Nests in woodlands under cover of objects.
Myrmica scabrinodis schencki var. *monticola* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:505. ☿, ♂.
Myrmica sabuleti nearctica Weber, 1939. Lloydia 2: 148. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1952. Psyche 59:117 (larva).

Biology: Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 243. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 106-108. —Gregg, 1963. Ants of Colo., pp. 306-309. —Francoeur, 1966. Nat. Canad. 93: 455 (Que.).

pinetorum Wheeler. Mass. s. to S. C., w. to Ohio, Okla., Miss. Ecology: Prefers to nest in sandy soil.
Myrmica punctiventris pinetorum Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:384. ☿, ♀.

Biology: Davis and Bequaert, 1922. Brooklyn Ent. Soc., Bul. 17:10. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:90, 94.

punctiventris Roger. Mass. s. to Ga., w. to Iowa, Nebr., Ark. Ecology: Nests have been found in soil and rotten logs in woodlands.
Myrmica punctiventris Roger, 1863. Berlin Ent. Ztschr. 7:190. ☿.
Myrmica punctiventris var. *isafahani* Forel, 1922. Rev. Suisse de Zool. 30:92. ☿, ♀.

Taxonomy: Gregg, 1961. N. Y. Ent. Soc., Jour. 69:211.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:383-384. —Cole, 1940. Amer. Midland Nat. 24:55. —Headley, 1943. Ohio Jour. Sci. 43:25-26. —Buren, 1944. Iowa State Col., Jour. Sci. 18:283. —Kannowski, 1959. Insectes Sociaux 6:124.

rubra (Linnaeus). Que., Maine, Mass., R. I.; Europe. Ecology: Unlike other species of *Myrmica*, *rubra* is pugnacious and can inflict a painful sting. Probably accidentally introduced from Europe.
Formica rubra Linnaeus, 1758. Syst. Nat., Ed. 10 1:580.
Myrmica laevinodis Nylander, 1846. Acta Soc. Fenn. 2:927. ☿, ♀, ♂.
Myrmica rubra champlaini Forel, 1901. Naturhist. Mus. Hamburg Mitt. 18:80. ☿.
Myrmica rubra laevinodis var. *bruesi* Wheeler, 1906. Psyche 13:38. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1952. Psyche 58:119 (larva). —Picquet, 1958. Dijon Univ. Lab. de Zool. Trav. 23:28 (larva). —Yarrow, 1955. Roy. Ent. Soc. London, Proc., Ser. B: Taxonomy. 24:113-115. —Wheeler and Wheeler, 1960. Ent. Soc. Amer., Ann. 53:4-5 (larva).

Biology: Wheeler, 1908. Jour. Econ. Ent. 1:337-339 (introduced into Mass.). —Sturtevant, 1931. Psyche 38:75. —Brian, 1951. Experientia 7:182 (caste determination). —Brian, 1951.

Physiol. Comp. and Oecol. 2:248-262. —Brian, 1953. Physiol. Comp. and Oecol. 3:25-36 (oviposition by workers). —Brian, 1954. Insectes Sociaux 1:101-122 (caste differentiation, larval dormancy, winter size, vernalization). —Brian, 1955. Insectes Sociaux 2:1-34 (caste differentiation, growth of workers and intercastes). —Brian, 1955. Insectes Sociaux 2:85-114 (caste differentiation, larval dormancy, winter size, and vernalization). —Brian and Brian, 1955. Evolution 9: 280-290 (macrogynes and microgynes). —Brian, 1956. Insectes Sociaux 3:369-394 (caste differentiation, controlled larval nutrition). —Brian, 1956. Jour. Anim. Ecol. 25:319-337 (segregation of *Myrmica* spp.). —Brian, 1957. Insectes Sociaux 4:191-210 (serial organization of brood). —Brian, 1957. Physiol. Comp. and Oecol. 4:329-345 (food distribution and larval size in cultures). —Weir, 1958. Insectes Sociaux 5:315-339 (polyethism in workers). —Brian, 1962. Insectes Sociaux 9:295-310 (social conditions affecting early larval differentiation). —Brian, 1963. Insectes Sociaux 10:91-102 (caste differentiation). —Plateaux, 1960. Insectes Sociaux 7: 221. —Brian, 1965. Insectes Sociaux 12:347 (caste differentiation). —Brian, *et al.*, 1967. Insectes Sociaux 14:13-24 (caste differentiation). —Brian, 1969. Insectes Sociaux 16:249-268 (ecological notes). —Jaisson, 1969. Insectes Sociaux 16:279-312. —Brian, 1970. Animal Behavior 18:467-472 (communication between queens and larvae).

Morphology: Tulloch, 1936. Ent. Soc. Amer., Ann. 29:81-84 (metasternal glands). —Allen, 1957. Ent. Monthly Mag. 93:136-139 (intercastes). —Weir, 1959. Insectes Sociaux 6:375-386 (rectro-cerebral endocrine glands and their relation to larval growth and development).

spatulata Smith. Tenn., Miss., Ill.
Myrmica schencki var. *spatulata* Smith, 1930. Ent. Soc. Amer., Ann. 23:566. ☿, ♀.

Biology: Smith, 1931. Ent. News 42:21.

striolagaster Cole. Tex., Colo., N. Mex., Ariz.
Myrmica striolagaster Cole, 1953. Tenn. Acad. Sci., Jour. 28:81. ☿.

Taxonomy: Cole, 1957. Tenn. Acad. Sci., Jour. 32:208-209 (male). —Gregg, 1961. N.Y. Ent. Soc., Jour. 69:211. —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:234 (larva).

Biology: Gregg, 1963. Ants of Colo., pp. 313-314.

wheeleri Weber. Ariz. (Mt. Lemmon and Mt. Stratton in Santa Catalina Mtns.).
Myrmica wheeleri Weber, 1939. Lloydia 2:150. ☿, ♀, ♂.

Unplaced Taxon of Myrmica

rubra neolaevinodis Forel. "From New York with iris roots". The iris from which the ants were taken may not have come from New York; consequently, this form may not belong in the Nearctic fauna.
Myrmica rubra neolaevinodis Forel, 1901. Naturhist. Mus. Hamburg Mitt. 18: 80. ☿.

Genus PARAMYRMICA Cole

Paramyrmica Cole, 1957. Tenn. Acad. Sci., Jour. 32:37-42.
Type-species: *Paramyrmica colax* Cole. Monotypic.

Little is known of the habits of the two species included in this genus. The genus is close to *Myrmica*, but differences in the larvae support the distinctness of *Paramyrmica*.

Taxonomy: Gregg, 1961. N. Y. Ent. Soc., Jour. 69:209-220.

colax Cole. Tex. (Limpia Canyon, Davis Mtns., Jeff Davis Co.). Ecology: An inquiline. Host: *Myrmica striolagaster* Cole.
Paramyrmica colax Cole, 1957. Tenn. Acad. Sci., Jour. 32:37-41. ☿, ♀.

Taxonomy: Wheeler and Wheeler, 1959. Tenn. Acad. Sci., Jour. 34:291-220 (larva).

rugiventris (Smith). Colo., Ariz., s. Calif.
Tetramorium rugiventris Smith, 1943. Ent. Soc. Wash., Proc. 45:2, 4. ☿.

Taxonomy: Brown, 1957. Breviora 72:5-7 (an endemic species; in *Myrmica*). —Gregg, 1961. N. Y. Ent. Soc., Jour. 69:209 (in *Paramyrmica*). —Francoeur, 1968. Nat. Canad. 95:728 (probably in *Myrmica*).

Genus MANICA Jurine

Manica Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 276.
Type-species: *Formica rubida* Latreille. Desig. by Wheeler, 1911.
Aphaenogaster subg. *Neomyrma* Forel, 1914. Rev. Suisse Zool. 22:275.
Type-species: *Aphaenogaster* (*Neomyrma*) *calderoni* Forel. Monotypic.
Myrmica subg. *Oreomyrma* Wheeler, 1914. Psyche 21:118.
Type-species: *Formica rubida* Latreille. Orig. desig.

Four of the five species in this genus are found in western North America, west of the hundredth meridian; the other is Palearctic. Colonies are small and nests are usually found in openings in coniferous forests commonly under stones in creek or river bottoms. For an excellent account of each species, see Wheeler and Wheeler (1970).

Revision: Wheeler, 1914. Psyche 21:118-122. —Wheeler and Wheeler, 1970. Kans. Ent. Soc., Jour. 43:129-162.

Taxonomy: Weber, 1947. Ent. Soc. Amer., Ann. 40:439. —Wheeler and Wheeler, 1952. Psyche 59:123 (larvae). —Cole, 1957. Tenn. Acad. Sci., Jour. 32:213 (key to males). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:15 (larva). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 108-110. —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:234-236 (larvae).

Biology: Wheeler and Wheeler, 1970. Kans. Ent. Soc., Jour. 43:129-162. —Wheeler and Wheeler, 1970. Kans. Ent. Soc., Jour. 43:363 (additions to natural history of *Manica*). —Went, Wheeler, and Wheeler, 1972. BioScience 22:82-88 (feeding and digestion).

Morphology: Fales, *et al.*, 1972. Jour. Ins. Physiol. 18: 1077-1088 (alarm pheromones derived from the mandibular galnd).

bradleyi (Wheeler). W. Nev., Calif. Ecology: Typically found in openings in coniferous forests in the Sierra Nevada Mtns. of w. Nev. and Calif., and the Transverse Ranges in s. Calif. Host of *Manica parasitica* (Creighton), but the exact relationship is not known.
Myrmica bradleyi Wheeler, 1909. N. Y. Ent. Soc., Jour. 17:77. ☿.
Aphaenogaster (*Neomyrma*) *calderoni* Forel, 1914. Rev. Suisse de Zool. 22:275. ☿.

Taxonomy: Cole, 1957. Tenn. Acad. Sci., Jour. 32:210-212 (female, male). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:5-6 (larva). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:234-235 (larva).

Biology: Creighton, 1934. Psyche 41:188-189. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:65.

hunteri (Wheeler). Alta., Mont., Wyo., Idaho, Utah, B. C., Wash., Oreg., Nev., Calif. Ecology: Typically found in openings in coniferous forests.
Myrmica (*Oreomyrma*) *hunteri* Wheeler, 1914. Psyche 21:119, 121. ☿.
Myrmica (*Oreomyrma*) *aldrichi* Wheeler, 1914. Psyche 21:119, 120. ☿.

Taxonomy: Cole, 1956. Tenn. Acad. Sci., Jour. 31:262. —Cole, 1957. Tenn. Acad. Sci., Jour. 32:212-213 (male). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:235 (larva).

mutica (Emery). N. Dak., S. Dak., Colo., N. Mex. w. to Alaska, B. C., Wash., Oreg., Calif. Ecology: The most widely distributed ant of the genus in N. Amer. It is more xerophilous and occurs in a greater variety of habitats. Host of the inquiline *Symmyrmica chamberlini* Wheeler.
Myrmica mutica Emery, 1895. Zool. Jahrb., Abt. f. System. 8:311. ☿.

Taxonomy: Cole, 1957. Tenn. Acad. Sci., Jour. 32: 213 (male). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:5-6 (larva). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:235 (larva).

Biology: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:6-7. —Wheeler, 1910. Ants, pp. 432-434. —Cole, 1953. Tenn. Acad. Sci., Jour. 28:243. —Gregg, 1963. Ants of Colo., pp. 314-317. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 109-110.

parasitica (Creighton). Calif. (Alpine Co.; Yosemite Nat. Pk., Mariposa Co.). Ecology: Collections made from ants nests. Host: *Manica bradleyi* (Wheeler).
Myrmica (*Manica*) *parasitica* Creighton, 1934. Psyche 41:185. ☿.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:66. —Wheeler and Wheeler, 1968. Pan-Pacific Ent. 44:71-72 (rediscovery).

Genus POGONOMYRMEX Mayr

Members of this genus are collectively known as harvester ants and some species are among the most conspicuous ants in the arid regions of the western United States and Mexico because of their mound building habits. The workers collect seeds for food, harvesting plants in their nesting areas by snipping off seeds with their mandibles. The seeds are stored and are the main food source though the ants are also scavengers. Nests are in the soil in areas fully exposed to the sun; some are under stones and others are surmounted by soil craters or by small to huge mounds with or without coverings of gravel. Some species alter the area surrounding their nest by clearing away the vegetation. Some species have a painful sting, procure seeds from cultivated crops and damage rangelands.

Revision: Wheeler, 1902. Amer. Nat. 36:85-100. —Wheeler, 1902. Psyche 9:387-393. —Wheeler, 1914. Psyche 21:151-157. —Olsen, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77:493-514. —Cole. 1968. Pogonomyrmex Harvester Ants, 222 pp.

Taxonomy: Wheeler and Wheeler, 1952. Psyche 59:106-111 (larvae). —Cole, 1954. Tenn. Acad. Sci., Jour. 29:117-119. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:2 (larva). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:236-237 (larvae).

Morphology: Eisner, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116:477-478 (proventriculus). —McGurk, *et al.*, 1966. Jour. Ins. Physiol. 12:1435-1441 (identification of 4-methyl-3-heptanone).

Genus POGONOMYRMEX Subgenus POGONOMYRMEX Mayr

Pogonomyrmex Mayr, 1868. Soc. Nat. Modena, Ann. 3:169.
Type-species: *Formica badia* Latreille. Desig. by Wheeler, 1911.

Species Group Barbatus

anergismus Cole. N. Mex. (15 mi. e. Silver City, 6900 ft.). Ecology: Possibly a social parasite; found in nest of *P. rugosus*. Host: *Pogonomyrmex rugosus* Emery.
Pogonomyrmex (*Pogonomyrmex*) *anergismus* Cole, 1954. Tenn. Acad. Sci., Jour. 29:115-116. ♀, ♂.

apache Wheeler. Southwest. Kans. (?), w. Tex., s. Colo., N. Mex., s. Ariz., s. Nev.; Mexico. Ecology: Colonies are small and the usually obscure nests are in stony soils with no superstructure though sometimes in sandy soil with small circular craters.
Pogonomyrmex apache Wheeler, 1902. Psyche 9:392. ☿.
Pogonomyrmex sancti-hyacinthi Wheeler, 1902. Psyche 9:388. ☿.

Biology: Wheeler, 1910. Ants, p. 283. —Cole, 1954. Tenn. Acad. Sci., Jour. 29:266-267. —Gregg, 1963. Ants of Colo., pp. 318-319.

barbatus (Smith). E. Ark., e. La., s. and w. Kans., Okla., Tex., e. Colo., s. and central N. Mex., s.e. and central Ariz., Nev. (Clark Co.); Mexico. Ecology: The usual nest is a low to high gravel mound, frequently with a scooped-out center, though the nest structure varies. The most conspicuous ant of this genus in its range. Red harvester ant.
Myrmica barbata Smith, 1858. Cat. Hym. Brit. Mus. 6:130. ♀.
Myrmica (*Atta*) *molefaciens* Buckley, 1860. Acad. Nat. Sci. Phila., Proc. 12:445. ☿, ♀.
Pogonomyrmex barbatus var. *nigrescens* Wheeler, 1902. Psyche 9:389, 391. ☿.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:308 (each caste). —Wheeler, 1914. N. Y. Ent. Soc., Jour. 22:51-52 (each caste). —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:116-119. —Wheeler and Wheeler, 1952. Psyche 59:107 (larva). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:2 (larva).

Biology: McCook, 1879. The Natural History of the Agricultural Ant of Texas, 311 pp. —Wheeler, 1901. Soc. Ent. de Belg., Ann. 45:202. —Wheeler, 1901. Amer. Nat. 35:723-724. —Wheeler, 1910. Ants, pp. 11, 85, 179, 197, 202-203, 222, 264, 284, 286-288, 290-293. —Hunter, 1921. U. S. Dept. Agr. Bur. Ent. Cir. 148:4-7. —Gordon, 1943. Jour. Econ. Ent.

36:354 (damage to airplane runways). —Michener, 1948. N. Y. Ent. Soc., Jour. 56:239-242. —Cassidy, *et al.*, 1950. U. S. Dept. Agr. Cir. 842:15. —Barnes and Nerney, 1953. U. S. Dept. Agr. Farmers' Bul. 1668:1-11. —Young and Howell, 1954. Okla. Acad. Sci., Proc. 35:60-62 (mating swarms). —Young and Gonzalez, 1957. Mex. Secretaria de Agr. y Ganaderia, Fol. Tec. 23:1-20. —Michener, 1960. Kans. Ent. Soc., Jour. 33:46 (treetop mating aggregations). —Box, 1960. Ecology 41:381-382. —Gregg, 1963. Ants of Colo., pp. 319-321. —Johnson, *et al.*, 1969. Biochemical Genetics 3:429-450 (isozyme genotype-environment relationships in natural populations).

Morphology: Williams and Williams, 1965. Soc. Exp. Biol. Med., Proc. 119:344-346 (venom). —Benthuysen and Blum, 1974. Ga. Ent. Soc., Jour. 9: 235-238 (quantitative sensitivity of ant to enantiomers of its alarm pheromone).

bicolor Cole. S. Ariz.; Mexico. Ecology: Nests are in gravelly soil with a low mound of sand and with a single entrance. Apparently does not clear plants from nest periphery.
Pogonomyrmex (*Pogonomyrmex*) *bicolor* Cole, 1968. Pogonomyrmex Harvester Ants, pp. 59-64. ☿, ♀, ♂.

desertorum Wheeler. W. Tex., s. N. Mex., s. Ariz., s.e. Calif.; Mexico. Ecology: Nests are in sandy soil in open areas and have circular craters.
Pogonomyrmex desertorum Wheeler, 1902. Psyche 9:387, 390. ☿.
Pogonomyrmex desertorum var. *ferrugineus* Olsen, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77:496. ☿.

Taxonomy: Cole, 1954. Tenn. Acad. Sci., Jour. 29:119.

Biology: Wheeler, 1910. Ants, p. 283. —Cole, 1934. Ent. Soc. Amer., Ann. 27:399. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:64. —Whitford and Ettershank, 1975. Environ. Ent. 4: 689-696 (factors affecting foraging activity).

rugosus Emery. W. Okla., w. Tex., s.e. and s.w. Colo., N. Mex., s. Utah, Ariz., s. and central Nev., s. Calif.; Mexico. Ecology: Typically, the nest is a flattened gravel disc, though there is variation in structure.
Pogonomyrmex barbatus rugosus Emery, 1895. Zool. Jahrb., Abt. f. System. 8:309. ☿, ♂.
Pogonomyrmex barbatus var. *fuscatus* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:309. ☿.
Pogonomyrmex barbatus var. *marfensis* Wheeler, 1902. Amer. Nat. 36:98. ☿.
Pogonomyrmex similis Olsen, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77:497, 512. ☿.
Pogonomyrmex barbatus curvispinosus Cole, 1936. Ent. News 47:120. ☿.
Pogonomyrmex barbatus spadix Cook, 1953. The Ants of Calif., pp. 98-99, 3 figs. ☿. No description.

Taxonomy: Wheeler, 1902. Psyche 9:391, 393 (each caste).

Biology: Wheeler, 1902. Psyche 9:393. —Wheeler, 1910. Ants, pp. 284, 290. —Wheeler, 1917. Psyche 24:178. —Cole, 1937. Ent. News 48:134. —Cole, 1942. Amer. Midland Nat. 28:367. —Lindquist, 1942. Jour. Econ. Ent. 35:850-853. —Gregg, 1963. Ants of Colo., pp. 322-324, 325, 327. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 50. —Whitford and Ettershank, 1975. Environ. Ent. 4: 689-696 (factors affecting foraging activity).

tenuispina Forel. S. Calif. (Deep Canyon); Mexico (Baja Calif.).
Pogonomyrmex desertorum var. *tenuispina* Forel, 1914. Soc. Vaud. des Sci. Nat., Bul. 50:269. ☿.
Pogonomyrmex dentatus Olsen, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77:505. ☿.

Taxonomy: Cole, 1968. Pogonomyrmex Harvester Ants, pp. 77-81. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 50-51 (first U. S. record).

Species Group Occidentalis

anzensis Cole. Calif. (Split Mtn., Anza Desert State Park).
Pogonomyrmex (*Pogonomyrmex*) *anzensis* Cole, 1968. Pogonomyrmex Harvester Ants, pp. 87-89. ☿.

brevispinosus Cole. S. Calif., Nev. (Lyon Co.). Ecology: Nests are in compact sandy soil, each marked by a low circular crater 3 to 8 inches in diameter with a single entrance.
Pogonomyrmex (*Pogonomyrmex*) *brevispinosus* Cole, 1968. Pogonomyrmex Harvester Ants, pp. 89-94. ☿, ♀, ♂.

occidentalis (Cresson). Southwest. N. Dak., w. S. Dak., w. Nebr., central and w. Kans., central and w. Okla., n. Tex., s.e. Mont., Wyo., Colo., N. Mex., s.e. Idaho, Utah, e. and n. Ariz., Nev., e. Calif. Ecology: The populous colonies build conical pebble mounds with basal entrances and peripheral clearings. Workers are pugnacious and are active harvesters, feeding on and storing large quantities of seeds. Western harvester ant.

Myrmica occidentalis Cresson, 1895. Ent. Soc. Phila., Proc. 4:426. ☿, ♀.
Myrmica seminigra Cresson, 1865. Ent. Soc. Phila., Proc. 4:427. ♂.
Pogonomyrmex opaciceps Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:971. ☿.
Pogonomyrmex occidentalis ruthveni Gaige, 1914. Biol. Soc. Wash., Proc. 27:93. ☿, ♀, ♂.
Pogonomyrmex occidentalis var. *utahensis* Olsen, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77:498, 509. ☿, ♀, ♂.

Taxonomy: Smith, 1953. Brooklyn Ent. Soc., Bul. 48:131. —Wheeler and Wheeler, 1952. Psyche 59:110 (larva).

Biology: McCook, 1882. The Honey Ants of the Garden of the Gods, and the Occident Ants of the American Plains, pp. 123-160. —Dean, 1905. Kans. Acad. Sci., Trans. 19:164-170. —Headlee and Dean, 1908. Kans. State Col., Bul. 154:165-180. —Wheeler, 1910. Ants, pp. 145, 200, 202-205, 222, 283-284, 290, 291, 426. —Herrick, 1914. Insects Injurious to the Household and Annoying to Man, pp. 172-173. —Cole, 1934. Ent. News 45:170. —Cole, 1942. Amer. Midland Nat. 28:366. —Knowlton, 1951. Brooklyn Ent. Soc., Bul. 46:75 (loss of surface area on western rangeland). —Weber, 1959. Ent. News 70:85 (stings; note on populations). —Chew, 1960. N. Y. Ent. Soc., Jour. 68:81 (colony size and activity). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 118-120. —Gregg, 1963. Ants of Colo., pp. 328-334 (as *occidentalis comanche*). —Spangler, 1968. Kans. Ent. Soc., Jour. 41:318-323 (behavior). —Lavigne, 1969. Ent. Soc. Amer., Ann. 62:1166-1175 (bionomics and nest structure). —Clark and Camanor, 1973. Biol. Soc. Nev., Occ. Papers 34:1-6 (use of seed stores by Heteromyid rodents). —Lavigne and Rogers, 1974. Wyo. Univ. Agr. Exp. Sta. Sci. Monog. 26: 1-14 (annotated bibliography).

owyheei Cole. Sask., central and w. Mont., n.w. Wyo., Alta., Idaho, n.w. Utah, B. C., Wash., Oreg., n. Nev., n.e. Calif. Ecology: Nest structure and habits are similar to those of *P. occidentalis*.

Pogonomyrmex occidentalis owyheei Cole, 1938. Amer. Midland Nat. 19:240. ☿, ♀.

Biology: Cole, 1932. Ohio Jour. Sci. 32:17-20, 133-146, 245-246, 533-538 (as *occidentalis*). —Cole, 1933. Ent. News 44:16-19 (as *occidentalis*). —Cole, 1934. Canad. Ent. 66:193-198 (as *occidentalis*). —Cole, 1934. Ent. News 45:96-101 (as *occidentalis*). —Willard and Crowell, 1965. Jour. Econ. Ent. 58:484-489 (biology; e. Oreg.). —Lavigne and Rogers, 1974. Wyo. Univ., Agr. Exp. Sta. Sci. Monog. 26: 14-18 (annotated bibliography).

salinus Olsen. Southeast. Oreg., Nev., e. Calif. Ecology: Found mostly in pinyon-juniper areas; nests are a low bed of gravel with a cleared area surmounted by one or more craterlike depressions each with one entrance. A docile ant.

Pogonomyrmex salinus Olsen, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77:498, 510. ☿.

Taxonomy: Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:237 (larva).

subdentatus Mayr. Southwest. Oreg., w. Nev., Calif. Ecology: A timid, inoffensive ant whose nests are low, irregular beds of sand and gravel with more than one entrance. Mayr's citation of this form from Conn. is an error.

Pogonomyrmex subdentatus Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:971. ☿.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:399. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:65.

subnitidus Emery. Nev. (?) (Nye Co., Lyon Co.). coastal central and s. Calif.; Mexico. Ecology: Nests are in sand or loose, sandy soil surmounted by semicircular or circular craters or marked by irregular beds of sand.

Pogonomyrmex occidentalis var. *subnitidus* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:310. ☿.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:399. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:65. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 52.

Species Group Maricopa

californicus (Buckley). W. Tex., s. N. Mex., s. Utah., Ariz., Nev., s. Calif.; Mexico. Ecology: Nests are surmounted by a circular or semicircular crater of loose sand and have a single entrance. California harvester ant.
Myrmica californica Buckley, 1867. Ent. Soc. Phila., Proc. 6:336. ☿.
Pogonomyrmex badius var. *estebanius* Pergande, 1893. Calif. Acad. Sci., Proc. 4:33. ☿, ♀.
Pogonomyrmex californicus longinodis Emery, 1895. Zool. Jahrb., Abt. f. System. 8:311. ☿.
Pogonomyrmex californicus nitratus Cook, 1953. The Ants of Calif., pp. 99-100, 3 figs. ☿.

Biology: Wheeler, 1910. Ants, pp. 188-190, 200-201, 284-286, 290-291. —Essig, 1926. Ins. of West. N. Amer., p. 861. —Cole, 1934. Ent. Soc. Amer., Ann. 27:399. —Michener, 1942. Sci. Monthly 55:248-258 (history and behavior of a colony). —Michener, 1960. Kans. Ent. Soc., Jour. 33:46 (treetop mating habit). —McCluskey, 1969. Amer. Zool. 9:566 (flights). —Erickson, 1972. Ent. Soc. Amer., Ann. 65:57-61 (mark-recapture techniques for population estimates). —Wheeler and Wheeler, 1973. Ants of Deep Canyon pp. 53-60. —Whitford and Ettershank, 1975. Environ. Ent. 4: 689-696 (factors affecting foraging activity).

Morphology: Shapley, 1921. Natl. Acad. Sci., Proc. 6:687-690 (pterergates). —Tullock, 1930. Psyche 37:61-70.

comanche Wheeler. Southwest. Ark., w. La., s. Kans., Okla., e. Tex. Ecology: Nests are in sandy areas in close proximity to post-oak groves and each is marked by a crescentric or circular crater of sand or sandy soil 3 inches to 2 feet in diameter with a single entrance.
Pogonomyrmex occidentalis comanche Wheeler, 1902. Psyche 9:392. ☿.

Biology: Wheeler, 1910. Ants, pp. 201, 284-285, 292. —Strandtmann, 1942. Ent. Soc. Amer., Ann. 38:140.

magnacanthus Cole. S. Nev., w. Ariz., s. Calif.; Mexico. Ecology: Nests are in loose, sandy soil of open deserts with a circular, shallow crater 4 to 6 inches in diameter.
Pogonomyrmex (*Pogonomyrmex*) *magnacanthus* Cole, 1968. Pogonomyrmex Harvester Ants, pp. 133-137. ☿, ♀, ♂.

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 60-61.

maricopa Wheeler. W. Tex., s. Colo., N. Mex., s. Utah., s. Nev., Ariz., s.e. Calif.; Mexico. Ecology: Nests and habits are similar to those of *P. californicus*.
Pogonomyrmex californicus maricopa Wheeler, 1914. Psyche 21:155. ☿, ♀.
Pogonomyrmex californicus barnesi Smith, 1929. Ent. Soc. Amer., Ann. 22:546. ☿.
Pogonomyrmex californicus sinaloanus Olsen, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77:504. ☿.

Taxonomy: Cole, 1954. Tenn. Acad. Sci., Jour. 29:120.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:399. —Gregg, 1963. Ants of Colo., pp. 326-328. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 61-62.

Species Group Badius

badius (Latreille). N. C., S. C., Ga., Fla., Ala., Miss., La. Ecology: Nests are in sand or sandy soil usually in open woodlands and grassy fields; they construct single or multiple, flattened, circular sand craters or dome-shaped sand mounds with depressed tops. The only species of *Pogonomyrmex* found east of the Mississippi River and the only N. Amer. polymorphic species. Florida harvester ant.
Formica badia Latreille, 1802. Hist. Nat. Fourmis, p. 238. ☿, ♀.
Myrmica transversa Smith, 1858. Cat. Hym. Brit. Mus. 6:129. ☿.
Atta crudelis Smith, 1858. Cat. Hym. Brit. Mus. 6:170. ☿, ♀.
Myrmica brevipennis Smith, 1858. Cat. Hym. Brit. Mus. 6:130. ♂. A questionable syn.

Taxonomy: Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:2 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:384-385. —Turner, 1909. Biol. Bul. 17:161-170. —Wheeler, 1910. Ants, pp. 131, 152, 201, 280, 283-285, 292. —Wray, 1938. Ent. Soc. Amer., Ann. 31:196-200. —Van Pelt, 1953. Tenn. Acad. Sci., Jour. 28:164-168. —Van Pelt, 1958. Amer. Midland Nat. 59:11-12. —Carter, 1962. Elisha Mitchell Sci. Soc., Jour. 78:172. —Golley and Gentry, 1964. Ecology 45:217-225. —Hangartner, Reichson, and Wilson, 1970. Animal Behavior 18:331-334 (orientation to nest material). —Gentry and Carlson, 1970. Assoc. Southeast. Biol., Bul. 17:44 (formation and early development). —Holldobler and Wilson, 1970. Psyche 77:385-399 (recruitment trails). —Holldobler, 1971. Science 171:1149-1151 (homing). —Nickle and Neal, 1972. Fla. Ent. 55:65-66 (foraging behavior). —Morrill, 1972. Fla. Ent. 55:59-60 (tool using behavior). —Morrill, 1975. Ga. Ent. Soc., Jour. 10: 50-51 (a predator, *Apiomerus crassipes crassipes* (F.) (Reduviidae)).

Morphology: Wilson, Durlach, and Roth, 1958. Psyche 65:108-114 (chemical releasers of necrophoric behavior). —Wilson, 1958. Psyche 65:41-51 (chemical releasers of alarm and digging behavior). —Hermann and Blum, 1967. Ent. Soc. Amer., Ann. 60:661-668 (morphology and histology of poison apparatus). —Blum and Hermann, 1969. Ga. Ent. Soc., Jour. 4:23-28 (poison gland, functions of the main glandular elements).

Unplaced Taxon of Pogonomyrmex Subgenus Pogonomyrmex

Pogonomyrmex (*Pogonomyrmex*) *californicus* var. *Hindleyi* Forel, 1914. Soc. Vaud. des Sci. Nat., Bul. 50:270. ♀. Calif. (Escondido).

Genus POGONOMYRMEX Subgenus EPHEBOMYRMEX Wheeler

Pogonomyrmex subg. *Ephebomyrmex* Wheeler, 1902. Psyche 9:390.
Type-species: *Pogonomyrmex naegelii* Forel. Desig. by Wheeler, 1911.

Biology: Creighton, 1956. Psyche 63:54-56.

huachucanus Wheeler. N. Mex., Ariz. Ecology: Nests are in stony soil, sometimes under stones, in the open exposed to the sun; there is little or no excavated soil.
Pogonomyrmex huachucanus Wheeler, 1914. Psyche 21:151. ☿.

Taxonomy: Creighton, 1952. Psyche 59:76-81 (each caste). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:237 (larva).

Biology: Cole, 1954. Tenn. Acad. Sci., Jour. 26:119.

imberbiculus Wheeler. Southwest. Okla., central and w. Tex., s.w. Colo., N. Mex., s. Ariz., s. Nev., s. Calif.; Mexico. Ecology: Nests are in open or under stones, sometimes with a small crater.
Pogonomyrmex imberbiculus Wheeler, 1902. Amer. Nat. 36:87, 97. ☿.
Pogonomyrmex (*Ephebomyrmex*) *townsendi* Wheeler, 1909. N. Y. Ent. Soc., Jour. 17:80. ☿.

Taxonomy: Creighton, 1956. Psyche 63:63-64 ♀. —Wheeler and Wheeler, 1952. Psyche 59:111 (larva). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:237 (larva).

Biology: Wheeler, 1910. Ants, pp. 283-284, 290, 292. —Wheeler, 1917. Psyche 24:178-179. —Creighton, 1956. Psyche 63:54-56. —Gregg, 1963. Ants of Colo., pp. 334-336. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 63-64.

pima Wheeler. S. Ariz.; Mexico. Ecology: Habits are similar to those of *P. imberbiculus*.
Pogonomyrmex (*Ephebomyrmex*) *pima* Wheeler, 1909. N. Y. Ent. Soc., Jour. 17:79. ☿.

Biology: Wheeler, 1910. Ants, p. 283. —Cole, 1934. Ent. Soc. Amer., Ann. 27:399-400. —Creighton, 1956. Psyche 63:61.

Tribe PHEIDOLINI

Genus STENAMMA Westwood

Stenamma Westwood, 1840. Introduct. Mod. Class. Ins., Sup. 2:83.
Type-species: *Stenamma westwoodii* Westwood. Monotypic.
Asemorhoptrum Mayr, 1861. Die Europaischen Formiciden, p. 76.
Type-species: *Myrmica lippula* Nylander. Monotypic.
Theryella Santschi, 1921. Soc. d'Hist. Nat. l'Afrique de Nord, Bul. 12:68.

Type-species: *Theryella myops* Santschi. Monotypic.

This is a holarctic genus which also extends into the Neotropical Region. Nests are usually in wooded areas where the small colonies are found in logs, stumps, branches, in soil beneath rocks, moss, debris, or humus. Workers are apparently predatory, feeding mostly on other arthropods. Snelling (1973) set up five species groups for the 12 western species of this genus; other North American species may belong to one of these groups or form new groups.

Revision: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:297-301. —Forel, 1901. Soc. Ent. de Belg., Ann. 45:347-348. —Wheeler, 1903. Psyche 10:164-168. —Smith, 1957. Amer. Midland Nat. 57:133-174 (N. Amer.). —Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:1-38 (western N. Amer.).

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:50-52. (larvae).

Biology: Francoeur, 1966. Ent. Soc. Quebec, Ann. 11:115-119 (4 species in Que.).

brevicorne (Mayr). N. S., Que. s. to Va., w. to Ont., Minn., Nebr., Colo. (?). Ecology: Prefers to nest in wooded areas, though sometimes found in meadows, in soil under stones, in debris, rotting wood, etc.

Aphaenogaster brevicornis Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:443, 447-448. ☿, ♀.

Stenamma neoarcticum (!) Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:454. ☿ (female, male misdet.).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:373, 382. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:585. —Kannowski, 1958. Ent. News 69:231-233 (swarming of males). —Gregg, 1963. Ants of Colo., pp. 346-348. —Francoeur, 1966. Ent. Soc. Quebec, Ann. 11:115-119.

californicum Snelling. Calif. Ecology: Found in fern humus and oak leaf litter.

Stenamma californicum Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:16-18. ☿, ♀.

carolinense Smith. N. C. (Hoffman, Richmond Co.). Ecology: Collected in sparsely vegetated sandy soil.

Stenamma carolinense Smith, 1951. Ent. Soc. Wash., Proc. 53:156-158. ☿.

chiricahua Snelling. S. Ariz. Ecology: Found in mountains in shaded creek bed.

Stenamma chiricahua Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:7-10. ☿, ♀, ♂.

diecki Emery. Que., Maine s. to N. C., w. to B. C., Wash., Oreg., Calif.; Mexico. Ecology: A widespread species adapted to various habitats but apparently absent in the southern states from S. C. to Fla., w. to Tex. Nests are usually in wooded areas in rotting wood or under objects.

Stenamma westwoodi diecki Emery, 1895. Zool. Jahrb., Abt. f. System. 8:300. ☿, ♀.

Stenamma westwoodi diecki var. *impressum* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:301. ☿.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:50 (larva). —Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:18-21.

Biology: Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11:244. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:284, 304. —Cole, 1950. Tenn. Acad. Sci., Jour. 25:297. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 121-122. —Gregg, 1963. Ants of Colo., pp. 350-351, 353. —Francoeur, 1966. Ent. Soc. Quebec, Ann. 11:115-119. —Lettendre and Pilon, 1972. Nat. Canad. 99:73-82 (in Que.).

dyscheres Snelling. Calif. Ecology: Found at low to moderate elevations in the Sierra Nevada foothills. Specimens have been found in pine duff.

Stenamma dyscheres Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:21-25. ☿, ♀, ♂.

exasperatum Snelling. Calif. (Calaveras Co. and Yosemite Nat. Pk.). Ecology: Found under stones in Sequoia and pine forests.

Stenamma exasperatum Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:28-30. ☿.

foveolocephalum Smith. Miss. (2 mi. s. of Ackerman). Ecology: Specimens collected from sandy soil on a thinly wooded hillside.
Stenamma fovolocephala (!) Smith, 1930. Ent. Soc. Amer., Ann. 23:564. ☿.

Biology: Smith, 1931. Ent. News 42:17.

heathi Wheeler. Nev., Calif.; Mexico. Ecology: Collected under rocks in pine forests.
Stenamma brevicorne heathi Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:410. ☿.

Taxonomy: Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:30-34.

huachucanum Smith. Colo., Ariz. Ecology: Collected from under rocks.
Stenamma huachucanum Smith, 1957. Amer. Midland Nat. 57:153. ☿.

Taxonomy: Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:34.

Biology: Gregg, 1963. Ants of Colo., pp. 350-351, 353.

impar Forel. Que., Mass. s. to N. C., w. to N. Dak., Ill., Mo. Ecology: Nests in soil or rotten wood.
Stenamma brevicorne impar Forel, 1901. Soc. Ent. de Belg., Ann. 45:347. ☿, ♀.

Biology: Wheeler and Wheeler, 1963. Ants of N. Dak., p. 122. —Francoeur, 1966. Ent. Soc. Quebec, Ann. 11:115-119.

meridionale Smith. Va. s. to Ga., w. to Ill., Ark. Ecology: Found in wooded areas in soil.
Stenamma meridionale Smith, 1957. Amer. Midland Nat. 57:169-171. ☿, ♀.

occidentale Smith. S. Dak., Colo., N. Mex., Idaho, Utah, Ariz., B. C., Wash., Oreg., Calif.; Mexico. Ecology: Nests in soil under rocks.
Stenamma occidentale Smith, 1957. Amer. Midland Nat. 57:146. ☿, ♀, ♂.

Taxonomy: Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:25-28.

Biology: Gregg, 1963. Ants of Colo., pp. 352-354.

punctatoventre Snelling. Calif. Ecology: Specimens collected under a decayed limb in litter.
Stenamma punctatoventre Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:10-12. ☿, ♀, ♂.

schmittii Wheeler. Que., Maine s. to N. C., w. to Minn., Iowa, Mo., Tenn. Ecology: Nests in wooded areas under stones, rotten wood and litter.
Stenamma brevicorne schmittii Wheeler, 1903. Psyche 10:167. ☿.

Biology: Wesson and Wesson, 1940. Amer. Midland Nat. 24:93. —Francoeur, 1966. Ent. Soc. Quebec, Ann. 11:115-119.

sequoiarum Wheeler. Calif. (coastal region from Siskiyou Co. to San Luis Obispo Co.). Ecology: Specimens have been found under stones in redwood forests and in redwood litter.
Stenamma brevicorne sequoiarum Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:520. ☿, ♀.

Taxonomy: Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:28.

smithi Cole. Idaho, Utah, Nev. Ecology: Collected from sagebrush and juniper duff.
Stenamma smithi Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7 (3):7. ☿.
Stenamma knowltoni Gregg, 1972. Great Basin Nat. 32:35-39. ☿, ♀.

Taxonomy: Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:12-16.

wheelerorum Snelling. Nev. (Mt. Rose, Washoe Co., 8800 ft.).
Stenamma wheelerorum Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 245:34-35. ☿, ♀.

Genus APHAENOGASTER Mayr

Aphaenogaster Mayr, 1853. Zool.-Bot. Gesell. Wien, Verh. 3:107.
Type-species: *Aphaenogaster sardous* Mayr. Desig. by Bingham, 1903.
Deromyrma Forel, 1913. Zool. Jahrb., Abt. f. System. 36:772.
Type-species: *Aphaenogaster* (*Ischnomyrmex*) *swammerdami* Forel. Monotypic.
Planimyrma Viehmeyer, 1914. Zool. Jahrb., Abt. f. System. 37:604.
Type-species: *Stenamma* (*Ischnomyrmex*) *loriai* Emery. Orig. desig.

Aphaenogaster subg. *Attomyrma* Emery, 1915. Accad. delle Sci. dell'Ist. Bologna, Rend. (n. s.) 19: 70.
Type-species: *Formica subterranea* Latreille. Orig. desig.
Novomessor Emery, 1915. Accad. delle Sci. dell'Ist. Bologna, Rend. (n. s.) 19:73.
Type-species: *Aphaenogaster* (*Ischnomyrmex*) *cockerelli* Andre. Orig. desig.
Nystalomyrma Wheeler, 1916. Roy. Soc. So. Austral., Trans. 40:215.
Type-species: *Myrmica longiceps* Smith. Orig. desig.

Most species of this genus nest in soil beneath a covering object but some may be in rotten logs or arboreal in dead branches. Two species, *mariae* and *tennesseensis* are believed to be temporary social parasites but more investigation is needed. The genus is worldwide. The North American fauna is in need of intensive study.

Revision: Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:443-446. —Emery, 1895. Zool. Jahrb., Abt. f. System. 8:301-306. —Wheeler and Wheeler, 1934. Psyche 41:6-12 (*treatae* and forms). —Wheeler and Creighton, 1934. Amer. Acad. Arts and Sci., Proc. 69:343-354 (*Novomessor*). —Enzmann, 1947. N. Y. Ent. Soc., Jour. 55:147-151 (*Novomessor*).

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:54-62 (larvae). —Brown, 1973. *In* Meggers, *et al.*, Tropical forest ecosystems in Afr. and S. Amer., pp. 178-185 (generic syn.). —Brown, 1974. Ent. News 85: 45-47 (justification of synonymy of *Novomessor*).

Biology: Fellers and Fellers, 1976. Science 192: 70-72 (tool use in 4 species).

albisetosa Mayr. Tex., N. Mex., Ariz.; Mexico. Ecology: Found in arid plateaus, at elevations of 2,500 to 5,000 feet; makes small crater nests, often under large stones. Omnivorous, but has a preference for fruits and seeds.
Aphaenogaster albisetosa Mayr, 1886. Zool.-Bot. Gesell. Wien., Verh. 36:443, 446. ☿.
Novomessor cockerelli var. *minor* Enzmann, 1947. N. Y. Ent. Soc., Jour. 55:148. ☿.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:70 (larva). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:8 (larva).

Biology: Wheeler, 1910. Ants, pp. 280-282. —Cole, 1934. Ent. Soc. Amer., Ann. 27:398. —Creighton, 1955. Psyche 62:89-97.

ashmeadi (Emery). N. C., Tenn. s. to Fla., w. to Mo., Tex.
Stenamma (*Aphaenogaster*) *treatae* var. *ashmeadi* Emery, 1985. Zool. Jahrb., Abt. f. System. 8:302. ☿.
Aphaenogaster treatae harnedi Wheeler, 1919. Psyche 26:50. ☿.

Taxonomy: Wheeler, 1919. Psyche 26:50. —Smith, 1924. Ent. News 35:50.

boulderensis boulderensis Smith. Ariz. (Horseshoe Is., Mead Lake); Nev., Tex. (?). Ecology: Probably nests in small colonies beneath stones. Possibly confused with *A. mutica* Pergande.
Aphaenogaster (*Attomyrma*) *boulderensis* Smith, 1941. Great Basin Nat. 2:118, 120. ☿.

Biology: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7:9.

boulderensis smithi Gregg. N. Mex. (Carrizozo).
Aphaenogaster (*Attomyrma*) *boulderensis smithi* Gregg, 1949. Ent. Soc. Wash., Proc. 51:171. ☿.

cockerelli Andre. Tex., N. Mex., Ariz., Nev., s. Calif.; Mexico. Ecology: Found in arid plateaus as high as 7,000 ft. Constructs large craters of pebbles under four inches in height with a single entrance.
Aphaenogaster (*Ischnomyrmex*) *cockerelli* Andre, 1893. Rev. de. Ent. 12:150. ☿.
Aphaenogaster sonorae Pergande, 1893. Calif. Acad. Sci., Proc. 4:34. ☿.

Taxonomy: Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:10 (larva). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:239 (larva).

Biology: Wheeler, 1910. Ants, pp. 69, 178, 201, 280-282. —Cole, 1934. Ent. Soc. Amer., Ann. 27:397-398. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:67. —Cole, 1953. Tenn. Acad. Sci., Jour. 28:243. —Creighton, 1955. Psyche 62:89-97. —Whitford and Ettershank, 1975. Environ. Ent. 4: 689-696 (factors affecting foraging activity).

Morphology: Vick, Drew, *et al.*, 1969. Ent. Soc. Amer., Ann. 62:723-725 (identification of hydrocarbons).

flemingi Smith. N. C. s. to Fla., w. to Ky., La.
Aphaenogaster texana flemingi Smith, 1928. Ent. News 39:275. ☿.
Aphaenogaster texana macrospina Smith, 1934. Ent. Soc. Amer., Ann. 27:386. ☿.

Taxonomy: Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:238 (larva). —Smith, 1957. Brooklyn Ent. Soc., Bul. 52:113.

floridana Smith. N. C. s. to Fla., Ala.
Aphaenogaster (*Attomyrma*) *floridana* Smith, 1941. Great Basin Nat. 2:118. ☿.

Taxonomy: Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:7 (larva).

fulva Roger. Vt. s. to Fla., w. to Nebr., Colo., La. Ecology: Nests in rotting wood such as logs and stumps or in soil under stones or other objects. Food consists mostly of live and dead insects. Temporary host of *A. tennesseensis* (Mayr) and possibly of *A. mariae* Forel.
Aphaenogaster fulva Roger, 1863. Berlin Ent. Ztschr. 7:190. ☿.
Aphaenogaster fulva var. *rubida* Enzmann, 1947. N. Y. Ent. Soc., Jour. 55:147. ☿.

Biology: Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:586. —Wheeler, 1910. Ants, pp. 81, 83, 206, 448, 453. —Gregg, 1963. Ants of Colo., pp. 336-337, 339. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:24-25.

huachucana crinimera Cole. N. Mex. (Bandelier Natl. Mon.).
Aphaenogaster (*Allomyrma*(*!*)) *huachucana crinimera* Cole, 1953. Tenn. Acad. Sci., Jour. 28:82. ☿, ♀, ♂.

huachucana huachucana Creighton. Colo., Ariz.
Aphaenogaster (*Attomyrma*) *huachucana* Creighton, 1934. Psyche 41:189. ☿.

Taxonomy: Creighton, 1951. Psyche 58:89-99 (each caste).

Biology: Gregg, 1963. Ants of Colo., pp. 338-340.

lamellidens Mayr. N. Y. s. to Fla., w. to Ill., Mo., Tex. Ecology: Typically nests in stumps and logs and feeds on live and dead insects.
Aphaenogaster lamellidens Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:443, 445. ☿, ♀, ♂.
Aphaenogaster lamellidens var. *nigripes* Smith, 1923. Ent. News 34:308. ☿.

Taxonomy: Cole, 1940. Amer. Midland Nat. 24:50, 52.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:383. —Smith, 1918. Ent. News 29:21. —Smith, 1924. Ent. News 35:51. —Smith, 1928. Ent. News 39:246. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:285, 304. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:20-21.

mariae Forel. N. Y. s. to Fla., w. to Iowa, Kans. Ecology: Probably a temporary parasite. Host: *Aphaenogaster fulva* Roger.
Aphaenogaster mariae Forel, 1886. Soc. Ent. de Belg., Bul. 30:41. ☿.

Taxonomy: Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:585. —Buren, 1944. Iowa State Col., Jour. Sci. 18:284 (female).

Biology: Wheeler, 1910. Ants, pp. 151, 448. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:93.

megommata Smith. Oreg., Nev., Ariz., Calif. Ecology: A crepuscular and nocturnal forager.
Aphaenogaster (*Attomyrma*) *megommatus* Smith, 1963. N. Y. Ent. Soc., Jour. 71:244-246. ☿.

Taxonomy: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7(3):9-11 (female, male). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:238 (larva).

miamiana Wheeler. Fla., Ala., Miss. Ecology: Possibly arboreal, nesting in branches.
Aphaenogaster (*Attomyrma*) *texana* var. *miamiana* Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:5. ☿, ♀, ♂.

mutica Pergande. Tex. (?); Mexico (Lower Calif.). Ecology: Recorded from Brownsville, Tex., but may not occur in U. S.
Aphaenogaster mutica Pergande, 1895. Calif. Acad. Sci., Proc. 5:891. ☿.

patruelis Forel. Calif. (Coastal Islands); Mexico (Lower Calif., Guadeloupe Is., St. Nicholas Is.).
Aphaenogaster patruelis Forel, 1886. Soc. Ent. de Belg., Ann. 30:41. ☿.
Stenamma (*Aphaenogaster*) *patruelis bakeri* Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:270. ☿.
Aphaenogaster patruelis willowsi Wheeler, 1933. Calif. Acad. Sci., Proc. 21:64. ☿.

Taxonomy: Wheeler, 1934. Pan-Pacific Ent. 10:133.

rudis picea (Emery). N. S. s. to N. C. Ecology: Habits are similar to *rudis rudis* (Emery), but *rudis picea* is normally found at higher elevations. Temporary host of *A. tennesseensis* (Mayr).
Stenamma (*Aphaenogaster*) *fulvum aquia* var. *piceum* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:305. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:57-60 (larva).

Biology: Wheeler, 1910. Ants, pp. 195, 282, 447-448, 453. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:286-287, 305. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:94. —Haskins, 1960. N. Y. Ent. Soc., Jour. 68:66-67 (longevity of fertile females).

rudis rudis (Emery). Mass. s. to Fla., w. to Wyo., Colo. Ecology: A common and highly adaptable species, nesting in soil, under stones or logs, in decaying wood, leaf litter, hollow stems of plants, or under bark at bases of trees. Food consists of insects, seeds, and pollen of ground nesting bees. Host of temporary ant parasite *Aphaenogaster tennesseensis* (Mayr).
Stenamma (*Aphaenogaster*) *fulva aquia* var. *rude* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:305. ☿, ♀.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:56 (larva).

Biology: Wesson and Wesson, 1940. Amer. Midland Nat. 24:90, 94. —Talbot, 1951. Ent. Soc. Amer., Ann. 44:302-307. —Brown, 1958. Psyche 65:39-40 (nest raided by *Formica subintegra* Emery). —Gregg, 1963. Ants of Colo., pp. 340-342. —Bobb, 1965, Jour. Econ Ent. 58:925 (predator of *Neodiprion pratti pratti* (Dyar)). —Smith, 1965. U. S. Dept., Agr., Tech. Bul. 1326:21-22.

Morphology: Gotwald, 1969. N. Y. (Cornell) Agr. Expt. Sta., Mem. 408:99-112 (mouthparts).

subterranea occidentalis (Emery). B. C. s. to Nev., Calif. *A. subterranea subterranea* (Latreille) occurs in the Mediterranean region and central Europe.
Stenamma (*Aphaenogaster*) *subterraneum occidentale* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:301. ☿.
Aphaenogaster subterranea borealis Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:412. ☿.
Aphaenogaster subterranea valida var. *manni* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:516. ☿.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28:363. —Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:61 (larva).

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:7. —Bruniquel, 1970. Insectes Sociaux 17:245-252 (biology of *A. subterranea* in Europe).

subterranea valida Wheeler. S. Dak. to B. C., s. to Colo., Utah. Ecology: Prefers to nest under stones in moist, shady foothill canyons. Intergrades in northern part of range with subsp. *occidentalis*.
Aphaenogaster subterranea valida Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:411. ☿, ♀, ♂.

Biology: Gregg, 1947. Colo. Univ., Studies (ser. D) 2:393. —Gregg, 1963. Ants of Colo., pp. 342-344.

tennesseensis (Mayr). Que., Ont. s. to Fla., w. to Minn., S. Dak., Nebr., Kans., Okla. Ecology: In early stages of colony formation, probably a temporary parasite in ground nests of other *Aphaenogaster* species. Lives in ground nests only when females occur in nests of *rudis* and *picea*, otherwise it is exclusively a wood nesting ant. Host: *Aphaenogaster fulva* Roger, *A. rudis picea* (Emery), *A. rudis rudis* (Emery).
Atta Tenneseensis (!) Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12:743. ☿.
Atta laevis Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12:743. ♀.

Myrmica subruba Buckley, 1867. Ent. Soc. Phila., Proc. 6:336. ☿, "♀" = ♂.
Stenamma (*Aphaenogaster*) *tenesseense* (!) var. *ecalcaratum* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:301. ☿.

Taxonomy: Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:585-586. —Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:61-62 (larva). —Francoeur and Beique, 1968. Nat. Canad. 95:227 (distribution).

Biology: Wheeler, 1910. Ants, pp. 114, 447-448, 450. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:287-288. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:90, 94. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:23-24.

texana carolinensis Wheeler. S. Va. to n. Ala. Ecology: Nests are in both wood and soil.
Aphaenogaster texana var. *carolinensis* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:414. ☿, ♀.

Taxonomy: Smith, 1931. Ent News 42:17.

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31:287, 305.

texana texana (Emery). N. C., Tenn. s. to Fla., w. to Kans., Ariz.
Stenamma (*Aphaenogaster*) *fulvum aquia* var. *texanum* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:306. ☿.
Aphaenogaster texana var. *furvescens* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:413. ☿, ♀.
Aphaenogaster (*Deromyrma*) *Silvestrii* Menozzi, 1929. Bol. Lab. Zool. Gen. e Agr. Portici 22:282. ☿, ♀.

Taxonomy: Creighton, 1934. Psyche 41:192. —Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:62 (larva).

treatae pluteicornis Wheeler and Wheeler. Ala. w. to Okla., Tex.
Aphaenogaster treatae pluteicornis Wheeler and Wheeler, 1934. Psyche 41:7, 12. ☿, ♀, ♂.
Aphaenogaster treatae pluteicornis var. *oklahomensis* Wheeler and Wheeler, 1934. Psyche 41:10, 12. ☿, ♀.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:62 (larva).

treatae treatae Forel. Ont. s. to Fla., w. to Mich., Ohio, Ill., Ala. Ecology: Nests are in soil usually in open areas.
Aphaenogaster treatae Forel, 1886. Soc. Ent. de Belg., Bul. 30:40-41. ☿, ♀, ♂.
Aphaenogaster treatae wheeleri Mann, 1915. Psyche 22:51. ☿, ♀.
Aphaenogaster treatae pluteicornis var. *alabamensis* Wheeler and Wheeler, 1934. Psyche 41:10. ☿, ♀.

Taxonomy: Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:585. —Wheeler, 1919. Psyche 26:50.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:303. —Wheeler, 1910. Ants, pp. 151, 200. —Talbot, 1954. Mich. Univ., Contrib. Lab. Vertebr. Biol. 69:1-9. —Talbot, 1966. Kans. Ent. Soc., Jour. 39:67-77 (flights).

uinta Wheeler. Colo., Idaho, Utah, Nev. Ecology: Nests are in fully exposed areas of great aridity.
Aphaenogaster uinta Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:517. ☿, ♀, ♂.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28:363-364.

Biology: Cole, 1934. Psyche 41:223. —Gregg, 1963. Ants of Colo., pp. 344-345, 347.

Unplaced Taxa of Aphaenogaster

According to Creighton (1950, Harvard Univ., Mus. Comp. Zool., Bul.) the following forms were described from minims only, and it is not possible to determine what they actually represent.

aquia (Buckley). N. Y., Va. In the early literature, this and *fulva aquia* (Buckley) were used for what is currently called *rudis rudis* (Emery).
Myrmica (*Monomarium* (*!*)) *aquia* Buckley, 1867. Ent. Soc. Phila., Proc. 6: 341. ☿, ♀.

fulva aquia var. **pusilla** (Emery). D. C.
Stenamma (*Aphaenogaster*) *fulvum aquia* var. *pusillum* Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 306. ☿.

texana nana Wheeler. Fla. (Gainesville).
Aphaenogaster (*Attomyrma*) *texana nana* Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 6. ☿.

texana punctithorax Cole. Tenn. (Gregory's Bald, Great Smoky Mtn. Natl. Pk.).
Aphaenogaster texana punctithorax Cole, 1938. Amer. Midland Nat. 19: 239. ☿.

Genus VEROMESSOR Forel

Novomessor subg. *Veromessor* Forel, 1917. Soc. Vaud. des Sci. Nat., Bul. 51:235. Type-species: *Aphaenogaster andrei* Mayr. Desig. by Emery, 1921.
Veromessor subg. *Lobognathus* Enzmann, 1947. N. Y. Ent. Soc., Jour. 55:152. Nomen nudum.

These are harvester ants, most common in the arid Southwest. They feed on seeds and other Arthropods and usually nest in exposed soil where the nests may or may not be marked with a small crater or piles of chaff from seeds stored in the nest. They are docile ants which seldom sting.

Revision: Wheeler and Creighton, 1934. Amer. Acad. Arts and Sci., Proc. 69:354-387.

Taxonomy: Smith, 1956. Pan-Pacific Ent. 32:36-37 (key to workers of U. S. species). —Wheeler and Wheeler, 1956. Psyche 63:142-143 (larvae). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:240 (larvae).

Biology: Creighton, 1953. Amer. Mus. Novitates 1612:1-18. —Went, Wheeler, and Wheeler, 1972. BioScience 22:82-88 (feeding and digestion).

andrei (Mayr). Oreg., Nev., Ariz., Calif.; Mexico. Ecology: Found from sea level up to 3500 feet. Nests are in various types of soil and openings are surrounded by a circular disc or low, obscure crater.
Aphaenogaster andrei Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:443, 448. ☿.
Veromessor andrei flavus Wheeler and Creighton, 1934. Amer. Acad. Arts and Sci., Proc. 69:361, 366. ☿.
Veromessor andrei castaneus Wheeler and Creighton, 1934. Amer. Acad. Arts and Sci., Proc. 69:361, 365. ☿.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:306-307 (worker, female). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:240 (larva).

Biology: Wheeler, 1910. Ants, p. 280. —Cole, 1934. Ent. Soc. Amer., Ann. 27:398. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:7. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342:24 (economics). —Creighton, 1953. Amer. Mus. Novitates 1612:2-4. —McCluskey, 1958. Science 128:536-537 (daily rhythm of male). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 65-67.

chamberlini (Wheeler). Calif. (coastal islands and mainland).
Messor chamberlini Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:410. ☿.

Taxonomy: Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:240 (larva).

lariversi Smith. Nev., Calif. Ecology: Nests are in exposed soil or gravel, and may be marked by one or more small circular craters several inches in diameter.
Veromessor lariversi Smith, 1951. Great Basin Nat. 11:94-96. ☿.

Taxonomy: Cole, 1955. Tenn. Acad. Sci., Jour. 30:51-52 (female).

Biology: Creighton, 1953. Amer. Mus. Novitates 1612:5-6. —Cole, 1963. Ent. Soc. Amer., Ann. 56:680-682. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7(3):12.

lobognathus (Andrews). Southwest. N. Dak., Colo., Nev. Ecology: Colonies are populous and nests are under large stones.
Messor lobognathus Andrews, 1916. Psyche 23:82. ☿.

Taxonomy: Wheeler and Wheeler, 1956. Psyche 63:143-145 (larva). —Cole, 1963. Ent. Soc. Amer., Ann. 56:680-682 (each caste).

Biology: Gregg, 1955. Psyche 62:45-52 (rediscovery). —Wheeler and Wheeler, 1956. Psyche 63:140-145 (in N. Dak.). —Wheeler and Wheeler, 1959. Ent. Soc. Amer., Ann. 52:176-179 (behavior, nest structure). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 123-125. —Gregg, 1963. Ants of Colo., pp. 354-356. —Wheeler and Wheeler, 1965, Kans. Ent. Soc., Jour. 38:55-61. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7(3):12-13.

pergandei (Mayr). Ariz., Nev., Calif.; Mexico. Ecology: Nests are in exposed soil, usually with a single entrance which is surrounded by a crater of excavated soil. Workers are diurnal foragers and can remain active during periods of intense heat.
Aphaenogaster pergandei Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:444, 448. ☿.

Taxonomy: Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342:8, 25. —Cole, 1963. Ent. Soc. Amer., Ann. 56:681. —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:240 (larva).

Biology: Wheeler, 1910. Ants, pp. 16, 280. —Cole, 1937. Ent. News 48:101. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:68. —Creighton, 1953. Amer. Mus. Novitates 1612:7-17. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7(3):13-14. —Wheeler and Wheeler, 1965. Kans. Ent. Soc., Jour. 38:55 (habitat, harvesting habits, defense). —Wheeler and Wheeler, 1967. Kans. Ent. Soc. Jour. 40:238 (distribution and habitat). —Tevis, 1958. Ecology 39:695-704 (interrelations with some desert ephemerals). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 67-72. —Clark and Comanor, 1973. Amer. Midland Nat. 90: 467-474 (quantitative examination of spring foraging). —Wheeler and Rissing, 1975. Pan-Pacific Ent. 51: 205-216 (nest). —Wheeler and Rissing, 1975. Pan-Pacific Ent. 51: 303-314 (behavior). —Rissing and Wheeler, 1976. Pan-Pacific Ent. 52: 63-72 (foraging responses to changes in seed production).

smithi Cole. Nev. (Mercury, Nye Co.), Ariz. Ecology: Nests are in fully exposed areas, each with a small circular crater of soil about their entrance.
Veromessor smithi Cole, 1963. Ent. Soc. Amer., Ann. 56:678-680. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:240 (larva).

Biology: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7(3):14.

stoddardi chicoensis Smith. Calif. (Chico). Ecology: The type series was found beneath a large stone.
Veromessor stoddardi chicoensis Smith, 1956. Pan-Pacific Ent. 32:36-38. ☿.

stoddardi stoddardi (Emery). S. Calif.; Mexico. Ecology: Nests have been found in hard clay soil, each with several openings situated at the bottom of a shallow depression and without excavated soil.
Stenamma (*Messor*) *stoddardi* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:307. ☿.

Biology: Wheeler, 1910. Ants, p. 280. —Creighton, 1953. Amer. Mus. Novitates 1612:17-18.

Genus PHEIDOLE Westwood

Pheidole Westwood, 1841. Ann. and Mag. Nat. Hist. 6:87.
Type-species: *Atta providens* Sykes. Monotypic.
Oecophthora Heer, 1852. Naturf. Gesell. in Zurich, Neujahrsbl. 54:11, 15.
Type-species: *Oecophthora pusilla* Heer. Monotypic.
Ischnomyrmex Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12:738.
Type-species: *Myrmica longipes* Smith. Monotypic.
Leptomyrma Motschulsky, 1863. Soc. Imp. Nat. Moscou, Bul. 36:17.
Type-species: *Leptomyrma gracilipes* Motschulsky. Monotypic.
Pheidolacanthinus Smith, 1864. Linn. Soc. London, Jour., Zool. 8:75.
Type-species: *Pheidolacanthinus armatus* Smith. Monotypic.
Pheidole subg. *Ceratopheidole* Pergande, 1895. Calif. Acad. Sci., Proc. 5:889.
Type-species: *Pheidole* (*Ceratopheidole*) *granulata* Pergande. Monotypic.
Phidole Bingham, 1903. Fauna Brit. India, Hym. 2:220. Variant spelling.
Epipheidole Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 19:664.
Type-species: *Epipheidole inquilina* Wheeler. Monotypic.
Sympheidole Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:1, 7.
Type-species: *Sympheidole elecebra* Wheeler. Monotypic.
Phidola Schulz, 1906. Spolia Hym., p. 155. Emend.

Allopheidole Forel, 1912. Soc. Ent. de Belg., Mem. 19:237.
Type-species: *Pheidole kingi* Andre. Desig. by Wheeler, 1913.
Decapheidole Forel, 1912. Soc. Ent. de Belg., Mem. 19:237.
Type-species: *Pheidole perpusilla* Emery. Desig. by Wheeler, 1913.
Isopheidole Forel, 1912. Rev. Suisse de Zool. 20:765.
Type-species: *Myrmica longipes* Smith. Monotypic.
Elasmopheidole Forel, 1913. Zool. Jahrb., Abt. f. System. 36:43.
Type-species: *Pheidole aberans* Mayr. Desig. by Emery, 1922.
Cardiopheidole Wheeler, 1914. N. Y. Ent. Soc., Jour. 22:48-51.
Type-species: *Pheidole vasliti* Pergande. Orig. desig.
Anergatides Wasmann, 1915. Ent. Mitt. 4:281. Uncertain syn.
Type-species: *Anergatides kohli* Wasmann. Monotypic.
Macropheidole Emery, 1915. Soc. Ent. de France, Bul. p. 190.
Type-species: *Pheidole fimbriata* Roger. Monotypic.
Scrobopheidole Emery, 1915. Soc. Ent. de France, Bul. p. 190.
Type-species: *Pheidole scrobifera* Emery. Monotypic.
Stegopheidole Emery, 1915. Soc. Ent. de France, Bul. p. 190.
Type-species: *Pheidole* (*Elasmopheidole*) *upeneci* Forel. Monotypic.
Trachypheidole Emery, 1915. Soc. Ent. de France, Bul. p. 190.
Type-species: *Pheidole bicornis* Forel. Orig. desig.
Parapheidole Emery, 1915. R. Accad. delle Sci. dell'Ist. Bologna, p. 68.
Type-species: *Aphaenogaster oculata* Emery. Monotypic.
Pheidole subg. *Electropheidole* Mann, 1921. Harvard Univ., Mus. Comp. Zool., Bul. 64:438.
Type-species: *Pheidole* (*Electropheidole*) *roosevelti* Mann. Desig. by Donisthorpe, 1943.
Bruchomyrma Santschi, 1922. Soc. Cient. Argentina, An. 94:248. Uncertain syn.
Type-species: *Bruchomyrma acutidens* Santschi. Monotypic.
Cephalomorium Forel, 1922. Rev. Suisse de Zool. 30:91.
Type-species: *Tetramorium* (*Cephalomorium*) *bahai* Forel. Monotypic.
Hendecapheidole Wheeler, 1922. Amer. Mus. Novitates 96:3.
Type-species: *Pheidole tachigaliae* Wheeler. Orig. desig.
Gallardomyrma Bruch, 1932. La Plata Mus., Rev. 33:271.
Type-species: *Gallardomyrma argentina* Bruch. Orig. desig.
Conothorax Karawajew, 1935. Treubia 15:75. Preocc. by Jekel, 1854.
Type-species: *Conothorax bilobum* Karawajew. Monotypic.
Conothoracoides Strand, 1935. Folia Zool. Hydrobiol. 8:176. N. name for *Conothorax* Karavaiev.
Eriopheidole Kusnezov, 1952. Mus. de Entre Rios, Mem. 29:5.
Type-species: *Eriopheidole symbiotica* Kusnezov. Orig. desig.

A large genus of harvesting ants for which most species are found in the arid Southwest. Most species have a dimorphic worker caste with majors or soldiers and minors which are not connected by intermediate forms. Only a few species are polymorphic with intermediate sized workers. The soldier is characteristic in having an enormous head, way out of proportion to the rest of the body, and may function as a seed husker.

Most species harvest seeds for food and chaff piles are sometimes found around the entrances to the nests. Nests may have craterlike excavations when in exposed soil, or nests may be under stones or other objects and sometimes in rotten wood. Though the main diet normally consists of seeds, most species also feed on other animal food. Most colonies are small with 300 or fewer individuals.

This is a huge cosmopolitan genus for which few satisfactory subdivisions have been made. A few species had been segregated into subgenera or closely related genera, but the bulk of the species always remained in the subgenus *Pheidole*. Emery (1921) attempted a group arrangement for this large subgenus, but this has met with little acceptance in recent years. It is now the trend to thrust all species into a single unit until satisfactory divisions can be made. The arrangement of this genus essentially follows the generic synonomy by Brown (1973) and the treatment of the genus by Gregg (1958).

Revision: Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:979-989. —Mayr, 1887. Zool.-Bot. Gesell. Wien, Verh. 37:582-608. —Emery, 1895. Zool. Jahrb., Abt. f. System. 8:288-297. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:431-478. —Gregg, 1958. N. Y. Ent. Soc., Jour. 66:7-48 (key to and list of species).

Taxonomy: Emery, 1921. *In* Wytsman, Gen. Ins., fasc. 174:77-111 (groups). —Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:70-80 (larvae). —Smith, 1953. N. Y. Ent. Soc., Jour. 61:143 (*Ceratopheidole*). —Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:1-46. —Creighton, 1957. N. Y. Ent. Soc., Jour. 65:203-212 (*vastiti* complex). —Cole, 1965. Ent. Soc. Amer., Ann. 58:173-175 (*Epipheidole*). —Brown, 1973. *In* Meggers, *et al.*, Tropical forest ecosystems in Afr. and S. Amer., pp. 178-185 (generic syn.).

Biology: Weber, 1948. Ent. News 59:31-35 (food of larvae and adults). —Szlep-Fessel, 1970. Insectes Sociaux 17:233-244 (regulatory mechanism in mass foraging and recruitment of soldiers).

anastasii Emery. S. Fla.; Mexico, Central Amer. Probably introduced. Reported from greenhouses in various parts of the East, but only established in southern Fla.
Pheidole anastasii Emery, 1896. Soc. Ent. Ital., Bol. 28:76. ☿, ♂.

Taxonomy: Forel, 1901. Naturhist. Mus. Hamburg Mitt. 18:78 (female).

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:6. —Smith, 1933. Fla. Ent. 17:23.

bahai (Forel). N. C. (Faisons).
Tetramorium (*Cephalomorium*) *bahai* Forel, 1922. Rev. Suisse de Zool. 30:91. ☿.

Taxonomy: Smith, 1955. Brooklyn Ent. Soc., Bul. 50:99 (correct taxonomic placement).

barbata Wheeler. W. Ariz., s. Nev., s.e. Calif. Ecology: In small crater nests in desert areas.
Pheidole barbata Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:448. ☿, ♂.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:68. —Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:1-3. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 75.

bicarinata bicarinata Mayr. Mich. to Tenn., w. to N. Dak., Wyo., Colo. Ecology: Found in grasslands where nests are usually under objects.
Pheidole bicarinata Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:982, 989. ♂.
Pheidole hayesi Smith, 1924. Ent. News 35:251. ☿, ♂.

Biology: Hayes, 1925. Ent. News 36:42. —Talbot, 1934. Ecology 15:418, 420, 422. —Buren, 1944. Iowa State Col., Jour. Sci. 18:286. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 126-127. —Gregg, 1963. Ants of Colo., pp. 408-409.

bicarinata longula Emery. N. Y., N. Dak., w. Tex., Colo., N. Mex. Ecology: Nests may be in sand or under stones.
Pheidole vinelandica var. *longula* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:289, 292. ☿, ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:453-454. —Cole, 1956. Tenn. Acad. Sci., Jour. 31:112. —Gregg, 1958. N. Y. Ent. Soc., Jour. 65:37.

Biology: Davis and Bequaert, 1922. Brooklyn Ent. Soc., Bul. 17:9. —Wheeler and Wheeler, 1963. Ants of N. Dak., p. 127. —Gregg, 1963. Ants of Colo., pp. 408, 410.

bicarinata paiute Gregg. Nev., s. Calif. Ecology: Nests are beneath stones or with craters.
Pheidole bicarinata paiute Gregg, 1958. N. Y. Ent. Soc., Jour. 66:17-18. ☿, ♂.

Biology: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7(3):15. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 80-81

bicarinata vinelandica Forel. N. Y. to Fla., w. to N. Dak., Utah, Ariz. Ecology: Nests in rotten logs, exposed soil, or under objects in grassy areas.
Pheidole bicarinata race *vinelandica* Forel, 1886. Soc. Ent. de Belg., Ann. 30:45. ☿, ♂, ♀, ♂.
Pheidole vinelandica laeviuscula Emery, 1895. Zool. Jahrb., Abt. f. System. 8:289, 292. ☿, ♂.
Pheidole vinelandica buccalis Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:454. ☿, ♂, ♀.
Pheidole vinelandica longula var. *castanea* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:405. ☿, ♂. Preocc. by Smith, 1858.

Pheidole (*Allopheidole*) *vinelandica* var. *nebrascensis* Forel, 1922. Rev. Suisse de Zool. 30:92. ☿, ♂, ♀.

Pheidole vinelandica longula var. *huachucana* Smith, 1951. *In* Muesebeck, *et al.*, U. S. Dept. Agr., Agr. Monog. 2:805. N. name for *castanea* Wheeler.

Taxonomy: Gregg, 1958. N. Y. Ent. Soc., Jour. 66:18, 36.

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:336-337. —Cole, 1937. Ent. News 48:100. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:92. —Cole, 1953. Tenn. Acad. Sci., Jour. 28:297. —Reid and Nugara, 1961. Jour. Parasitology 47:885-889 (as intermediate hosts of a turkey tapeworm). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 127-128. —Gregg, 1963. Ants of Colo., pp. 410, 412-413. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:25-26.

californica californica Mayr. Calif. (San Francisco region southwards). Ecology: Nests are found under objects, in oak galls, or in sandy soil.

Pheidole californica Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:981, 984, 987. ☿, ♂.

Pheidole californica var. *incenata* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:407. ☿, ♂.

Pheidole californica var. *satura* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:407. ☿, ♂.

Taxonomy: Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:243 (larva).

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:395-397. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:68-69.

californica oregonica Emery. Idaho, Wash., Oreg., n. Calif.

Pheidole oregonica Emery, 1895. Zool. Jahrb., Abt. f. System. 8:288, 291. ☿, ♂.

Pheidole californica var. *shoshoni* Cole, 1933. Ent. Soc. Amer., Ann. 26:618. ☿, ♂.

Pheidole californica var. *hagermani* Cole, 1936. Canad. Ent. 68:35. ☿, ♂.

Taxonomy: Gregg, 1958. N. Y. Ent. Soc., Jour. 66:19.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:69. —Cole, 1942. Amer. Midland Nat. 28:362.

californica pyramidensis Emery. Nev. (Pyramid Lake).

Pheidole californica nevadensis Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:408. ☿, ♂, ♀. Preocc. by Forel, 1901.

Pheidole californica pyramidensis Emery, 1922. *In* Wytsman, Gen. Ins., fasc. 174:105. N. name for *nevadensis Wheeler.*

casta Wheeler. Tex. (Canyon of the Rio Grande, Langtry).

Pheidole casta Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:454. ☿, ♂.

cerebrosior Wheeler. N. Mex., Ariz., Calif.; Mexico. Ecology: Nests more frequently in mountan canyons than on open desert and the species seems to prefer the evergreen oak association.

Pheidole vinelandica cerebrosior Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:405. ☿, ♂.

Taxonomy: Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:3-5.

ceres Wheeler. Tex., Colo., N. Mex., Ariz. Ecology: Host of the permanently parasitic ant *P. elecebra*. Parasitized colonies have been found to contain only soldiers and workers of *ceres*. *Ceres* nests under stones in rather dry, sunny localities at altitudes of 5,000 to 9,000 ft. and is a seed-storing form. Parasite: *Pheidole elecebra* (Wheeler).

Pheidole ceres Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:10. ☿, ♂, ♀, ♂.

Taxonomy: Gregg, 1958. N. Y. Ent. Soc., Jour. 66:20, 35.

Biology: Wheeler, 1919. Amer. Phil. Soc., Proc. 58:25. —Wheeler, 1923. Social Life Among the Insects, p. 219. —Wheeler, 1910. Ants, pp. 279, 497. —Cole, 1953. Tenn. Acad. Sci., Jour. 28:297. —Gregg, 1963. Ants of Colo., pp. 413-415.

clementensis Gregg. Calif. (San Clemente Is., Los Angeles Co.; Orange Co.; San Diego Co.).

Pheidole clementensis Gregg, 1969. Ent. News 80: 93-97. ☿, ♂.

clydei Gregg. N. Mex., Ariz., Nev., s. Calif. Ecology: Nests are found in and among rocks and boulders.

Pheidole (*Ceratopheidole*) *clydei* Gregg, 1950. N. Y. Ent. Soc., Jour. 58: 89. ☿.

Taxonomy: Gregg, 1953. Amer. Mus. Novitates 1673: 1 (soldier, distribution).

Biology: Creighton, 1964. Psyche 71: 169. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 84-86.

cockerelli Wheeler. Okla., Tex., Colo., N. Mex., Ariz.
Pheidole cockerelli Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 464. ☿, ☋.

Biology: Gregg, 1963. Ants of Colo., pp. 415-417.

crassicornis crassicornis Emery. N. C., Tenn., Ga. w. to Tex.
Pheidole crassicornis Emery, 1895. Zool. Jahrb., Abt. f. System. 8:289, 296. ☋.
Pheidole crassicornis var. *diversipilosa* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:467. ☿, ☋, ♀.

Taxonomy: Forel, 1901. Soc. Ent. de Belg., Ann. 45:350 (male).

Biology: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:302. —Smith, 1918. Ent. News 29:22.

crassicornis tetra Wheeler. Tex. w. to Ariz.
Pheidole crassicornis porcula var. *tetra* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:467. ☿, ☋.

creightoni Gregg. Oreg., Nev., n. Calif.
Pheidole creightoni Gregg, 1955. Psyche 62:19-28. ☿, ♀, ♂.

Taxonomy: Cole, 1957. N. Y. Ent. Soc., Jour. 65:131 (distribution).

davisi Wheeler. N. J. s. to N. C., n. Ala.
Pheidole davisi Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:380. ☿, ☋.

Biology: Davis and Bequaert, 1922. Brooklyn Ent. Soc., Bul. 17:8-9. —Bequaert, 1928. N. Y. (Cornell) Agr. Expt. Sta., Mem. 101:996.

dentata Mayr. Va. to Fla., w. to Ill., Kans, Tex. Ecology: Nests of small to large colonies are in exposed soil with a mound of excavated earth above it, under the cover of objects, or in rotting wood. Occasionally a house-infesting ant.
Pheidole Morrisi var. *dentata* Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:457. ☿, ☋, ♂.
Pheidole commutata Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:459. ☿, ☋.
Pheidole dentata var. *faisonsica* Forel, 1901. Soc. Ent. de Belg., Ann. 45:352. ☿, ☋.
Leptothorax tennesseensis Cole, 1938. Amer. Midland Nat. 19:238. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:460-461. —Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:71 (larva).

Biology: Mitchell and Pierce, 1912. Ent. Soc. Wash., Proc. 14:71. —Smith, 1924. Ent. News 35:77. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:281, 304. —Cole, 1940. Amer. Midland Nat. 24:29, 44. —Van Pelt, 1950. Ent. News 61:161-163 (parasitism by an *Orasema* chalcid). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:27-28. —Wilson, 1975. Science 190: 798-800 (enemy specification in the alarm-recruitment system).

dentigula Smith. N. C., Tenn. s. to Fla., w. to La. Ecology: Nests in soil or in well-rotted stumps.
Pheidole dentigula Smith, 1927. Ent. News 38:310. ☿, ☋.

Taxonomy: Smith, 1928. Ent. News 39:245-246 (female). —Cole, 1940. Amer. Midland Nat. 24:42, 45. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:12 (larva).

Biology: Smith, 1944. Fla. Ent. 27:14.

desertorum Wheeler. W. Okla., w. Tex., N. Mex., Utah, Ariz., Nev. Ecology: Nests have been found beneath stones and as small crater mounds in sand.
Pheidole desertorum Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:337. ☿, ☋, ♀, ♂.
Pheidole desertorum var. *comanche* Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:339. ☿, ☋, ♀.
Pheidole desertorum var. *maricopa* Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:339. ☿, ☋.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28:362.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:397. —Cole, 1937. Ent. News 48:100. —Gregg, 1963. Ants of Colo., pp. 417-419.

elecebra (Wheeler). Colo. Ecology: A permanent, workerless parasite in colonies of its host. Host: *Pheidole ceres* Wheeler.
Sympheidole elecebra Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:8. ♀, ♂.

Biology: Wheeler, 1910. Ants, p. 497. —Wheeler, 1923. Social Life Among the Insects, p. 219. —Gregg, 1963. Ants of Colo., pp. 429-431.

flavens Roger. Fla.; W. Indies, Central Amer. Possibly an adventive.
Pheidole flavens Roger, 1863. Berlin. Ent. Ztschr. 7:198. ☿, ☋.

Taxonomy: Gregg, 1958. N. Y. Ent. Soc., Jour. 66:45-46 (Fla. populations regarded as not quite typical representatives of *Pheidole flavens*).

floridana constipata Wheeler. Tex. (Austin and New Braunfels).
Pheidole constipata Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:468. ☿, ☋, ♀, ♂.

floridana floridana Emery. N. C. to Fla., w. to Tex.
Pheidole flavens floridana Emery, 1895. Zool. Jahrb., Abt. f. System. 8:289, 293. ☿, ☋, ♀.
Pheidole lauta Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:470. ☿, ☋, ♀, ♂.

Taxonomy: Gregg, 1958. N. Y. Ent. Soc., Jour. 66:35.

gilvescens Wheeler. Ariz., s. Nev., Calif. Ecology: Nests in soil in deserts, usually forms small craters.
Pheidole xerophila tucsonica var. *gilvescens* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:448. ☿, ☋.

Taxonomy: Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:5-7, 40.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:397. —Cole, 1956. Tenn. Acad. Sci., Jour. 31:113. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 76.

grundmanni Smith. Utah (Ashley Cr. near Vernal).
Pheidole (*Ceratopheidole*) *grundmanni* Smith, 1953. N. Y. Ent. Soc., Jour. 61:144-146. ☿.

Biology: Gregg, 1963. Ants of Colo., pp. 426-427.

humeralis Wheeler. Tex. (Corsicana).
Pheidole humeralis Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:456. ☿, ☋.

hyatti hyatti Emery. Okla., Tex., Colo. w. to Nev., s. Calif.; Mexico.
Pheidole hyatti Emery, 1895. Zool. Jahrb., Abt. f. System. 8:289-290, 295. ☿, ☋.
Pheidole hyatti var. *ecitonodora* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:463. ☿, ☋, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:74 (larva). —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:244 (larva).

Biology: Essig, 1926. Ins. of West. N. Amer., p. 859. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342:26. —Gregg, 1963. Ants of Colo., pp. 419-420. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 79-80.

hyatti solitanea Wheeler. Calif. (coastal area in San Diego region).
Pheidole hyatti solitanea Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:409. ☿, ☋, ♀.

inquilina (Wheeler). Nebr., Colo., Nev. Ecology: An inquiline in nests of other ants. Host: *Pheidole pilifera pilifera* (Roger), *P. pilifera coloradensis* Emery.
Epipheidole inquilina Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 19:664. Gynandromorph.

Taxonomy: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:15-17 (female, male). —Smith, 1940. Ent. Soc. Wash., Proc. 42:106-109 (worker). —Cole, 1965. Ent. Soc. Amer., Ann. 58:173-175 (worker, soldier; placement in *Pheidole;* biological notes).

Biology: Wheeler, 1910. Ants, pp. 107, 113, 150, 156, 497-498. —Wheeler, 1923. Social Life Among the Insects, pp. 215-219. —Gregg, 1963. Ants of Colo., pp. 427-429. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7(3):15.

lamia Wheeler. Ga., Miss., Tex. Ecology: Apparently hypogaeic, living under stones in small colonies. The phragmotic head of the soldier is a striking feature of this species.
Pheidole lamia Wheeler, 1901. Amer. Nat. 35:534. ☿, ☋.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:477-478 (soldier, female.).

Biology: Wheeler, 1910. Ants, pp. 212, 248. —Smith, 1931. Ent. News 42:21-22. —Gregg, 1956. Ent. News 67:37-39 (also distribution).

macclendoni Wheeler. S. Tex. w. to Ariz.
Pheidole macclendoni Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:450. ☿, ☿.

Taxonomy: Cole, 1957. N. Y. Ent. Soc., Jour. 65:130-131 (worker, soldier). —Gregg, 1958. N. Y. Ent. Soc., Jour. 66:46-47.

marcidula Wheeler. Tex. (Barton Cr., Austin).
Pheidole marcidula Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:457. ☿, ☿.

megacephala (Fabricius). Fla.; W. Indies, Hawaii, and probably all tropical regions of the world. Introduced, probably native to Africa but spread by commerce throughout the world. Bigheaded ant.
Formica megacephala Fabricius, 1793. Ent. System. 2:361. ☿.
Phidola megalocephala Schulz, 1906. Spolia Hym., p. 155. Emend.

Taxonomy: Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:843-844. —Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:75 (larva). —Wilson and Taylor, 1967. Pacific Insects Monog. 14:46-48.

Biology: Illingsworth, 1916. Hawaii. Ent. Soc., Proc. 3:349-368. —Phillips, 1934. (Hawaii Univ.) Expt. Sta. Pineapple Prod. Coop. Assoc. Bul. 15:5-12. —Broekhuysen, 1948. Union So. Africa Dept. Agr. Bul. 266:1-40. —Brown, 1958. Acta Hym. 1:47. —Brown, 1959. Bul. Ent. Res. 50:523. —Weber, 1960. Ent. Soc. Wash., Proc. 62:232. —Taylor and Wilson, 1961. Psyche 68:143. —Kempf, 1962. Studia Ent. 5:18-19. —Haskins and Haskins, 1965. Ecology 46:737 (competition between *P. megacephala* and *Iridomyrmex humilis* (Mayr) in Bermuda). —Fluker, Huddleston, and Beardsley, 1968. Jour. Econ. Ent. 61:474. —Fluker and Beardsley, 1970. Ent. Soc. Amer., Ann. 63:1290-1296 (sympatric association with *Iridomyrmex humilis* and *Anoplolepis longipes* in Hawaii).

metallescens metallescens Emery. Fla. w. to Tex.
Pheidole metallescens Emery, 1895. Zool. Jahrb., Abt. f. System. 8:289, 294. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:476-477. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:12 (larva).

Biology: Smith, 1924. Ent. News 34:78 (as *splendidula*).

metallescens splendidula Wheeler. Southwest. Tex.
Pheidole metallescens splendidula Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:474. ☿, ☿, ♀, ♂.

micula Wheeler. Ariz., s. Calif. Ecology: Nest was found under a stone.
Pheidole californica micula Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:408. ☿, ☿.

Taxonomy: Gregg, 1958. N. Y. Ent. Soc., Jour. 66:33. —Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:244 (larva).

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 80.

militicida Wheeler. N. Mex., Ariz.
Pheidole militicida Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:398. ☿, ☿.

Taxonomy: Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:9-12 (female, male; biological notes).

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:395. —Cole, 1953. Tenn. Acad. Sci., Jour. 28:298. —Creighton and Creighton, 1959. Psyche 66:1-12 (observations on habits in s. Ariz.).

moerens Wheeler. Fla., Ala. (Mobile); Puerto Rico. Apparently introduced.
Pheidole moerens Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:136-138. ☿, ☿.

Taxonomy: Wheeler and Wheeler, 1972. Ga. Ent. Soc., Jour. 7:244 (larva). —Wojcik, Banks, and Buren, 1975. Coop. Econ. Ins. Rpt. 25 (49-52): 906 (first report in Fla.).

Biology: Smith, 1937. Puerto Rico Univ., Jour. Agr. 20:842-843.

morrisi impexa Wheeler. Okla., Tex.
Pheidole morrisi var. *impexa* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:461. ☿, ☿, ♀, ♂.

Biology: Lindquist, 1942. Jour. Econ. Ent. 35:850-852.

morrisi morrisi Forel. N. Y. to Fla., w. to Ill., La., Tex.
Pheidole Morrisii Forel, 1886. Soc. Ent. de Belg., Bul. 30:46. ☿, ♂.
Pheidole morrisi var. *Vanceae* Forel, 1901. Soc. Ent. de Belg., Ann. 45:351. ☿, ♂, ♀, ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:461. —Smith, 1924. Ent. News 35:53. —Wheeler and Wheeler, 1960. Ent. Soc. Amer., Ann. 53:12 (larva).

Biology: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:302. —Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:380. —Davis and Bequaert, 1922. Brooklyn Ent. Soc., Bul. 17:8-9.

nuculiceps Wheeler. Tex. (Canal River, New Braunfels).
Pheidole nuculiceps Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:473. ☿, ♂.

pilifera artemisia Cole. Utah, Ariz.
Pheidole pilifera artemisia Cole, 1933. Ent. Soc. Amer., Ann. 26:616. ☿, ♂.

Taxonomy: Cole, 1938. Amer. Midland Nat. 20:372 (female). —Cole, 1952. Tenn. Acad. Sci., Jour. 27:280. —Gregg, 1955. Psyche 62:22-23.

Biology: Cole, 1942. Amer. Midland Nat. 28:362.

pilifera coloradensis Emery. N. Dak., Colo., N. Mex., Nev. Ecology: A harvester of seeds of various grasses; nests are usually under stones. Parasite: *Pheidole inquilina* (Wheeler).
Pheidole pilifera var. *coloradensis* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:288, 291. ☿, ♂.
Pheidole pilifera coloradensis var. *neomexicana* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:436. ♂.

Taxonomy: Cole, 1952. Tenn. Acad. Sci., Jour. 27:279. —Gregg, 1955. Psyche 62:22-23.

Biology: Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 19:666. —Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:16-17. —Wheeler, 1910. Ants, pp. 279, 498. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 128-130. —Gregg, 1963. Ants of Colo., pp. 419, 421-422. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7(3):15.

pilifera pacifica Wheeler. Nev., Calif.
Pheidole xerophila pacifica Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:404. ☿, ♂, ♀, ♂.

Taxonomy: Cole, 1952. Tenn. Acad. Sci., Jour. 27:279. —Gregg, 1955. Psyche 62:22-23.

pilifera pilifera (Roger). N. Y., Mass. s. to Fla., w. to N. Dak., Nebr., Kans. Ecology: A harvester of seeds; most nests have been found in exposed soil and have craterlike excavations. Parasite: *Pheidole inquilina* (Wheeler).
Leptothorax pilifer Roger, 1863. Berlin. Ent. Ztschr. 7:180. ☿.
Pheidole pennsylvanica Roger, 1863. Berlin. Ent. Ztschr. 7:199. ☿.
Pheidole pilifera septentrionalis Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:436. ♂.
Pheidole pilifera var. *simulans* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:436. ♂.

Taxonomy: Cole, 1952. Tenn. Acad. Sci., Jour. 27:280. —Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:79 (larva). —Gregg, 1955. Psyche 62:22-23.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:379-380. —Wheeler, 1910. Ants, pp. 152, 278. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:92. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 130-131.

pinealis Wheeler. Tex.; Mexico. Ecology: Nests have been found under stones.
Pheidole pinealis Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:459. ☿, ♂.

Taxonomy: Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:12-15 (also biological notes).

porcula Wheeler. W. Tex., Colo. (?).
Pheidole crassicornis porcula Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:466. ☿, ♂.

psammophila Creighton and Gregg. Ariz., s. Calif.; Mexico. Ecology: Found in sandy areas at low elevations.
Pheidole psammophila Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:15-19. ☿, ♂.

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 81.

rhea Wheeler. S. Ariz.; Mexico. Ecology: Prefers to nest on plateaus or in foothills at the base of mountains, 3700 to 7000 ft.
Pheidole rhea Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:452. ♀.

Taxonomy: Smith, 1943. Ent. Soc. Wash., Proc. 45:5-9 (worker, soldier). —Gregg, 1949. Psyche 56:70-73.

Biology: Gregg, 1949. Psyche 56:70-73.

ridicula Wheeler. Tex. (Brownsville area).
Pheidole ridicula Wheeler, 1916. New England Zool. Club, Proc. 6:29. ☿.

Biology: Creighton, 1966. Psyche 73:1.

rugulosa Gregg. Tex., Ariz.
Pheidole rugulosa Gregg, 1958. N. Y. Ent. Soc., Jour. 66:26-29. ☿, ☿, ♀, ♂.

sciara Cole. Tex., N. Mex.
Pheidole sciara Cole, 1955. Tenn. Acad. Sci., Jour. 30:47-49. ☿, ☿.

Taxonomy: Cole, 1956. Tenn. Acad. Sci., Jour. 31:116.

sciophila Wheeler. Tex. to s. Ariz.; Mexico.
Pheidole sciophila Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:443. ☿, ☿, ♀, ♂.
Pheidole proserpina Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:437. ☿, ☿.
Pheidole sciophila var. *semilaevicephala* Smith, 1934. Ent. Soc. Amer., Ann. 27:385. ☿.

Taxonomy: Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:19-22.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:397.

senex Gregg. Tex., Colo., N. Mex.
Pheidole senex Gregg, 1952. Amer. Mus. Novitates 1557:1-4. ☿, ☿.
Pheidole pilifera anfracta Cole, 1952. Tenn. Acad. Sci., Jour. 27:278. ☿, ☿.

Taxonomy: Gregg, 1955. Psyche 62:22-23.

Biology: Gregg, 1963. Ants of Colo., pp. 422-424.

sitarches campestris Wheeler. Miss., Mo. w. to Colo., central Tex.
Pheidole sitarches rufescens var. *campestris* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:443. ☿, ☿.
Pheidole sitarches rufescens Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:443. ☿, ☿, ♀.

Taxonomy: Gregg, 1958. N. Y. Ent. Soc., Jour. 66:37.

Biology: Smith, 1924. Ent. News 35:53. —Gregg, 1963. Ants of Colo., pp. 424-425.

sitarches littoralis Cole. Fla. (Lido Beach, Sarasota).
Pheidole sitarches littoralis Cole, 1952. Ent. Soc. Amer., Ann. 45:443-444. ☿, ☿.

Taxonomy: Gregg, 1958. N. Y. Ent. Soc., Jour. 66:39.

sitarches sitarches Wheeler. Tex. (Brownsville area); Mexico.
Pheidole sitarches Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:440. ☿, ☿, ♀.
Pheidole sitarches var. *transvarians* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:442. ☿, ☿.

Taxonomy: Cole, 1952. Ent. Soc. Amer., Ann. 45:444. —Gregg, 1958. N. Y. Ent. Soc., Jour. 66:39.

Biology: Wheeler, 1910. Ants, p. 279. —Wilson, 1957. Psyche 64:46-50 (nuptial flights).

sitarches soritis Wheeler. W. Tex., N. Mex., Utah, Ariz.; Mexico.
Pheidole soritis Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:439. ☿, ☿.
Pheidole tepicana cavigenis Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:403. ☿.

Taxonomy: Cole, 1952. Ent. Soc. Amer., Ann. 45:444. —Gregg, 1958. N. Y. Ent. Soc., Jour. 66:37.

spadonia Wheeler. S. Ariz.; Mexico.
Pheidole spadonia Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:400. ☿, ☿.

Taxonomy: Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:22-24 (also biological notes).

subdentata Pergande. Ariz.; Mexico.
Pheidole subdentata Pergande, 1895. Calif. Acad. Sci., Proc. 5:888. ☿.
Pheidole obtusospinosa Pergande, 1895. Calif. Acad. Sci., Proc. 5:889. ☿.
Pheidole arizonica Santschi, 1909. Soc. Ent. Ital., Bol. 41:3. ☿.

Taxonomy: Creighton, 1957. N. Y. Ent. Soc., Jour. 65:211.

tepicana Pergande. Tex., Ariz.; Mexico. A polymorphic species with the largest soldiers and smallest workers connected by intermediates, unlike the dimorphic worker castes of most *Pheidole*.
Pheidole tepicana Pergande, 1895. Calif. Acad. Sci., Proc. 5:878. ☿, ☿.
Pheidole rugifrons Pergande, 1895. Calif. Acad. Sci., Proc. 5:880. ☿.
Pheidole carbonaria Pergande, 1895. Calif. Acad. Sci., Proc. 5:881. ☿, ☿.
Pheidole Kingi Andre, 1898. Soc. Ent. de France, Bul. p. 244. ☿, ☿.
Pheidole Townsendi Andre, 1898. Soc. Ent. de France, Bul., p. 246. ☿, ☿.
Pheidole kingi instabilis Emery, 1901. Soc. Ent. de France, Bul., p. 129. ☿, ☿.
Pheidole kingi torpescens Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:404. ☿, ☿.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Wash., Proc. 55:74 (larva). —Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:24-35.

Biology: Wheeler, 1901. Soc. Ent. de Belg., Ann. 45:203. —Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:2-12. —Cole, 1956. Tenn. Acad. Sci., Jour. 31:113.

Morphology: Wheeler, 1910. Ants, p. 56.

texana Wheeler. Tex. (Travis Co.).
Pheidole texana Wheeler, 1903. Psyche 10:95. ☿, ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:464.

titanis Wheeler. W. Tex. to s. Ariz. Ecology: Diet may be restricted to termites.
Pheidole titanis Wheeler, 1903. Psyche 10:95. ☿, ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:461-462. —Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:35-37 (also biological notes; termite feeding).

tysoni Forel. Va., N. C., Ohio, Tenn.
Pheidole tysoni Forel, 1901. Soc. Ent. de Belg., Ann. 45:348. ☿, ☿, ♂.

Taxonomy: Cole, 1940. Amer. Midland Nat. 24:42, 45.

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31:282, 304. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:92.

vallicola Wheeler. S. Ariz.
Pheidole crassicornis vallicola Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:409. ☿, ☿.

virago Wheeler. Tex., Ariz.
Pheidole virago Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:401. ☿, ☿.

vistana Forel. S. Calif.; Mexico. Ecology: Found in deserts in small crater nests in the soil.
Pheidole susannae longipes Pergande, 1895. Calif. Acad. Sci., Proc. 5:885. ☿, ☿. Preocc. by Latreille, 1802; Smith, 1858.
Pheidole longipes var. *vistana* Forel, 1914. Soc. Vaud. des Sci. Nat., Bul. 50:272. ☿.
Pheidole grallipes Wheeler, 1916. Psyche 23:40. N. name for *longipes* Pergande.

Taxonomy: Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:397-398.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:69. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 77-79.

xerophila tucsonica Wheeler. Tex., N. Mex., Ariz., Calif.; Mexico. Ecology: Nests in soil may be craterlike or with small mounds.
Pheidole xerophila tucsonica Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:448. ☿, ☿.

Taxonomy: Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:40-42.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27:397. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 82-83.

xerophila xerophila Wheeler. Tex., N. Mex., s. Calif. Ecology: Found in small crater nests in the desert soil. The range of this subspecies lies slightly to the south of that of *tucsonica* in Tex. and N. Mex.
Pheidole xerophila Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:446. ☿, ♀, ♂.

Taxonomy: Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:40-42.

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 82.

yaqui Creighton and Gregg. S. Calif.; Mexico. Ecology: Found in deserts in small crater nests in the soil.
Pheidole yaqui Creighton and Gregg, 1955. Colo. Univ. Studies, Biol. Ser. 3:43-46. ☿, ♀.

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 83-84.

Tribe CARDIOCONDYLINI

Genus CARDIOCONDYLA Emery

Cardiocondyla Emery, 1869. Accad. degli Aspiranti Naples, Ann. 2:20.
Type-species: *Cardiocondyla elegans* Emery. Monotypic.
Emeryia Forel, 1890. Soc. Ent. de Belg. Ann. (C. R.) 34:110.
Type-species: *Emeryia wroughtoni* Forel. Monotypic.
Xenometra Emery, 1917. Soc. Ent. de France, Bul., p. 96.
Type-species: *Xenometra monilicornis* Emery. Monotypic.
Cardiocondyla subg. *Dyclona* Santschi, 1930. Rev. Suisse de Zool. 37:70. Syn. questionable.
Type-species: *Monomorium cristatum* Santschi. Orig. desig.
Cardiocondyla subg. *Loncyda* Santschi, 1930. Rev. Suisse de Zool. 37:70. Syn. questionable.
Type-species: *Cardiocondyla* (*Loncyda*) *monardi* Santschi. Monotypic.
Cardiocondyla subg. *Prosopidris* Wheeler, 1935. Psyche 42:40.
Type-species: *Cardiocondyla* (*Prosopidris*) *sima* Wheeler. Orig. desig.

The majority of species of this genus are found in the warmer parts of Europe, Asia, and Africa. In the United States, members of this genus are found in the southern tier of states from Florida to California. The colonies are small and nests are constructed in soil and in plant cavities. They are easily transported by commerce and all the species below may have been introduced.

Revision: Smith, 1944. Ent. Soc. Wash., Proc. 46:30-41 (U. S. species).

Taxonomy: Weber, 1952. Amer. Mus. Novitates 1548:5. —Brown, 1973. *In* Meggers, *et al.*, Tropical forest ecosystems in Afr. and S. Amer., pp. 161-185 (generic syn.).

Biology: Wilson, 1960. Psyche 66:29-34 (tandem running).

ectopia Snelling. Ariz., s. Calif. Possibly of Old World origin.
Cardiocondyla ectopia Snelling, 1974. N. Y. Ent. Soc., Jour. 82: 76-81, figs. ☿, ♀, ♂.

Biology: Creighton and Snelling, 1974. N. Y. Ent. Soc., Jour. 82: 87-91 (behavior).

emeryi Forel. Fla., Tex.; W. Indies, Africa, Asia, Pacific Islands. Probably introduced. A tramp species distributed by commerce throughout the tropics.
Cardiocondyla emeryi Forel, 1881. Munchen Ent. Ver., Mitt. 5:5. ☿.
Cardiocondyla nuda subsp. *nereis* Wheeler, 1927. Amer. Acad. Arts and Sci., Proc. 62:140. ☿, ♀.

Taxonomy: Borgmeier, 1937. Rev. de Ent. 7:133 (ergatoid male). —Weber, 1952. Amer. Mus. Novitates 1548:5. —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:53 (Polynesia).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:89. —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:835. —Creighton and Snelling, 1974. N. Y. Ent. Soc., Jour. 82: 82-86 (behavior).

nuda (Mayr). Fla., Ga., La., Tex.; Pacific Islands. Probably introduced into U. S. from the Oriental Region.
Leptothorax nudus Mayr, 1866. Akad. der Wiss. Wien, Math.-Nat. Kl., Sitzber. 53:508. ☿.
Cardiocondyla nuda var. *minutior* Forel, 1899. Fauna Hawaiiensis, 1:120. ☿.

Taxonomy: Wilson and Taylor, 1967. Pacific Ins. Monog. 15:55 (Polynesia). —Wheeler and Wheeler, 1973. Ga. Ent. Soc., Jour. 8:27 (larva).

Biology: Phillips, 1934. (Hawaii Univ.) Expt. Sta., Pineapple Prod. Coop. Assoc. Bul. 15:22. —Creighton and Snelling, 1974. N. Y. Ent. Soc., Jour. 82: 86-87 (behavior).

venustula Wheeler. Fla., La.; Puerto Rico, Haiti. Probably introduced.
Cardiocondyla venustula Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:128. ☿, ♀.

Biology: Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:836. —Smith, 1944. Fla. Ent. 27:15.

wroughtonii (Forel). Fla., Ga.; Oriental Region. Probably introduced.
Emeryia wroughtonii Forel, 1890. Soc. Ent. de Belg., Ann. (C. R.) 34:110. "☿" = ergatomorphic ♂.
Cardiocondyla wroughtonii var. *hawaiensis* (*!*) Forel, 1899. Fauna Hawaiiensis 1:119. ☿.
Cardiocondyla wroughtoni var. *bimaculata* Wheeler, 1929. Lab. Zool. Gen. e Agr. Portici, Bol. 24:43. ☿, ♀.

Taxonomy: Wilson and Taylor, 1967. Pacific Ins. Monog. 14:56 (Polynesia).

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:7. —Smith, 1933. Fla. Ent. 17:24.

Tribe CREMATOGASTRINI

Genus CREMATOGASTER Lund

Crematogaster Lund, 1831. Ann. des Sci. Nat., Zool. 23:132.
Type-species: *Formica scutellaris* Olivier. Desig. by Bingham, 1903.
Cremastogaster Agassiz, 1846. Nomencl. Zool., Index Univ., p. 103. Emend.
Acrocoelia Mayr, 1852. Zool.-Bot. Gesell. Wien, Verh. 2:147.
Type-species: *Acrocoelia ruficeps* Mayr. Desig. by Wheeler, 1911.
Crematogaster subg. *Oxygyne* Forel, 1901. Soc. Ent. de Belg., Ann. 45:375.
Type-species: *Crematogaster* (*Oxygyne*) *daisyi* Forel. Desig. by Wheeler, 1911.
Decacrema Forel, 1910. Soc. Ent. de Belg., Ann. 54:18.
Type-species: *Crematogaster schencki* Forel. Desig. by Wheeler, 1911.
Crematogaster subg. *Atopogyne* Forel, 1911. Soc. Vaud. des Sci. Nat., Bul. 47:342.
Type-species: *Crematogaster* (*Atopogyne*) *hellanica* Forel. Desig. by Wheeler, 1911.
Physocrema Forel, 1912. Soc. Ent. de Belg., Mem. 14:220.
Type-species: *Crematogaster inflatus* Smith. Desig. by Wheeler, 1911.
Xiphocrema Forel, 1913. Zool. Jahrb., Abt. f. System. 36:80.
Type-species: *Crematogaster tetracantha* Emery. Desig. by Emery, 1922.
Eucrema Santschi, 1918. Soc. Ent. de France, Bul., p. 182.
Type-species: *Formica acuta* Fabricius. Orig. desig.
Nematocrema Santschi, 1918. Soc. Ent. de France, Bul. p. 182.
Type-species: *Crematogaster stadelmanni* Mayr. Orig. desig.
Neocrema Santschi, 1918. Soc. Ent. de France, Bul., p. 182.
Type-species: *Crematogaster distans* Mayr. Orig. desig.
Orthocrema Santschi, 1918. Soc. Ent. de France, Bul. p. 182.
Type-species: *Myrmica sordidula* Nylander. Orig. desig.
Paracrema Santschi, 1918. Soc. Ent. de France, Bul. p. 182.
Type-species: *Crematogaster spengeli* Forel. Orig. desig.
Sphaerocrema Santschi, 1918. Soc. Ent. de France, Bul. p. 182.
Type-species: *Crematogaster kneri* Mayr. Orig. desig.
Crematogaster subg. *Rhachiocrema* Mann, 1919. Harvard Univ., Mus. Comp. Zool., Bul. 63:318.
Type-species: *Crematogaster* (*Rhachiocrema*) *wheeleri* Mann. Orig. desig.
Tranopeltoides Wheeler, 1922. Amer. Mus. Novitates 48:10.
Type-species: *Tranopelta huberi* Forel. Orig. desig.
Crematogaster subg. *Colobocrema* Wheeler, 1927. Quart. Rev. Biol. 2:31.
Type-species: *Crematogaster* (*Colobocrema*) *cylindriceps* Wheeler. Monotypic.
Mesocrema Santschi, 1928. Soc. Ent. de Belg., Bul. 68:33.
Type-species: *Crematogaster rasoherini* Forel. Desig. by Donisthorpe, 1943.
Apterocrema Wheeler, 1936. Psyche 43:45.

Type-species: *Apterocrema atillani* Wheeler. Monotypic.

These ants nest in moderately large colonies under objects in the soil, in wood, in cavities of plants, in insect galls, in carton nests of their own making, or even in the woodwork of buildings. Most are omnivorous but show a preference for sweets and some tend honeydew excreting insects. Some are well known house-infesting forms; others have been reported to kill young birds or gnaw rubber insulation from telephone wires. North American species of this genus had been separated into two subgenera, subgenus *Orthocrema* for *arizonensis* and *minutissima* and its subspecies and subgenus *Crematogaster* for the remaining species. Subgenera are not recognized here.

Revision: Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:989-996. —Emery, 1895. Zool. Jahrb., Abt. f. System. 8:280-288. —Wheeler, 1919. Psyche 26:111. —Creighton, 1939. Psyche 46:137-140 (subg. *Orthocrema*). —Buren, 1968. Ga. Ent. Soc., Jour. 3:91-121 (subg. *Crematogaster*).

Taxonomy: Wheeler and Wheeler, 1952. Wash. Acad. Sci., Jour. 42:258-261 (larvae). —Buren, 1958. N. Y. Ent. Soc., Jour. 66:119-134 (also biological notes). —Brown, 1973. *In* Meggers, *et al.*, Tropical Forest Ecosystems in Afr. and S. Amer., pp. 161-185 (generic syn.). —Wheeler and Wheeler, 1973. Ga. Ent. Soc., Jour. 8:27-30 (larvae).

Biology: Soulie, 1962. Insectes Sociaux 9:181-195 (colony foundation and development).

arizonensis Wheeler. S. Ariz. Ecology: Apparently arboreal; found nesting in mistletoe on oaks.

Crematogaster arizonensis Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:482. ☿.

Biology: Wheeler, 1912. N. Y. Ent. Soc., Jour. 20:130-133 (also description of female, male).

ashmeadi Mayr. Va. to Fla., w. to Tex. Ecology: Strictly arboreal; nests in twigs and branches.

Crematogaster Ashmeadi Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:463. ☿, ♂.

Crematogaster (*Acrocoelia*) *ashmeadi* var. *matura* Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:8. ☿.

Taxonomy: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:8.

Biology: Smith, 1924. Ent. News 35:79. —Cole, 1940. Amer. Midland Nat. 24:46. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:28-29 (economic importance). —Leuthold, 1968. Psyche 75:233-248 (tibial gland scent-trail and trail-laying behavior). —Leuthold, 1968. Psyche 75:334-350 (recruitment to food).

atkinsoni Wheeler. N. C. s. to Fla., w. to Miss. Ecology: Common in coastal salt-grass marshes where they often build large carton nests on sedges or bushes. Nests are sometimes a foot and a half or more above the ground and range in size from the diameter of an egg to that of a human head.

Crematogaster atkinsoni Wheeler, 1919. Psyche 26:108. ☿.

Crematogaster atkinsoni var. *helveola* Wheeler, 1919. Psyche 26:109. ☿ (♀, ♂ misdet.). The female and male are *C. ashmeadi.*

Biology: Atkinson, 1887. Amer. Nat. 21:770-771. —Smith, 1930. Fla. Ent. 14:4-5. —Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:8-9.

browni Buren. W. Tex., N. Mex., s. Ariz. Ecology: In mountains, usually over 5000 ft.; nests have been found under rocks.

Crematogaster browni Buren, 1968. Ga. Ent. Soc., Jour. 3:100. ☿, ♀.

californica Emery. S. Calif.; Mexico. Ecology: Nests in soil in desert or semidesert habitats; found at bases and on roots of various plants cultivating aphids and coccids. Males are unusually large for this genus.

Crematogaster lineolata laeviuscula var. *californica* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:285. ☿.

Taxonomy: Wheeler, 1934. Pan-Pacific Ent. 10:135-136.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:70. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 87-88.

cerasi (Fitch). Que. s. to Ga., w. to S. Dak., Ark., N. Mex. Ecology: Nests under rocks and logs; sometimes does minor damage when nesting in woodwork and timbers in houses.
Myrmica cerasi Fitch, 1855 (1854). N. Y. State Agr. Soc., Trans. 14:835. ☿.
Crematogaster (*Acrocoelia*) *kennedyi* Wheeler, 1930. Psyche 37:58. ♀, ♂.
Crematogaster (*Acrocoelia*) *lineolata cerasi* var. *punctinodis* Enzmann, 1946. N. Y. Ent. Soc., Jour. 54:91, 93, 96. ☿, ♀, ♂.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:282-283. —Wheeler, 1933. Psyche 40:83-84. —Wheeler and Wheeler, 1952. Wash. Acad. Sci., Jour. 42:250-252 (larva, as *lineolata*). —Wheeler and Wheeler, 1973. Ga. Ent. Soc., Jour. 8:28 (larva).

Biology: Gaige, 1914. Mich. Univ., Mus. Zool., Occas. Papers 5:8-9. —Headley, 1943. Ohio Jour. Sci. 43:25. —Morris, 1943. Ind. Acad. Sci., Proc. 52:208. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11:245. —Kannowski, 1959. Insectes Sociaux 6:125. —Kulman, 1965. Jour. Econ. Ent. 58:865 (in cocoons of *Thyridopteryx ephemeraeformis*). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:30-31 (economic importance).

clara Mayr. N. J. s. to Fla., w. to Ind., Mo., Tex. Ecology: Nests in a variety of semi-arboreal situations in or near swamps, salt marshes, rivers, and streams.
Oecodoma (*Atta*) *bicolor* Buckley, 1867. Ent. Soc. Phila., Proc. 6:350. ☿. Preocc. by Smith, 1860.
Crematogaster clara Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:990, 993. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:481 (each caste). —Smith, 1924. Ent. News 35:80. —Wheeler and Wheeler, 1952. Wash. Acad. Sci., Jour. 42:255-256 (larva, as *laeviuscula*).

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31:283. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:31-32 (economic importance).

Morphology: Pasteels, Crews, and Blum, 1970. Acad. Soc. Paris, Compt. Rend., Ser. D 271:835-838 (histology of gland secreting the trail pheromone).

coarctata Mayr. Oreg.(?), Nev., Calif. Ecology: Nests under rocks and boulders. Suspected of now being a rather rare species in coastal Calif. due to displacement by the Argentine ant.
Crematogaster coarctata Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:990, 992. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:482. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:207-208.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:70-71. —Essig, 1926. Ins. of West. N. Amer., p. 859.

colei Buren. W. Tex., N. Mex., Ariz. Ecology: Nests under rocks in grassland situations at elevations over 5000 ft.
Crematogaster colei Buren, 1968. Ga. Ent. Soc., Jour. 3:108. ☿, ♀.

dentinodis Forel. Ariz.; Mexico. Ecology: Nests under stones in open grasslands and chaparral, or grass and mesquite, or among shrubs in succulent desert areas.
Crematogaster opaca var. *dentinodis* Forel, 1901. Soc. Ent. de Belg., Ann. 45:130. ☿

depilis Wheeler. Tex., N. Mex., Ariz., Nev., s. Calif.; Mexico. Ecology: Nests in and among roots and lower stems of various plants throughout desert and semi-desert regions.
Crematogaster lineolata opaca var. *depilis* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:478. ☿.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:209 (worker, not female). —Wheeler and Wheeler, 1973. Ga. Ent. Soc., Jour. 8:28-30 (larva).

Biology: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7:16. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 88.

emeryana Creighton. W. Tex., Colo., N. Mex., Utah, Ariz.; Mexico. Ecology: Usually in mountains at elevations of over 6000 ft.; often constructs carton structures under rocks.
Crematogaster lineolata lineolata var. Emery, 1895. Zool. Jahrb., Abt. f. System. 8:282. ☿, ♀, ♂. Variety described but not named.

Crematogaster (*Acrocoelia*) *lineolata emeryana* Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:213-214. ☿.

Biology: Gregg, 1963. Ants of Colo., pp. 358-360.

hespera Buren. W. Tex., N. Mex., Utah, Ariz., Calif.; Mexico. Ecology: Usually arboreal in cottonwood trees along rivers and streams; also in other trees and rotten logs.
Crematogaster hespera Buren, 1968. Ga. Ent. Soc., Jour. 3:98. ☿, ♀.

isolata Buren. W. Tex., N. Mex., s. Ariz. Ecology: Arboreal in oaks in mountain ranges at altitudes over 5000 ft.
Crematogaster isolata Buren, 1968. Ga. Ent. Soc., Jour. 3:106. ☿.

laeviuscula Mayr. La., Tex., Okla.; Mexico. Ecology: Incipient colonies are often found in twigs and oak galls, larger colonies in hollow trees and logs. No authentic records east of Mississippi River.
Oecodoma (*Atta*) *arborea* Buckley, 1867. Ent. Soc. Phila., Proc. 6:349-350. ☿, ♀. Preocc. by Smith, 1858.
Crematogaster laeviuscula Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:990, 993. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:481 (each caste). —Cole, 1940. Amer. Midland Nat. 24:46.

larreae Buren. W. Tex., Ariz., Calif.; Mexico. Ecology: Nests in lower stems and among roots of the creosote bush. Host: *Larrea divaricata*.
Crematogaster larreae Buren, 1968. Ga. Ent. Soc., Jour. 3:117. ☿, ♀, ♂.

lineolata (Say). Que., Ont. s. to Fla., w. to N. Dak., Colo., Tex. Ecology: Nests in ground under objects or in logs or stumps; infests houses and often nests within buildings.
Myrmica lineolata Say, 1836. Boston Jour. Nat. Hist. 1:290. ☿, ♀, ♂.
Myrmica (*Monomarium* (*!*)) *marylandica* Buckley, 1867. Ent. Soc. Phila., Proc. 6:339. ☿. Syn. uncertain.
Myrmica (*Monomarium* (*!*)) *columbiana* Buckley, 1867. Ent. Soc. Phila., Proc. 6:340. ☿, ♀. Syn. uncertain.
Crematogaster lineolata lineolata var. *lutescens* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:282. ☿.
Crematogaster (*Acrocoelia*) *lineolata cerasi* var. *wheldeni* Enzmann, 1946. N. Y. Ent. Soc., Jour. 54:92-93, 96. ☿.

Taxonomy: Smith, 1918. Ent. News 29:19. —Buren, 1944. Iowa State Col., Jour. Sci. 18:288. —Wheeler and Wheeler, 1952. Wash. Acad. Sci., Jour. 42:252 (larva as *lineolata subopaca*).

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:1-18. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:585. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:93. —Wallace, 1945. Conn. State Ent., 44th Rpt., Bul. 488:389 (economics). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 132-133. —Gregg, 1963. Ants of Colo., pp. 357, 359. —Ayre, 1963. Canad. Ent. 95:712-715 (feeding habits). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:32-33 (economic importance). —Ayre, 1968. Canad. Ent. 100:165-172 (prey finding, capture, transport). —Ayre, 1969. Canad. Ent. 101:118-128 (trail formation and group foraging).

marioni Buren. S. Calif.; Mexico. Ecology: Arboreal species in manzanita and live oaks.
Crematogaster marioni Buren, 1968. Ga. Ent. Soc., Jour. 3:105. ☿.

minutissima minutissima Mayr. N. C. s. to Fla., w. to Tex. Ecology: Nests have been found in soil at bases of stumps.
Crematogaster minutissima Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:991, 995. ☿, ♀.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:484. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:14 (larva).

Biology: Smith, 1928. Ent. News 39:277.

Morphology: Pasteels, Crewe, and Blum, 1970. Paris Acad. Soc., Compt. Rend., Ser. D 271:835-838 (histology of gland secreting the trail pheromone).

minutissima missouriensis Emery. Nebr., Mo., Tex., Colo., N. Mex.
Crematogaster victima missuriensis (*!*) Emery, 1895. Zool. Jahrb., Abt. f. System. 8:287. ☿.

Taxonomy: Wheeler and Wheeler, 1952. Wash. Acad. Sci., Jour. 42:260-261 (larva).

Biology: Gregg, 1963. Ants of Colo., pp. 363-364.

minutissima smithi Creighton. Ariz. (Huachuca Mtns.).
Crematogaster (*Orthocrema*) *minutissima thoracica* Creighton, 1939. Psyche 46:138. ☿. Preocc. by Santschi, 1921.
Crematogaster (*Orthocrema*) *minutissima smithi* Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:205. N. name.

mormonum Emery. Utah, Idaho, e. Oreg. (?), Nev., Calif.; Mexico. Ecology: Most common in the Great Basin; nests under rocks.
Crematogaster lineolata coarctata var. *mormonum* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:284. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:482 (each caste).

Biology: Cole, 1942. Amer. Midland Nat. 28:363. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 88-89.

mutans Buren. Nev., Calif. Ecology: The only North American species of this genus suspected of being parasitic.
Crematogaster mutans Buren, 1968. Ga. Ent. Soc., Jour. 3:115. ☿, ♀.

navajoa Buren. N. Mex., Ariz. in the Colorado Plateau region. Ecology: Found under rocks and at bases of various plants.
Crematogaster navajoa Buren, 1968. Ga. Ent. Soc., Jour. 3:102. ☿, ♀.

nocturna Buren. S. Utah, n. Ariz.
Crematogaster nocturna Buren, 1968. Ga. Ent. Soc., Jour. 3:112. ♀, ♂, possible ☿.

opaca Mayr. Ariz. (Tumacacori Mts., under stones among oaks, 3900 ft.); Mexico. Only a single Arizona record for the U. S.
Crematogaster opaca Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:989. ☿.

opuntiae Buren. N. Mex., s. Ariz. Ecology: Found principally at bases of and foraging on *Opuntia fulgida* but also at bases of various other plants.
Crematogaster opuntiae Buren, 1968. Ga. Ent. Soc., Jour. 3:120. ☿.

pilosa Emery. N. J. s. to Ga. Ecology: Often nests in logs and fallen branches in marshy situations.
Crematogaster lineolata pilosa Emery, 1895. Zool. Jahrb., Abt. f. System. 8:285. ☿.
Crematogaster lineolata subpilosa Wheeler, 1913. Psyche 20:115. Syn. uncertain. Nomen nudum.
Crematogaster (*Acrocoelia*) *creightoni* Wheeler, 1933. Psyche 40:86. ♀.

Taxonomy: Wheeler, 1933. Psyche 40:85.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:379. —Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:6-7.

punctulata Emery. Va. s. to Fla., w. to Colo., Ariz.; Mexico. Ecology: Abundant in southern Great Plains region where they nest in the ground and tend aphids and coccids.
Crematogaster punctulata Emery, 1895. Zool. Jahrb., Abt. f. System. 8:287. ☿.
Crematogaster lineolata lineolata var. *subopaca* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:283. ☿, ♀, ♂.
Crematogaster (*Acrocoelia*) *opaca* var. *texana* Santschi, 1929. Wien Ent. Ztg. 46:91. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:479-480.

Biology: Smith, 1927. Ent. News 38:310. —Gregg, 1963. Ants of Colo., pp. 361-362, 364.

rifelna Buren. S. Tex.;Mexico. Ecology: Arboreal, found nesting in live oaks and other trees.
Crematogaster rifelna Buren, 1968. Ga. Ent. Soc., Jour. 3:96. ☿, ♀, ♂.

vermiculata Emery. N. C. s. to Fla., w. to Ark., La. Ecology: Arboreal, found only in cypress swamps.

Crematogaster vermiculata Emery, 1895. Zool. Jahrb., Abt. f. System. 8:286. ♀. Types mislabeled, not found in Calif. or other western states.

Taxonomy: Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:13 (larva).

Tribe SOLENOPSIDINI

Genus MONOMORIUM Mayr

Monomorium Mayr, 1855. Zool.-Bot. Gesell. Wien, Verh. 5:452.
Type-species: *Monomorium minutum* Mayr. Monotypic.

Phacota Roger, 1862. Berlin. Ent. Ztschr. 6:260. Uncertain syn.
Type-species: *Phacota sicheli* Roger. Monotypic.

Trichomyrmex Mayr, 1865. Novara Exped., Zool., Formicidae, pt. 2, v. 1, p. 19.
Type-species: *Trichomyrmex rogeri* Mayr. Monotypic.

Lampromyrmex Mayr, 1868. Beitr. Naturk. Preuss. 1:92.
Type-species: *Lampromyrmex gracillimus* Mayr. Monotypic.

Holcomyrmex Mayr, 1878. Zool.-Bot. Gesell. Wien, Verh. 28:671.
Type-species: *Holocomyrmex scabriceps* Mayr. Desig. by Bingham, 1903.

Epoecus Emery, 1892. Soc. Ent. de France, Bul. 61: CCLXXVI.
Type-species: *Epoecus pergandei* Emery. Monotypic.

Wheeleria Forel, 1905. Soc. Ent. de Belg., Ann. 49:171. Preocc. by Tutt, 1895.
Type-species: *Wheeleria santschii* Forel. Monotypic.

Wheeleriella Forel, 1907. Inst. Sci. Revue 4:145. N. name for *Wheeleria* Forel.

Epixenus Emery, 1908. Deut. Ent. Ztschr., p. 556.
Type-species: *Epixenus andrei* Emery. Desig. by Wheeler, 1911.

Monomorium subg. *Xeromyrmex* Emery, 1915. Ent. Soc. de France, Bul. p. 190.
Type-species: *Formica salomonis* Linnaeus. Orig. desig.

Monomorium subg. *Parholcomyrmex* Emery, 1915. Ent. Soc. de France, Bul. p. 190.
Type-species: *Myrmica gracillima* Smith. Orig. desig.

Monomorium subg. *Paraholcomyrmex* Emery, 1915. Soc. Ent. de France, Bul. p. 191. Misspelling ?.

Mitara Emery, 1913. Soc. Ent. de Belg., Ann. 57:261.
Type-species: *Monomorium laeve* Mayr. Orig. desig.

Monomorium subg. *Corynomyrmex* Viehmeyer, 1916. Arch. f. Naturgesch. 18:134.
Type-species: *Monomorium* (*Corynomyrmex*) *hospitum* Viehmeyer. Monotypic.

Monomorium subg. *Isolcomyrmex* Santschi, 1917. Soc. Cient. Argentina, An. 84:296.
Type-species: *Holcomyrmex santschii* Forel. Orig. desig.

Paraphacota Santschi, 1919. Soc. Ent. de France, Bul., p. 91.
Type-species: *Phacota novalhieri* Emery. Orig. desig.

Monomorium subg. *Equestrimessor* Santschi, 1919. Soc. Ent. de France, Bul. p. 92.
Type-species: *Holcomyrmex chobauti* Emery. Desig. by Donisthorpe, 1943.

Xenhyboma Santschi, 1919. Soc. Espan. de Hist. Nat., Bol. 19:405. Uncertain syn.
Type-species: *Xenhyboma mystes* Santschi. Monotypic.

Equessimessor Santschi, 1936. Bul. Soc. Sci. Nat. Maroc. 16:32. Emend.

Isholcomyrmex Santschi, 1936. Bul. Soc. Sci. Nat. Maroc. 16:32. Variant spelling.

Ireneidris Donisthorpe, 1943. Ent. Monthly Mag. 79:81.
Type-species: *Ireneidris myops* Donisthorpe. Monotypic.

Monomorium subg. *Pharaophanes* Bernard, 1952. Inst. Franc. d'Afr. Noire, Mem. 19:238. Nomen nudum.

Xenoaphaenogaster Baroni Urbani, 1964. Atti della Accad. Gioenia di Sci. Nat. Catania 16:50. Uncertain syn.
Type-species: *Xenoaphaenogaster inquilina* Baroni Urbani. Orig. desig.

Members of this genus are small in size and are particularly adaptable with respect to nesting sites. They may nest in various preformed cavities or in soil. Most species are Old World, but because of their adaptability and size, they are especially susceptible to distribution by com-

merce. Three of the North American species have been introduced and are common tramp species and house pests.

Taxonomy: Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:121-122 (larvae). —Ettershank, 1966. Austral. Jour. Zool. 14:82-93 (generic syn., list of world species). —Brown, 1973. *In* Meggers, *et al.*, Tropical Forest Ecosystems in Afr. and S. Amer., pp. 161-185 (generic syn.). —Wheeler and Wheeler, 1973. Ga. Ent. Soc., Jour. 8:30-31 (larvae).

Morphology: Blum, 1966. Roy. Ent. Soc. London, Proc. (A) 41: 155-160 (source and specificity of trail pheromones).

destructor (Jerdon). Tenn., Fla.; throughout tropical regions of world. Ecology: A pantropical tramp and common house-infesting ant that may nest in soil or in buildings. They are omnivorous and may feed on various household foods. They have been reported to gnaw holes in fabrics, rubber goods, remove rubber insulation from electric or telephone wires, and damage polyethylene cable. Introduced, probably originating from Africa or the Oriental region.

Atta Destructor Jerdon, 1851. Madras Jour. Lit. and Sci. 17:105. ☿.
Myrmica vastator Smith, 1857. Linn. Soc. London, Jour., Zool. 2:71.
Myrmica basalis Smith, 1858. Cat. Hym. Brit. Mus. 6:125. ☿.

Taxonomy: Bingham, 1903. Fauna British India 2:209 (each caste). —Emery, 1908. Deut. Ent. Ztschr. pp. 665-666, 671. —Phillips, 1934. (Hawaii Univ.) Expt. Sta., Pineapple Prod. Coop. Assoc., Bul. 15:2. —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:64.

Biology: Wheeler, 1910. Ants, pp. 10, 153, 221. —Wheeler, 1914. Amer. Jour. Trop. Dis. and Prev. Med. 2:160-168 (economics). —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:833. —Kalshoven, 1937. Ent. Meded. van Nederland. Indie 3:65-71. —Marlatt, 1928. U. S. Dept. Agr., Farmers' Bul. 740:9. —Kempf, 1960. Studia Ent. 3:506-507 (economics). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:37-38 (economic importance).

floricola (Jerdon). Fla., Ala.; throughout tropical regions of world. Ecology: An arboreal species, nesting in twigs and branches or under bark of trees or other plants. Commonly infests houses and feeds on household foods. Introduced, probably originating from tropical Asia.

Atta floricola Jerdon, 1851. Madras Jour. Lit. and Sci. 17:107. ☿.
Monomorium speculare Mayr, 1866. Akad. der Wiss. Wien, Math.-Nat. Kl., Sitzber. 53:509.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:88 (female). —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:831, 834. —Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:121 (larva). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:64-65.

Biology: Wheeler, 1910. Ants, pp. 153, 426. —Smith, 1930. Fla. Ent. 14:3. —Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:9. —Plank and Smith, 1940. Puerto Rico Univ., Jour. Agr. 24:49-75 (association with pineapple mealybug, *Pseudococcus brevipes* (Ckll.)). —Brown, 1964. Ent. News 75:15. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:36-37 (economic importance).

minimum (Buckley). Que., Ont. s. to Fla., w. to Mont., Colo., Calif.; Mexico. Rare or absent in the Pacific Northwest. Ecology: Nests in exposed soil, under cover of objects, or in rotting or faulty wood. Sometimes invades houses from outdoors or nests in woodwork. Parasite: *Monomorium pergandei* (Emery). Little black ant.

Myrmica (*Monomarium* (*!*)) *minima* Buckley, 1867. Ent. Soc. Phila., Proc. 6:338. ☿, ♀.
Myrmica (*Monomarium* (*!*)) *atra* Buckley, 1867. Ent. Soc. Phila., Proc. 6:342. ☿ (?).
Monomorium minutum ergatogyna Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:269. ☿, apterous ergatoid ♀.
Monomorium minimum emersoni Gregg, 1945. Psyche 52:66. ☿, ♀.
Monomorium metoecus Brown and Wilson, 1957. Ent. News 68: 239-244. Ergatogyne.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:274-275 (each caste). —Wheeler, 1905. South. Calif. Acad. Sci., Bul. 40:60. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:423. —Buren, 1944. Iowa State Col., Jour. Sci. 18:289. —Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:122 (larva). —Wilson and Brown, 1958. Ent. News 69:33-38 (worker of *metoecus;* also biology). —Ettershank, 1966. Austral. Jour. Zool. 14:90 (syn. of *metoecus*).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:274, 377. —Marlatt, 1922. U. S. Dept. Agr., Farmers' Bul. 740:4, 10. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta., Cir. 342:23. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:271, 272, 274, 279-280. —Metcalf and Flint, 1939. Destructive and Useful Insects, p. 770. —Gregg, 1944. Ent. Soc. Amer., Ann. 37:454,456, 466. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 133-135. —Gregg, 1963. Ants of Colo., pp. 366-368. —Burns, 1964. Ent. Soc. Amer., Ann. 57:138 (association with tuliptree scale). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:33-34 (economic importance). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 89-90.

pergandei (Emery). D. C. Ecology: Supposedly workerless and parasitic. The host colony contained only winged males and winged females. Host: *Monomorium minimum* (Buckley).

Epoecus pergandei Emery, 1892. Soc. Ent. de France, Bul. 61: CCLXXVI. ♀, ♂.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:272-274. —Wheeler, 1910. Ants, p. 498. —Smith, 1947. Amer. Midland Nat. 37:569 (female). —Ettershank, 1966. Austral. Jour. Zool. 14:82, 91.

pharaonis (Linnaeus). Fla., throughout U. S. and Canada in larger cities; cosmopolitan. Ecology: Not uniformly distributed; adapted to field conditions only in Florida but probably found in every town or city of commercial importance especially in hotels, large apartment buildings, groceries, or other places where food is commercially handled. Colonies are populous and are commonly found in the most inaccessible places in buildings. They breed continuously through the year and take 38 to 42 days to develop. They may feed on various household foods, damage silk, rayon and rubber goods and are also known to damage insect collections. This is the most persistent and difficult of all our house-infesting ants to control or eradicate. Introduced, probably originating from Africa or tropical Asia. Pharaoh ant.

Formica Pharaonis Linnaeus, 1758. Syst. Nat., Ed. 10:580.

Taxonomy: Emery, 1908. Deut. Ent. Ztschr., pp. 664-665, 667, 684 (each caste). —Donisthorpe, 1927. British Ants, p. 104. —Buren, 1944. Iowa State Col., Jour. Sci. 18:289. —Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:121 (larva). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62: 16 (larva). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:68-60.

Biology: Bellevoye, 1889. U. S. Dept. Agr., Insect Life 2:230-233 (in 2 years, 1,360,000 workers, 1,900 females, and 560 males taken on same premises). —Herrick, 1914. Insects Injurious to the Household and Annoying to Man, pp. 174-176. —Essig, 1926. Insects of West. N. Amer., p. 857. —Metcalf and Flint, 1939. Destructive and Useful Insects, p. 770. —Smith, 1934. Kans. Acad. Sci., Trans. 37:140-142. —Armand, 1942. Pests 10:18-19 (thermal preference as guide to control work). —Peacock and Baxter, 1949. Ent. Monthly Mag. 85:256. —Peacock, 1950. Ent. Monthly Mag. 86:129. —Peacock and Baxter, 1950. Ent. Monthly Mag. 86:171-178 (life history). —Peacock, 1950. Ent. Monthly Mag. 86:294. —Peacock, *et al.*, 1950. Scot. Dept. Agr., Misc. Pub. 17:1-50 (biology and control). —Peacock, 1951. Ent. Monthly Mag. 87:185-191. —Sudd, 1953. Advancement of Sci. (Brit.) 10:17-18 (colony foundation). —Peacock, *et al.*, 1954. Ent. Monthly Mag. 90:154-158 (male production by parthenogenesis). —Peacock, *et al.*, 1955. Ent. Monthly Mag. 91:125, 130. —Peacock, *et al.*, 1955. Ent. Monthly Mag. 91:37-42 (viability in regard to temperature and moisture). —Brown, 1958. Acta Hym. 1:36. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 135-136. —Brown, 1964. Ent. News 75:14-15. —Eichler, 1963. Deut. Ent. Ztschr. 10:207-215. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:34-36 (economic importance). —Wisniewski, Myjak, and Przyborowski, 1971. Polskie Pismo Ent. 61:459-474 (biology, in Poland). —Petersen and Buschinger, 1971. Anz. f. Schadlingsk. u. Pflanzensch. 44:121-127 (behavior). —Petersen and Buschinger, 1971. Ztschr. f. Angew. Ent. 68:168-175 (behavior of sexuals).

Morphology: Tanquary, 1913. Ill. State Lab. Nat. Hist., Bul. 9:443-453 (physiology). —Hall and Smith, 1951. Ent. Monthly Mag. 87:217: —Hall and Smith, 1952. Ent. Monthly Mag. 88:97-102 (thoracic structure). —Hall and Smith, 1953. Evolution 7:127. —Hall and Smith, 1954. Ent. Monthly Mag. 90:176-182 (somatic mosaics). —Smith and Peacock, 1957. Roy. Soc. Edinb., Proc., Section B, 66:235-261 (cytology).

viridum peninsulatum Gregg. Ga., Fla. w. to Colo., Ariz., s. Calif. Ecology: Most commonly found in soil under objects.
Monomorium peninsulatum Gregg, 1945. Psyche 52:62. ☿, ♀.

Biology: Gregg, 1963. Ants of Colo., pp. 368-370.

viridum viridum Brown. N. Y. (Coram, Selden, L. I.), N. J. (Lakehurst). Ecology: The types from N. J. were taken from nests with 5 to 8 inch craters in yellow and white sand among scanty, low weeds of a roadside strip.
Monomorium viridum Brown, 1943. Ent. News 54:243. ☿, ♀.

Genus XENOMYRMEX Forel

Xenomyrmex Forel, 1885. Soc. Vaud. des Sci.Nat., Bul. 20:369.
Type-species: *Xenomyrmex stollii* Forel. Monotypic.
Myrmecinella Wheeler, 1922. Amer. Mus. Novitates 46:1.
Type-species: *Myrmecinella panamana* Wheeler. Monotypic.

A small New World genus of three species. The ants are arboreal, nesting in small colonies in plant cavities such as twigs, galls, and thorns.

Revision: Wheeler, 1931. Rev. de Ent. 1:129-139. —Creighton, 1957. Amer. Mus. Novitates 1843:1-14.

Taxonomy: Creighton, 1953. Amer. Mus. Novitates 1634:2. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:19-20 (larva). —Ettershank, 1966. Austral. Jour. Zool. 14:150-152.

floridanus floridanus Emery. Fla.; Bahamas, Cuba. Another subspecies is found in Mexico.
Xenomyrmex stolli floridanus Emery, 1895. Zool. Jahrb., Abt. f. System. 8:275. ☿, ♂.
Xenomyrmex stolli floridanus var. *lucayanus* Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:87. ♀.
Xenomyrmex stolli rufescens Wheeler, 1931. Rev. de Ent. 1:133,137. ♀.
Xenomyrmex stolli cubanus Wheeler, 1931. Rev. de Ent. 1:134-135. ☿.

Biology: Wheeler, 1901. Amer. Nat. 35:538. —Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:6.

Morphology: Holldobler, 1971. Jour. Ins. Physiol. 17:1497-1499 (sex pheromone).

Genus SOLENOPSIS Westwood

Solenopsis Westwood, 1841. Ann. and Mag. Nat. Hist. 6:86.
Type-species: *Solenopsis mandibularis* Westwood. Monotypic.
Diplorhoptrum Mayr, 1855. Zool.-Bot. Gesell. Wien, Verh. 5:449.
Type-species: *Formica fugax* Latreille. Monotypic.
Solenopsis subg. *Synsolenopsis* Forel, 1918. Soc. Vaud. des Sci. Nat., Bul. 52:155.
Type-species: *Solenopsis bruchiella* Emery. Monotypic.
Solenopsis subg. *Diagyne* Santschi, 1923. Rev. Suisse de Zool. 30:267.
Type-species: *Solenopsis succinea* Emery. Monotypic.
Labauchena Santschi, 1930. Soc. Ent. Argent., Rev. 13:81.
Type-species: *Labauchena daguerrei* Santschi. Monotypic.
Solenopsis subg. *Euophthalma* Creighton, 1930. Amer. Acad. Arts and Sci., Proc. 66: 43.
Type-species: *Myrmica globularia* Smith. Orig. desig.
Solenopsis subg. *Oedaleocerus* Creighton, 1930. Amer. Acad. Arts and Sci., Proc. 66:43.
Type-species: *Solenopsis argulata* Emery. Orig. desig.
Bisolenopsis Kusnezov, 1953. Acta. Zool. Lilloana [Tucuman] 13:1.
Type-species: *Bisolenopsis sea* Kusnezov. Monotypic.
Paranamyrma Kusnezov, 1954. Mus. Entre Rios, Mem. 30:9.
Type-species: *Paranamyrma solenopsidis* Kusnezov. Monotypic.
Lilidris Kusnezov, 1957. Zool. Anz. 158:268, 274. Uncertain syn.
Type-species: *Lilidris metatarsalis* Kusnezov. Monotypic.
Solenopsis subg. *Granisolenopsis* Kusnezov, 1957. Zool. Anz. 158:270, 277.
Type-species: *Solenopsis* (*Granisolenopsis*) *granivora* Kusnezov. Monotypic.

Previously, this genus was divided into several subgenera, the subgenus *Solenopsis* included the larger, polymorphic species *aurea, geminata, invicta, richteri,* and *xyloni,* the subgenus *Euophthalma* included *globularia littoralis* and *huachucana,* and the subgenus *Diplorhoptrum* included the minute "thief ants", the remaining species listed here. Those previously placed in the subgenus *Solenopsis* are commonly known as "fire ants", the colonies are populous, nests are usually mounded in exposed situations, and workers are agressive and possess a painful sting. They are of the most economically important of ants. Most species in the other subgenera are minute and cryptic, often lestobiotic in the nests of other ants.

Revision: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:277-279 (*Diplorhoptrum*). —Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:397. —Creighton, 1930. Amer. Acad. Arts and Sci., Proc. 66:39-139.

Taxonomy: Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:131-136 (larvae). —Snelling, 1963. Calif. Dept. Agr., Bur. Ent., Occas. Papers No. 3, 10 pp. (keys to all castes of subg. *Solenopsis*). —Ettershank, 1966. Austral. Jour. Zool. 14:134-144 (generic syn. and list of world species). —Buren, 1972. Ga. Ent. Soc., Jour. 7:1-27 (revisionary studies of the imported fire ants).

Morphology: Blum, *et al.,* 1958. Science 128:306-307 (chemical, insecticidal and antibiotic properties of fire ant venom). —MacConnel, Blum and Fales, 1971. Tetrahedron 26:1129-1139 (chemistry of fire ant venom). —San Martin, 1971. *In* Bucheil and Buckley, Venomous Animals and Their Venoms v. 3, pp. 95-101 (venomous ants of *Solenopsis*).

aurea Wheeler. Tex., N. Mex., Ariz., s. Calif.; Mexico. Ecology: Nests are in fully exposed situations, in dry, coarse, gravelly soil, and are without a mound.

Solenopsis geminata var. *aurea* Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:336. ☿, ♀, ♂.

Solenopsis aurea amblychila Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:394. ☿, ♀, ♂.

Taxonomy: Snelling, 1963. Calif. Dept. Agr., Bur. Ent., Occas. Papers No. 3: 7.

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:425-426.

carolinensis Forel. Mass. s. to N. C., Tenn., Ohio. Ecology: Probably lestobiotic.

Solenopsis tenana race *carolinensis* Forel, 1901. Soc. Ent. de Belg., Ann. 45:345. ☿, ♀, ♂.

Biology: Wesson and Wesson, 1940. Amer. Midland Nat. 24:92.

geminata (Fabricius). S. C. s. to Fla., w. to Tex. and s. to Peru; West Indies; tropical Asia and Pacific Islands. Ecology: In the U. S., it is most common on or near the coast with its incidence decreasing inland except in Florida where it is distributed over most of the state. Nests are in the ground in open areas in dry to moist soil of various composition surmounted by irregular piles of dirt; they may also be under cover of objects or in rotting logs. Economic importance is similar to that of *xyloni* McCook, but its importance has subsided since the introduction of the imported fire ants. A common tramp species, native to the New World and spread by commerce to other tropical regions of the world. Fire ant.

Atta geminata Fabricius, 1804. Systema Piezatorum, p. 423. ♀.
Atta Rufa Jerdon, 1851. Madras Jour. Lit. and Sci. 17:106. ☿.
Solenopsis mandibularis Westwood, 1841. Ann. and Mag. Nat. Hist. 6:87. ☿.
Myrmica virulens Smith, 1858. Cat. Hym. Brit. Mus. 6:132. ☿.
Atta clypeata Smith, 1858. Cat. Hym. Brit. Mus. 6:169. ♀, ♂.
Solenopsis cephalotes Smith, 1858. Linn. Soc. London, Jour., Zool. 3:149. ☿.
Crematogaster laboriosus Smith, 1860. Linn. Soc. London, Jour., Zool. 4:109. ♀.
Diplorhoptrum drewseni Mayr, 1861. Eur. Formicid., p. 71. ☿.
Myrmica glaber Smith, 1862. Ent. Soc. London, Trans. (3) 1: 34. ☿.
Myrmica polita Smith, 1862. Ent. Soc. London, Trans. (3) 1: 34. ☿.
Myrmica (*Monomarium* (*!*)) *saxicola* Buckley, 1867. Ent. Soc. Phila., Proc. 6:341. ☿. Syn. uncertain.
Atta Lincecumii Buckley, 1867. Ent. Soc. Phila., Proc. 6:344. ☿, ♂. Syn. uncertain.
Atta brazoensis Buckley, 1867. Ent. Soc. Phila., Proc. 6:345. ☿, ♂. Syn. uncertain.
Atta coloradensis Buckley, 1867. Ent. Soc. Phila., Proc. 6:346. ☿, ♂. Syn. uncertain.

Solenopsis geminata var. *diabola* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:424. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:132-133 (larva). —Snelling, 1963. Calif. Dept. Agr., Bur. Ent., Occas. Papers No. 3:7-9. —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:58-59.

Biology: Mann, 1920. Amer. Mus. Nat. Hist., Bul. 42:427. —Marlatt, 1928. U. S. Dept. Agr., Farmers' Bul. 740:5. —Neig, 1930. Bombay Nat. Hist. Soc., Jour. 34:185. —Clark, 1931. Tex. Agr. Expt. Sta. Bul. 435:1-12. —Cole, 1934. Ent. Soc. Amer., Ann. 27:395. —Phillips, 1934. (Hawaii Univ.) Expt. Sta. Pineapple Prod. Coop. Assoc., Bul. 15:12-17. —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:838-839. —Plank and Smith, 1940. Puerto Rico Univ., Jour. Agr. 24:49-76. —Travis, 1941. Fla. Ent. 24:15-22. —Griffiths, 1942. Science 96:271-272. —Lindquist, 1942. Jour. Econ. Ent. 35:850-851. —Kempf, 1961. Studia Ent. 4:507. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:40-41 (economic importance). —Banks, Plumley, and Hicks, 1973. Ent. Soc. Amer., Ann. 66:234-235 (polygyny in a colony). —Bass and Hays, 1976. Ga. Ent. Soc., Jour. 11: 34-36 (in S. C.).

globularia littoralis Creighton. N. C. s. to Fla., w. to La.; Mexico. Ecology: Commonly found on open beaches; nests are constructed in or under rotten logs. *S. globularia globularia* (Smith) occurs in Central and S. Amer.

Solenopsis (*Euophthalma*) *globularia littoralis* Creighton, 1930. Amer. Acad. Arts and Sci., Proc. 66:110, 113. ☿, ♀, ♂.

Solenopsis globularia mobilensis Smith, 1931. Ent. News 42:20. ☿. Nomen nudum.

Taxonomy: Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:22 (larva).

Biology: Smith, 1931. Ent. News 42:20. —Smith, 1933. Fla. Ent. 17:23.

huachucana Wheeler. Ariz. (Miller Canyon, Huachuca Mtns.).

Solenopsis huachucana Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:393. ☿, ♀.

Taxonomy: Creighton, 1930. Amer. Acad. Arts and Sci., Proc. 66:118-120.

invicta Buren. N. C., S. C., Ga., Fla., Tenn., Ala., Miss., Ark., La., Tex.; Brazil. Ecology: The most widespread of the two imported fire ants and the most economically important being an annoying and sometimes destructful pest. The mound nests are unsightly and sometimes interfere with agricultural operations; workers are agressive and can inflict a painful sting; workers steal seeds from seedbeds and feed on germinating seeds of corn, may gnaw holes in various fabrics, foster honeydew excreting insects, injure or kill young rabbits, pigs, and other mammals, quail and other birds, gnaw into roots, stems, buds, and fruits of various agricultural crops, and may girdle young plants. Introduced, probably originating from Mato Grosso, Brazil; the earliest U. S. record is 1945 from Daphne, Ala. Red imported fire ant. Because of the recent distinction of two introduced species in the U. S., it is difficult to determine whether much of the literature pertains to this species or *S. richteri.* Only selected references are given below; for a bibliography through 1971 see U. S. Dept. Agr., Coop. Econ. Ins. Rpt., 1971, Sept., 21 (36): 639-652. Much of the literature is under the name *S. saevissima richteri* Forel.

Solenopsis invica (!) Buren, 1972. Ga. Ent. Soc., Jour. 7:9-15. ☿, ♀, ♂.

Taxonomy: Wilson, 1951. Evolution 5:68-79. —Wilson, 1952. Inst. Oswaldo Cruz, Mem. 50:49-68. —Wilson, 1953. Evolution 7:262-263. —Brown, 1957. Quart. Rev. Biol. 32:258-261. —Wilson and Brown, 1958. Evolution 12:211-218 (morphological changes in introduced population). —Snelling, 1963. Calif. Dept. Agr., Bur. Ent., Occas. Papers No. 3:10. —Buren, 1972. Ga. Ent. Soc., Jour. 7:9-15. —Buren, *et. al.*, 1974. N. Y. Ent. Soc., Jour. 82: 113-124 (zoogeography of the imported fire ants).

Biology: Wilson, 1958. Sci. Amer. 198:36-41. —Bellinger, Dyer, King and Pratt, 1965. Ga. Acad. Sci., Bul. 23:122 (review of fire ant problem). —Fincher and Lund, 1967. Ga. Ent. Soc., Jour. 2:91-94 (biology and life cycle in Ga.). —Rhoades and Davis, 1967. Jour. Econ. Ent. 60:544-558 (effects of meteorological factors on biology and control). —Anon. 1971 Sept., U. S. Dept. Agr., Coop. Econ. Ins. Rpt., 21 (36): 639-652 (bibliography through 1971). —Collins and Markin, 1971. Ent. Soc. Amer., Ann. 64:1376-1380 (inquilines and other arthropods).—Markin and Dillier, 1971. Ent. Soc. Amer., Ann. 64:562-565 (seasonal life

cycle in Miss.). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:41-43 (economic importance). —Wilson and Oliver, 1969. Jour. Econ. Ent. 62:1268-1271 (food habits). —Glancey, *et al.*, 1970. Nature 226:863-864 (pheromone may induce brood tending). —Wilson, Dillier, and Markin, 1971. Ent. Soc. Amer., Ann. 64:660-665 (foraging territories). —Markin, *et al.*, 1971. Ga. Ent. Soc., Jour. 6:145-156 (nuptial flight and flight ranges). —Collins and Markin, 1971. Ent. Soc. Amer., Ann. 64:1376-1380 (inquilines and other arthropods in nests). —Markin, Collins, and Dillier, 1972. Ent. Soc. Amer., Ann. 65:1053-1058 (colony founding by queens). —Harris and Burns, 1972. Environ. Ent. 1:362-365 (predation on lone star tick). —Bhatkar, *et al.*, 1972. Environ. Ent. 1:274-279 (confrontation behavior between *Lasius neoniger* and the imported fire ant). —Stringer, *et al.*, 1972. Jour. Econ. Ent. 65:872-873 (air separation of different castes). —Glancey, Stringer, and Bishop, 1973. Ga. Ent. Soc., Jour. 8:217-220 (trophic egg production). —Glancey, *et al.*, 1973. Ga. Ent Soc., Jour. 8:237-238 (multiple fertile queens in colonies). —O'Neal and Markin, 1973. Ga. Ent. Soc., Jour. 8:294-303 (brood nutrition and parental relationships). —Hubbard, 1974. Ga. Ent. Soc., Jour. 9: 127-132 (influence of nest material and colony odor on digging). —Allen, *et. al.*, 1974. Ent. Soc. Amer., Ann. 67: 43-46 (distribution and habits in Brazil). —Morrill, 1974. Environ. Ent. 3: 265-271 (production and flight). —Morrill, 1975. Ga. Ent. Soc., Jour. 10: 162-164 (reduction of populations by tillage). —Horton, *et al.*, 1975. Ga. Ent. Soc., Jour. 10: 207-213 (food carrying ability and recruitment time). —Lofgren, Banks, and Glancey, 1975. Ann. Rev. Ent. 20: 1-30 (biology and control of imported fire ants). —Bass and Hays, 1976. Ga. Ent. Soc., Jour. 11: 34-36 (in S. C.). —Adams, *et al.*, 1976. Ga. Ent. Soc., Jour. 11: 165-169 (economic importance, impact on soybean harvest).

Morphology: Blum, *et al.*, 1958. Science 128:306-307 (chemical, insecticidal, and antibiotic properties of venom). —Callahan, Blum, and Walker, 1959. Ent. Soc. Amer., Ann. 52:573-590 (histology of poison glands and sting). —Adrouny, Derbes, and Jung, 1959. Science 130:479 (hemolytic component of fire ant venom). —Wilson, Durlach and Roth, 1959. Psyche 65:108-114 (chemical releases of necrophoric behavior). —Wilson, 1959. Science 129:643-644 (nature of odor trail). —Wilson, 1962. Animal Behavior 19:134-147 (chemical communication among workers-mass foraging). —Blum and Callahan, 1960. XI Int. Kong. Ent. Wien, Verh. B. 111:290-293 (chemical and biological properties of venom). —Wilson, 1962. Animal Behavior 10:148-158 (chemical communication among workers). —Wilson, 1962. Animal Behavior 10:159-164 (induction of social responses). —Walker and Clower, 1961. Ent. Soc. Amer., Ann. 54:92-99 (alimentary canal of queen). —Caro, Derbes, and Jung, 1957. Amer. Med. Assoc., Arch. Dermat. 75:475-488 (skin responses to sting). —Thompson and Blum, 1967. Ent. Soc. Amer., Ann. 60:632-642 (spermatozoa). —Vinson, 1970. Ent. Soc. Amer., Ann. 63:930-935 (gustalory response to various electrolytes). —MacConnell, Blum, and Fales, 1970. Science 168:840-841 (alkaloid from fire ant venom). —Smith and Smith, 1971. Arch. Dermat. 103:438-441 (multiple fire ant stings - a complication of alcoholism). —MacConnell, Blum, and Fales, 1971. Tetrahedron 26:1129-1139 (chemistry of fire ant venom). —Glancey, *et al.*, 1976. Ga. Ent. Soc., Jour. 11: 83-88 (testes degeneration). —Robeau and Vinson, 1976. Ga. Ent. Soc., Jour. 11: 198-203 (effects of juvenile hormone analogues on caste differentiation).

krockowi Wheeler. N. Mex.; Mexico.

Solenopsis krockowi Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:428. ☿, ♀.

molesta (Say). Ont. s. to Fla., w. to Wash., Calif. Ecology: Lestobiotic, usually nests in or near nests of other ants from which they rob food and brood. A house-infesting ant and of great annoyance because of their small size; sometimes nests in woodwork and masonry of houses. Thief ant. The form occurring west of the Rockies is sometimes referred to as the subspecies *validiuscula*.

Myrmica molesta Say, 1836. Boston Jour. Nat. Hist. 1:293. ♀.

Myrmica minuta Say, 1836. Boston Jour. Nat. Hist. 1:294. ☿.

Myrmica (Tetmamorium (!)) exigua Buckley, 1867. Ent. Soc. Phila., Proc. 6:342. ☿, "♀" = ♂.

Solenopsis debilis Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:461. ☿, ♀, ♂.

Solenopsis molesta var. *validiuscula* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:278. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:430. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:584 (each caste). —Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:134-135 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:377-378. —McColloch and Hayes, 1916. Jour. Econ. Ent. 9:23-38. —Hayes, 1920. Kans. Agr. Expt. Sta., Tech. Bul. 7:1-54. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342:21-22. —Metcalf and Flint, 1939. Destructive and Useful Insects, p. 770. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:72. —Macnamara, 1945. Canad. Ent. 77:40. —Grundmann and Peterson, 1953. Kans. Ent. Soc., Jour. 26:59. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 136-138. —Gregg, 1963. Ants of Colo., pp. 372-375. —Ayre, 1963. Canad. Ent. 95:712-715 (feeding habits). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:43-45 (economic importance). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 91-92.

pergandei Forel. Va. s. to Fla., w. to La. Ecology: Nests have been found in soil in rotting stumps, and next to nests of other ants.

Solenopsis pergandei Forel, 1901. Soc. Ent. de Belg., Ann. 45:343. ☿, ♀, ♂.

Taxonomy: Smith, 1931. Ent. News 42:20. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:21-22 (larva).

Biology: Smith, 1931. Ent. News 42:20. —Smith, 1944. Fla. Ent. 27:15.

picta Emery. S. C. s. to Fla., w. to Tex. Ecology: Nests have been found in hollow twigs.

Solenopsis tenuis Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:262. ☿. Preocc. by Mayr, 1877.

Solenopsis picta Emery, 1895. Zool. Jahrb., Abt. f. System. 8:278. ☿.

Solenopsis picta var. *moerens* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:393. ☿.

Taxonomy: Smith, 1942. Ent. Soc. Wash., Proc. 44:211. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:22 (larva).

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:10.

pilosula Wheeler. Tex. (Alice).

Solenopsis pilosula Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:426. ☿, ♂.

richteri Forel. Miss., Ala.; S. Brazil, Uruguay, Argentina. Ecology: A mound building ant with similar habits and importance of *invicta* Buren. May have been more widespread in U. S. until the introduction of *invicta* which may have replaced *richteri* in many localities. Introduced, probably originating from southern S. Amer.; first recorded from Mobile, Ala. in 1930 but may have been present there for 10 to 12 years. Black imported fire ant. Until 1972, the imported fire ant had been known under one name, *S. saevissima richteri* Forel; consequently, it is difficult to determine to which species, either *invicta* or *richteri*, much of the earlier literature pertains. For a bibliography of the "imported fire ant" through 1971, see U. S. Dept. Agr., Coop. Econ. Ins. Rpt., 1971, Sept., 21 (36): 639-652, as well as the list of references given under *invicta*.

Solenopsis Pylades var. *Richteri* Forel, 1909. Deut. Ent. Ztschr., p. 267. ☿, ♀.

Taxonomy: Creighton, 1930. Amer. Acad. Arts and Sci., Proc. 66:87 (first U. S. record). —Wilson, 1951. Evolution 5:68-79. —Wilson, 1952. Inst. Oswaldo Cruz, Mem. 50:49-68. —Wilson, 1953. Evolution 7:262-263 (origin of variation). —Brown, 1957. Quart. Rev. Biol. 32:258-261. —Wilson and Brown, 1958. Evolution 12:211-218 (morphological changes in introduced population). —Buren, 1972. Ga. Ent. Soc., Jour. 7:4-8 (two species of imported fire ants).

Biology: Green, 1952. Jour. Econ. Ent. 45:593-597 (biology and control in Miss.). —Green, 1967. Miss. State Univ., Agr. Expt. Sta., Bul. 737, 23 pp.

salina Wheeler. W. Tex., Colo. w. to Calif.; Mexico. Ecology: Nests under rocks and wood; lestobiotic.

Solenopsis salina Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:427. ☿.

Biology: Gregg, 1963. Ants of Colo., pp. 376-378.

tennesseensis Smith. Fla., Tenn., Miss., Tex., Kans., Calif. (nr. Azusa).

Solenopsis (Diplorhoptrum) longiceps Smith, 1942. Ent. Soc. Wash., Proc. 44:210. ☿. Preocc. by Forel, 1907.

Solenopsis (*Diplorhoptrum*) *tennesseensis* Smith, 1951. *In* Muesebeck, *et al.*, U. S. Dept. Agr., Agr. Monog. 2:814. N. name.

texana catalinae Wheeler. Calif. (Catalina Is.).
Solenopsis texana catalinae Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:269. ☿, ♀.

Taxonomy: Wheeler, 1905. South. Calif. Acad. Sci., Bul. 4:60.

texana texana Emery. Ont. s. to Fla., w. to Okla., Tex. Ecology: Nests have been found in logs, stumps, and under bark.
Solenopsis pollux var. *texana* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:278. ☿.
Solenopsis rosella Kennedy, 1938. Canad. Ent. 70:232. ☿, ♀, ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:430-431. —Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:136 (larva).

Biology: Mitchell and Pierce, 1912. Ent. Soc. Wash., Proc. 14:70.

truncorum Forel. N. C. s. to Fla., w. to Colo., Ariz., Calif. Ecology: Nests have been found under rocks and other objects; lestobiotic.
Solenopsis texana race *truncorum* Forel, 1901. Soc. Ent. de Belg., Ann. 45:346. ☿, ♀.
Solenopsis molesta var. *castanea* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:430. ☿.

Biology: Gregg, 1963. Ants of Colo., pp. 378-380.

xyloni McCook. N. C. s. to Fla., w. to Colo., Calif.; Mexico. Ecology: Nests are in ground in exposed soil or under cover of stones or other objects, sometimes in wood; they are surmounted by irregular and variable-shaped mounds of loose soil. A serious pest in some parts of its range: builds ugly mounds on lawns, inflicts painful stings, steals seeds from seedbeds, kills young poultry and other birds, girdles nursery stock, gnaws into buds, tubers, and fruits of various plants, bites holes in fabrics such as silk, nylon, and linen, removes rubber insulation from telephone wires, and feeds on household foods. Southern fire ant.
Solenopsis xyloni McCook, 1879. *In* Comstock, Rpt. Cotton Ins., p. 188. ☿, ♀.
Myrmica (*Atta*) *sabeana* Buckley, 1867. Ent. Soc. Phila., Proc. 6:343. ☿. Syn. questionable.
Solenopsis geminata maniosa Wheeler, 1915. Amer. Mus. Nat Hist., Bul. 34:396. ☿, ♂, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:133 (larva). —Snelling, 1963. Calif. Dept. Agr., Bur. Ent., Occas. Papers No. 3:9.

Biology: Severin, 1923. Jour. Econ. Ent. 16:96-97. —Smith, 1936. Jour. Econ. Ent. 29:120-122. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342:10-21. —Mallis, 1938. Pan-Pacific Ent. 14:87-91. —Metcalf and Flint, 1939. Destructive and Useful Insects, p. 771. —Eagleson, 1940. Jour. Econ. Ent. 33:700. —Wray, 1962. Jour. Econ. Ent. 55:145 (apparent introduction into N. C.). —Gregg, 1963. Ants of Colo., pp. 370-371, 373. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:38-40 (economic importance). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 92-94.

Morphology: Blum, Roberts, and Novak, 1961. Psyche 68:73-74 (chemical and biological characters of venom).

Genus OLIGOMYRMEX Mayr

Oligomyrmex Mayr, 1867. Ent. Tidskr. 10:110.
Type-species: *Oligomyrmex concinnus* Mayr. Monotypic.
Aeromyrma Forel, 1891. Soc. Ent. de Belg., Ann. 35:307.
Type-species: *Aeromyrma nosindambo* Forel. Monotypic.
Pheidologeton subg. *Aneleus* Emery, 1900. Termes. Fuzetek 23:327.
Type-species: *Solenopsis similis* Mayr. Desig. by Wheeler, 1911.
Erebomyrma Wheeler, 1903. Biol. Bul. 4:138.
Type-species: *Erebomyrma longii* Wheeler. Monotypic.
Pheidologeton subg. *Lecanomyrma* Forel, 1913. Soc. Vaud. des Sci. Nat., Bul. 49:56.
Type-species: *Pheidologeton* (*Lecanomyrma*) *butteli* Forel. Monotypic.
Oligomyrmex subg. *Octella* Forel, 1915. Arkiv for Zool. 9:69.
Type-species: *Oligomyrmex* (*Octella*) *pachycerus* Forel. Monotypic.

Spelaeomyrmex Wheeler, 1922. Amer. Mus. Novitates 45:9.
Type-species: *Spelaeomyrmex urichi* Wheeler. Monotypic.
Oligomyrmex subg. *Hendecatella* Wheeler, 1927. Lab. Zool. Gen. e Agr. Portici, Bol. 20:93.
Type-species: *Oligomyrmex (Hendecatella) capreolus* Wheeler. Monotypic.
Solenopsis subg. *Solenops* Karawajew, 1930. Zool. Anz. 92:207. Preocc. by Dufour, 1820.
Type-species: *Solenopsis (Solenops) weyeri* Karawajew. Monotypic.
Sporocleptes Arnold, 1948. Natl. Mus. South. Rhodesia, Occas. Papers 2 (14): 219.
Type-species: *Sporocleptes nicotiana* Arnold. Monotypic.
Solenopsis subg. *Crateropsis* Patrizi, 1948. Ist. Ent. Univ. Bologna, Bol. 17:174.
Type-species: *Solenopsis (Crateropsis) elmenteitae* Patrizi. Monotypic.
Nimbamyrma Bernard, 1953. Mem. Inst. Franc. Afr. Noire 19, fasc. 1, p. 240. Questionable syn.
Type-species: *Nimbamyrma villiersi* Bernard. Monotypic.

A large genus in tropical Africa and Asia, with fewer species in the neotropics and only one species reaching the United States. Colonies are small and collections are usually made from under bark of logs, in rotten wood, or leaf litter. Most species may be lestobiotic in the nests of other ants and termites.

Taxonomy: Wilson, 1962. Psyche 69:62-72. —Ettershank, 1966. Austral. Jour. Zool. 14:119-124 (generic syn. and list of world species). —Wheeler and Wheeler, 1953. Psyche 60:141 (larvae).

longii (Wheeler). Okla. (Ft. Sill), Tex. (Denton). Ecology: May be lestobiotic.
Erebomyrma longii Wheeler, 1903. Biol. Bul. 4:140. ☿, ♀, ♂.

Taxonomy: Mann, 1926. Psyche 33:104. —Wheeler, 1936. Amer. Acad. Arts and Sci., Proc. 71:197.

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:423. —Wheeler, 1910. Ants, pp. 113, 140, 152, 158-159, 427-428.

Tribe LEPTOTHORACINI

Genus MACROMISCHA Roger

Macromischa Roger, 1863. Berlin. Ent. Ztschr. 7:184.
Type-species: *Macromischa purpurata* Roger. Desig. by Wheeler, 1911.
Macromischa subg. *Croesomyrmex* Mann, 1920. Amer. Mus. Nat. Hist., Bul. 42:408.
Type-species: *Macromischa (Croesomyrmex) wheeleri* Mann. Orig. desig.
Macromischa subg. *Antillaemyrmex* Mann, 1920. Amer. Mus. Nat. Hist., Bul. 42:408.
Type-species: *Macromischa (Antillaemyrmex) terricola* Mann. Orig. desig.

A rather large genus in the neotropics with only three species reaching the United States.

Revision: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:138-142. —Mann, 1920. Amer. Mus. Nat. Hist., Bul. 42:407-424. —Wheeler, 1931. Harvard Univ., Mus. Comp. Zool., Bul. 72:3-34. —Wheeler, 1937. Harvard Univ., Mus. Comp. Zool., Bul. 81:441, 449-458, 463-465. —Smith, 1939. Ent. Soc. Amer., Ann. 32:502-509.

Taxonomy: Brown, 1973. *In* Meggers, *et al.*, Tropical Forest Ecosystems in Afr. and S. Amer., p. 181 (listed as a provisional syn. of *Leptothorax*).

floridana (Wheeler). Fla. (Paradise Key, Dade Co.). Ecology: Nest of the types was found in a hollow branch of a small tree.
Antillaemyrmex floridanus Wheeler, 1931. Harvard Univ., Mus. Comp. Zool., Bul. 72:27. ☿.

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:11.

polita Smith. Ariz. Ecology: One nest was found under the bark of a tree, but most specimens have been taken on the ground.
Macromischa polita Smith, 1939. Ent. Soc. Amer., Ann. 32:503, 506. ☿.

subditiva Wheeler. La., Tex.; Mexico. Ecology: Nests have been found under willow bark, and from dead hollow branches lying on the ground.
Macromischa subditiva Wheeler, 1903. Psyche 10:99. ☿.

Biology: Mitchell and Pierce, 1912. Ent. Soc. Wash., Proc. 14:73. —Smith, 1939. Ent. Soc. Amer., Ann. 32:506. —Creighton, 1965. Psyche 72:282.

Genus ROGERIA Emery

Rogeria Emery, 1894. Soc. Ent. Ital., Bol. 26:188.
Type-species: *Rogeria curvipubens* Emery. Desig. by Wheeler, 1911.
Rogeria subg. *Irogeria* Emery, 1915. Soc. Ent. de France, Bul. p. 191.
Type-species: *Rogeria procera* Emery. Orig. desig.

A neotropical genus with about 24 species. Only two species reach the southwestern U. S.

Taxonomy: Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:28 (larvae). —Kempf, 1961. Rev. Brasil. Biol. 21:435-441. —Kempf, 1962. Studia Ent. 5:1-38. —Kempf, 1963. Rev. Brasil. Biol. 23:189-196 (S. Amer. species). —Kempf, 1964. Studia Ent. 7:45-71. —Kempf, 1965. Rev. Brasil. Biol. 25:181-186. —Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. No. 236:1-6 (first record of genus in U. S.). —Wheeler and Wheeler, 1973. Psyche 80: 74 (larvae, revised description).

creightoni Snelling. Tex. (La Feria, Cameron Co.).
Rogeria creightoni Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. No. 236:2-4. ☿.

huachucana Snelling. Ariz. (Cochise Co.). Ecology: Specimens found beneath stones.
Rogeria huachucana Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. No. 236:4-6. ☿.

Genus LEPTOTHORAX Mayr

Other than those genera listed under *Macromischa* and the subgenera of *Leptothorax*, Brown (1973) gives the following synonyms or possible synonyms: *Chalepoxenus* Menozzi, 1923?, *Doronomyrmex* Kutter, 1945?, *Epimyrma* Emery, 1915?, *Formicoxenus* Mayr, 1855 ?, *Gonepimyrma* Bernard, 1948 ?, *Icothorax* Hamann and Klemm, 1967 ?, *Leonomyrma* Arnoldi, 1968 ?, *Myrmamnophilus* Menozzi, 1924, *Myrmetaerus* Soudek, 1925 ?, *Myrmoxenus* Ruzksy, 1902 ?, *Symmyrmica* Wheeler, 1904 ?, and *Temnothorax* Mayr, 1861. There is apparently considerably more work to be done on this and related genera; consequently, I am using subgenera in *Leptothorax* as has been done in past catalogs.

Taxonomy: Brown, 1973. *In* Meggers, *et al.*, Tropical Forest Ecosystems in Afr. and S. Amer., pp. 161-185.

Genus LEPTOTHORAX Subgenus NESOMYRMEX Wheeler

Leptothorax subg. *Goniothorax* Emery, 1896. Soc. Ent. Ital., Bol. 28:26, 58. Preocc. by Milne-Edwards, 1879.
Type-species: *Leptothorax vicinus* Mayr. Desig. by Wheeler, 1911.
Nesomyrmex Wheeler, 1910. Amer. Mus. Nat. Hist., Bul. 28:259.
Type-species: *Nesomyrmex clavipilis* Wheeler. Monotypic.
Leptothorax subg. *Caulomyrma* Forel, 1914. Soc. Vaud. des Sci. Nat., Bul. 50:233.
Type-species: *Leptothorax echinatinodis* Forel. Orig. desig.
Limnomyrmex Arnold, 1948. Nat. Mus. So. Rhodesia, Occas. Papers 2 (14): 222.
Type-species: *Limnomyrmex stramineus* Arnold. Monotypic.

Most species of this subgenus are neotropical.

Revision: Kempf, 1959. Studia Ent. 2:391-432.

Taxonomy: Smith, 1950. Psyche 57:30. —Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:25 (larva). —Brown, 1971. Breviora 365:4-5 (generic syn.).

wilda Smith. S. Tex.; Mexico. Ecology: Arboreal, forms small colonies in plant cavities; probably nocturnal.
Leptothorax (*Goniothorax*) *wilda* Smith, 1943. Ent. Soc. Wash., Proc. 45:155. ☿, ♀.

Biology: Creighton, 1971. Ga. Ent. Soc., Jour. 6:207-210 (distribution and habits).

Genus LEPTOTHORAX Subgenus MYRAFANT Smith

Leptothorax subg. *Myrafant* Smith, 1950. Psyche 57:29.

Type-species: *Leptothorax curvispinosus* Mayr. Orig. desig.

These small ants nest in small colonies, commonly in preformed cavities under bark, hollow twigs, dried grass stems, old galls, or empty nut shells. A few may be found under rocks or in the soil. Some species are lestobiotic, nesting near the nests of other ants, and others may be dulotic.

Revision: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:317-318, 320-323. —Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:215, 224, 232-256.

Taxonomy: Smith, 1950. Psyche 57:29. —Smith, 1952. N. Y. Ent. Soc., Jour. 60:96-106 (*tricarinatus - texanus* complex). —Brown, 1955. Ent. News 66:43. —Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:22-25 (larvae). —Cole, 1956. Tenn. Acad. Sci., Jour. 31:30-31 (*tricarinatus - texanus* complex). —Cole, 1958. Ent. Soc. Amer., Ann. 51:535-538 (*nitens - carinatus* complex). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:23 (larvae).

ambiguus ambiguus Emery. Que. to Va., w. to N. Dak., S. Dak., Iowa, Nebr. Ecology: Nests in soil in woodlands and grasslands or in hollow dead grass stems near the soil.
Leptothorax (*Leptothorax*) *curvispinosus ambiguus* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:317, 320. ☿.

Taxonomy: Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:588-589. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:97 (each caste). —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:261-262. —Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:22-23 (larva).

Biology: Sturtevant, 1925. Psyche 32:314. —Buren, 1944. Iowa State Col., Jour. Sci. 18:287. —Kannowski, 1959. Insectes Sociaux 6:124, 150-151, 155 (parasitism; pleometrosis). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 140-141.

ambiguus foveatus Smith. Ill. (Plainfield). Ecology: Found in nest of a species of *Aphaenogaster* in a roadside ditch.
Leptothorax foveata Smith, 1934. Psyche 41:211. ☿.

ambiguus pinetorum Wesson and Wesson. Ohio (Jackson Co.).
Leptothorax ambiguus var. *pinetorum* Wesson and Wesson, 1940. Amer. Midland Nat. 24:97. ☿, ♀, ♂.

andrei Emery. N. Mex., Ariz., Nev., Calif. Ecology: Nests have been found under stones.
Leptothorax (*Leptothorax*) *andrei* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:318, 322. ☿.

Taxonomy: Cole, 1958. Ent. Soc. Amer., Ann. 51:537-538 (each caste).

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:73. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 95.

bradleyi Wheeler. Ga., Ala., Fla. Ecology: Colonies found in galleries in bark.
Leptothorax bradleyi Wheeler, 1913. Psyche 20:113. ☿.

Taxonomy: Wilson, 1952. Ent. News 63:68-71 (each caste).

carinatus Cole. W. Tex., Ariz. Ecology: Nests were found beneath stones.
Leptothorax (*Leptothorax*) *carinatus* Cole, 1957. Tenn. Acad. Sci., Jour. 32:213-215. ☿, ♀.

Taxonomy: Cole, 1958. Ent. Soc. Amer., Ann. 51:537-538. —Wheeler and Wheeler, 1973. Psyche 80: 70-71 (semipupa).

curvispinosus Mayr. Maine s. to Fla., w. to Iowa, Kans., Okla., Tex., Ariz. Ecology: Nests in plant cavities such as hollow stems, twigs, and in acorns. Enslaved by *Leptothorax duloticus* Wesson and *Harpagoxenus americanus* (Emery).
Leptothorax curvispinosus Mayr, 1866. Akad. der Wien, Math.-Nat. Kl., Sitzber. 53:508. ☿.
Stenamma gallarum Patton, 1879. Amer. Nat. 13:126. ☿, ♀.

Taxonomy: Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36:451, 453 (worker, female). —Cole, 1940. Amer. Midland Nat. 24:56-57.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:385. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:289, 305. —Headley, 1943. Ent. Soc. Amer., Ann. 36:743-753 (population studies).

—Talbot, 1957. Ecology 38:449-456 (populations). —Kannowski, 1959. Insectes Sociaux 6:124. —Wilson and Fagan, 1974. N. Y. Ent. Soc., Jour. 82: 106-112 (estimation of total behavioral repertories).

furunculus Wheeler. Wyo., Colo.
Leptothorax furunculus Wheeler, 1909. N. Y. Ent. Soc., Jour. 17:82. ☿.

Biology: Gregg, 1963. Ants of Colo., pp. 381-382.

gallae Smith. Calif. Ecology: Commonly found on the canyon live oak, *Quercus chrysolepis*, often in twig galls made by cynipids.
Leptothorax (*Leptothorax*) *gallae* Smith, 1949. Psyche 56:112. ☿.

hispidus Cole. W. Tex.; Mexico. Ecology: Nests were found under stones at higher elevations.
Leptothorax (*Leptothorax*) *hispidus* Cole, 1957. Tenn. Acad. Sci., Jour. 32:42-45. ☿, ♀.

Taxonomy: Wheeler and Wheeler, 1973. Psyche 80: 71 (immatures).

longispinosus Roger. Que., Ont. s. to Ga., Ala. w. to Iowa. Ecology: Nests in plant cavities such as hollow stems, twigs, and in acorns. Enslaved by *Leptothorax duloticus* Wesson and *Harpagoxenus americanus* (Emery).
Leptothorax longispinosus Roger, 1863. Berlin. Ent. Ztschr. 7:180. ☿.
Leptothorax (*Leptothorax*) *longispinosus laeviceps* Buren, 1944. Iowa State Col., Jour. Sci. 18:286. ☿.
Leptothorax longispinosus iowensis Buren, 1945. Ent. Soc. Wash., Proc. 47:288. N. name for *laeviceps*, thought to be preocc. by *leviceps* Emery, 1898.

Taxonomy: Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:588. —Cole, 1940. Amer. Midland Nat. 24:56-57. —Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:24 (larva).

Biology: Wheeler, 1910. Ants, pp. 212, 222, 495, 504. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:274, 289, 305. —Headley, 1943. Ent. Soc. Amer., Ann. 36:743-753 (population studies). —Kannowski, 1959. Insectes Sociaux 6:125. —Lettendre and Pilon, 1972. Nat. Canad. 99:73-82 (ecology; in Que.).

mariposa Wheeler. Calif. (Yosemite Natl. Pk.). Ecology: Colonies were found under stones.
Leptothorax nitens var. *mariposa* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:507. ☿.

Taxonomy: Cole, 1958. Ent. Soc. Amer., Ann. 51:536.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:73-74.

minutissimus Smith. D. C. The type series of several females was associated with *L. curvispinosus* workers, but the exact relationship is not known.
Leptothorax minutissimus Smith, 1942. Ent. Soc. Wash., Proc. 44:59. ♀.

nevadensis eldoradensis Wheeler. Calif. (Coastal Range and lower elevations of the Sierras).
Leptothorax eldoradensis Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:414. ☿.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:73.

nevadensis melanderi Wheeler. W. Mont. to e. Wash.
Leptothorax melanderi Wheeler, 1909. N. Y. Ent. Soc., Jour. 17:81. ☿.

nevadensis nevadensis Wheeler. Wash., Oreg., Calif. (Eastern slopes of Sierras north to Cascade Mtns.). Ecology: Nests in soil, usually under stones.
Leptothorax nevadensis Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:224, 252. ☿, ♀, ♂.

Taxonomy: Wheeler, 1909. N. Y. Ent. Soc., Jour. 17:81. —Wheeler and Wheeler, 1973. Psyche 80: 71 (larva).

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 95-96 (subspecies not recognized).

nevadensis rudis Wheeler. Nev., Calif. (Sierras from Lake Tahoe to Sequoia Park).
Leptothorax nevadensis rudis Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:508. ☿, ♀.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:73. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7:17.

nitens Emery. Wyo., Colo., Tex. w. to Wash., Oreg., Calif. Ecology: Found under rocks and in duff.

Leptothorax (*Leptothorax*) *nitens* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:318, 322. ☿.
Leptothorax nitens occidentalis Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:233, 245. ☿.
Leptothorax nitens var. *heathii* Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223, 245. ☿.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28:369-370. —Cole, 1958. Ent. Soc. Amer., Ann. 51:536. —Wheeler and Wheeler, 1973. Psyche 80: 71, 73 (larva).

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:73. —Gregg, 1963. Ants of Colo., pp. 382-384. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 96.

obliquicanthus Cole. Colo., N. Mex. Ecology: Found under stones in meadows and prairies.

Leptothorax (*Myrafant*) *obliquicanthus* Cole, 1953. Ent. Soc. Wash., Proc. 55:28-30. ☿.

Taxonomy: Gregg, 1953. Breviora 22:1-3.

Biology: Gregg, 1963. Ants of Colo., pp. 384-385, 387.

obturator Wheeler. Tex. Ecology: One colony was found in an oak gall.

Leptothorax obturator Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:224, 249. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:24 (larva).

Biology: Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 19:663-664. —Wheeler, 1910. Ants, pp. 208-209.

rugatulus brunnescens Wheeler. N. Dak., Mont. s. to Colo., Utah. Ecology: Nests under rocks or wood. Sometimes not distinguished from the typical subspecies in the literature.

Leptothorax rugatulus brunnescens Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:510. ☿.
Leptothorax rugatulus dakotensis Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11:247. ☿.

Taxonomy: Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:25 (larva).

Biology: Gregg, 1963. Ants of Colo., pp. 388-389.

rugatulus rugatulus Emery. N. Dak., S. Dak., Colo., N. Mex. w. to B. C., Calif. Ecology: Nests under stones, wood, in decaying wood, in grasses.

Leptothorax (*Leptothorax*) *rugatulus* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:317, 321. ☿.
Leptothorax curvispinosus rugatulus var. *Cockerelli* Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:241. ☿, ♀.
Leptothorax curvispinosus annectens Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:242. ☿.
Leptothorax rugatulus var. *mediorufus* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:510. ☿, ♀.

Taxonomy: Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223, 241. —Cole, 1942. Amer. Midland Nat. 28:369. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:267-269.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:509. —Cole, 1934. Psyche 41:222. —Cole, 1954. Tenn. Acad. Sci., Jour. 29:240. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 141-143 (does not distinguish subspecies). —Gregg, 1963. Ants of Colo., pp. 386-388.

schaumi Roger. Maine to Ga., w. to Iowa., Kans., Tex. Ecology: Commonly nests in the bark of trees.

Leptothorax schaumi Roger, 1863. Berlin. Ent. Ztschr. 7:180. ☿.
Leptothorax fortinodis Mayr, 1886 Zool.-Bot. Gesell. Wien, Verh. 36:451. ☿, ♀.
Leptothorax fortinodis var. *gilvus* Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:235. ☿, ♀.
Leptothorax fortinodis var. *melanoticus* Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:235. ☿, ♀.

Taxonomy: Wesson and Wesson, 1940. Amer. Midland Nat. 24:94-96. —Cole, 1940. Amer. Midland Nat. 24:56. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:269-271. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:23 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:385. —Wheeler, 1916. Ind. Acad. Sci., Proc. 26:461.

schmittii Wheeler. Colo. (Canyon City).
Leptothorax Schmittii Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223, 242. ☿.

Taxonomy: Gregg, 1963. Ants of Colo., pp. 388, 390-391.

silvestrii (Santschi). S. Ariz. Ecology: Nests in evergreen oaks at altitudes of 3500 ft. or more.
Tetramorium silvestrii Santschi, 1909. Soc. Ent. Ital., Bol. 41:6. ☿.

Taxonomy: Creighton, 1953. Amer. Mus. Novitates 1635:1-7 (each caste described; note on habitat).

stenotyle Cole. Ariz. (nr. Rustler's Park, Chiricahua Mtns.). Ecology: Nests were found under stones.
Leptothorax (*Leptothorax*) *angustinodus* Cole, 1956. Tenn. Acad. Sci., Jour. 31:28-30. ☿, ♀. Preocc. by Stitz, 1917.
Leptothorax (*Leptothorax*) *stenotyle* Cole, 1956. Tenn. Acad. Sci., Jour. 31:214. N. name.

terrigena Wheeler. Tex. (Austin).
Leptothorax terrigena Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:224, 254. ☿, ♀.

texanus davisi Wheeler. N. Y., N. J., Fla.
Leptothorax texanus davisi Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:385. ☿, ♀.

Taxonomy: Smith, 1952. N. Y. Ent. Soc., Jour. 60:104-106.

texanus texanus Wheeler. Mich. (?), Ohio, s. to N. C., Ga. w. to Okla., Tex. Ecology: Nests have been found in sandy soil.
Leptothorax texanus Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223-245. ☿, ♀, ♂.

Taxonomy: Gregg, 1944. Ent. Soc. Amer., Ann. 37:446. —Smith, 1952. N. Y. Ent. Soc., Jour. 60:102-104. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:24 (larva).

Biology: Smith, 1932. Ent. News 43:160. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:98.

tricarinatus neomexicanus Wheeler. W. Colo., Utah, N. Mex., Ariz. Ecology: Nests found in soil, under stones, in open grassy areas.
Leptothorax neomexicanus Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223-248. ☿.

Taxonomy: Smith, 1952. N. Y. Ent. Soc., Jour. 60:100-102.

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:341. —Cole, 1953. Ent. Soc. Wash., Proc. 55:28. —Gregg, 1963. Ants of Colo., pp. 393-394.

tricarinatus tricarinatus Emery. N. Dak., S. Dak., Iowa w. to Wyo., Colo., Utah. Ecology: Nests under rocks and in soil.
Leptothorax (*Leptothorax*) *tricarinatus* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:318, 321. ☿.

Taxonomy: Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223, 247-248. —Buren, 1944. Iowa State Col., Jour. Sci. 18:286, 288. —Smith, 1952. N. Y. Ent. Soc., Jour. 60:98-100 (worker, male).

Biology: Wheeler and Wheeler, 1963. Ants of N. Dak., p. 143. —Gregg, 1963. Ants of Colo., pp. 391-393.

tuscaloosae Wilson. N. C., Ala. Ecology: Colony was found in small cavity in soil under a bed of moss at base of an oak tree.
Leptothorax (*Myrafant*) *tuscaloosae* Wilson, 1950. Psyche 57:128-130. ☿, ♀.

wheeleri Smith. N. C., Ga., Fla., Ohio, Tenn., Ala., Miss. Ecology: Colonies found in cavities in trees and under bark.
Leptothorax wheeleri Smith, 1929. Ent. Soc. Amer., Ann. 22:547. ☿, ♀.

Taxonomy: Wilson, 1952. Ent. News 60:67-68, 70 (worker, male).

Biology: Smith, 1931. Ent. News 42:18. —Wesson and Wesson, 1940. Amer. Midland Nat. 24:90, 96.

Genus LEPTOTHORAX Subgenus DICHOTHORAX Emery

Leptothorax subg. *Dichothorax* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:323.

Type-species: *Leptothorax* (*Dichothorax*) *pergandei* Emery. Desig. by Wheeler, 1911.

The status of the two forms below needs clarification. Though regarded as subspecies, the ranges overlap considerably.

Revision: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:318, 323-324. —Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:224, 256-260.

pergandei floridanus Emery. N. J., N. C. to Fla., w. to Tex. Ecology: Has been found in stumps, logs, and nut shells.

Leptothorax (*Dichothorax*) *floridanus* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:318, 324. ☿.

Leptothorax (*Dichothorax*) *pergandei flavus* Smith, 1929. Ent. Soc. Amer., Ann. 22:549. ☿, ♀.

Leptothorax (*Dichothorax*) *pergandei floridanus* var. *spinosus* Smith, 1929. Ent. Soc. Amer., Ann. 22:551. ☿.

Taxonomy: Smith, 1931. Ent. News 42:18-19.

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31:290, 305.

pergandei pergandei Emery. D. C. s. to Ga., Tenn., w. to Nebr., Tex. Ecology: Apparently a ground nesting species.

Leptothorax (*Dichothorax*) *pergandei* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:318, 323. ☿.

Leptothorax (*Dichothorax*) *manni* Wesson, 1935. Ent. News 46:208. ☿, ♀, ♂. Preocc. by Wheeler, 1914.

Taxonomy: Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:224, 256-259 (worker, female). —Smith, 1924. Ent. News 35:50. —Cole, 1940. Amer. Midland Nat. 24:56, 58. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:23 (larva).

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31:290. —Buren, 1944. Iowa State Col., Jour. Sci. 18:288.

Genus LEPTOTHORAX Subgenus LEPTOTHORAX Mayr

Leptothorax Mayr, 1855. Zool.-Bot. Gesell. Wien, Verh. 5:431.
Type-species: *Formica acervorum* Fabricius. Desig. by Bingham, 1903.

Mychothorax Ruzsky, 1904. Sapiski Imp. Russ. Geog. Obshch. 41:288.
Type-species: *Formica acervorum* Fabricius. Orig. desig.

In North America, this subgenus is confined mostly to the northern and western United States and Canada. The ants nest in living and dead trees, decaying wood, soil, or stumps. Some are inquilines in nests of other ants and some are dulotic.

Taxonomy: Brown, 1955. Ent. News 66:43-50. —Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:21-22 (larvae).

crassipilis Wheeler. Wyo., Colo., N. Mex., Utah, Ariz., Nev. Ecology: Found under rocks, under wood, in decaying logs.

Leptothorax (*Mychothorax*) *acervorum crassipilis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:513. ☿, ♀, ♂.

Taxonomy: Cole, 1954. Tenn. Acad. Sci., Jour. 29:240-241.

Biology: Cole, 1953. Ent. Soc. Wash., Proc. 55:27. —Gregg, 1963. Ants of Colo., pp. 401-402, 405.

diversipilosus Smith. Wash. Ecology: An inquiline in nests of *Formica obscuripes* Forel.

Leptothorax (*Mychothorax*) *diversipilosus* Smith, 1939. Ent. Soc. Wash., Proc. 41:179. ☿, ergatoid ♀.

Taxonomy: Smith, 1956. Ent. Soc. Wash., Proc. 58:271-275 (female, ergatoid male).

Biology: Alpert and Akre, 1973. Ent. Soc. Amer., Ann. 66:753-760 (distribution, abundance, behavior).

duloticus Wesson. Mich., Ohio, Ill. (?). Ecology: Dulotic, enslaves *Leptothorax curvispinosus* Mayr and *L. longispinosus* Roger.
Leptothorax (*Mychothorax*) *duloticus* Wesson, 1937. Ent. News 48:125. ☿, ♀.

Taxonomy: Wesson, 1940. Brooklyn Ent. Soc., Bul. 35:81-83 (male, biology).

Biology: Wesson and Wesson, 1940. Amer. Midland Nat. 24:94. —Talbot, 1957. Ecology 38:449-456 (populations). —Kannowski, 1959. Insectes Sociaux 6:124-215, 150-151 (parasitism).

hirticornis Emery. N. Dak., S. Dak., Colo., Utah., Calif. Ecology: An inquiline in nests of *Formica obscuripes* Forel and possibly *Formica integroides integroides* Emery.
Leptothorax (*Leptothorax*) *hirticornis* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:317, 319. ☿.
Leptothorax (*Leptothorax*) *hirticornis formidolosus* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:415. ☿, ergatoid ♀.

Taxonomy: Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223-224. —Smith, 1939. Ent. Soc. Wash., Proc. 41:176-179 (worker, ergatoid female).

Biology: Weber, 1935. Ecol. Monog. 5:200. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11:248. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 145-146. —Gregg, 1963. Ants of Colo., pp. 403, 405. —Snelling, 1965. South. Calif. Acad. Sci., Bul. 64:16 (also description of dealate female and ergatoid male).

muscorum (Nylander). Newfoundland (Labrador) w. to N. W. T., Alaska, s. to Conn., Wis., N. Mex., Ariz., Calif.; Eurasia. Ecology: Has been found at 69° 22' N., Kidluit Bay on Richards Is., the northernmost record of any New World ant. Mostly found in woodlands, in decaying stumps, logs, under bark of fallen trees, or under rocks. It is best able to survive in extreme arctic conditions under stones.
Myrmica muscorum Nylander, 1846. Acta Soc. Sci. Fenn. 2:1054. ☿, ♀, ♂.
Leptothorax canadensis Provancher, 1887. Addit. Corr. Faune Ent. Canada, Hym. p. 245. ☿, ♀, ♂.
Leptothorax (*Leptothorax*) *canadensis* var. *yankee* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:317, 319. ☿, ♀.
Leptothorax yankee var. *kincaidi* Pergande, 1900. Wash. Acad. Sci., Proc. 2:520. ☿, ♀.
Leptothorax muscorum var. *sordidus* Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223, 224. ☿.
Leptothorax acervorum canadensis var. *convivialis* Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:228. ☿, ♀.
Leptothorax canadensis obscurus Viereck, 1903. Amer. Ent. Soc., Trans. 29:72. ☿.
Leptothorax (*Lepothorax*) *acervorum canadensis* var. *Calderoni* Forel, 1914. Deut. Ent. Ztschr., p. 617. ☿, ♀.
Leptothorax (*Mychothorax*) *muscorum* var. *septentrionalis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:511. ☿, ♀, ♂.

Taxonomy: Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223, 225-229. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22:588. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:512-513. —Brown, 1955. Ent. News 66:47-50 (also ecology). —Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:21 (larva). —Francoeur and Beique, 1966. Canad. Ent. 98:142 (Provancher ant types).

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:621. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11:247-248. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:73. —Cole, 1942. Amer. Midland Nat. 28:369-370. —Gregg, 1946. Amer. Midland Nat. 35:748. —Kannowski, 1959. Insectes Sociaux 6:125. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 143-145. —Gregg, 1963. Ants of Colo., pp. 393-400. —Chapman, 1969. Ent. Soc. Amer., Ann. 62:1256-1259 (release and recovery of marked winged forms). —Moglich, Machwitz, and Holldobler, 1974. Science 186: 1046-1047 (tandem calling).

provancheri Emery. Que., Maine w. to Alta., N. Dak., Colo., N. Mex. Ecology: Apparently an inquiline, found in nests of *Myrmica incompleta incompleta* Provancher and *M. lobicornis fracticornis* Emery.

Leptothorax (*Leptothorax*) *provancheri* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:317, 320. ☿.

Leptothorax emersoni Wheeler, 1901. Amer. Nat. 35:433. ☿, ♀, ♂.

Leptothorax emersoni glacialis Wheeler, 1907. Wis. Nat. Hist. Soc., Bul. (n. s.) 5:71. ☿, ♀, ♂.

Leptothorax (*Mychothorax*) *emersoni hirtipilis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:515. ☿.

Taxonomy: Wheeler, 1903. Acad. Nat. Sci. Phila., Proc. 55:223, 229. —Cole, 1954. Tenn. Acad. Sci., Jour. 29:241. —Wheeler and Wheeler, 1973. Psyche 80: 73-74 (larva).

Biology: Wheeler, 1907. Wis. Nat. Hist. Soc., Bul. (n. s.) 5:78-83. —Wheeler, 1910. Ants, pp. 107, 393, 434-436. —Wheeler, 1901. Amer. Nat. 35:436-438. —Wheeler, 1903. Jour. Psychol. and Neurol. 2:1-21. —Kannowski, 1957. Psyche 64:1-5. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 146-148. —Gregg, 1963. Ants of Colo., pp. 404-407.

Genus SYMMYRMICA Wheeler

Symmyrmica Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:1, 3.
Type-species: *Symmyrmica chamberlini* Wheeler. Monotypic.

Taxonomy: Brown, 1973. *In* Meggers *et al.*, Tropical Forest Ecosystems in Afr. and S. Amer., p. 185 (possible syn. of *Leptothorax*).

chamberlini Wheeler. Utah, Oreg. Ecology: An inquiline in nest of *Manica mutica* (Emery).

Symmyrmica chamberlini Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20:5. ☿, ♀, apterous ergatoid ♂.

Biology: Wheeler, 1910. Ants, pp. 432-434. —Wheeler, 1919. Amer. Phil. Soc., Proc. 58:22.

Genus HARPAGOXENUS Forel

Tomognathus Mayr, 1861. Die Europaischen Formiciden, pp. 29, 56. Preocc. by Dixon, 1850.
Type-species: *Myrmica sublaevis* Nylander. Monotypic.

Harpagoxenus Forel, 1893. Soc. Ent. de Belg., Ann. 37:167. N. name for *Tomognathus*.

Protomognathus Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:3.
Type-species: *Tomognathus americanus* Emery. Monotypic.

Ants of this genus are dulotic, enslaving and conducting raids on colonies of certain species of *Leptothorax*. There is a single European species.

Revision: Smith, 1939. Ent. Soc. Wash., Proc. 41:165-172.

Taxonomy: Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:26-28 (larvae).

americanus (Emery). Mass., Ont. s. to N. C., w. to Ill., Mo. Ecology: Enslaves *Leptothorax curvispinosus* Mayr and *L. longispinosus* Roger.

Tomognathus americanus Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 272 ☿.

Taxonomy: Creighton, 1927. Psyche 34:28 (male). —Smith, 1939. Ent. Soc. Wash., Proc. 41:166-168 (each caste). —Wheeler and Wheeler, 1955. Ent. Soc. Amer., Ann. 48:26-27 (larva).

Biology: Sturtevant, 1927. Psyche 34:1-9. —Creighton, 1927. Psyche 34:11-29. —Creighton, 1923. Psyche 36:48-50. —Wesson, 1939. Amer. Ent. Soc., Trans. 65:97-122.

canadensis Smith. N. S., Que., Maine w. to Mich., Minn. Ecology: Enslaves *Leptothorax muscorum* (Nylander). Apparently closely related to the Palearctic *H. sublaevis* (Nylander) and like that form has ergatoid females in addition to normal workers and females.

Harpagoxenus canadensis Smith, 1939. Ent. Soc. Wash., Proc. 41:168. ♀, ergatoid ♀.

Taxonomy: Gregg, 1945. Canad. Ent. 77:74-76.

Biology: Gregg, 1946. Amer. Midland Nat. 35:748.

Tribe MYRMECININI

Genus MYRMECINA Curtis

Myrmecina Curtis, 1829. Brit. Ent. 6:226, pl. 265.
Type-species: *Myrmecina latreillii* Curtis. Orig. desig.
Archaeomyrmex Mann, 1921. Harvard Univ., Mus. Comp. Zool., Bul. 64:448, 451.
Type-species: *Archaeomyrmex cacabau* Mann. Orig. desig.

Apparently only one species occurs in North America, though several subspecies are sometimes recognized.

Revision: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:271. —Smith, 1948. Ent. Soc. Wash., Proc. 50:238-240. —Snelling, 1965. South. Calif. Acad. Sci., Bul. 64:101-105. —Brown, 1967. Ent. News 78:233-230.

Taxonomy: Brown, 1951. Brooklyn Ent. Soc., Bul. 46:103-106. —Wheeler and Wheeler, 1954. Ent. Soc. Wash., Proc. 56:129-131 (larvae). —Brown, 1971. Breviora 365:1-2 (generic syn.).

americana Emery. Que. s. to Ga., w. to Iowa, Colo., N. Mex., Ariz., Calif. Ecology: Colonies are small and nests are obscure, usually built in moist shady areas often under small stones.
Myrmecina latreillei americana Emery, 1895. Zool. Jahrb., Abt. f. System. 8:271. ☿.
Myrmecina latreillei americana var. *brevispinosa* Emery, 1895. Zool. Jahrb., Abt. f. System. 8:271. ☿, ♀, ♂.
Myrmecina graminicola texana Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:422. ☿.
Myrmecina graminicola quadrispina Enzmann, 1946. N. Y. Ent. Soc., Jour. 54:13. ☿.
Myrmecina californica Smith, 1948. Ent. Soc. Wash., Proc. 50:239. ☿.

Taxonomy: Cole, 1940. Amer. Midland Nat. 24:39. —Buren, 1944. Iowa State Col., Jour. Sci. 18:290. —Brown, 1949. Psyche 56:44-47. —Brown, 1951. Brooklyn Ent. Soc., Bul. 46:103-106. —Wheeler and Wheeler, 1954. Ent. Soc. Wash., Proc. 56:130 (larva). —Francoeur, 1966. Nat. Canad. 93:439.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:373, 376. —Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22:332, 335-336. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52:502. —Talbot, 1934. Ecology 15:420, 427-428. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:274, 278-279, 304. —Gregg, 1963. Ants of Colo., pp. 364-365, 367.

Tribe TETRAMORIINI

Revision: Bolton, 1976. Brit. Mus. (Nat. Hist.) Ent., Bul. 34: 283-379.

Genus TRIGLYPHOTHRIX Forel

Triglyphothrix Forel, 1890. Soc. Ent. de Belg., Ann. 34: CVI.
Type-species: *Triglyphothrix walshi* Forel. Monotypic.

A single introduced form is established in a number of localities in southeastern United States. The genus is native to Africa and southern Asia.

Revision: Bingham, 1903 Fauna Brit. India, Hym. 2:172-175. —Bolton, 1976. Brit. Mus. (Nat. Hist.) Ent., Bul. 34: 310-359 (world species).

lanuginosa (Mayr). S. C., Ga., Fla., Ala., Miss., La.; pantropical. Introduced, probably native to India. Spread by commerce to most tropical regions of the world.
Tetramorium lanuginosa Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 972, 976. ☿.
Tetramorium obesum race *striatidens* Emery, 1889. Ann. Mus. Civ. Stor. Nat. Genova 7:501. ☿.

Taxonomy: Wheeler, 1912. N. Y. Ent. Soc., Jour. 20:46. —Wheeler, 1916. Jour. Econ. Ent. 9:568-569 (first notice of occurrence in U. S.). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:70. —Wheeler and Wheeler, 1973. Psyche 80: 78 (larva). —Bolton, 1976. Brit. Mus. (Nat. Hist.) Ent., Bul. 34: 350-352 (further synonymy).

Biology: Donisthorpe, 1927. British Ants, p. 393. —Smith, 1931. Ent. News 42:21.

Genus TETRAMORIUM Mayr

Tetramorium Mayr, 1855. Zool.-Bot. Gesell. Wien, Verh. 5:423.
Type-species: *Formica caespitum* Linnaeus. Desig. by Girard, 1879.
Tetrogmus Roger, 1857. Berlin. Ent. Ztschr. 1:10.
Type-species: *Tetrogmus caldarius* Roger. Monotypic.
Tetramorium subg. *Xiphomyrmex* Forel, 1887. Schweiz. Ent. Gesell. Mitt. 7: 385.
Type-species: *Tetramorium* (*Xiphomyrmex*) *kelleri* Forel. Desig. by Wheeler, 1911.

This genus is better represented in Asia and Africa than in North America. Three of the four species, *guineense*, *pacificum*, and *simillimum*, are, with little question, introduced; the other, *caespitum*, which is also found in Europe, is generally believed to be native, though some workers also consider it as being introduced. This genus contains some important house pests.

Revision: Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:972-977. —Bingham, 1903. Fauna British India, Hym. 2:175-189. —Emery, 1916. Soc. Ent. Ital., Bol. 47:195. —Smith, 1938. Wash. Acad. Sci., Jour. 28: 126-130 (*Xiphomyrmex*). —Smith, 1943. Ent. Soc. Wash., Proc. 45:1-5 (U. S. species).

Taxonomy: Wheeler and Wheeler, 1954. Amer. Midland Nat. 52: 445, 450 (larvae). —Cole, 1957. Tenn. Acad. Sci., Jour. 32: 209-219 (male, *Xiphomyrmex*). —Brown, 1957. Breviora 72:1-8 (native in N. Amer. ?). —Bolton, 1976. Brit. Mus. (Nat. Hist.) Ent., Bul. 34: 288, 359-365 (generic synonymy).

caespitum (Linnaeus). Ont. s. to Tenn., w. to Nebr., Mo., Wash., Nev., Calif.; Eurasia, Africa. Ecology: One of the most common house-infesting ants in the large cities of the Atlantic coast. They also steal seeds from seedbeds, gnaw into tubers, roots, and stalks of various plants, attend honeydew excreting insects, and serve as an intermediate host for poultry tapeworms. Colonies are populous and nests may be in exposed soil, under cover of stones, pavement, or other objects, in rotting wood, or next to building foundations. Possibly introduced by early colonists from Europe but believed by some to be a native species. Parasite: *Anergates atratulus* (Schenck), *Strongylognathus* sp. Pavement ant. Most common in the Atlantic seaboard states and more sparsely distributed inland.
Formica caespitum Linnaeus, 1758. Syst. Nat., ed. 10, v. 1, p. 581.
Myrmica (*Myrmica*) *brevinodis* var. *transversinodis* Enzmann, 1946. N. Y. Ent. Soc., Jour. 54:47. ☿.

Taxonomy: Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:972. —Donisthorpe, 1927. British Ants, p. 189 (each caste). —Smith, 1943. Ent. Soc. Wash., Proc. 45:2. —Brown, 1949. Psyche 56:47. —Wheeler and Wheeler, 1954. Amer. Midland Nat. 52:445 (larva). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:24-25 (larva). —Wheeler and Wheeler, 1973. Psyche 80: 76, 78 (larva).

Biology: Smith, 1915. Va. Truck Expt. Sta., Bul. 16:1-15. —Wheeler, 1919. Amer. Phil. Soc., Proc. 58:23-26. —Wheeler, 1927. Psyche 34:164-165. —Donisthorpe, 1927. British Ants, pp. 193-198. —Metcalf and Flint, 1939. Destructive and Useful Insects, p. 771. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:74. —Brown, 1964. Ent. News 75:15. —Brown, 1957. Breviora 72:1-4 (historical). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:45-47 (economic importance). —Lange, 1961. Jour. Econ. Ent. 54:1063. —Poldi, 1963. Pavia Univ. Symposium Genet. et Biol. Ital. 12:132. —Weber, 1965. Ent. News 76: 137-139 (in Philadelphia area). —Brian, Elmes, and Kelley, 1967. Jour. Anim. Ecol. 36:337-342 (populations). —Bruder and Gupta, 1972. Ent. Soc. Amer., Ann. 65:358-367. —Gurney, 1975. Ins. World Digest 2 (5): 19-25 (stinging habits).

guineense (Fabricius). Ga., Fla. w. to Tex.; pantropical. Ecology: Nests in small to moderate colonies in exposed soil, under stones or other objects, in rotting logs and stumps, in stems of plants, and in branches and under bark of trees. Occasionally a house pest. Introduced, spread throughout the tropical regions of the world by commerce. Occasionally found in greenhouses farther north in N. Amer. Guinea ant.
Formica guineensis Fabricius, 1793. Ent. System. 2:357. ☿.

Taxonomy: Emery, 1909. Deut. Ent. Ztschr., p. 695 (each caste). —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:831, 852. —Smith, 1943. Ent. Soc. Wash., Proc. 45:3. —Wilson and

Taylor, 1967. Pacific Ins. Monog. 14:71-72 (Polynesia). —Wheeler and Wheeler, 1954. Amer. Midland Nat. 52:449-450 (larva).

Biology: Marlatt, 1928. U. S. Dept. Agr., Farmers' Bul. 740:6. —Phillips, 1934. (Hawaii Univ.) Expt. Sta. Pineapple Prod. Coop. Assoc. Bul. 15:23-24. —Smith, 1943. Ent. Soc. Wash., Proc. 45:1-2. —Brown, 1958. Acta Hym. 1:28. —Taylor and Wilson, 1961. Psyche 68:138. —Brown, 1964. Ent. News 75:14-15. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:47-48 (economic importance).

Morphology: Blum and Ross, 1965. Jour. Ins. Physiol. 11:857-868 (odor trail pheromone).

pacificum Mayr. Calif.; Oriental and Australian Regions. Introduced into a nursery in Calif; may not be established.
Tetramorium pacificum Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20:972, 976. ☿, ♀.

Taxonomy: Smith, 1943. Ent. Soc. Wash., Proc. 45:2-3. —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:72-73 (Polynesia).

simillimum (Smith). Ga., Fla.; Pantropical. Introduced, a tramp species probably native to Africa. Occasionally found in greenhouses farther north in N. Amer.
Myrmica simillima Smith, 1851. List Hym. Brit. Mus. v. 6, p. 118. ☿.

Taxonomy: Emery, 1909. Deut. Ent. Ztschr., pp. 695-696 (each caste). —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:831, 853. —Smith, 1943. Ent. Soc. Wash., Proc. 45:2. —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:73 (Polynesia).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:101. —Marlatt, 1928. U. S. Dept. Agr., Farmers' Bul. 740:6. —Smith, 1933. Fla. Ent. 17:24. —Phillips, 1934. (Hawaii Univ.) Expt. Sta. Pineapple Prod. Coop. Assoc. Bul. 15:24. —Taylor and Wilson, 1961. Psyche 68:142-143.

spinosus hispidus (Wheeler). S. Ariz. Ecology: Found nesting in small craters in the desert. *X. spinosus spinosus* Pergande occurs in Mexico.
Xiphomyrmex spinosus hispidus Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:415. ☿.

spinosus insons (Wheeler). W. Tex., Ariz. Ecology: Nests found in small craters in dry, grassy areas.
Xiphomyrmex spinosus insons Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:416. ☿, ♀, ♂.

spinosus wheeleri Forel. S. Ariz.; Mexico. Ecology: One colony was found beneath a stone in a cactus desert.
Tetramorium (*Xiphomyrmex*) *Wheeleri* Forel, 1901. Soc. Ent. de Belg., Ann. 45:128. ☿.

Biology: Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34:416.

Genus ANERGATES Forel

Anergates Forel, 1874. Schweiz. Naturf. Gesell. Denkschr. 26:93.
Type-species: *Myrmica atratula* Schenck. Monotypic.

The single species of this genus is a permanent parasite.

atratulus (Schenck). Conn., N. Y., N. J., Pa., Del., Md., D. C., Va.; Europe. Ecology: A parasitized nest of the host consists of a single fertile female of *atratulus*, a large number of host workers, and a large number of pupoidal males and virgin females of *atratulus*. Workers of the parasite are entirely lacking. Possibly introduced with its host from Europe, though some workers are of the opinion that the host and *atratulus* are native. Host: *Tetramorium caespitum* (L.).
Myrmica atratula Schenck, 1852. Nassau. Ver. f. Naturk. Jahrb. 8:91. ♀.
Anergates friedlandi Creighton, 1934. Psyche 41:193. ♀.

Taxonomy: Emery, 1922. *In* Wytsman, Gen. Ins., fasc. 174:205-206 (female, male). —Donisthorpe, 1927. British Ants, pp. 96-97 (female, male). —Wheeler and Wheeler, 1955. Amer. Midland Nat. 54:128-130 (larva). —Ettershank, 1966. Austral. Jour. Zool. 14:157-158.

Biology: Wheeler, 1910. Ants, pp. 498-504. —Donisthorpe, 1915. British Ants, p. 89. —Wheeler, 1923. Social life Among the Insects, pp. 215-219. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:241-243.

Morphology: Meyer, 1955. Insectes Sociaux 2:163-170.

TRIBE OCHETOMYRMICINI

Genus OCHETOMYRMEX Mayr

Ochetomyrmex Mayr, 1877. Zool.-Bot. Gesell. Wien, Verh. 27:871.
Type-species: *Ochetomyrmex semipolitus* Mayr. Monotypic.
Wasmannia Forel, 1893. London Ent. Soc., Trans. 4:383.
Type-species: *Tetramorium? auropunctatum* Roger. Desig. by Wheeler, 1911.
Blepharidatta Wheeler, 1915. Harvard Univ., Mus. Comp. Zool., Bul. 59:484.
Type-species: *Blepharidatta brasiliensis* Wheeler. Monotypic.
Hercynia Enzmann, 1947. N. Y. Ent. Soc., Jour. 55:43. Preocc. by Rafinesque, 1815.
Type-species: *Hercynia panamana* Enzmann. Monotypic.

A single species of this Neotropical genus has been introduced into the United States.

Taxonomy: Brown, 1948. Ent. News 59:102. —Brown, 1973. *In* Meggers, *et al.*, Tropical Forest Ecosystems in Afr. and S. Amer., pp. 178-185 (generic syn.).

auropunctata (Roger). Fla., Calif.; W. Indies, Mexico, Central and S. Amer. Ecology: Nests in exposed soil, under cover of objects, or in wood. Attends honeydew excreting insects, can sting severely, and infests houses. Introduced. Little fire ant.
Tetramorium ? auropunctatum Roger, 1863. Berlin. Ent. Ztschr. 7:182. ☿, ♀, ♂.
Wasmannia ? glabra Santschi, 1931. Rev. Ent. Sao Paulo 1:272. ☿.
Hercynia panamana Enzmann, 1947. N. Y. Ent. Soc., Jour. 55:44. ☿, ♀.

Taxonomy: Smith, 1929. Jour. Econ. Ent. 22:243. —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:831, 854. —Brown, 1948. Ent. News 59:102. —Smith, 1954. Amer. Mus. Novitates 1671:7-8. —Wheeler and Wheeler, 1954. Amer. Midland Nat. 52:444 (larva). —Kempf, 1964. Studia Ent. 7:66.

Biology: Wheeler, 1929. Psyche 36:89-90. —Spencer, 1941. Fla. Ent. 24:6-14. —Fernald, 1947. Jour. Econ. Ent. 40:428. —Osburn, 1948. Fla. Ent. 31:11-15. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326:48-49 (economic importance).

TRIBE CEPHALOTINI

Revision: Kempf, 1951. Rev. de Ent. 22:1-244.

Taxonomy: Kempf, 1958. Studia Ent. 1:1-168. —Kempf, 1973. Studia Ent. 16: 449-462 (generic classification; key to genera).

Genus ZACRYPTOCERUS Wheeler

Zacryptocerus Ashmead, 1905. Canad. Ent. 37: 384. Nomen nudum. No description given; the type-species is given as *Cryptocerus multistrigus* F. Smith, but no such species exists.
Zacryptocerus Wheeler, 1911. N. Y. Acad. Sci., Ann. 21: 175.
Type-species: *Cryptocerus clypeatus* Fabricius. Monotypic.
Cryptocerus subg. *Paracryptocerus* Emery, 1915. Soc. Ent. de France, Bul., p. 192.
Type-species: *Cryptocerus spinosus* Mayr. Orig. desig.
Cryptocerus subg. *Cyathocephalus* Emery, 1915. Soc. Ent. de France, Bul., p. 192. Preocc. by Kessler, 1868.
Type-species: *Cryptocerus pallens* Klug. Orig. desig.
Cryptocerus subg. *Hypocryptocerus* Wheeler, 1920. Psyche 27: 53.
Type-species: *Formica haemorrhoidalis* Latreille, Orig. desig.
Cyathomyrmex Creighton, 1933. Psyche 40:98. N. name for *Cyathocephalus* Emery.
Paracryptocerus subg. *Harnedia* Smith, 1949. Psyche 56:20.
Type-species: *Cryptocerus umbraculatus* Fabricius. Orig. desig.

Mainly Neotropical with slight extensions into the United States. The ants are arboreal, forming small colonies in cavities of plants, especially twigs. Food consists largely of honeydew and small arthropods. The soldier is believed to keep intruders from the nest by blocking the entrance hole with its head.

Revision: Smith, 1947. Ent. Soc. Wash., Proc. 49:29-40. —Kempf, 1958. Studia Ent. 1:65-158.

Taxonomy: Kempf, 1951. Rev. de Ent. 22:156-157, 233. —Wheeler and Wheeler, 1954. Wash. Acad. Sci., Jour. 44:156-157 (larvae). —Kempf, 1973. Studia Ent. 16: 457-460 (syn. of *Paracryptocerus* and *Hypocryptocerus*).

rohweri (Wheeler), n. comb. S. Ariz.; Mexico. Ecology: Arboreal.
Cryptocerus (*Cyathocephalus*) *rohweri* Wheeler, 1916. New England Zool. Club, Proc. 6:32. ♀, ♂.

Taxonomy: Kempf, 1958. Studia Ent. 1:129-132. —Snelling, 1968. Los Angeles Co., Mus., Contrib. Sci. 132:5-9.

Biology: Smith, 1947. Ent. Soc. Wash., Proc. 49:34-37. —Creighton and Nutting, 1965. Psyche 72: 59-64 (habits and distribution).

texanus (Santschi), n. comb. S. Tex.; Mexico. Ecology: Arboreal.
Cryptocerus texanus Santschi, 1915. Soc. Ent. de France, Bul., p. 208. ♀, ♂.

Taxonomy: Kempf, 1958. Studia Ent. 1:123-127.

Biology: Smith, 1947. Ent. Soc. Wash., Proc. 49:37-40. —Creighton, 1954. Psyche 61:41-57. —Creighton, 1963. Psyche 70:133-143.

varians (Smith), n. comb. Fla.; Central Amer., W. Indies. Ecology: Arboreal.
Cryptocerus varians Smith, 1876. London Ent. Soc., Trans., p. 606. ♀.
Cryptocerus (*Cyathocephalus*) *varians* var. *jamaicensis* Forel, 1922. Rev. Suisse de Zool. 30:97. ♀.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:102-104. —Wheeler and Wheeler, 1954. Wash. Acad. Sci., Jour. 44:156 (larva). —Kempf, 1958. Studia Ent. 1:155-158.

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40:11. —Smith, 1947. Ent. Soc. Wash., Proc. 49:33.

Tribe DACETINI

Taxonomy: Brown, 1948. Amer. Ent. Soc., Trans. 74:101-129 (preliminary generic revision of higher Dacetini). —Brown, 1949. Amer. Ent. Soc., Trans. 75:43-51. —Brown, 1953. Amer. Midland Nat. 50:1-137 (revisionary studies). —Wheeler and Wheeler, 1954. Psyche 61:111-145 (larvae). —Brown and Wilson, 1959. Quart. Rev. Biol. 34:278-294 (evolution of dacetine ants).

Genus STRUMIGENYS Smith

Strumigenys Smith, 1860. Jour. Ent. (London) 1:72.
Type-species: *Strumigenys mandibularis* Smith. Monotypic.
Labidogenys Roger, 1862. Berlin. Ent. Ztschr. 6:249.
Type-species: *Labidogenys lyroessa* Roger. Monotypic.
Pyramica Roger, 1862. Berlin. Ent. Ztschr. 6:251.
Type-species: *Pyramica gundlachi* Roger. Monotypic.
Proscopomyrmex Patrizi, 1946. Bol. Inst. Ent. R. Univ. Bologna 15:294.
Type-species: *Proscopomyrmex londianensis* Patrizi. Monotypic.
Eneria Donisthorpe, 1947. Ann. and Mag. Nat. Hist. 14:598.
Type-species: *Eneria excisa* Donisthorpe. Monotypic.

This genus is best represented in the tropical regions of the world; over 50 species are known from the New World, but only four of these have been recorded from the United States. Three of these four species are believed to have been introduced. Colonies are small and nests are usually found in leaf litter, plant cavities, rotting wood, or under objects.

Revision: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:325-326. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:145-147. —Smith, 1931. Ent. Soc. Amer., Ann. 24:688-691 (N. Amer.). —Brown, 1962. Psyche 69:238-267 (Neotropical species and key).

Taxonomy: Brown, 1948. Amer. Ent. Soc., Trans. 74:108. —Brown, 1949. Mushi 20:14. —Wheeler and Wheeler, 1954. Psyche 61:135 (larvae). —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:25-26 (larvae). —Brown, 1959. Studia Ent. (n. s.) 2:25-30 (*silvestrii* group). —Brown, 1960 (1959). Psyche 66:37-52 (*gundlachi* group).

Biology: Brown, 1950. Brooklyn Ent. Soc., Bul. 45:87-89. —Brown and Wilson, 1960 (1959). Quart. Rev. Biol. 34:281.

Species Group Silvestrii

silvestrii Emery. La. (Paradise); Brazil, Argentina, Cuba. Ecology: In La. found in a basal rot hole in a live oak tree. Probably introduced.

Strumigenys silvestrii Emery, 1905. Soc. Ent. Ital., Bol. 37:168. ☿, ♀.

Strumigenys (*Strumigenys*) *caribbea* Weber, 1934. Rev. de Ent. 4:43. ☿, ♀.

Taxonomy: Brown, 1959. Studia Ent. (n. s.) 2:25-28. —Brown, 1962. Psyche 69:246, 257, 259.

Species Group Louisianae

louisianae Roger. N. C. to Fla., w. to Okla., Ariz.; Mexico s. to Bolivia, Argentina. Ecology: The small colonies are beneath objects, in rotting wood, plant cavities; food consists of small arthropods, especially Collembola.

Strumigenys louisianae Roger, 1863. Berlin. Ent. Ztschr. 7:211. ☿.

Strumigenys unidentata Mayr, 1887. Zool.-Bot. Gesell. Wien, Verh. 37:570, 575. ☿.

Strumigenys unispinulosa Emery, 1890. Soc. Ent. Ital., Bol. 22:67. ☿, ♀.

Strumigenys unispinulosa var. *longicornis* Emery, 1894. Soc. Ent. Ital., Bol. 26:214. ☿.

Strumigenys fusca Emery, 1894. Soc. Ent. Ital., Bol. 26:215. ☿.

Strumigenys louisianae var. *obscuriventris* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:145. ☿.

Strumigenys bruchi Forel, 1912. Soc. Ent. de Belg., Mem. 29:197-198. ☿, ♂.

Strumigenys infidelis Santschi, 1919. Soc. Cient. Argentina, An. 87:48. ☿.

Strumigenys eggersi var. *cubaensis* Mann, 1920. Amer. Mus. Nat. Hist., Bul. 42:430. ☿.

Strumigenys (*Strumigenys*) *louisianae laticephala* Smith, 1931. Ent. Soc. Amer., Ann. 24:688, 690. ☿.

Strumigenys (*Strumigenys*) *louisianae soledadensis* Weber, 1934. Rev. de Ent. 4:38-39. ☿, ♀.

Strumigenys (*Strumigenys*) *louisianae guatemalensis* Weber, 1934. Rev. de Ent. 4:39. ☿.

Strumigenys (*Strumigenys*) *louisianae costaricensis* Weber, 1934. Rev. de Ent. 4:39. ☿.

Strumigenys clasmospongia Brown, 1953. Psyche 60:2. ☿.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:325-326. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:147. —Haug, 1932. Ent. Soc. Amer., Ann. 25:170-172. —Brown, 1953. Amer. Midland Nat. 50:28-31. —Brown, 1953. Psyche 60:1-2. —Wheeler and Wheeler, 1954. Psyche 61:136-137 (larva). —Brown, 1957. Quart. Rev. Biol. 32:271. —Brown, 1961. Psyche 68: 64-67, 68 (variation and syn.). —Brown, 1962. Psyche 69:246-247, 257, 263.

Biology: Smith, 1931. Ent. Soc. Amer., Ann. 24:690-691. —Creighton, 1937. Psyche 44:97-109. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:269, 291, 305. —Wilson, 1950. Brooklyn Ent. Soc., Bul. 45:85-86. —Wilson, 1953. Ent. Soc. Amer., Ann. 46:481-483. —Kempf, 1958. Studia Ent. 1:555.

Species Group Gundlachi

eggersi Emery. Fla. (Miami, Fisher's Is., Archbold Biol. Sta.); W. Indies, Mexico, S. Amer. Probably introduced.

Strumigenys eggersi Emery, 1890. Soc. Ent. Ital., Bol. 22:68. ☿, ♀.

Taxonomy: Brown, 1960 (1959). Psyche 66:46-47 (worker, female). —Brown, 1962. Psyche 69:249, 257, 264.

Biology: Weber, 1952. Amer. Mus. Novitates 1554:5. —Kempf, 1958. Studia Ent. 1:554. —Kempf, 1961. Studia Ent. 4:515.

gundlachi (Roger). Fla. (Royal Palm Ranger Sta., Everglades Natl. Pk.; Key Largo); W. Indies, Mexico, Central Amer. Ecology: Usually found in leaf litter; feeds almost exclusively on Collembola. Probably introduced.

Pyramica gundlachi Roger, 1862. Berlin. Ent. Ztschr. 6:253. "♀"= ☿.

Strumigenys eggersi var. *vincentensis* Forel, 1893. London Ent. Soc., Trans. p. 378. ☿.

Strumigenys eggersi var. *banillensis* Santschi, 1930. Soc. Roy. Ent. d'Egypte, Bul. (n. s.), p. 80. ☿.
Strumigenys bierigi Santschi, 1930. Soc. Roy. Ent. d'Egypte, Bul. (n. s.), p. 80. ☿.
Strumigenys (*Strumigenys*) *eggersi* var. *isthmica* Santschi, 1931. Rev. de Ent. 1:276. ☿.
Strumigenys (*Strumigenys*) *eggersi infuscata* Weber, 1934. Rev. de Ent. 4:35. ☿, ♀.
Strumigenys (*Strumigenys*) *eggersi* var. *berlesei* Weber, 1934. Rev. de Ent. 4:36. ☿.

Taxonomy: Brown, 1960 (1959). Psyche 66:37-45 (worker, female). —Brown, 1962. Psyche 69:249, 257, 264.

Biology: Weber, 1952. Amer. Mus. Novitates 1554:4-5.

Genus SMITHISTRUMA Brown

Cephaloxys Smith, 1864. Linn. Soc. London, Jour. 8:77. Preocc. by Signoret, 1847.
Type-species: *Cephaloxys capitata* Smith. Monotypic.
Smithistruma Brown, 1948. Amer. Ent. Soc., Trans. 74:104-106.
Type-species: *Strumigenys pulchella* Emery. Orig. desig.
Smithistruma subg. *Wessonistruma* Brown, 1948. Amer. Ent. Soc., Trans. 74:106.
Type-species: *Strumigenys pergandei* Emery. Orig. desig.
Smithistruma subg. *Weberistruma* Brown, 1948. Amer. Ent. Soc., Trans. 74:106-107.
Type-species: *Strumigenys* (*Cephaloxys*) *leptothrix* Wheeler. Orig. desig.
Smithistruma subg. *Platystruma* Brown, 1953. Amer. Midland Nat. 50:112.
Type-species: *Strumigenys* (*Cephaloxys*) *depressiceps* Wheeler. Orig. desig.

Ants of this genus nest in small colonies in the soil, various types of soil cover, rotting logs and stumps, and beneath objects. They are most frequently collected in berlese funnels of samples of leaf litter, duff, etc. Food consists almost exclusively of Collembola.

Revision: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:325-329. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:148. —Smith, 1931. Ent. Soc. Amer., Ann. 24:691-710. —Wesson and Wesson, 1939. Psyche 46:91-112. —Brown, 1953. Amer. Midland Nat. 50:55-92 (key to spp.).

Taxonomy: Wheeler and Wheeler, 1954. Psyche 61:141-145 (larvae).

Biology: Brown, 1950. Brooklyn Ent. Soc., Bul. 45:87-89. —Wilson, 1953. Ent. Soc. Amer., Ann. 46:485-487. —Brown and Wilson, 1960 (1959). Quart. Rev. Biol. 34:282. —Brown, 1964. Amer. Ent. Soc., Trans. 89:183-200.

abdita (Wesson and Wesson). Pa., Va., N. C., Ohio, Ill., Iowa. Ecology: Nests are found under rocks in the soil.
Strumigenys (*Cephaloxys*) *abdita* Wesson and Wesson, 1939. Psyche 46:95, 109. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:89-90 (worker, female). —Brown, 1964. Amer. Ent. Soc., Trans. 89:189-190, 199-200.

angulata (Smith). Ill., Ala., Miss. Ecology: Colonies found in a rotten pine stump; some specimens found in nest of *Strumigenys louisianae* Roger.
Strumigenys (*Cephaloxys*) *angulata* Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 697. ☿.

Taxonomy: Smith, 1932. Ent. News 43:157-158 (also biology). —Wesson and Wesson, 1939. Psyche 46:110. —Brown, 1953. Amer. Midland Nat. 50:54-55 (worker, female).

bimarginata (Wesson and Wesson). Ohio, Ill. Ecology: Specimens found in soil cover.
Strumigenys (*Cephaloxys*) *bimarginata* Wesson and Wesson, 1939. Psyche 46:95-97. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:62-63 (worker, female).

bunki Brown. Ga., Fla., Miss., La. Ecology: Nests are found in the soil.
Smithistruma (*Smithistruma*) *bunki* Brown, 1950. Amer. Ent. Soc., Trans. 76:41-42. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:82-84 (worker, female). —Brown, 1964. Amer. Ent. Soc., Trans. 89:190.

californica Brown. Calif.
Smithistruma (*Smithistruma*) *californica* Brown, 1950. Amer. Ent. Soc., Trans. 76:40-41. ♀.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:85-86.

carolinensis Brown. N. C., S. C. Ecology: Specimens found in pine needle litter and oak leaf mold.
Smithistruma carolinensis Brown, 1964. Amer. Ent. Soc., Trans. 89:185-186. ☿.

cloydi Pfitzer. Tenn. (Knoxville).
Smithistruma cloydi Pfitzer, 1951. Tenn. Acad. Sci., Jour. 16:198-200. ☿.

Taxonomy: Brown, 1964. Amer. Ent. Soc., Trans. 89:191.

clypeata (Roger). N. J., Pa. s. to Fla., w. to Ill., Ark., La. Ecology: Usually found in forested areas where it nests in soil cover, under stones, and in rotten logs.
Strumigenys clipeata(!) Roger, 1863. Berlin. Ent. Ztschr. 7:213. ☿.

Taxonomy: Mayr, 1887. Zool.-Bot. Gesell. Wien, Verh. 37:571 (worker, female). —Emery, 1895. Zool. Jahrb., Abt. f. System. 8:326, 328 (each caste). —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:148. —Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 699-700. —Brown, 1953. Amer. Midland Nat. 50:58-59 (each caste). —Wheeler and Wheeler, 1954. Psyche 61:143 (larva). —Brown, 1964. Amer. Ent. Soc., Trans. 89:191 (further distribution).

Biology: Smith, 1932. Ent. News 43:159. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:291, 305. —Wesson and Wesson, 1939. Psyche 46:93-94. —Smith, 1955. Brooklyn Ent. Soc., Bul. 50:28. —Wilson, 1953. Ent. Soc. Amer., Ann. 46:486.

creightoni (Smith). D. C., N. C., Ga., Fla., Tenn., Ala. Ecology: Collections made from leaf litter.
Strumigenys (*Cephaloxys*) *creightoni* Smith, 1931. Ent. Soc. Amer., Ann. 24:692, 705. ☿.

Taxonomy: Wesson and Wesson, 1939. Psyche 46:110. —Brown, 1953. Amer. Midland Nat. 50:80-81 (worker, female). —Brown, 1964. Amer. Ent. Soc., Trans. 89:191.

dietrichi (Smith). Md. s. to Fla., w. to Ohio, Ill., Ark., La. Ecology: Nests in or under bark of rotting logs or stumps; a few are known from leaf litter. Sometimes occurs in or near nests of other ants.
Strumigenys (*Cephaloxys*) *dietrichi* Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 696. ☿.

Taxonomy: Smith, 1932. Ent. News 43:159. —Wesson and Wesson, 1939. Psyche 46:108. —Brown, 1953. Amer. Midland Nat. 50:67-68 (worker, female). —Wheeler and Wheeler, 1954. Psyche 61:143 (larva). —Brown, 1964. Amer. Ent. Soc., Trans. 89:191-192.

Biology: Kennedy and Schramm, 1933. Ent. Soc. Amer., Ann. 26:95-96. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:270, 272-273, 291, 305. —Wilson, 1953. Ent. Soc. Amer., Ann. 46:487.

filirrhina Brown. N. C., Mo. Ecology: Specimens taken in leaf mold.
Smithistruma (*Smithistruma*) *filirrhina* Brown, 1950. Amer. Ent. Soc., Trans. 76:37-38. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:63-64. —Brown, 1964. Amer. Ent. Soc., Trans. 89:193.

filitalpa Brown. Ind., Ark.
Smithistruma (*Smithistruma*) *filitalpa* Brown, 1950. Amer. Ent. Soc., Trans. 76:39-40. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:79-80. —Brown, 1964. Amer. Ent. Soc., Trans. 89:193-194.

laevinasis (Smith). Va., N. C., Tenn., Ala., Miss., Ill. Ecology: Nests have been found in rotten logs.
Strumigenys (*Cephaloxys*) *clypeata* var. *laevinasis* Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 701. ☿.

Taxonomy: Wesson and Wesson, 1939. Psyche 46:109. —Brown, 1953. Amer. Midland Nat. 50:61-62 (worker, female). —Brown, 1964. Amer. Ent. Soc., Trans. 89:194, 199.

Biology: Smith, 1932. Ent. News 43:159.

margaritae (Forel). Ga., Ala., Tex.; W. Indies, Mexico, Colombia. Ecology: Specimens have been found in soil cover.
Strumigenys margaritae Forel, 1893. London Ent. Soc., Trans, p. 378. ☿, ♀, ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:148. —Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 692-693. —Wesson and Wesson, 1939. Psyche 46:108. —Brown, 1953. Amer. Midland Nat. 50:108-110. —Brown, 1964. Amer. Ent. Soc., Trans. 89:194-195.

missouriensis (Smith). N. Y., Va., N. C., Ohio, Miss., Ill., Iowa, Mo. Ecology: Primarily a soil and soil cover inhabitant.

Strumigenys (*Cephaloxys*) *missouriensis* Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 701. ☿.

Strumigenys (*Cephaloxys*) *sculpturata* Smith, 1931. Ent. Soc. Amer., Ann. 24:692, 706. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:72-73 (worker, female). —Wheeler and Wheeler, 1954. Psyche 61:143 (larva). —Brown, 1964. Amer. Ent. Soc., Trans. 89:195.

Biology: Wilson, 1953. Ent. Soc. Amer., Ann. 46:485-486.

ohioensis (Kennedy and Schramm). N. J. s. to Ga., w. to Ill., Ark., La. Ecology: Found in soil cover and upper soil layers, often under objects; sometimes in rotting wood.

Strumigenys ohioensis Kennedy and Schramm, 1933. Ent. Soc. Amer., Ann. 26:98-99. ☿.

Strumigenys (*Cephaloxys*) *manni* Wesson and Wesson, 1939. Psyche 46:97. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:87-89 (each caste). —Brown, 1964. Amer. Ent. Soc., Trans. 89:196.

ornata (Mayr). Del., Md. s. to Fla., w. to Mich., Ill., Mo., Okla., Tex. Ecology: Most commonly found in leaf litter or forest debris.

Strumigenys ornata Mayr, 1887. Zool.-Bot. Gesell. Wien, Verh. 37:571. ☿.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8:325, 328. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:148 (worker, female). —Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 695-696. —Wesson and Wesson, 1939. Psyche 46:109. —Brown, 1953. Amer. Midland Nat. 50:65-67. —Brown, 1964. Amer. Ent. Soc., Trans. 89:197.

pergandei (Emery). Mass., N. Y., Ont. s. to N. C., Tenn., w. to Iowa, Mo., Kans. Ecology: Nests in rotten logs, in soil, or under stones in soil. Often found in or near nests of other ants where it may prey on myrmecophilous collembolans. Records from Mass. are the northernmost for dacetine ants in the New World.

Strumigenys pergandei Emery, 1895. Zool. Jahrb., Abt. f. System. 8:325. ☿, ♀, ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:148. —Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 698-699 (also biology). —Wesson and Wesson, 1939. Psyche 46:110. —Brown, 1953. Amer. Midland Nat. 50:51-54. —Wheeler and Wheeler, 1954. Psyche 61:144-145 (larva). —Brown, 1964. Amer. Ent. Soc, Trans. 89:197.

Biology: Kennedy and Schramm, 1933. Ent. Soc. Amer., Ann. 26:95-98. —Wesson, 1936. Ent. News 47:171-174. —Brown, 1952. Psyche 59:12. —Wilson, 1953. Ent. Soc. Amer., Ann. 46:487-488.

pilinasis (Forel). Pa. s. to N. C., Ala., w. to Ohio., Ill., Mo., Ark., La. Ecology: Nests under stones, in soil cover, or in logs.

Strumigenys clypeata var. *pilinasis* Forel, 1901. Soc. Ent. de Belg., Ann. 45:339. ☿.

Strumigenys (*Cephaloxys*) *clypeata* var. *brevisetosa* Smith, 1935. Ent. Soc. Amer., Ann. 28:215. ☿.

Strumigenys (*Cephaloxys*) *medialis* Wesson and Wesson, 1939. Psyche 46:94, 110. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:148 (worker, female). —Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 700. —Wesson and Wesson, 1939. Psyche 46:109. —Brown, 1953. Amer. Midland Nat. 50:60-61 (worker, female). —Wheeler and Wheeler, 1954. Psyche 61:143 (larva). —Brown, 1964. Amer. Ent. Soc., Trans. 89:197-199.

Biology: Wilson, 1953. Ent. Soc. Amer., Ann. 46:485.

pulchella (Emery). N. Y., Pa. s. to Fla., w. to Ill., La. Ecology: Nests in rotting wood.

Strumigenys pulchella Emery, 1895. Zool. Jahrb., Abt. f. System. 8:325, 327. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:148 (worker, female). —Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 702. —Brown, 1953. Amer. Midland Nat. 50:70-72 (each caste). —Brown, 1964. Amer. Ent. Soc., Trans. 89:198.

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31:291, 305. —Wesson and Wesson, 1939. Psyche 46:111.

reflexa (Wesson and Wesson). Md. s. to N. C., Tenn., Ala., w. to Ohio, Ill. Ecology: Nests in soil or under or in objects lying on soil.
Strumigenys (*Cephaloxys*) *reflexa* Wesson and Wesson, 1939. Psyche 46:102, 111. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:73-75 (each caste).

rohweri (Smith). Miss.
Strumigenys (*Cephaloxys*) *rohweri* Smith, 1935. Ent. Soc. Amer., Ann. 28:214. ☿.

Taxonomy: Wesson and Wesson, 1939. Psyche 46:109. —Brown, 1953. Amer. Midland Nat. 50:57-58.

rostrata (Emery). N. J., Pa. s. to Fla., w. to Ill., Mo., La. Ecology: Nests in soil and rotting wood.
Strumigenys rostrata Emery, 1895. Zool. Jahrb., Abt. f. System. 8:326, 329. ☿, ♀, ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:148. —Smith, 1931. Ent. Soc. Amer., Ann. 24:692, 704-705. —Wesson and Wesson, 1939. Psyche 46:110. —Brown, 1953. Amer. Midland Nat. 50:84-85 (each caste). —Wheeler and Wheeler, 1954. Psyche 61:144 (larva).

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31:273, 291-292, 305. —Wilson, 1953. Ent. Soc. Amer., Ann. 46:485.

talpa (Weber). N. C., Fla., Ohio, Tenn., Ala., Ill., La. Ecology: Found in soil or humus.
Strumigenys (*Cephaloxys*) *talpa* Weber, 1934. Psyche 41:63. ☿.
Strumigenys (*Cephaloxys*) *venatrix* Wesson and Wesson, 1939. Psyche 46:103, 110. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:76-78 (each caste). —Wheeler and Wheeler, 1954. Psyche 61:141 (larva).

Biology: Wilson, 1953. Ent. Soc. Amer., Ann. 46:486.

wrayi Brown. N. C. (Fayetteville). Ecology: Found in leaf mold.
Smithistruma (*Smithistruma*) *wrayi* Brown, 1950. Amer. Ent. Soc., Trans. 76:38-39. ☿.

Taxonomy: Brown, 1953. Amer. Midland Nat. 50:78-79.

Genus TRICHOSCAPA Emery

Strumigenys subg. *Trichoscapa* Emery, 1869. Accad. Degli Aspiranti Napoli, Ann. 2:24.
Type-species: *Strumigenys* (*Trichoscapa*) *membranifera* Emery. Monotypic.

The single species in this genus has been spread throughout the tropical regions of the world by commerce.

Revision: Brown, 1948. Amer. Ent. Soc., Trans. 74:112-114.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:144-145, 148. —Smith, 1931. Ent. Soc. Amer., Ann. 24:691, 693-695.

Biology: Brown and Wilson, 1960 (1959). Quart. Rev. Biol. 34:283.

membranifera (Emery). Ga., Fla., Ala., Miss., La., Calif. (nr. Stockton); Pantropical. Ecology: Nests are in soil, wood, and plant cavities, and the ants are predaceous on a variety of small soft-bodied arthropods. Introduced, probably of African origin.
Strumigenys (*Trichoscapa*) *membranifera* Emery, 1869. Accad. Degli Aspiranti Napoli, Ann. 2:24. ☿.
Strumigenys membranifera simillima Emery, 1890. Soc. Ent. Ital., Bol. 22:69. ☿.
Strumigenys membranifera var. *santschii* Forel, 1904. Rev. Suisse de Zool. 12:6. ☿.
Strumigenys (*Cephaloxys*) *vitiensis* Mann, 1921. Harvard Univ., Mus. Comp. Zool., Bul. 64:461-462. ☿.
Strumigenys (*Cephaloxys*) *silvestriana* Wheeler, 1928. Bol. Lab. Zool. Sci. Agr. Portici 22:27-28. ☿.
Strumigenys (*Cephaloxys*) *foochowensis* Wheeler, 1928. Bol. Lab. Zool. Sci. Agr. Portici 22:28-29. ☿.
Strumigenys (*Cephaloxys*) *membranifera* var. *marioni* Wheeler, 1933. Hawaii. Ent. Soc., Proc. 8:276. ☿.

Strumigenys (*Cephaloxys*) *membranifera* var. *williamsi* Wheeler, 1933. Hawaii. Ent. Soc., Proc. 8:275-277. ☿, ♀.

Taxonomy: Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:829, 856. —Brown, 1948. Amer. Ent. Soc., Trans. 74:114. —Brown, 1949. Mushi 20:7, 22. —Wheeler and Wheeler, 1954. Psyche 61:145 (larva). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:35 (Polynesia).

Biology: Weber, 1952. Amer. Mus. Novitates 1554:7. —Wilson, 1953. Ent. Soc. Amer., Ann. 46:483-485. —Brown, 1954. Harvard Univ., Mus. Comp. Zool., Bul. 112:6.

Genus QUADRISTRUMA Brown

Quadristruma Brown, 1949. Amer. Ent. Soc., Trans. 75:47.
Type-species: *Epitritus emmae* Emery. Orig. desig.

The single species in the United States is an introduction.

emmae (Emery). Fla. (homestead); Pantropical. Ecology: Most commonly found under objects on sea beaches or in debris from forests or agricultural areas near the sea. Introduced; spread to many tropical regions of the world by commerce, possibly originating from Africa.
Eiptritus emmae Emery, 1890. Soc. Ent. Ital., Bol. 22:70. ☿.
Epitritus clypeatus Szabo, 1909. Arch. Zool. (Budapest) 1(7):1. ☿.
Epitritus clypeatus var. *malesiana* Forel, 1913. Zool. Jahrb., Abt. f. System. 36:83-84. ☿, ♀.
Epitritus wheeleri Donisthorpe, 1916. Ent. Rec. 28:121. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24:149. —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:829, 858. —Brown, 1949. Amer. Ent. Soc., Trans. 75:48-50 (worker, female). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14:42 (Polynesia).

Biology: Weber, 1934. Rev. de Ent. 4:51. —Brown, 1949. Mushi 20:21. —Brown, 1954. Harvard Univ., Mus. Comp. Zool., Bul. 112:6. —Brown and Wilson, 1960 (1959). Quart. Rev. Biol. 34:281. —Kempf, 1961. Studia Ent. 4:516.

Tribe BASICEROTINI

Revision: Brown and Kempf, 1960. Studia Ent. 3:161-250 (world). —Taylor, 1968. Austral. Jour. Zool. 16:333-348 (Indo-Australian).

Taxonomy: Wheeler and Wheeler, 1954. Psyche 61:111-145 (larvae).

Genus EURHOPALOTHRIX Brown and Kempf

Eurhopalothrix Brown and Kempf, 1960. Studia Ent. (n. s.) 3:202-203.
Type-species: *Rhopalothrix Bolaui* Mayr. Desig. by Brown and Kempf, 1961.

Taxonomy: Brown and Kempf, 1961 (1960). Psyche 67:44. —Wheeler and Wheeler, 1973. Pan-Pacific Ent. 49:207 (larvae).

floridana Brown and Kempf. Fla. (Highlands Hammock, Highlands Co.). Ecology: Collected in leaf litter.
Eurhopalothrix floridana Brown and Kempf, 1960. Studia Ent. (n. s.) 3:207-208. ☿.

Tribe ATTINI

Taxonomy: Wheeler, 1948. Amer. Midland Nat. 40:664-689 (larvae). —Weber, 1970. Ent. Soc. Wash., Proc. 72:414-415 (northern extent of tribe). —Wheeler and Wheeler, 1974. Ent. Soc. Wash., Proc. 76:76-81 (larvae).

Biology: Weber, 1962. Amer. Mus. Nat. Hist., Bul. 71:45-49 (insect gardeners). —Weber, 1966. Science 153:587-604 (general). —Moser, 1967. Amer. Mus. Nat. Hist., Nat. Hist. 76:32-35 (trail of the leafcutters). —Weber, 1972. Amer. Scientist 60:448-456 (general). —Weber, 1972. Amer. Phil. Soc., Mem. 92, 146 pp. (gardening ants, the attines).

Morphology: Blum, Moser, and Cordero, 1964. Psyche 71:1-7 (source and specificity of odor trail substances). —Moser, 1964. Science 143:1048-1049 (inquiline roach responds to trail making substance). —Markl, 1970. Z. Vergl. Physiol. 69:2-37 (communication by stridulatory signals). —Crewe and Blum, 1972. Jour. Ins. Physiol. 18:31-42 (alarm pheromones, their phylogenetic significance).

Genus CYPHOMYRMEX Mayr

Cyphomyrmex Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12:690.
Type-species: *Cyphomyrmex minutus* Mayr. Monotypic.
Cyphomyrmex subg. *Cyphomannia* Weber, 1938. Rev. de Ent. 9:183.
Type-species: *Cyphomyrmex* (*Cyphomannia*) *laevigatus* Weber. Orig. desig.

A rather large Neotropical genus with extensions into the southern United States. These ants form small colonies, usually in the soil, and live on fungi which they cultivate from a substratum of vegetable matter of feces of certain insects.

Revision: Mayr, 1887. Zool.-Bot. Gesell. Wien, Verh. 37:555-562. —Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:670, 719-728, 765-773. —Weber, 1940. Rev. de Ent. 11:406-427. —Kempf, 1964. Studia Ent. 7:1-44 (*strigatus* group). —Kempf, 1965. Studia Ent. 8:161-200 (*rimosus* group).

Taxonomy: Wheeler, 1948. Amer. Midland Nat. 40:668-670 (larvae). —Weber, 1966. Ent. News 77:166-168.

Biology: Weber, 1955. Science 121:109. —Weber, 1957. Ecology 38: 480-494 (cultivation of fungus).

rimosus (Spinola). Fla., Ala., Miss., La., Tex., Ariz., Calif.; W. Indies and Mexico s. to Argentina. Ecology: Nests are in soil, under bark of rotten wood, or in humus around roots; cultures a fungus in form of a yeast. A puzzling and variable complex for which many subspecies have been proposed; see Kempf (1965) for names to be considered.
Cryptocerus ? rimosus Spinola, 1853. Accad. Sci. Torino, Mem. (2) 13: 65. ☿, ♂.
Meranoplus difformis Smith, 1858. Cat. Hym. Brit. Mus. v. 6, p. 195. ☿.
Cyphomyrmex minutus Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12:691. ☿.
Cyphomyrmex steinheili Forel, 1884. Soc. Vaud. des Sci. Nat., Bul. 20:368. ☿.
Cyphomyrmex rimosus var. *comalensis* Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:719. ☿, ♀, ♂.

Taxonomy: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:719-712. —Weber, 1940. Rev. de Ent. 11:411. —Weber, 1941. Rev. de Ent. 12:116-119. —Wheeler, 1948. Amer. Midland Nat. 40:668 (larva). —Weber, 1958. Ent. Soc. Wash., Proc. 60:259-260. —Wheeler and Wheeler, 1960. Ent. Soc. Wash., Proc. 62:28 (larva). —Kempf, 1965. studia Ent. 8:162, 198.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:106. —Weber, 1945. Rev. de Ent. 16:5-14. —Weber, 1947. Bol. de Ent. Venezolana 6:144. —Weber, 1955. Wash. Acad. Sci., Jour. 45:275-281. —Weber, 1972. Amer. Phil. Soc., Mem. 92, pp. 8, 26, 31-32, 34, 39-42, 51, 60, 71-72, 94-95, 98-99, 102, 105-108, 110, 117.

wheeleri Forel. Tex., Calif.; Mexico. Ecology: Nests in the soil beneath stones in very arid habitats.
Cyphomyrmex wheeleri Forel, 1900. Schweiz. Ent. Gesell. Mitt. 10:282. ☿, ♀.

Taxonomy: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:725-726 (each caste). —Weber, 1940. Rev. de Ent. 11:409. —Kempf, 1965. Studia Ent. 8:167-172.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40:74. —Weber, 1972. Amer. Phil. Soc., Mem. 92, pp. 26, 93. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 97-98.

Genus MYCETOSORITIS Wheeler

Atta subg. *Mycetosoritis* Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:714.
Type-species: *Atta* (*Mycetosoritis*) *hartmanni* Wheeler. Monotypic

A small genus found only in the United States and Brazil.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:317-318. —Kempf, 1964. Studia Ent. 7:1.

hartmanni (Wheeler). La., Tex. Ecology: Forms small colonies in soil; food consists of a fungus grown upon a substratum composed of flower anthers.

Atta (*Mycetosoritis*) *hartmanni* Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:714. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1974. Ent. Soc. Wash., Proc. 76:77-79 (larva).

Biology: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:761-765. —Wheeler, 1910. Ants, pp. 334-335.

Genus TRACHYMYRMEX Forel

Atta subg. *Trachymyrmex* Forel, 1893. Soc. Ent. de Belg., Ann. 37:600.
Type-species: *Atta septentrionalis* McCook. Desig. by Wheeler, 1911.

A Nearctic and Neotropical genus found from New York south to Argentina, and the largest genus of attine ants. In the United States, most forms are recorded from the more humid areas, though a few occur in arid sections. Nests are in the soil. The fungi on which the ants feed is grown on a substratum of plant particles and insect excrement.

Revision: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:706-714, 746-760. —Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:245-255.

Taxonomy: Weber, 1945. Rev. de Ent. 16:44. —Wheeler, 1948. Amer. Midland Nat. 40:673-674 (larvae).

Biology: Weber, 1955. Science 121:109. —Weber, 1960. Ent. News 71:1-6 (comparison of worker and female behavior).

arizonensis (Wheeler). Ariz. (Huachuca Mtns.). Ecology: Found in arid, stony canyons, 5000 to 6000 ft.

Atta (*Trachymyrmex*) *arizonensis* Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:710. ♀, ♂.

Taxonomy: Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:250 (worker).

Biology: Wheeler, 1911. Psyche 18:93-98. —Essig, 1926. Ins. of West. No. Amer., p. 862. —Weber, 1972. Amer. Phil. Soc., Mem. 92, p. 93.

desertorum (Wheeler). Ariz. (nr. Tucson). Ecology: Nests were found in hard, pebbly, desert soil.

Atta (*Trachymyrmex*) *desertorum* Wheeler, 1911. Psyche 18:98-100. ☿.

Taxonomy: Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:249.

Biology: Wheeler, 1911. Psyche 18:100-101. —Essig, 1926. Ins. of West. No. Amer., p. 862.

jamaicensis (Andre). Fla. (Dania); W. Indies. Possibly introduced.

Atta (*Acromyrmex*) *jamaicensis* Andre, 1893. Rev. Ent. Caen 12:149. ☿.
Trachymyrmex sharpi Forel, 1893. Ent. Soc. London, Trans., p. 372. ☿.
Atta (*Trachymyrmex*) *maritima* Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:107. ☿.

Taxonomy: Smith, 1936. Puerto Rico Univ., Jour. Agr. 20:860. —Weber, 1967. Ent. News 78:107-109.

Biology: Weber, 1972. Amer. Phil. Soc., Mem. 92, pp. 102, 104 (fungi).

nogalensis Byars. Ariz. (Nogales).

Trachymyrmex nogalensis Byars, 1951. Ent. Soc. Wash., Proc. 53:109-111. ☿, ♀.

septentrionalis (McCook). N. Y. (L. I., Staten Is.) s. to Fla., w. to Ill., La., Tex. Ecology: Nests are in soil, usually with a small semicircular crater. Of some economic importance because of the habit of cutting leaves from domesticated plants. The New York records are the northernmost for an attine ant.

Oecodoma virginiana Buckley, 1867. Ent. Soc. Phila., Proc. 6:346. ☿. Placement of this species is questionable.
Atta septentrionalis McCook, 1880. Acad. Nat. Sci. Phila., Proc. 32:359. ☿.
Atta (*Trachymyrmex*) *septentrionalis* var. *obscurior* Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:706. ☿, ♀, ♂.

Atta (*Trachymyrmex*) *septentrionalis* var. *vertebrata* Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:246, 250. ☿, ♀.

Atta (*Trachymyrmex*) *septentrionalis obscurior* var. *seminole* Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:247, 250. ☿, ♀, ♂.

Atta (*Trachymyrmex*) *septentrionalis obscurior* var. *crystallina* Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:247, 250. ☿, ♀.

Atta (*Trachymyrmex*) *septentrionalis obscurior* var. *irrorata* Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:247, 250. ☿.

Taxonomy: Forel, 1884. Soc. Vaud. des Sci. Nat., Bul. 20:91. —Smith, 1924. Ent. News 35:52. —Cole, 1940. Amer. Midland Nat. 24:59. —Wheeler, 1948. Amer. Midland Nat. 40:673 (larva). —Weber, 1958. Ent. News 69:52-53.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21:374, 386-387. —Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:680-681, 746-753. —Wheeler, 1911. Psyche 18:95-97. —Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:250-255. —Dennis, 1938. Ent. Soc. Amer., Ann. 31:273, 292, 305. —Cole, 1939. Lloydia 2:153-160. —Cole, 1951 (1950). Ent. Soc. Amer., Ann. 43:499-500. —Weber, 1956. Ecology 37:150-161. —Weber, 1966. Ent. News 77:241. —Moser, 1964. Science 143:1048-1049 (inquiline roach responds to trail-making substance). —Weber, 1972. Amer. Phil. Soc., Mem. 92, pp. 3, 13-15, 25-28, 32-33, 35-36, 40-44, 46, 51, 54-55, 62, 70, 99, 103-104, 106-107, 112, 117.

smithi neomexicanus Cole. N. Mex., Ariz. Ecology: Nests found in sand. *T. smithi smithi* Buren occurs in Mexico.

Trachymyrmex smithi neomexicanus Cole, 1952. Tenn. Acad. Sci., Jour. 27:159-162. ☿.

Taxonomy: Cole, 1953. Tenn. Acad. Sci., Jour. 28:300-301 (female, male).

turrifex caroli (Wheeler). Tex. (Huntsville).

Atta (*Trachymyrmex*) *turrifex caroli* Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:248. ☿.

turrifex turrifex (Wheeler). La., Tex.; Mexico. Ecology: Nests in soil.

Atta (*Trachymyrmex*) *turrifex* Wheeler, 1903. Psyche 10:100. ☿, ♀.

Taxonomy: Wheeler, 1907. Amer. Mus. Nat., Hist., Bul. 23:709-710. —Wheeler, 1911. N. Y. Ent. Soc., Jour. 19:249.

Biology: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:753-759. —Wheeler, 1911. Psyche 18:95-97.

Genus ACROMYRMEX Mayr

Atta subg. *Acromyrmex* Mayr, 1865. Reise d. Novara, Zool. v. 1, Hym., p. 83.
Type-species: *Formica hystrix* Latreille. Monotypic.

Atta subg. *Moellerius* Forel, 1893. Soc. Ent. de Belg., Ann. 37:589.
Type-species: *Atta* (*Acromyrmex*) *landolti* Forel. Desig. by Wheeler, 1911.

Pseudoatta Gallardo, 1916. Buenos Aires Mus. Nac. de Hist. Nat., An. 28:320. Syn. uncertain.
Type-species: *Pseudoatta argentina* Gallardo. Monotypic.

A Neotropical genus with a slight extension into southwestern United States. These are mostly grassland and semidesert fungus-growing ants which usually collect grass. They are comparable to *Atta* in biology and economic importance but colonies are apparently not so large and the leaf-cutting habits not so extensive. The species listed below have previously been placed in the subgenus *Moellerius*.

Revision: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:669-700, 703-706, 743-746. —Santschi, 1925. Rev. Suisse de Zool. 31:386-398.

Taxonomy: Weber, 1945. Rev. de Ent. 16:61-62. —Wheeler, 1948. Amer. Midland Nat. 40:674-676 (larvae). —Brown, 1973. *In* Meggers, *et al.*, Tropical Forest Ecosystems in Afr. and S. Amer., pp. 178-185 (generic syn.).

Biology: Weber, 1967. Ent. Soc. Amer., Ann. 78:107-109 (growth of young colonies in first year).

versicolor chisosensis (Wheeler). Tex. (Mtns. of Big Bend area).
Atta (*Moellerius*) *versicolor chisosensis* Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:705. ☿.

versicolor versicolor (Pergande). Ariz., Calif.; Mexico. Ecology: Nests are in soil in deserts; collects pieces of leaves from bushes and herbs for a media on which to grow fungus.
Atta versicolor Pergande, 1893. Calif. Acad. Sci., Proc. 4:31. ☿.

Taxonomy: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:703-705 (each caste).

Biology: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:743-746. —Wheeler, 1911. Psyche 18:101. —Wheeler, 1917. Psyche 24:179-180. —Weber, 1972. Amer. Phil. Soc., Mem. 92, pp. 22, 26, 30, 32.

Genus ATTA Fabricius

Atta Fabricius, 1804. Systema Piezatorum, p. 421.
Type-species: *Formica cephalotes* Linnaeus. Desig. by Wheeler, 1911.
Oecodoma Latreille, 1818. Nouv. Dict. Hist. Nat. 23:223.
Type-species: *Formica cephalotes* Linnaeus. Desig. by Shuckard, 1840.
Archeatta Goncalves, 1942. Soc. Brasil. de Agron., Bol. 5:342.
Type-species: *Oecodoma mexicana* Smith. Orig. desig.
Atta subg. *Neoatta* Goncalves, 1942. Soc. Brasil. de Agron., Bol. 5:334.
Type-species: *Formica sexdens* Linnaeus. Orig. desig.
Atta subg. *Palaeatta* Borgmeier, 1950. Inst. Oswaldo Cruz, Mem. 48:244, 270.
Type-species: *Atta bisphaerica* Forel. Orig. desig.
Atta subg. *Epiatta* Borgmeier, 1950. Inst. Oswaldo Cruz, Mem. 48:246, 272.
Type-species: *Atta laevigata* Smith. Orig. desig.

A Neotropical genus with an extension into southern United States. The nests, which are deep in the soil and usually have many lateral and vertical entrances, are often extremely large and contain numerous individuals. Workers defoliate both wild and domesticated plants, including trees, and they feed on a fungus grown from a substratum composed of macerated leaves and other vegetable matter.

Revision: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:669-703, 729-742. —Goncalves, 1942. Soc. Brasil. de Agron., Bol. 5:333-358. —Borgmeier, 1959. Studia Ent. 2:321-390.

Taxonomy: Wheeler, 1948. Amer. Midland Nat. 40:676-683 (larvae). —Borgmeier, 1950. Inst. Oswaldo Cruz, Mem. 48:239-263. —Weber, 1958. Ent. News 69:7-13. —Smith, 1963. Ent. Soc. Wash., Proc. 65:299-302 (key to spp. of U. S. and Mexico; biol. notes). —Weber, 1968. Ent. Soc. Wash., Proc. 70:348-350 (Panama species).

Biology: Weber, 1962. Amer. Mus. Nat. Hist., Nat. Hist. 61:45-51.

Morphology: Blum, *et al.*, 1968. Comp. Biochem. Physiol. 26: 291-299 (alkanones and terpenes in the mandibular glands of *Atta* species).

mexicana (Smith). Ariz. (Organ Pipe Cactus Natl. Mon.); Mexico s. to Honduras. Ecology: Nests are in a variety of ecological situations and their fungus gardens are grown on a wide variety of vegetable substances.
Oecodoma mexicana Smith, 1858. Cat. Hym. Brit. Mus. 6:185. ♀, ♂.

Taxonomy: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:702-703. —Goncalves, 1942. Soc. Brasil. de Agron., Bol. 5:335, 337, 343. —Byars, 1949. Jour. Econ. Ent. 42:545 (Ariz. record; soldier). —Borgmeier, 1950. Inst. Oswaldo Cruz, Mem. 48:260-261. —Borgmeier, 1959. Studia Ent. 2:351-353 (each caste). —Smith, 1963. Ent. Soc. Wash., Proc. 65:299-302.

texana (Buckley). La., Tex.; e. Mexico. Ecology: Nests are in well-drained sand or loamy soils. The interior of the nest may reach a depth of 15 to 20 ft. and contains innumerable interconnected chambers. It is connected to the exterior by numerous holes which are surrounded by crater-shaped piles of dirt. In a large nest there may be 1,000 entrance holes occupying an area of 4,500 square feet. The ants grow a fungus primarily on macerated leaves. An economically important pest; invades houses; cuts leaves from domesticated plants; steals seeds; builds unsightly nests; damages roads, walks, stock, or

equipment by cave-ins of the nest; and can inflict painful bites. Texas leafcutting ant; also known locally as the town ant, night ant, cut ant, parasol ant, pack ant, or fungus ant.

Myrmica (*Atta*) *texana* Buckley, 1860. Acad. Nat. Sci. Phila., Proc. 12:233. ☿, ♀, ♂.

Taxonomy: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:700-703. —Goncalves, 1942. Soc. Brasil. de Agron., Bol. 5:335, 337, 343. —Byars, 1949. Jour. Econ. Ent. 42:545. —Borgmeier, 1950. Inst. Oswaldo Cruz, Mem. 48:260-261. —Borgmeier, 1959. Studia Ent. 2:356-358. —Smith, 1963. Ent. Soc. Wash., Proc. 65:299-301. —Wheeler and Wheeler, 1974. Ent. Soc. Wash., Proc. 76:79-81 (larva).

Biology: Wheeler, 1907. Amer. Mus. Nat. Hist., Bul. 23:729-742. —Hunter, 1912. U. S. Dept. Agr., Bur. Ent. Cir. 148:1-4. —Jones, 1917. Jour. Econ. Ent. 10:561. —Snyder, 1937. La. Conserv. Rev., pp. 14-17. —Walter, Seaton, and Mathewson, 1938. U. S. Dept. Agr. Cir. 494:1-18. —Metcalf and Flint, 1939. Destructive and Useful Insects, p. 771. —Smith, 1939. South. Forest Expt. Sta., Occas. Papers 84:2-6. —Johnston, 1944. Jour. Forestry 42:130-132. —Bennett, 1958. U. S. Dept. Agr., Forest Pest Leaflet 23:1-4 (rev. 1967). —Warter, Moser, and Blum, 1962. La. Acad. Sci., Proc. 25:42-46 (correlation between night hawk feeding and nuptial flights). —Moser, 1962. Forests and People 12:40-41 (nesting habits). —Moser, 1963. Ent. Soc. Amer., Ann. 56:286-291 (contents and structure of nest in summer). —Moser, 1964. Science 143:1048-1049 (inquiline roach responds to trail-making substance). —Moser, 1967. Insectes Sociaux 14:295-312 (mating activities). —Moser, 1967. Amer. Mus. Nat. Hist., Nat. Hist. 76:33-35. —Weber, 1972. Amer. Phil. Soc., Mem. 92, pp. 3, 24, 30-33, 35, 37-38, 65, 81, 84.

Morphology: Moser and Blum, 1963. Science 140:1228 (trail marking substance, source and potency). —Moser, Brownlee, and Silverstein, 1968. Jour. Ins. Physiol. 14:529-535 (alarm pheromones). —Hermann, Moser, and Hunt, 1970. Ent. Soc. Amer., Ann. 63:1152-1158 (poison apparatus, morphological and behavioral changes). —Moser and Silverstein, 1967. Nature 215:206-207 (volatility of trail marking substance). —Tumlinson, *et al.*, 1971. Nature 234: 348-349 (identification of trail pheromone). —Tumlinson, *et al.*, 1972. Jour. Insect. Physiol. 18: 809-814 (a volatile trail pheromone). —Riley, *et al.*, 1974. Science 183: 760-762 (biological responses to its alarm pheromone).

Unplaced Taxa of Myrmicinae

Pheidole buckleyi Smith, 1951. *In* Muesebeck, *et al*, U. S. Dept. Agr., Agr. Monog. 2:806. N. name for *Atta pennsylvanica* Buckley.

Crematogaster (*Acrocoelia*) *sanguinea coachellai* Enzmann, 1946. N. Y. Ent. Soc., Jour. 54:95. ♀. In same paper, fig. 3 of the petiole is given as that of *Crematogaster* (*Acrocoelia*) *lineolata* var. *coachellai*.

Myrmica corrugata Say, 1836. Boston Jour. Nat. Hist. 1:291. ♀, ♂.

Myrmica dimidiata Say, 1836. Boston Jour. Nat. Hist. 1:293. ♀ (?). N. Amer.

Myrmica (*Monomarium* (*!*)) *diversa* Buckley, 1867. Ent. Soc. Phila., Proc. 6:337. ☿, ♀. Tex.

Myrmica inflecta Say, 1836. Boston Jour. Nat. Hist. 1:292. ♂.

Myrmica (*Monomarium* (*!*)) *lineolata* Buckley, 1867. Ent. Soc. Phila., Proc. 6:340. ☿, ♀. Preocc. by Say, 1836. No locality.

Solenopsis madara Roger, 1863. Berlin. Ent. Ztschr. 7:200. ☿, ♀.

Myrmica (*Monomarium* (*!*)) *montana* Buckley, 1867. Ent. Soc. Phila., Proc. 6:339. ☿. Tex.

Myrmica novaeboracensis Buckley, 1867. Ent. Soc. Phila., Proc. 6:337. ♀. N. Y.

Myrmica opposita Say, 1836. Boston Jour. Nat. Hist. 1:292. ☿, ♂. N. Amer.

Atta pennsylvanica Buckley, 1867. Ent. Soc. Phila., Proc. 6:345. ☿, ♂. Pa. Previously placed in *Pheidole* where it would be preocc. by Roger, 1863; see *Pheidole buckleyi* Smith.

Atta picea Buckley, 1867. Ent. Soc. Phila., Proc. 6:344. ☿, ♂. Tex.

Oecodoma pilosa Buckley, 1867. Ent. Soc. Phila., Proc. 6:348. ☿. Tex.

Myrmica (*Diplorhoptrum*) *scabrata* Buckley, 1867. Ent. Soc. Phila., Proc. 6:343. ☿. Conn.

Myrmica (*Atta*) *sublanuginosa* Buckley, 1867. Ent. Soc. Phila., Proc. 6:343. ☿. Tex.

Oecodoma tardigrada Buckley, 1867. Ent. Soc. Phila., Proc. 6:349. ☿, ♀, ♂. Tex.

Pheidole pubiventris race *timmi* Forel, 1901. Mitt. Naturh. Mus. Hamburg 18:62. ☿, ♂. "Probably of Mexican origin - Dr. R. Timm."

Subfamily DOLICHODERINAE

A small subfamily with most Nearctic representatives found in the southern portion of the United States. Most species are small, drab-colored insects and are recognized by the single segmented pedicel, lack of a constriction between the first and second gastric segments, and the slitlike cloacal orifice.

Taxonomy: Starcke, 1933. Tijdschr. v. Ent. 76: XXVI-XXXII (larvae). —Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 169-210 (larvae). —Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 726-732 (larvae). —Wheeler and Wheeler, 1974 (1973). Pan-Pacific Ent. 49: 396-401 (larvae).

Morphology: Eisner, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 453-464 (proventriculus; use as a generic character).

Tribe DOLICHODERINI

Genus DOLICHODERUS Lund

Brown (1973) listed *Monacis* Roger, 1862, *Diabolus* Karavaiev, 1926, *Diceratoclinea* Wheeler, 1935, and *Karawajewella* Donisthorpe, 1944 as synonyms of *Dolichoderus* and *Hypoclinea* Mayr, 1855, and *Acanthoclinea* Wheeler, 1935 as provisional synonyms. Because of the doubt as to the exact status of some of the genera, subgeneric groupings are used as in some previous North American literature until the genus has been adequately studied.

Taxonomy: Brown, 1973. *In* Meggers, *et al.*, Tropical Forest Ecosystems in Afr. and S. Amer., pp. 178-185 (generic syn.).

Genus DOLICHODERUS Subgenus DOLICHODERUS Lund

Dolichoderus Lund, 1831. Ann. des Sci. Nat., Zool. 23: 130.
Type-species: *Formica attelaboides* Fabricius. Monotypic.

Not known to occur in the Nearctic Region.

Genus DOLICHODERUS Subgenus HYPOCLINEA Mayr

Hypoclinea Mayr, 1855. Zool.-Bot. Gesell. Wien, Verh. 5: 377.
Type-species: *Formica quadripunctata* Linnaeus. Desig. by Wheeler, 1911.

In North America, this subgenus is found only in the eastern half of the continent. Colonies are small to moderately large and nests are constructed in the soil, in curled leaves and hollow stems of plants, and in cartons attached to plants. Workers attend honeydew-excreting insects and feed on small arthropods. Some forms emit a fluid which has a peculiar smoky or pungent odor.

Revision: Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 953-960. —Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36: 434-437. —Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 305-319.

Taxonomy: Brown, 1950. Wasmann Jour. Biol. 8: 249. —Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 172 (larvae). —Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 726-730 (larvae).

Biology: Kannowski, 1959. Insectes Sociaux 6: 129-134 (flight comparisons of some spp.). —Torossian, 1960. Insectes Sociaux 7: 383-393 (biology of *D. quadripunctatus* (L.)).

Morphology: Torossian, 1959. Insectes Sociaux 6: 369-374 (tropholactic and proctodeal exchange in *D. quadripunctatus* (L.)).

mariae Forel. Mass. to Ga., w. to Minn., Ill., Okla., La. Ecology: Nests of the rather large colonies are found in the soil, preferably sand, beneath tufts of grass or small bushes.
Dolichoderus Mariae Forel, 1884. Soc. Vaud. des Sci. Nat., Bul. 20: 349. ☿.
Dolichoderus mariae davisi Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 306, 308. ☿.
Dolichoderus (*Hypoclinea*) *mariae* var. *blatchleyi* Wheeler, 1917. Ind. Acad. Sci., Proc. 26: 462. ☿.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 306. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 589 (worker, female). —Cole, 1940. Amer. Midland Nat. 24: 60. —Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 726 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 316-319, 387-388. —Smith, 1924. Ent. News 35: 81. —Talbot, 1956. Psyche 63: 134-139 (flight activities). —Kannowski, 1959. Insectes Sociaux 6: 129-133.

plagiatus (Mayr). N. B., Ont. s. to Ga., Tenn., w. to N. Dak., Ill. Ecology: Colonies are small and nests are found in inconspicuous places such as under forest debris in the soil, in hollow stems, and in curled-up leaves.

Hypoclinea plagiata Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 957, 960. ☿.

Dolichoderus borealis Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 408. ☿.

Dolichoderus plagiatus var. *inornatus* Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 306, 313. ☿.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 310 (each caste). —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 590. —Cole, 1940. Amer. Midland Nat. 24: 60. —Gregg, 1944. Ent. Soc. Amer., Ann. 37: 467. —Wheeler, and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 727 (larva). —Francoeur and Beique, 1966. Canad. Ent. 98: 142 (Provancher types).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 306, 315-316, 388. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 621-622. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 90, 99. —Kannowski, 1959. Insectes Sociaux 6: 133. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 149-151. —Kannowski, 1967. Ent. Soc. Amer., Ann. 60: 1246-1252 (population studies).

pustulatus Mayr. N. S. s. to Fla., w. to Ill., Okla., Tex. Ecology: Colonies are small and nests are found under piles of detritus or in a hard, thin carton shell above ground about blades of a tuft of grass.

Dolichoderus pustulatus Mayr, 1886. Zool.-Bot. Gesell. Wien., Verh. 36: 435-436. ☿, ♀.

Dolichoderus plagiatus var. *beutenmuelleri* Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 304. ☿.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 306, 313, 388. —Smith, 1924. Ent. News 35: 82. —Smith, 1931. Ent. News 42: 22. —Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 727-728 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 315-316, 388. —Wheeler, 1917. Ind. Acad. Sci., Proc. 26: 462. —Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 12. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 89, 99. —Kannowski, 1959. Insectes Sociaux 6: 133-134, 155. —Kannowski, 1967. Ent. Soc. Amer., Ann. 60: 1246-1252 (population studies).

taschenbergi (Mayr). N. S., Ont. s. to S. C., w. to Man., N. Dak., S. Dak., La. Ecology: Nests of rather large colonies are constructed in the soil in wooded areas or the edge of woods and usually have a low mound of thatch (grass, twigs, needles) over the entrance hole. Workers commonly attend honeydew-excreting insects.

Hypoclinea Taschenbergi Mayr, 1866. Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 53: 498. ☿.

Dolichoderus taschenbergi var. *gagates* Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 306, 310. ☿. Preocc. by Emery, 1890.

Dolichoderus (*Hypoclinea*) *taschenbergi* var. *aterrimus* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 417. N. name for *gagates* Wheeler.

Dolichoderus tachenbergi var. *wheeleriella* Forel, 1916. Rev. Suisse de Zool. 24: 458. N. name for *gagates* Wheeler.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 306, 309-310. —Smith, 1924. Ent. News 35: 82. —Cole, 1940. Amer. Midland Nat. 24: 60. —Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 728 (larva).

Biology: Wheeler, 1915. Psyche 22: 306. —Smith, 1924. Ent. News 35: 81-82. —Logier, 1923. Canad. Ent. 55: 247. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 292-293. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 99. —Kannowski, 1959. Ent. Soc. Amer., Ann. 52:

755-760 (flight activities). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 151-154. —Bradley and Hinks, 1968. Canad. Ent. 100: 40-50 (attending aphids on jack pine). —Bradley, 1972. Canad. Ent. 104: 245-249 (transplanting colonies in jack pine stands in Man.). —Burns, 1973. Canad. Ent. 105: 97-104 (foraging and tending behavior).

Tribe TAPINOMINI

Genus LIOMETOPUM Mayr

Liometopum Mayr, 1861. Die Europaischen Formiciden, pp. 25, 38.
Type-species: *Formica microcephala* Panzer. Monotypic.

A Holarctic genus found only in the western United States in the Nearctic region. The Nearctic forms nest in the soil beneath cover or under bark or in crevices in trees and the nest chambers are usually subdivided by a network of paperlike material. Colonies are often populous. Workers forage in files sometimes several hundred feet long and commonly attend coccids and aphids. They are pugnacious and eject a repellent secretion with a strong and disagreeable odor like that of butyric acid.

Revision: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 321-333.

Taxonomy: Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 172, 181 (larvae).

apiculatum Mayr. W. Tex., Colo., N. Mex., Ariz.; Mexico. Ecology: Usually in foothill areas at elevations of 4000 to 7000 feet.
Liometopum apiculatum Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 961. ☿.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 331 (female). —Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 322-324 (each caste). —Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 181 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 322-324. —Wheeler, 1917. Psyche 24: 177-178. —Gregg, 1963. Univ. Colo. Studies, Biol. Ser. 11, pp. 1-6. —Gregg, 1963. Ants of Colo., pp. 438-441. —Van Pelt, 1971. Ent. Soc. Amer., Ann. 64: 1186 (trophobiosis and feeding habits).

occidentale luctuosum Wheeler. Wyo., Colo., w. Tex., w. to Ariz., Calif. Ecology: At higher elevations, 4000 to 8000 feet.
Liometopum apiculatum luctuosum Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 325. ☿.

Taxonomy: Forel, 1914. Deut. Ent. Ztschr. 6: 619 (male). —Cole, 1942. Amer. Midland Nat. 28: 371.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 332. —Mallis, 1941. South Calif. Acad. Sci., Bul. 40: 75. —Gregg, 1963. Ants of Colo., pp. 441-443. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 18 (Nevada Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 100-101.

occidentale occidentale Emery. Oreg., Calif.; Mexico. Ecology: Found at lower elevations, sea level to 4000 feet.
Liometopum microcephalum var. *occidentale* Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 330. ☿, ♀.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 324-325. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 8, 17.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 522. —Mallis, 1941. South Calif. Acad. Sci., Bul. 40: 75. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 100.

Genus IRIDOMYRMEX Mayr

Iridomyrmex Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12: 702.
Type-species: *Formica detecta* Smith. Desig. by Bingham, 1903.
Tapinoma subg. *Doleromyrma* Forel, 1907. Mus. Nat. Hungarici, Ann. 5: 28.
Type-species: *Tapinoma* (*Doleromyrma*) *darwinianum* Forel. Monotypic.
Anonychomyrma Donisthorpe, 1946. Ann. and Mag. Nat. Hist. 13: 588. Syn. uncertain.
Type-species: *Anonychomyrma myrmex* Donisthorpe. Monotypic.

Three of the four species of this cosmopolitan genus found in North America have been introduced. Most species nest in the soil and some are found in buildings. Workers collect honeydew but are also entomophagous.

Revision: Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 953-960. —Smith, 1929. Jour. Econ. Ent. 22: 241-243.

Taxonomy: Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 172, 184 (larvae). —Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 729 (larvae).

glaber (Mayr). Fla. (Winter Park); Australian and Oriental regions. Ecology: Florida specimens collected from a stump of queen palm, *Arecastrum romanzoffianum*. Probably introduced. These specimens are tentatively referred to *glaber* since the taxonomy of *glaber* and related species in the Old World are unstudied.

Hypoclinea glabra Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12: 705. ☿, ♂.

Taxonomy: Brown, 1958. Acta Hym. 1:40-41 (also biological notes; New Zealand; Australia). —Wheeler and Wheeler, 1974 (1973). Pan-Pacific Ent. 49: 398 (larva, from Australian specimens).

humilis (Mayr). Md. to Fla. w. to Ill., Tex., Ariz., Calif.; Mexico, S. Amer.; Europe; S. Africa; Hawaii; Australia. Ecology: Nests in soil, rotting wood or debris and lives in large colonies that contain many females. Workers forage in files and tend honeydew-excreting insects though they also feed on other sweet substances. A most persistent and troublesome house-infesting ant; also known to steal seeds from seedbeds, drive poultry from their nests, kill newly hatched chickens, foster honeydew-excreting insects, disrupt bee hives, and gnaw into ripened fruits. Introduced, native to S. Amer. and spread to the U. S. and other parts of the world by commerce; probably introduced first into New Orleans on coffee ships from Brazil sometime prior to 1891. Argentine ant.

Hypoclinea (*Iridomyrmex*) *humilis* Mayr, 1868. Soc. Nat. Modena, Ann. 3: 164. ☿.

Taxonomy: Wheeler, 1913. *In* Newell and Barber, U. S. Dept. Agr. Bur. Ent. Bul. 122: 27-30 (each caste). —Smith, 1929. Jour. Econ. Ent. 22: 241. —Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 186 (larva). —Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 729 (larva). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 79-80 (Polynesia).

Biology: Newell, 1909. Jour. Econ. Ent. 2: 174-192 (life history). —Newell and Barber, 1913. U. S. Dept. Agr. Bur. Ent., Bul. 122: 1-98. —Gallardo, 1915. Buenos Aires Mus. Nac. de Hist. Nat., An. 27: 23-25. —Barber, 1920. U. S. Dept. Agr. Farmers' Bul. 1101: 1-11. —Woglum and Borden, 1921. U. S. Dept. Agr. Bul. 965: 1-43. —Harned and Smith, 1922. Jour. Econ. Ent. 15: 261-264. —Essig, 1926. Ins. of West. N. Amer., pp. 865-866. —Smith, 1936. U. S. Dept. Agr. Cir. 387: 1-39. —Mallis, 1942. Sci. Monthly 55: 536-545 (half a century with the Argentine ant). —Flanders, 1943. Calif. Citrograph 28: 117, 128, 137 (Argentine ant versus parasites of black scale). —McCluskey, 1958. Science 128: 536-537 (daily rhythm in male Argentine ant). —Skaife, 1962. The Study of Ants, p. 12. —Pavan, 1963. Pavia Univ., Sympos. Genet. et Biol. Ital. 12: 122-131. —Haskins and Haskins, 1965. Ecology 46: 737 (extension of range in Bermuda at expense of *Pheidole megacephala* (F.)). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 52-54 (economic importance). —Markin, 1968. Kans. Ent. Soc., Jour. 41: 511-516 (study in citrus groves in Calif.). —Markin and McCoy, 1968. Ent. Soc. Amer., Ann. 61: 505-509 (a nematode in pharyngeal glands). —Markin, 1969. Insectes Sociaux 16: 159-190 (food distribution in laboratory colonies). —Dechene, 1970. Wasmann Jour. Biol. 28: 175-184 (behavioral patterns). —Fluker and Beardsley, 1970. Ent. Soc. Amer., Ann. 63: 1290-1296 (ecological notes, in Hawaii). —Markin, 1970. Jour. Econ. Ent. 63: 740-744 (foraging behavior in Calif. citrus groves). —Markin, 1970. Insectes Sociaux 17: 127-158. —Markin, 1970. Ent. Soc. Amer., Ann. 63: 1238-1242 (seasonal life cycle in S. Calif.). —Erickson, 1971. Psyche 78: 257-266 (displacement of native ant spp. by Argentine ant).

Morphology: Pavan, 1950 (1948). 8th Internat. Cong. Ent., Proc., Stockholm, pp. 863-865 (physiology). —Pavan, 1955. Soc. Ital. di Sci. Nat. Atti 94: 379-477. —Weber, 1961. Ent. Soc. Wash., Proc. 63: 218 (use of poison). —Torossian, 1961. Insectes Sociaux 8: 189-191. —Nachtwey, 1963. Insectes Sociaux 10: 50-53.

iniquus nigellus Emery. Mass., Ill., other scattered localities mostly in northeastern U. S.; Central Amer. Ecology: Found in greenhouses in U. S. Introduced. *I. iniquus iniquus* Mayr occurs in Central and S. Amer. and W. Indies.
Iridomyrmex iniquus var. *nigellus* Emery, 1890. Soc. Ent. Ital., Bol. 22: 56. ☿.

Biology: Wheeler, 1929. Psyche 36: 89-90. —Smith, 1929. Jour. Econ. Ent. 22: 241-242.

pruinosus analis (Andre). N. Dak., Kans., Okla., Tex. w. to s. Idaho, Calif.; Mexico, Guatemala. Ecology: Nests are in soil either under objects or in exposed situations surmounted by a craterlike mound.
Tapinoma anale Andre, 1893. Rev. Ent. de France 12: 148. ☿.
Iridomyrmex pruinosus var. *testaceus* Cole, 1936. Ent. News 47: 121. ☿, ♀.

Taxonomy: Smith, 1929. Jour. Econ. Ent. 22: 241. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 8. —Cole, 1942. Amer. Midland Nat. 28: 372-373 (also biological notes).

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 342. —Smith, 1924. Ent. News 35: 83. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 294, 305. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 154-155. —Gregg, 1963. Ants of Colo., pp. 436-438. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 18 (Nevada Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 101-102.

pruinosus pruinosus (Roger). N. Y. to Fla., w. to Wis., Ohio, Tex., N. Mex.; W. Indies. Ecology: Nests are in exposed soil with craterlike mounds or under the cover of objects. A house pest in the Gulf Coast states.
Tapinoma pruinosum Roger, 1863. Berlin Ent. Ztschr. 7: 165. ☿.

Taxonomy: Smith, 1929. Jour. Econ. Ent. 22: 241. —Cole, 1940. Amer. Midland Nat. 24: 64-65. —Cole, 1942. Amer. Midland Nat. 28: 372. —Santschi, 1930. Soc. Roy. Ent. d'Egypte, Bul. 23: 81. —Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 185. (larva). —Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 729 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 389. —Smith, 1930. Fla. Ent. 14: 5. —Wheeler, 1911. Harvard Univ., Mus. Comp. Zool., Bul. 54: 497. —Warter, Moser, and Blum, 1962. La. Acad. Sci., Proc. 25: 42-46 (correlation between night hawk feeding and nuptial flights of *pruinosus pruinosus*). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326: 54-55 (economic importance).

Morphology: Blum, Warter, Monroe, and Chidchester, 1963. Jour. Ins. Physiol. 9: 881-885 (chemical releasers of social behavior - methyl-n-amyl ketone).

Genus FORELIUS Emery

Forelius Emery, 1888. Ztschr. f. Wiss. Zool. 46: 389.
Type-species: *Iridomyrmex mccooki* Forel. Monotypic.

A small New World genus.

Taxonomy: Wheeler and Wheeler, 1966. Ent. Soc. Amer., Ann. 59: 729 (larvae).

foetidus (Buckley). Ark., Kans., Okla., Tex., Colo. w. to Calif.; Mexico. Ecology: Nests are under objects or in exposed soil with small craters of soil. Incorrectly reported from D. C.
Formica foetida Buckley, 1866. Ent. Soc. Phila., Proc. 6: 167. ☿, ♀.
Iridomyrmex McCooki Forel, 1878. Soc. Vaud. des Sci. Nat., Bul. 15: 382.
Forelius MacCooki race *Andrei* Forel, 1912. Soc. Ent. de Belg., Mem. 20: 44. ☿.

Taxonomy: Forel, 1886. Soc. Ent. de Belg., Bul. (C. R.) 30: 39. —Wheeler and Wheeler, 1974 (1973). Pan-Pacific Ent. 49: 401 (larva).

Biology: Cole, 1937. Ent. News 48: 137. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 48: 137. —Lindquist, 1942. Jour. Econ. Ent. 35: 850-852. —Gregg, 1963. Ants of Colo., pp. 434-436. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 102-103.

Genus CONOMYRMA Forel

Conomyrma Forel, 1913. Rev. Zool. Africaine 2: 350.
Type-species: *Prenolepis pyramica* Roger. Desig. by Santschi, 1922.

Conomyrma subg. *Biconomyrma* Kusnezov, 1952. Acta Zool. Lilloana (Tucuman) 10: 429-430.

Type-species: *Dorymyrex pyramicus* var. *brunnea* Forel. Desig. by Kusnezov, 1959.

A New World genus. The Nearctic forms construct nests in the soil which are surmounted by irregular or craterlike mounds of soil. They are usually found in open sunny areas in situations where other ant species find conditions intolerable. The workers are predaceous, active and agressive and emit a fluid with a disagreeable odor. The species below have previously been assigned to the genus *Dorymyrmex* Mayr, a genus now restricted to South America. The taxa of this genus occurring in the Gulf coast states are not yet clearly understood.

Taxonomy: Gallardo, 1916. Buenos Aires Mus. Nac. de Hist. Nat., An. 28: 1-130. —Santschi, 1922. Soc. Vaud. des Sci. Nat., Bul. 54: 365. —Kusnezov, 1952. Acta Zool. Lilloana (Tucuman) 10: 427, 429, 433-438. —Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 183. —Kusnezov, 1959. Zool. Anz. 162: 38-51. —Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 238: 1-6 (in the U. S.).

bicolor (Wheeler). Tex., N. Mex., Utah, Ariz., Nev., Calif.; Mexico. Ecology: Nests are in exposed situations in the soil and are usually surmounted by irregular or craterlike mounds.

Dorymyrmex pyramicus var. *bicolor* Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 342. ☿, ♀.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 372. —Cole, 1957. N. Y. Ent. Soc., Jour. 65: 130. —Wilson, 1957. Psyche 64: 76.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 76. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 19. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 18 (Nevada Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 103-104.

flavopecta (Smith). Fla. Occurrence in other Gulf Coast states is not certain.

Dorymyrmex pyramicus flavopectus Smith, 1944. Fla. Ent. 27: 15. ☿.

insana (Buckley). N. C. to Fla., w. to Ill., N. Dak., Oreg., Calif.; Mexico; W. Indies. Ecology: Nests are in soil in open sunny places and are surmounted by an irregular or craterlike mound. A pest species mainly in the South where it commonly enters houses and builds ugly mounds on lawns. Pyramid ant. Records in the literature for *Dorymyrmex pyramicus* (Roger) in N. Amer. should refer to this species; *Conomyrma pyramica* (Roger) is a valid species but is found only in S. Amer.

Formica insana Buckley, 1866. Ent. Soc. Phila., Proc. 6: 165. ☿, ♀.
Dorymyrmex flavus McCook, 1879. *In* Comstock, Rpt. on Cotton Insects, p. 186. ☿.
Dorymyrmex pyramicus var. *nigra* Pergande, 1895. Calif. Acad. Sci., Proc. 5: 871. ☿.
Dorymyrmex pyramica brunnea var. *antillana* Forel, 1911. Deut. Ent. Ztschr., p. 306.
Dorymyrmex pyramicus var. *smithi* Cole, 1936. Ent. News 47: 120. ☿.
Conomyrma (*?Biconomyrma*) *wheeleri* Kusnezov, 1952. Acta Zool. Lilloana (Tucuman) 10: 438. ☿.

Taxonomy: Emery, 1895. Zool. Jahrb., Abt. f. System 8: 331-332 (male). —Cole, 1940. Amer. Midland Nat. 24: 61. —Cole, 1942. Amer. Midland Nat. 28: 371. —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 861, 864. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 291. —Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 183 (larva). —Wilson, 1967. Psyche 64: 76 (sympatry of *bicolor* and *pyramica*). —Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 238: 5 (syn.).

Biology: Wheeler, 1910. Ants, pp. 146, 210, 205, 426. —Smith, 1924. Ent. News 35: 82. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 293, 305. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 19. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 155-157. —Gregg, 1963. Ants of Colo., pp. 432-434. —Wilson, 1967. Psyche 64: 76. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326: 56-57 (economic importance). —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 18 (Nevada Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 105-106.

Morphology: Metcalf and Metcalf, 1970. Ent. Soc. Amer., Ann. 63: 34-35 (effects of isomeres of 2-heptanone on alarm behavior). —Blum and Warter, 1966. Ent. Soc. Amer., Ann. 59: 774-779 (alarm and digging behavior; isolation of 2-heptanone).

Genus TAPINOMA Foerster

Tapinoma Foerster, 1850. Hym. Stud. 1: 43.
Type-species: *Tapinoma collina* Foerster. Monotypic.
Micromyrma Dufour, 1857. Soc. Ent. de France, Ann. 5: 60.
Type-species: *Micromyrma pygmaea* Dufour. Monotypic.
Tapinoma subg. *Tapinoptera* Santschi, 1925. Eos 1: 348.
Type-species: *Tapinoma vexatum* Santschi. Monotypic.

At least one of the three North American species is introduced. Nests are found in a variety of situations and workers commonly attend honeydew-excreting insects. All of the species emit a substance with an odor similar to that of butyric acid.

Taxonomy: Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 172 (larvae).

Morphology: Torossian, 1960. Insectes Sociaux 7: 171-174 (physiology of the Palearctic *Tapinoma erraticum* (Latreille)). —Weber, 1961. Ent. Soc. Wash., Proc. 63: 217-218 (use of poison).

litorale Wheeler. S. Fla.; W. Indies. Ecology: Apparently arboreal, nesting in twigs of trees and bushes, hollow culms, or between leaves.
Tapinoma litorale Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 109. ☿, ♀, ♂.

Taxonomy: Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 861-862.

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 150. —Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 13.

melanocephalum (Fabricius). Fla., where it is established; occasionally found in greenhouses or heated buildings in other parts of the continent such as Ont., Iowa., N. Mex., Calif.; tropicopolitan. Ecology: Highly adaptable in nesting habits; found in soil, rotten wood, decayed parts of trees, under bark, in plant cavities, houses, and greenhouses. Workers are fond of honeydew but also feed on live and dead insects. A house-infesting ant. Introduced; widely distributed in the tropical regions of the world by commerce.
Formica melanocephala Fabricius, 1793. Ent. System. 2: 353. ☿.
Formica nana Jerdon, 1851. Madras Jour. Lit. Sci. 17: 125. ☿.
Myrmica pellucida Smith, 1857. Linn. Soc. London, Jour., Zool. 2: 71. ☿.
Formica familiaris Smith, 1860. Linn. Soc. London, Jour., Zool., Sup. 4: 96. ☿.
Tapinoma (*Micromyrma*) *melanocephalum* var. *australis* Santschi, 1928. Insects of Samoa 5: 53. ☿.

Taxonomy: Smith, 1928. Ent. Soc. Amer., Ann. 21: 311. —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 861-862. —Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 197 (larva). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 79-82 (Polynesia).

Biology: Wheeler, 1910. Ants, pp. 154, 156. —Marlatt, 1928. U. S. Dept. Agr. Farmers' Bul. 740: 6. —Phillips, 1934. Hawaii Univ., Expt. Sta. Pineapple Prod. Coop. Assoc., Bul. 15: 20-21. —King, 1948. Iowa Acad. Sci., Proc. 55: 395. —Kempf, 1961. Studia Ent. 4: 520. —Brown, 1964. Ent. News 75: 14-15. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326: 59-60 (economic importance). —Tamsitt and Fox, 1966. Ent. Soc. Wash., Proc. 68: 268 (attacking lab. flea colony). —Gomez-Nunez, 1971. Jour. Med. Ent. 8: 735-737 (an inhibitor of *Rhodinus prolixus* populations).

Morphology: Weber, 1961. Ent. Soc. Wash., Proc. 63: 218 (employment of venom).

sessile (Say). N. S., Que. s. to Fla., w. to Wash., Calif.; Mexico. Ecology: A very adaptable ant found in a wide variety of habitats. Most nests are in the soil beneath objects but also under bark, in stumps, plant cavities, insect galls, refuse piles, and bird and mammal nests. Colonies may contain thousands of individuals and numerous reproductive females. A common and troublesome house-infesting ant. Food consists mainly of honeydew and workers attend honeydew-excreting insects. Odorous house ant.
Formica sessilis Say, 1836. Boston Jour. Nat. Hist. 1: 287. ☿, ♀.
Tapinoma boreale Roger, 1863. Berlin. Ent. Ztschr. 7: 165. ☿, ♀.
Formica gracilis Buckley, 1866. Ent. Soc. Phila., Proc. 6: 158. ☿, ♀.
Formica parva Buckley, 1866. Ent. Soc. Phila., Proc. 6: 159. ☿.

Tapinoma boreale Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 238. ☿, ♀. Preocc. by Roger, 1863.

Taxonomy: Wheeler and Wheeler, 1951. Ent. Soc. Wash., Proc. 53: 196 (larva). —Francoeur and Beique, 1966. Canad. Ent. 98: 143 (Provancher types).

Biology: Smith, 1928. Ent. Soc. Amer., Ann. 21: 307-329. —Metcalf and Flint, 1939. Destructive and Useful Insects, Ed. 2: 770. —Weber, 1941. Canad. Ent. 73: 140-141. —Kannowski, 1959. Insectes Sociaux 6: 126-129. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 157-160. —Gregg, 1963. Ants of Colo., pp. 443-447. —Judd, 1964. Canad. Ent. 96: 990 (in galls on goldenrod). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326: 57-59 (economic importance). —Bobb, 1965. Jour. Econ. Ent. 58: 925 (as predator of *Neodiprion pratti pratti* (Dyar)). —Kulman, 1965. Jour. Econ. Ent. 58: 70 (as predator of *Malacosoma americanum* (F.)). —Wang and Brook, 1970. Jour. Econ. Ent. 63: 1971-1973 (toxicological and biological studies). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 106-107.

Morphology: Crozier, 1970. Canad. Jour. Genet. and Cytol. 12: 541-546 (pericentric rearrangement polymorphism).

Unplaced Taxa of Dolichoderinae

Bothriomyrmex dimmocki Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 417. ☿, ♀. Mass. (Mt. Tom, Springfield).

Formica masonia Buckley, 1866. Ent. Soc. Phila., Proc. 6: 165. ☿. Tex. (Fort Mason).

Formica (*Hypochira* (*!*)) *subspinosa* Buckley, 1866. Ent. Soc. Phila., Proc. 6: 169. ☿. Tex.

Subfamily FORMICINAE

This subfamily is the predominant group of ants in North America, most common in the north and in the mountains with their numbers decreasing rapidly toward the southern part of the United States. They are recognized by the single segmented pedicel, lack of a constriction between the first and second gastric segments, and the round acidopore, usually with a circle of hairs.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 126-171, 175-217 (larvae). —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 205-222 (larvae). —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 648-656 (larvae).

Biology: Kannowski, 1963. Symp. Genet. et Biol. Ital. 12: 74-102 (flight activities). —Wilson and Regnier, 1971. Amer. Nat. 105: 279-289 (evolution of alarm-defense system).

Morphology: Blum and Wilson, 1964. Psyche 71: 28-31 (anatomical source of trail substances in formicine ants). —Hung, 1969. Ent. Soc. Amer., Ann. 62: 455-456 (chromosome numbers of various spp.).

Tribe PLAGIOLEPIDINI

Genus PLAGIOLEPIS Mayr

Plagiolepis Mayr, 1861. Eurp. Formicid., p. 42.
Type-species: *Formica pygmaea* Latreille. Monotypic.

Plagiolepis subg. *Anacantholepis* Santschi, 1914. Meddel. Goteborgs Mus. Zool. 3: 36.
Type-species: *Plagiolepis* (*Anacantholepis*) *decora* Santschi. Monotypic.

Aporomyrmex Faber, 1969. Pflanzenschutzber. 39: 52.
Type-species: *Aporomyrmex ampeloni* Faber. Orig. desig.

Plagiolepis subg. *Paraplagiolepis* Faber, 1969. Pflanzenschutzber. 39: 65.
Type-species: *Plagiolepis xene* Starcke. Monotypic.

An Old World genus with a single introduced species found in the United States.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 47: 129, 132 (larvae). —Brown. 1973. *In* Meggers, *et al.*, Tropical forest ecosystems in Afr. and S. Amer., pp. 178-185.

alluaudi Emery. Calif. (Catalina Is.); W. Indies, Pacific Islands, apparently pantropical. Introduced, probably native to Africa from where it has been widely distributed by commerce.

Plagiolepis alluaudi Emery, 1894. Soc. Ent. de France, Ann. 63: 71. ☿.
Plagiolepis mactavishi Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 166. ☿.
Plagiolepis foreli Santschi, 1920. Soc. Vaud. des Sci. Nat., Bul. 53: 165. ☿.
Plagiolepis foreli var. *ornata* Santschi, 1920. Soc. Vaud. des Sci. Nat., Bul. 53: 166. ☿.
Plagiolepis foreli Mann, 1921. Harvard Univ., Mus. Comp. Zool., Bul. 64: 473. ☿. Preocc. by Santschi, 1920.
Plagiolepis augusti Emery, 1921. Soc. Ent. de Belg., Ann. 61: 317. N. name for *foreli* Mann.

Taxonomy: Smith, 1957. N. Y. Ent. Soc., Jour. 65: 196 (also biol. notes). —Brown, 1958. Acta Hym. 1: 49. —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 85-86 (Polynesia).

Biology: Phillips, 1934. (Hawaii Univ.) Expt. Sta. Pineapple Prod. Coop. Assoc., Bul. 15: 17-18 (in Hawaii). —Taylor and Wilson, 1961. Psyche 68: 143.

Genus ACROPYGA Roger

Acropyga Roger, 1862. Berlin. Ent. Ztschr. 6: 242.
Type-species: *Acropyga acutiventris* Roger. Monotypic.
Acropyga subg. *Rhizomyrma* Forel, 1893. Ent. Soc. London, Trans., p. 347.
Type-species: *Acropyga* (*Rhizomyrma*) *goldii* Forel. Desig. by Wheeler, 1911.
Acropyga subg. *Atopodon* Forel, 1912. Rev. Suisse de Zool. 20: 771.
Type-species: *Acropyga* (*Atopodon*) *inerzae* Forel. Desig. by Wheeler, 1913.
Acropyga subg. *Malacomyrma* Emery, 1922. Mus. Nat. Hung., Ann. 19: 109.
Type-species: *Acropyga silvestrii* Emery. Monotypic.

The small yellow ants of this genus are subterranean in habit and are fond of honeydew. According to Weber (1944) all the New World species may be obligate coccidophiles. Some species may be of economic importance because they tend and disperse coccids on the roots of coffee plants.

Revision: Weber, 1944. Ent. Soc. Amer., Ann. 37: 89-122 (New World spp.; also biol. and association with coccids).

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 47: 136 (larvae). —Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 236: 6-7 (first record of genus in U. S.).

epedana Snelling. Ariz. (Montezuma Pass, 5800 ft., Huachuca Mts., Cochise Co.) Ecology: Specimens were found under a stone.
Acropyga epedana Snelling, 1973. Los Angeles Co. Mus., Contrib. Sci. 236: 7-8. ☿.

Tribe MYRMELACHISTINI

Genus MYRMELACHISTA Roger

Myrmelachista Roger, 1863. Berlin. Ent. Ztschr. 7: 162.
Type-species: *Myrmelachista kraatzii* Roger. Monotypic.
Myrmelachista subg. *Decamera* Roger, 1863. Berlin. Ent. Ztschr. 7: 166. Preocc. by Mulsant, 1842.
Type-species: *Myrmelachista* (*Decamera*) *nigella* Roger. Monotypic.
Aphomomyrmex subg. *Neaphomus* Menozzi, 1935. Zool. Jahrb., Abt. f. System 67: 324. Synonymy questionable.
Type-species: *Aphomomyrmex* (*Neaphomus*) *goetschi* Menozzi. Monotypic.
Hincksidris Donisthorpe, 1944. Ent. Monthly Mag. 80: 59. N. name for *Decamera* Roger.

A Neotropical genus represented in the United States by a single species probably introduced into Florida.

Taxonomy: Wheeler, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77: 187-206. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 47: 129, 137 (larvae). —Kusnezov, 1959. Acta Zool. Lilloana (Tucuman) 17: 379.

ramulorum Wheeler. Fla. (Highland City, Polk Co.); W. Indies. Ecology: Specimens in Florida collected on sweet orange. Probably introduced.

Myrmelachista ambigua ramulorum Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 155. ☿, ♀, ♂.

Taxonomy: Wheeler, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77: 189. —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 872-873 (also biol notes). —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 47: 138 (larva).

Biology: Anonymous, 1968. FAO Plant Protect. Bul. 16: 53 (Fla. record; biol).

Tribe BRACHYMYRMECINI

Genus BRACHYMYRMEX Mayr

Brachymyrmex Mayr, 1868. Soc. Nat. Modena, Ann. 3: 163.
Type-species: *Brachymyrmex patagonicus* Mayr. Monotypic.

Brachymyrmex subg. *Bryscha* Santschi, 1925. Buenos Aires Mus. Nac. de Hist. Nat., An. 31: 652.
Type-species: *Brachymyrmex pilipes* Mayr. Orig. desig.

Most species of this New World genus are found south of the United States. They usually form small colonies in the soil under various objects and are easily transported by commerce in soil or plants. They are fond of honeydew and attend honeydew excreting insects.

Revision: Wheeler, 1903. Psyche 10: 102-103. —Santschi, 1923. Buenos Aires Mus. Nac. de Hist. Nat., An. 31: 650-674.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 47: 129, 139 (larvae). —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 652 (larvae, Brachymyrmecini).

Biology: Arnaud and Quate, 1951. Pan-Pacific Ent. 27: 171 (note on swarming).

depilis Emery. N. S. s. to Fla. w. to B. C., Calif. Ecology: Nests are small and inconspicuous and are in the soil under stones, rotten wood, or other objects.

Brachymyrmex heerii depilis Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 635. ☿.
Brachymyrmex nanellus Wheeler, 1903. Psyche 10: 102. ☿, ♂.
Brachymyrmex depilis flavescens Grundmann, 1952. Kans. Ent. Soc., Jour. 25: 117. ☿.

Taxonomy: Santschi, 1923. Buenos Aires Mus. Nac. de Hist. Nat., An. 31: 664. —Cole, 1940. Amer. Midland Nat. 24: 65. —Gregg, 1944. Ent. Soc. Amer., Ann. 37: 469. —Cole, 1953. Ent. News 64: 266. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 47: 139 (larva). —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 210 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 389. —Smith, 1927. Ent. News 38: 313. —Dennis, 1938. Ent. Soc. Amer., Ann. 37: 469. —Headley, 1952. Ent. Soc. Amer., Ann. 45: 436, 439. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 161-163. —Gregg, 1963. Ants of Colo., pp. 447-449. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 108-109.

obscurior Forel. Fla., s. Tex.; Mexico, Central Amer., W. Indies. Possibly introduced into U. S.

Brachymyrmex heeri var. *obscurior* Forel, 1893. Ent. Soc. London, Trans., p. 345. ☿, ♀, ♂.

Taxonomy: Santschi, 1923. Buenos Aires Mus. Nac. de Hist. Nat., An. 31: 654, 666. —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 866-867 (also biol. notes). —Brown, 1957. Harvard Univ., Mus. Comp. Zool., Bul. 116: 237.

Biology: Plank and Smith, 1940. Puerto Rico Univ., Jour. Agr. 24: 60.

Tribe CAMPONOTINI

Genus CAMPONOTUS Mayr

This large genus of ants is found throughout North America and most other parts of the world. They are commonly referred to as carpenter ants, especially members of the subgenus *Camponotus*, because of their habit of nesting in wood. However, many species nest in the soil,

under stones, or in hollow twigs or branches.

Many subgeneric groupings have been proposed for *Camponotus* on a worldwide basis, many of which may or may not be valid or may eventually represent distinct genera. Brown (1973) gave 54 genus-group names to be considered with *Camponotus*. Seven subgenera have been recognized in North America, and these are separated here as in the past literature.

Revision: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 667-682. —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 295-354.

Taxonomy: Emery, 1920. Rev. Zool. Afr. 8: 16-19 (subgenera). —Wheeler, 1921. Psyche 28: 17. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 181 (larvae). —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 216 (larvae). —Wheeler and Wheeler 1970. Ent. Soc. Amer., Ann. 63: 649 (larvae). —Brown, 1973. *In* Meggers, *et al.*, Tropical forest ecosystems in Afr. and S. Amer., pp. 178-185 (genus-group names).

Biology: Smith, 1942. Ent. News 53: 133-135 (effect of reduced food supply on stature). —Smith, 1942. Tenn. Acad. Sci., Jour. 17: 367-373 (polymorphism). —Riordan, 1960. Insectes Sociaux 7: 353-355 (location of nests by a radioactive isotope). —Sanders, 1964. Canad. Ent. 96: 894-909 (biol. of carpenter ants in N. B.). —Patrick, 1969. Amer. Midland Nat. 82: 605-610 (changes in carpenter ants harboring dicrocoeliid metacercariae). —Sanders and Baldwin, 1969. Canad. Ent. 101: 416-418 (Iridium-192 as a tag for carpenter ants). —Sanders, 1970. Ecology 51: 865-873 (distribution of carpenter ant colonies in spruce fir forests in Ont.). —Ayre and Blum, 1971. Physiological Zool. 44: 77-83 (attraction and alarm). —Sanders, 1972. Canad. Ent. 104: 1681-1687 (seasonal and daily activity patterns in n.w. Ont.). —Sanders, 1973. Ent. Soc. Ontario, Proc. 102: 13-16 (aggregation of alate carpenter ants in Ont.).

Genus CAMPONOTUS Subgenus CAMPONOTUS Mayr

Camponotus Mayr, 1861. Die Europaischen Formiciden, pp. 25, 35.
Type-species: *Formica ligniperda* Latreille. Desig. by Bingham, 1903.

Most species of this subgenus build their nests in decaying wood. Some are common house infesting ants that make their nest in the timber and woodwork of buildings and tunnel nest passages into adjacent wood. Dry, sound wood is rarely attacked, and the presence of nests of carpenter ants in buildings is usually evidence that the wood was damp and partially decayed.

americanus Mayr. Ont. s. to Fla. w. to Mich., Iowa, Mo., Okla., Tex. Ecology: Prefers to nest in the soil, usually under stones or rotten logs.
Camponotus americanus Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12: 661. ☿, ♀.
Camponotus (*Camponotus*) *castaneus* stirps *rufinasis* Santschi, 1936. Rev. d. Ent. 6: 204. ☿.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 323-325 (each caste). —Cole, 1940. Amer. Midland Nat. 24: 82, 84 (also biol. notes). —Gregg, 1944. Ent. Soc. Amer., Ann. 37: 477. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 185 (larva). —Wheeler and Wheeler, 1958. Ent. Soc. Amer., Ann. 61: 216 (larva).

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31: 273, 275, 300-301.

Morphology: Ayre and Blum, 1971. Physiological Zool. 44: 77-83 (attraction and alarm by pheromones).

ferrugineus (Fabricius). Mass., N. Y. s. to Ga. w. to Mich., Ill., Nebr., Kans. Ecology: Nests are located in and beneath well-rotted logs and stumps with galleries often extending into the soil. They have also been found in dead standing trees and occasionally in moist or faulty wood in buildings. Red carpenter ant.
Formica ferruginea Fabricius, 1798. Sup. Ent. System., p. 279. ☿, ♀.

Taxonomy: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 668. —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 338-339 (each caste; biol. notes). —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 600-601. —Cole, 1940. Amer. Midland Nat. 24: 86. —Brown, 1950. Ent. News 61: 158-160. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 188 (larva).

Biology: Pricer, 1908. Biol. Bul. 14: 177-218. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 301-302. —Williams, 1961. Ohio Jour. Sci. 61: 279 (habits; nest). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 67-69 (economic importance).

Morphology: Tanquary, 1913. Ill. State Lab. Nat. Hist., Bul. 9: 454-475 (embryology).

herculeanus (Linnaeus). Newfoundland (Labrador and insular) w. to Alaska s. to N. Y., Pa., Wis., Minn., N. Dak., Colo., N. Mex., Utah, Oreg.; Eurasia. Ecology: Probably the dominant ant in the forests of boreal and alpine N. Amer. Large colonies are found in rotting logs and stumps, especially conifers.

Formica herculeana Linnaeus, 1758. Syst. Nat., Ed. 10, p. 579. ☿.

Camponotus herculeanus var. *Whymperi* Forel, 1902. Ent. Soc. London, Trans., p. 699. ☿, ♀.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 330-333 (each caste; biol. notes). —Cole, 1942. Amer. Midland Nat. 28: 387. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 367. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 185-187 (larva). —Yasumatsu and Brown, 1957. Kyushu Univ., Fac. Agr., Jour. 11: 45. —Arnoldi, 1967. Zool. Zhur. 46: 1817-1818. —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 651 (larva).

Biology: Jones, 1929. Colo. Agr. Expt. Sta. Bul. 341, 96 pp. (tends 19 spp. in 6 gen. of aphids on 12 spp. of host plants). —Gregg, 1946. Amer. Midland Nat. 35: 753. —Brown, 1949. Ent. News 60: 99. —Holldobler, 1950. Ztschr. f. Angew. Ent. 31: 583 (biol. and habits in Europe). —Weber, 1950. Amer. Ent. Soc., Trans. 76: 188. —Perttunen, 1955. Ann. Ent. Fenn. 21: 38 (reactions to air humidity). —Brown, 1955. Ent. News 66: 47-48. —Holldobler, 1961. Insectes Sociaux 8: 14 (rhythmical behavior). —Holldobler, 1962. Waldhygiene 4: 228 (nest types, ecomomic importance in Germany). —Holldobler, 1962. Ztschr. f. Angew. Ent. 49: 338. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 164-165. —Gregg, 1963. Ants of Colo., pp. 656-660. —Sanders, 1964. Canad. Ent. 96: 894 (biol. and habits, N. B.). —Sanders, 1972. Canad. Ent. 101: 1618-1687 (seasonal and daily activity patterns, Ont.).

Morphology: Ayre, 1963. Ent. Expt. and Appl. 6: 165-170 (feeding behavior and digestion). —Ayre and Blum, 1971. Physiological Zool. 44: 77-83 (attraction and alarm by pheromones).

laevigatus (Smith). Mont., Colo., N. Mex. w. to B. C., Oreg., Calif.; Mexico. Ecology: Found in wooded and forested areas where it nests in rotting logs and stumps. Occasionally found in buildings.

Formica laevigata Smith, 1858. Cat. Hym. Brit. Mus., v. 6, p. 55. ☿, ♀.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 327-330 (each caste; biol. notes). —Cole, 1942. Amer. Midland Nat. 28: 387-388. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 216 (larva).

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 556. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342· 29. —Furniss, 1944. Oreg. Agr. Expt. Sta. Cir. 158: 1-12. —Gregg, 1963. Ants of Colo., pp. 660-663.

modoc Wheeler. S. Dak., Colo. w. to B. C., Oreg., Calif. Ecology: Found in forested areas where it makes its nests in rotting logs and stumps. Has been considered a subspecies of *herculeanus* or *pennsylvanicus* by various authors.

Camponotus (*Camponotus*) *herculeanus* var. *modoc* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 333. ☿, ♀, ♂.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 387. —Brown, 1950. Ent. News 61: 158.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 557. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 29. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 90. —Furniss, 1944. Oreg. Agr. Expt. Sta. Cir. 158: 1-12. —Gregg, 1963. Ants of Colo., pp. 665-669.

novaeboracensis (Fitch). N. S., Que. s. to Va. w. to B. C., Oreg., Utah, Colo. Ecology: Prefers wooded areas where it normally nests in rotting logs and stumps. Sometimes a house pest.

Formica Novaeboracensis Fitch, 1855. N. Y. State Agr. Soc., Trans. 14: 766. ☿.

Camponotus herculeanus ligniperdus var. *pictus* Forel, 1879. Soc. Vaud. des Sci. Nat., Bul. 16: 59. ☿, ♀, ♂.

Camponotus herculeanus ligniperdus var. *noveboracensis* Forel, 1899. Soc. Ent. de Belg., Ann. 43: 447. Emend.

Camponotus herculeanus ligniperda var. *rubens* Wheeler, 1906. Psyche 13: 41. ♀, ♂.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300, 340 (each caste). —Buren, 1944. Iowa State Col., Jour. Sci. 18: 293. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 182-185 (larva). —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 651 (larva).

Biology: Jones, 1929. Colo. Agr. Expt. Sta. Bul. 341: 96 pp. (attends aphids). —Gregg, 1944. Ent. Soc. Amer., Ann. 37: 457-458. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 250-251. —Kannowski, 1959. Insectes Sociaux 6: 134-135. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 165-168. —Gregg, 1963. Ants of Colo., pp. 663-665. —Sanders, 1964. Canad. Ent. 96: 896 (biology and habits, N. B.). —Gotwald, 1968. N. Y. Ent. Soc., Jour. 76: 278-296 (food gathering behavior). —Sanders, 1972. Canad. Ent. 104: 1681-1687 (seasonal and daily activity pattern, Ont.).

Morphology: Smith, 1942. Tenn. Acad. Sci., Jour. 17: 368.

pennsylvanicus (DeGeer). N. B., Que. s. to Fla. w. to N. Dak., Tex. Ecology: Nests are found in live and dead trees, rotting logs and stumps, and in wood products such as fences, telegraph poles, and buildings. A common and important house infesting ant because of its adaptability to nest in woodwork of buildings. It commonly feeds on household foods, and it is annoying. Nests are started in buildings usually in moist or faulty wood. The first native North American ant to be described. Black carpenter ant.

Formica pensylvanica (!) DeGeer, 1773. Mem. Serv. Hist. Ins., v. 3, p. 603. ☿, ♀, ♂.

Camponotus herculeanus herculeanus herculeano-pennsylvanicus Forel, 1879. Soc. Vaud. des Sci. Nat., Bul. 16: 57. ☿ (?).

Camponotus herculeanus pennsylvanicus var. *mahican* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 338. N. name for *herculeano-pennsylvanicus* Forel.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 335-336 (each caste). —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 600. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 293. —Townsend, 1945. Ky. Agr. Expt. Sta. Cir. 59: 1-27 (references to 1945). —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 187-188 (larva). —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 651 (larva).

Biology: McCook, 1877. Amer. Ent. Soc., Trans. 6: 253-296. —Pricer, 1908. Biol. Bul. 14: 177-218. —Herrick, 1914. Insects Injurious to the Household and Annoying to Man, pp. 177-178. —Gibson, 1916. Canad. Ent. 48: 365-366. —Graham, 1918. Minn. State Ent. Rpt. 17: 32-40 (as destroyers of sound wood). —Back, 1937. U. S. Dept. Agr. Leaflet 147. —Van Pelt, 1958. Tenn. Acad. Sci., Jour. 33: 120-122 (parasitism by a fungus). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 168-170. —Sanders, 1964. Canad. Ent. 96: 899 (biology and habits, N. B.). —Smith, 1965. U. S. Dept. Agr. Tech. Bul. 1326, pp. 63-67 (economic importance). —Sanders, 1972. Canad. Ent. 104: 1681-1687 (seasonal and daily activity patterns, Ont.).

Morphology: McCook, 1878. Phila. Acad. Nat. Sci., Proc. 30: 15-19. —Fielde, 1903. Biol. Bul. 5: 320-325. —Fielde and Parker, 1904. Phila. Acad. Nat. Sci., Proc. 56: 642-649. —Forbes, 1938. Ent. Soc. Amer., Ann. 31: 181-195 (anatomy and histology of worker). —Smith, 1942. Tenn. Acad. Sci., Jour. 17: 367-373. —Forbes, 1952. N. Y. Ent. Soc., Jour. 60: 157-171 (male genitalia). —Forbes, 1954. Jour. Morph. 95: 523-548 (male reproductive system). —Forbes, 1956. Insectes Sociaux 3: 505-511 (male digestive tract). —Forbes and McFarlane, 1961. N. Y. Ent. Soc., Jour. 69: 92-103 (comparative anatomy of digestive glands of female and male). —Keister, 1963. Ent. Soc. Amer., Ann. 56: 336-340 (trachael system). —Hermann and Blum, 1968. Psyche 75: 216-227 (poison apparatus). —Ayre and Blum, 1971. Physiological Zool. 44: 77-83 (attraction and alarm by pheromones).

quercicola Smith. Calif. (Los Angeles Co. to San Diego Co.). Ecology: Nests in dead limbs of *Quercus agrifolia;* nocturnal.

Camponotus (*Camponotus*) *quercicola* Smith, 1953. N. Y. Ent. Soc., Jour. 61: 211-214. ☿, ♂.

schaefferi Wheeler. S. Ariz. Ecology: Nests in dead oak limbs at elevations of about 5000 to 8000 feet.
Camponotus schaefferi Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 88. ☿, ♀.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300, 344-345 (also biol. notes).

Biology: Wheeler, 1917. Amer. Acad. Arts. and Sci., Proc. 52: 557.

texanus Wheeler. Tex. Ecology: Nests have been found in oak logs.
Camponotus texanus Wheeler, 1903. Psyche 10: 108. ☿, ♀, ♂.

Taxonomy: Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 90. —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300, 344 (also biol. note).

Genus CAMPONOTUS Subgenus TANAEMYRMEX Ashmead

Tanaemyrmex Ashmead, 1905. Canad. Ent. 37: 384.
Type-species: *Formica longipes* Gerstaecker. Orig. desig.
Myrmoturba Forel, 1912. Soc. Ent. de Belg., Mem. 20: 91.
Type-species: *Formica maculata* Fabricius. Desig. by Wheeler, 1913.

Most species of this subgenus nest in the soil under stones or other objects; occasionally nests may be surmounted by a small crater. The ants rarely nest in wood, but, if so, the wood is usually buried in the soil.

acutirostris Wheeler. Tex., N. Mex., Ariz. Ecology: Nests have been found in the ground under stones.
Camponotus (*Camponotus*) *acutirostris* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 317. ☿, ♀, ♂.
Camponotus acutirostris var. *clarigaster* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 420. ☿.

Taxonomy: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 561-562.

castaneus (Latreille). N. Y. s. to Fla. w. to Iowa, Okla., Tex. Ecology: Nests in rotting logs and stumps, exposed soil, or in soil under objects. Occasionally enters buildings usually in search of food.
Formica castanea Latreille, 1802. Hist. Nat. Fourmis, p. 118. ☿, ♀, ♂.
Formica mellea Say, 1831. Descr. N. Spp. N. Amer. Ins. Found in La. by Jos. Barabino, p. 14. ♂.
Camponotus clarus Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12: 660. ☿.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 321-323. —Cole, 1940. Amer. Midland Nat. 24: 82, 84.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 402. —Gregg, 1944. Ent. Soc. Amer., Ann. 37: 457, 477. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 60-62.

dumetorum Wheeler. S. Calif. Ecology: Nests are common in the chaparral and are in the soil usually surmounted by flat craters.
Camponotus (*Camponotus*) *maculatus dumetorum* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 354. ☿, ♂.

Taxonomy: Snelling, 1970. Ent. Soc. Wash., Proc. 72: 390-397.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 560. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 90-91.

festinatus (Buckley). Tex., Colo., N. Mex., Ariz., Calif.; Mexico. Ecology: Nests in the ground under stones, logs, or dried cow dung.
Formica festinata Buckley, 1866. Ent. Soc. Phila., Proc. 6: 165. ☿, ♀.
Camponotus (*Camponotus*) *fumidus* var. *pubicornis* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 668, 670. ☿.
Camponotus fragilis Pergande, 1893. Calif. Acad. Sci., Proc. 4: 26. ♀.
Camponotus (*Camponotus*) *fumidus* var. *spurcus* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 315. ☿, ♀.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 312 (also biol. notes). —Snelling, 1968. Ent. Soc. Wash., Proc. 70: 350-355. —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 651 (larva).

Biology: Wheeler, 1901. Amer. Nat. 35: 518, 520, 533.

incensus Wheeler. Fla. (Pigeon Key near Miami).

Camponots (*Tanaemyrmex*) *incensus* Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 14. ☿.

ocreatus Emery. N. Mex., Ariz., s. Nev., s. Calif.; Mexico. Ecology: Nests are found under stones.

Camponotus (*Camponotus*) *maculatus ocreatus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 668, 673. ☿.

Camponotus (*Camponotus*) *acutirostris primipilaris* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 319. ☿, ♀.

Taxonomy: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 561-562. —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 651 (larva).

Biology: Cole, 1954. Tenn. Acad. Sci., Jour. 29: 272. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 20 (Nev. Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 111.

sansabeanus bulimosus Wheeler. N. Mex., Ariz. Ecology: Nests in the ground under stones.

Camponotus (*Camponotus*) *maculatus bulimosus* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 308. ☿, ♀, ♂.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 560-561. —Cole, 1954. Tenn. Acad. Sci., Jour. 29: 272.

sansabeanus sansabeanus (Buckley). Ark., La. w. to Colo., Utah, Ariz., s. Calif. Ecology: Nests under rocks and stones in dry woods.

Formica San Sabeana Buckley, 1866. Ent. Soc. Phila., Proc. 6: 167. ☿, ♀, ♂.

Taxonomy: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 672-673. —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 307-308 (also biol. notes). —Cole, 1942. Amer. Midland Nat. 28: 387. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 196 (larva).

Biology: Wheeler, 1901. Amer. Nat. 35: 518, 520, 533. —Wheeler, 1910. Ants, pp. 349, 393. —Gregg, 1963. Ants of Colo., pp. 669-671. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 111 (half of collections belong to subsp. *torrefactus*).

Morphology: Wheeler, 1910. Ants, pp. 24, 49.

sansabeanus torrefactus Wheeler. Colo., Ariz., Utah, Nev. Ecology: Nests are found under stones.

Camponotus (*Camponotus*) *maculatus sansabeanus* var. *torrefactus* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 308. ☿, ♂.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 387, 388 (also biol. note).

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 559.

semitestaceus Emery. Okla., Tex. w. to Wash., Oreg., Calif.; Mexico. Ecology: Nests are found under stones or in soil surmounted by low craters. Most U. S. records and references in the literature to *maccooki* Forel refer to *semitestaceus; maccooki* is apparently restricted to Guadalupe Is.

Camponotus (*Camponotus*) *maculatus vicinus* var. *semitestaceus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 668, 672. ☿.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 304, 306. —Snelling, 1970. Ent. Soc. Wash., Proc. 72: 390-397 (separation of *maccooki* and *semitestaceus*).

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 345. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 559. —Essig, 1926. Ins. West. N. Amer., p. 868. —Cole, 1934. Ent. Soc. Amer., Ann. 27: 403. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 28. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 91-92. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 19-20. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 112-113.

socius Roger. N. C. s. to Fla. w. to La.; Brazil. Ecology: Nests are built in branches and rotten logs that are covered by sand. Introduced into the U. S.

Camponotus socius Roger, 1863. Berlin. Ent. Ztschr. 7: 140. ♀.

Camponotus (*Tanaemyrmex*) *socius* var. *osceola* Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 15. ☿.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 319-321 (each caste).

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 14-15. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 374. —Holldobler, 1971. Z. Vergl. Physiol. 75: 123-142 (recruitment behavior).

tortuganus Emery. S. Fla. Ecology: May nest in soil under stones or under rotting wood. A frequent house pest and reported to have been found nesting in siding and roofing of buildings.

Camponotus maculatus tortuganus Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 336. ☿.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 310-312 (each caste).

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 13-14. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 62-63.

vafer Wheeler. Ariz. (Huachuca Mts., 5000 to 6000 ft.). Ecology: Nests were found under stones.

Camponotus (*Camponotus*) *vafer* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 315. ☿, ♀.

vicinus Mayr. Man., N. Dak., Colo., Okla., w. to B. C., Oreg., Calif.; Mexico. Ecology: Nests in soil under stones or in rotting wood buried in the soil.

Formica Tejonia Buckley, 1866. Ent. Soc. Phila., Proc. 6: 161. ♂. Questionably the same as *vicinus*.

Camponotus vicinus Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 940. ☿.

Camponotus (*Camponotus*) *maculatus vicinus* var. *nitidiventris* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 668, 672. ☿.

Camponotus (*Camponotus*) *maculatus vicinus* var. *infernalis* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 305. ☿.

Camponotus (*Camponotus*) *maculatus vicinus* var. *luteangulus* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 304. ☿, ♂.

Camponotus (*Camponotus*) *maculatus vicinus* var. *maritimus* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 305. ☿, ♀, ♂.

Camponotus (*Camponotus*) *maculatus vicinus* var. *plorabilis* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 298, 303. ☿, ♀, ♂.

Camponotus (*Myrmoturba*) *maculatus vicinus* var. *subrostrata* Forel, 1914. Deut. Ent. Ztschr., p. 620. ☿.

Camponotus (*Myrmoturba*) *maculatus Maccooki berkeleyensis* Forel, 1914. Deut. Ent. Ztschr., p. 619. ☿.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 387. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 381. —Snelling, 1970. Ent. Soc. Wash., Proc. 72: 390-397. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 220 (larva).

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 345. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 599-560. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 92. —McClure, 1943. Ecol. Monog. 13: 19. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 170-171. —Gregg, 1963. Ants of Colo., pp. 671-675. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 20 (Nev. Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 113-114.

Genus CAMPONOTUS Subgenus MYRMOTHRIX Forel

Myrmothrix Forel, 1912. Soc. Ent. de Belg., Mem. 20: 91.
Type-species: *Formica abdominalis* Fabricius. Desig. by Wheeler, 1913.

Most members of this subgenus are Neotropical with two forms extending into southern United States.

Revision: Santschi, 1936. Rev. de Ent. 6: 207-218.

abdominalis floridanus (Buckley). N. C. s. to Fla. w. to s. Miss. Ecology: Nests are in and under rotten logs and stumps, usually in damp situations. A house infesting ant, especially in Florida, where it is known to nest in the woodwork of buildings and feed on household foods. May also damage beehives. *C.* (*M.*) *abdominalis abdominalis* (F.) occurs in Central and South America. Florida carpenter ant.

Formica Floridana Buckley, 1866. Ent. Soc. Phila., Proc. 6: 161. ☿.

Camponotus atriceps stirps *Yankee* Forel, 1884. Soc. Vaud. des Sci. Nat., Bul. 20: 340. ☿.

Taxonomy: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 668. —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 325-326. —Santschi, 1936. Rev. de Ent. 6: 213-214.

Biology: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 326. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 69-70 (economic importance).

abdominalis transvectus Wheeler. S. Tex.; Mexico.

Camponotus (*Camponotus*) *abdominalis transvectus* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 326. ☿, ♀, ♂.

Taxonomy: Santschi, 1936. Rev. de Ent. 6: 213.

Genus CAMPONOTUS Subgenus MYRMENTOMA Forel

Myrmentoma Forel, 1912. Soc. Ent. de Belg., Mem. 20: 92.
Type-species: *Formica lateralis* Olivier. Desig. by Wheeler, 1913.

The Nearctic forms of this subgenus nest in insect galls, in branches and stems of plants, under bark of trees, in wood and buildings, and sometimes in the soil. Colonies are small, consisting of a few dozen to several hundred individuals. The listing below essentially follows that of Creighton (1950) though there will undoubtedly be some changes in the near future.

Taxonomy: Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 216-232. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 382-390.

anthrax Wheeler. S. Calif. Ecology: Nests were found in soil under large stones.

Camponotus anthrax Wheeler, 1911. N. Y. Ent. Soc., Jour. 19: 96. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 650 (larva).

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 558. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 89.

caryae caryae (Fitch). N. Y. s. to D. C. w. to Mich., Ohio. Ecology: Apparently associated with trees, especially hickory.

Formica caryae Fitch, 1855. N. Y. State Agr. Soc., Trans. 14: 855. ☿, ♀, ♂.

Camponotus marginatus discolor var. *cnemidatus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 669, 678. ☿.

Taxonomy: Smith, 1940. Ent. Soc. Wash., Proc. 42: 137-141 (each caste; biol. note).

caryae clarithorax Emery. S. Calif.

Camponotus marginatus discolor var. *clarithorax* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 670, 678. ☿, ♀, ♂.

Taxonomy: Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 222, 231-232 (each caste). —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 301.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 89.

caryae discolor (Buckley). Ohio, S. C., Fla. w. to N. Dak., Iowa, Kans., Tex. Ecology: Nests are in plant cavities in twigs, branches, under bark, in logs and stumps, or in insect galls. A house infesting ant that may nest in woodwork in houses, especially in preformed cavities or in rotting or faulty wood.

Formica discolor Buckley, 1866. Ent. Soc. Phila., Proc. 6: 166. ☿, ♀.

Taxonomy: Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 222, 230-231 (each caste). —Buren, 1944. Iowa State Col., Jour. Sci. 18: 293.

Biology: Wheeler, 1902. Tex. Acad. Sci., Trans. 4: 23. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 103. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 172-173. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 70-71.

essigi Smith. Idaho, Oreg., Nev., Calif.
Camponotus caryae var. *essigi* Smith, 1923. Ent. News 24: 306. ☿.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 89.

hyatti bakeri Wheeler. Calif. (Channel Islands). Ecology: Nests in soil.
Camponotus hyatti var. *bakeri* Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 271. ☿, ♀.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300, 346.

hyatti hyatti Emery. Nev., Calif.; Mexico (Baja Calif.). Ecology: Colonies have been found in the stem of *Yucca* and in soil under a dead juniper limb.
Camponotus (*Camponotus*) *hyatti* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 669, 680. ☿.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300, 345-346.

Biology: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 19 (Nev. Test Site).

nearcticus Emery. Ont. s. to Fla. w. to N. Dak., Colo., Tex.; B. C. s. to Idaho, Calif. Ecology: Forms small colonies in dead twigs and branches, under bark of live and dead trees, in insect galls, pine cones, and rotting logs and stumps; also in wood products such as fence posts and in woodwork of houses, especially the roofing.
Formica americana Buckley, 1866. Ent. Soc. Phila., Proc. 6: 154. ☿, ♀. Questionably the same as *nearcticus*.
Camponotus (*Camponotus*) *marginatus* var. *nearcticus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 669 675. ☿, ♀.
Camponotus (*Camponotus*) *marginatus* var. *minutus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 669, 676. ☿, ♀.
Camponotus (*Camponotus*) *marginatus* var. *decipiens* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 669, 676. ☿, ♀.
Camponotus fallax fallax var. *pardus* Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 222, 225. ☿, ♀, ♂.
Camponotus fallax fallax var. *tanquaryi* Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 222, 226. ☿, ♀, ♂.
Camponotus fallax rasilis var. *pavidus* Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 222, 228. ☿, ♀.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 293. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 193 (larva).

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 21: 402-403. —Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 220-221. —Davis and Bequaert, 1922. Brooklyn Ent. Soc., Bul. 17: 24. —Kannoswki, 1959. Insectes Sociaux 6: 134. —Gregg, 1963. Ants of Colo., pp. 675, 677. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 173-174. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 72-73 (economic importance).

nevadensis Gregg. Nev. (Fuller Lake, 3 mi. S. Verdi, 6000 ft.).
Camponotus (*Myrmentoma*) *nevadensis* Gregg, 1973. Southwest. Nat. 18: 39-43. ☿, ♀, ♂.

sayi Emery. N. C. s. to Fla. w. to Nebr., Kans., Colo., Ariz., Calif. Ecology: The small colonies are found in insect galleries in wood, in twigs and branches, insect galls, under bark, in stalks of plants, and in rotting logs and stumps. A house infesting ant which may nest in woodwork and feed on human foods. In most literature as *rasilis* Wheeler.
Camponotus (*Camponotus*) *sayi* Emery, 1894. Zool. Jahrb., Abt. f. System. 7: 679. ☿.
Camponotus sayi var. *bicolor* Pergande, 1894. Calif. Acad. Sci., Proc. 4: 161. ☿, ♀, ♂. Preocc. in *Camponotus* by Latreille, 1798.
Camponotus fallax rasilis Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 222, 227. ☿, ♀, ♂.
Camponotus sayi californica Emery, 1925. *In* Wytsman, Gen. Ins. 183: 118. N. name for *bicolor* Pergande.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 293-294. —Snelling, 1968. Ent. Soc. Wash., Proc. 70: 355-358.

Biology: Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 228. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 302-303. —Gregg, 1963. Ants of Colo., pp. 675, 677. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 73-74 (economic importance).

subbarbatus Emery. N. Y. s. to N. C. w. to Mich., Iowa, Kans. Ecology: Nests are in plant cavities, in twigs and branches, and under bark.
Camponotus (*Camponotus*) *marginatus subbarbatus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 669, 676. ☿, ♀, ♂.
Camponotus (*Camponotus*) *marginatus subbarbatus* var. *paucipilis* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 669, 677. ☿, ♂.

Taxonomy: Wheeler, 1910. N. Y. Ent. Soc., Jour. 18: 222, 229. —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 293.

Biology: Wesson and Wesson, 1940. Amer. Midland Nat. 24: 90, 103.

Genus CAMPONOTUS Subgenus COLOBOPSIS Mayr

Colobopsis Mayr, 1861. Die Europaischen Formiciden, pp. 25, 38.
Type-species: *Formica truncata* Spinola. Desig. by Bingham, 1903.

Ants of this subgenus are most abundant in the southern portions of the United States. They make their nests in hollow twigs or branches of trees and shrubs, in insect galls and nuts. The soldiers and females have a peculiar cylindrical, truncated head which the soldiers use for blocking the single entrance hole to the nest.

Revision: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 139-158.

Taxonomy: Wheeler and Wheeler 1953. Ent. Soc. Amer., Ann. 46: 188 (larvae).

etiolatus Wheeler. Tex.; Mexico. Ecology: Nests have been found in insect galls and in twigs of trees.
Camponotus (*Colobopsis*) *abditus* var. *etiolatus* Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 150. ☿, ♃, ♀, ♂.

Taxonomy: Wheeler, 1934. Harvard Univ., Mus. Comp. Zool., Bul. 77: 216. —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 650 (larva).

Biology: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 352-353.

hunteri Wheeler. Tex. (Victoria). Ecology: Type series taken from twig of a pecan.
Camponotus (*Colobopsis*) *pylartes* var. *hunteri* Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 301, 353. ☿, ♃.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 562.

impressus (Roger). Md. s. to Fla. w. to cent. Tex. Ecology: Colonies have been found in culms of sedges.
Colobopsis impressa Roger, 1863. Berlin. Ent. Ztschr. 7: 160. ☿.

Taxonomy: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 144-146 (each caste). —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 302. —Smith, 1955. Brooklyn Ent. Soc., Bul. 50: 98.

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 16.

mississippiensis Smith. Md. s. to Fla. w. to Ill., Okla., La.
Camponotus (*Colobopsis*) *mississippiensis* Smith, 1923. Psyche 30: 83. ☿, ♃.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 188-190 (larva).

Biology: Smith, 1923. Ent. News 35: 127. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 303, 306.

obliquus Smith. Ala., Miss. Ecology: Found nesting in a hickory nut.
Camponotus (*Colobopsis*) *obliquus* Smith, 1930. Ent. Soc. Amer., Ann. 23: 256. ♃.

Biology: Smith, 1931. Ent. News 42: 23.

papago Creighton. Ariz.; Mexico.
Camponotus (*Colobopsis*) *papago* Creighton, 1952. Psyche 59: 153-162. ☿, ♃, ♀, ♂.

pylartes fraxinicola Smith. N. C. to Ala. w. to Ark.
Camponotus (*Colobopsis*) *pylartes fraxinicola* Smith, 1923. Psyche 30: 86. ☿, ♃.

Biology: Smith, 1924. Ent. News 35: 127.

pylartes pylartes Wheeler. La., Tex. Ecology: Colonies found in twigs and spines of trees and shrubs.
Camponotus (Colobopsis) pylartes Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 147. ☿, ♀, ♀.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 120. —Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 301.

Biology: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 153-158.

Genus CAMPONOTUS Subgenus MYRMAPHAENUS Emery

Myrmaphaenus Emery, 1920. Rev. Zool. Bot. Africaines 8: 237.
Type-species: *Camponotus leydigi* Forel. Orig. desig.
Paracolobopsis Emery, 1920. Rev. Zool. Bot. Africaines 8: 249.
Type-species: *Camponotus salvini* Forel. Orig. desig.
Neomyrmamblys Wheeler, 1921. Psyche 28: 19.
Type-species: *Camponotus fastigatus* Roger. Desig. by Santschi, 1921.

Only two species of this Neotropical subgenus reach the United States.

ulcerosus Wheeler. Tex., Ariz.; Mexico. Ecology: Nests are constructed in the soil beneath stones. A carton shield is constructed at the nest entrance with an opening the same size as the head of the major worker. Thus, the major worker functions as a door in this opening.
Camponotus (Camponotus) ulcerosus Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 351. ☿.
Camponotus (Camponotus) bruesi Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 299, 349. ☿.

Taxonomy: Creighton, 1951. Psyche 58: 47-64 (also biology).

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 562. —Creighton, 1953. Psyche 60: 82-84. —Samuelson, 1961. Pan-Pacific Ent. 37: 189 (association with larvae of *Strymon melinus*).

yogi Wheeler. S. Calif. Ecology: Most colonies have been found in living stems of *Haplopappus pinifolius* where they live in burrows made by buprestids.
Camponotus yogi Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 420. ☿.

Taxonomy: Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 650 (larva). —Creighton and Snelling, 1966. Psyche 73: 187-195 (female, male; biological notes).

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 562. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 92.

Genus CAMPONOTUS Subgenus MYRMOBRACHYS Forel

Myrmobrachys Forel, 1912. Soc. Ent. de Belg., Mem. 20: 91.
Type-species: *Formica senex* Smith. Desig. by Wheeler, 1913.

This Neotropical subgenus extends into Florida, Texas, and Arizona. The species found in the United States usually nest under bark of trees, in branches of trees and shrubs, and in logs and stumps.

mina Forel. S. Ariz.; Mexico. Ecology: Most colonies have been found nesting in mesquite.
Camponotus Mina Forel, 1879. Soc. Vaud. des Sci. Nat., Bul. 16: 83. ☿.
Camponotus erythropus Pergande, 1894. Calif. Acad. Sci., Proc. 4: 28. ☿.
Camponotus (Camponotus) mina zuni Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 300. ☿.

Taxonomy: Creighton, 1965. Amer. Mus. Novitates 2239: 1-7 (also biological notes).

planatus Roger. S. Fla., S. Tex.; W. Indies, Mexico. Ecology: Arboreal, nesting in branches and under bark.
Camponotus planatus Roger, 1863. Berlin. Ent. Ztschr. 7: 148. ☿, ♀, ♂.

Taxonomy: Wheeler, 1910. N. Y. Acad. Sci., Ann. 20: 301, 348-349. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 194 (larva).

Biology: Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 15. —Wheeler, 1942. Harvard Univ., Mus. Comp. Zool., Bul. 90: 258.

trepidulus Creighton. S. Ariz. (Baboquivari Mtns.). Ecology: Colonies were found in dead limbs of *Quercus oblongifolia*.

Camponotus (*Myrmobrachys*) *trepidulus* Creighton, 1965. Amer. Mus. Novitates 2239: 7-9. ☿, ♂, ♀, ♂.

Tribe LASIINI

Genus LASIUS Fabricius

Ants of this holarctic genus nest in exposed soil, under objects or in rotting wood. Colonies are small to moderate in size. Workers attend and may foster honeydew-excreting insects. The treatment here follows the revision by Wilson (1955).

Revision: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 637-639. —Wheeler, 1916. Psyche 23: 168-173. —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 1-199.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 147-150 (larvae).

Biology: Kannowski, 1959. Insectes Sociaux 6: 145-146 (flight comparisons). —Pontin, 1961. Jour. Animal Ecology 30: 47-54 (population stabilization and competition between *L. flavus* and *L. niger*). —Pontin, 1963. Jour. Animal Ecology 32: 565-567 (competition and ecology of *L. flavus* and *L. niger*).

Morphology: Bernardi, *et. al.*, 1967. Tetrahedron Letters 40: 3893-3896 (components of secretion of mandibular glands).

Genus LASIUS Subgenus LASIUS Fabricius

Lasius Fabricius, 1805. Systema Piezatorum, p. 415.
Type-species: *Formica nigra* Linnaeus. Desig. by Bingham, 1903.

Donisthorpea Morice and Durrant, 1914. Ent. Soc. London, Trans., pp. 421-423.
Type-species: *Formica nigra* Linnaeus. Orig. desig.

alienus (Foerster). N. S., N. B. s. to Fla. w. to Man. N. Dak., S. Dak., Neb., Kans., Ark., Miss.; B. C., Mont., Idaho, Wash., Oreg., Calif., S. Ariz.; Mexico; Eurasia. Ecology: In N. Amer., this ant shows a preference for well-shaded woodlands where it nests in rotting logs and stumps or under stones. Only occasionally has it been found in open areas. In the early American literature, this species has been recorded as *americanus* Emery, and *alienus* has commonly been confused with *neoniger*. A frequent house pest. Cornfield ant is the approved common name for *alienus*.

Formica aliena Foerster, 1850. Hym. Studien 1: 36-38. ☿, ♂.
Prenolepis lasioides Emery, 1869. Accad. Natur. Napoli, Ann. 2: 6-7. ☿, ♀, ♂.
Prenolepis fuscula Emery, 1869. Accad. Natur. Napoli, Ann. 2: 8. ☿.
Lasius fumatus Emery, 1870. Soc. Ent. Ital., Bol. 2: 194.
Lasius niger var. *americanus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 639. ☿, ♀, ♂.
Lasius niger var. *grandis* Forel, 1909. Soc. Ent. de Belg., Ann. 53: 104-105. ☿.
Lasius niger alienus var. *alieno-americanus* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 525-526. ♀.
Lasius niger turcicus Santschi, 1921. Soc. Esp. Hist. Nat., Bol. 21: 115-116. ☿ (♀ misdet.).
Lasius niger lasioides var. *barbara* Santschi, 1921. Soc. Esp. Hist. Nat., Bol. 21: 170. ☿.
Acanthomyops niger alienus var. *flavidus* Kuznetzov-Ugamskij, 1927. Rev. Russ. d'Ent. 21: 189. ☿.
Acanthomyops niger alienus var. *turkmenus* Kuznetzov-Ugamskij, 1927. Rev. Russ. d'Ent. 21: 189. ☿.
Lasius brunneus var. *obscurata* Stitz, 1930. Mitt. Zool. Mus. Berlin 16: 239-240. ☿, ♀.
Lasius alienus illyricus Zimmermann, 1934. Zool.-Bot. Gesell. Wien, Verh. 84: 50-52. ☿, ♀, ♂.
Lasius alienus var. *pannonica* Roszler, 1942. Siebenburgischer Verh. Naturw., Hermannstadt, Verh. und Mitt. 91-92 :40. ☿, ♀.
Lasius alienus var. *pontica* Starcke, 1944. Ent. Ber. 11: 156-157. ☿.

Taxonomy: Gregg, 1945. Ent. Soc. Amer., Ann. 38: 529-546. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 147-148 (larva).

Biology: Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 77-89. —Benjamin, 1958. Canad. Ent. 90: 419. —Kannowski, 1959. Insectes Sociaux 6: 135-136. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 178-179. —Gregg, 1963. Ants of Colo., pp. 454-457. —Burns, 1964. Ent. Soc. Amer., Ann. 57: 138 (association with tuliptree scale). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 80-81 (economic importance). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 115-116.

Morphology: Regnier and Wilson, 1969. Jour. Ins. Physiology 15: 893-898 (alarm-defense system).

crypticus Wilson. N. Dak. s. to N. Mex. w. to Alta., Idaho, Oreg., Utah; S. Calif. Ecology: Abundant in prairie regions where it nests under stones or occasionally in crater nests in soil.

Lasius (*Lasius*) *crypticus* Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 104-118. ☿, ♀, ♂.

Biology: Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 179-182.

neoniger Emery. Que., Maine s. to Fla. w. to Idaho, Wyo., Colo., N. Mex.; Calif. (Sierras); Alaska (?). Ecology: Nests almost exclusively in open areas, either under stones or in crater nests. One of the dominant ants found in lawns, cultivated fields, grassy road strips, and prairies. A common house and lawn pest and also fosters honeydew-excreting insects. In American literature, *neoniger* has often been confused with *alienus* (=*americanus* Emery), and many early references applying these names are here referred to *neoniger*.

Lasius niger var. *neoniger* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 637. ☿.

Taxonomy: Gregg, 1945. Ent. Soc. Amer., Ann. 38: 534.

Biology: Forbes, 1894. 18th Rpt. State Ent. Ill., 171 pp. —Forbes, 1908. Ill. Agr. Expt. Sta. Bul. 131: 31-44. —Tanquary, 1913. Ill. State Lab., Nat. Hist. Bul. 9: 417-443. —Metcalf and Flint, 1939. Destructive and Useful Insects, pp. 371-374, 770. —Severin, 1920. S. Dak. State Ent. Cir. 20: 3. —Talbot, 1945. Amer. Midland Nat. 34: 504-506. —Talbot, 1946. Ecology 27: 65-70. —Schread and Chapman, 1948. Conn. (State) Agr. Expt. Sta. Bul. 515: 4-11. —Talbot, 1953. Mich. Univ., Lab. Vertebrate Biol., Contrib. No. 63, pp. 3-12. —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 100-104. —Ayre, 1962. Canad. Jour. Zool. 40: 157-164 (parasitism). —Wheeler and Wheeler, 1963. Ants. of N. Dak., pp. 182-185. —Gregg, 1963. Ants of Colo., pp. 461-465. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 81-84 (economic importance).

niger (Linnaeus). Colo., N. Mex., Ariz., Utah, Mont., Idaho, Wash., Oreg., Calif.; Mexico; Eurasia. Ecology: Found in forests or in open situations where it usually nests under stones, though occasionally in rotting wood.

Formica nigra Linnaeus, 1758. Syst. Nat., Ed. 10, 1: 580. ☿.

Lasius niger var. *alieno-niger* Forel, 1874. Les Fourmis de la Suisse, pp. 47, 49. ☿, ♀.

Lasius niger var. *alienoides* Emery, 1891. Explor. Sci. Tunisie, Paris, p. 16. ☿.

Lasius niger flavescens Forel, 1903. Mus. Zool. Acad. Imp. Sci. St. Petersburg, Ann. 8: 386-387. ☿.

Lasius niger emeryi Ruzsky, 1905. Schrift. Naturforsch.-Ges. Univ. Kasan 38: 313-314. ☿.

Acanthomyops niger nitidus Kuznetzov-Ugamskij, 1927. Rev. Russ. d'Ent. 21: 188. ☿.

Acanthomyops niger alienus var. *pilicornis* Kuznetzov-Ugamskij, 1927. Rev. Russe d'Ent. 21: 189. ☿.

Acanthomyops niger var. *minimus* Kuznetzov-Ugamskij, 1928. Ants of South Ussuri Region, U. S. S. R. Natl. Geog. Soc. Publ., p. 20. ☿.

Lasius emarginatus var. *nigrescens* Stitz, 1930. Mitt. Zool. Mus. Berlin 16: 240. ♀.

Lasius niger coloratus Santschi, 1937 Soc. Ent. de Belg., Bul. 68: 387. ☿, ♀.

Lasius emarginatus var. *japonicus* Santschi, 1941. Mitt. Schweiz. Ent. Ges., 18: 277-278. ☿, ♀.

Lasius transylvanica Roszler, 1943. Zool. Anz. 144: 44-46. ☿, ♂.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 148-150 (larva).

Biology: Goswald, 1932. Ztschr. Wiss. Zool. 142: 1-156 (in Germany). —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 72-75. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 116-117.

pallitarsis (Provancher). N. S., Que. w. to B. C., Alaska s. to N. Y., N. C., Mich., Wis., Minn., S. Dak., N. Mex., Ariz., Nev., Calif.; Siberia. Ecology: Found mostly in forested areas where it nests in rotting logs and stumps or under stones. Occasionally a house infesting ant.

Formica pallitarsis Provancher, 1881. Nat. Canad. 12: 355. ☿, ♂.
Lasius niger sitkaensis Pergande, 1900. Wash. Acad. Sci., Proc. 2: 519. ☿.

Taxonomy: Wheeler, 1917. Harvard Univ., Mus. Comp. Zool., Bul. 61: 18, 21. —Cole, 1942. Amer. Midland Nat. 28: 374. —Francoeur and Beique, 1966. Canad. Ent. 98: 144 (Provancher types).

Biology: Wheeler, 1915. Psyche 22: 206. —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 45-47. —Medler, 1958. Ent. Soc. Wash., Proc. 60: 258 (flights). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 185-188. —Gregg, 1963. Ants of Colo., pp. 461-465. —Corbet and Ayre, 1968. Canad. Field-Nat. 82: 230-231 (swarming and mating). —Kannowski, 1969. Canad. Field-Nat. 83: 283-285 (nuptial flights). —Corbet and Ayre, 1969. Canad. Field-Nat. 83: 285-286 (swarming and mating). —Akre and Hill, 1973. Kans. Ent. Soc., Jour. 46: 526-536 (behavior of a myrmecophilous beetle).

Morphology: Hung, 1969. Ent. Soc. Amer., Ann. 62: 456 (chromosome numbers).

sitiens Wilson. Colo., N. Mex., Ariz., Nev.; Mexico. Ecology: Found in the lower altitudinal forest belts in mountains, 7000 to 8000 feet where it nests under stones in dry open situations.

Lasius (*Lasius*) *sitiens* Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 108-111. ☿, ♀, ♂.

Biology: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 20 (Nev. Test Site).

Genus LASIUS Subgenus CAUTOLASIUS Wilson

Lasius subg. *Cautolasius* Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 13. Type-species: *Formica flava* Fabricius. Orig. desig.

fallax Wilson. Mont., Wyo., Colo., Idaho, Utah, Ariz., Wash. Ecology: Colonies have been found under stones in forest clearings.

Lasius (*Cautolasius*) *fallax* Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 130-133. ☿, ♀, ♂.

flavus (Fabricius). N. S., N. B., Que. s. to Ala. w. to Alta., Wash., Oreg., Calif.; Eurasia. Ecology: A subterranean ant which nests in various situations but most often under stones. Known to build mounds in parts of Eurasia. Workers may attend aphids on roots of grasses.

Formica flava Fabricius, 1781. Species Insectorum 1: 491. ☿.
Lasius brevicornis Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 637. ☿, ♀, ♂.
Lasius flavus myops Forel, 1894. Soc. Vaud. des Sci. Nat., Bul. 30: 12. ☿.
Lasius flavus myops var. *flavoides* Forel, 1894. Soc. Vaud. des Sci. Nat., Bul. 30: 12. ☿.
Lasius flavus var. *fuscoides* Ruzsky, 1902. Schrift. Naturforsch. Gesell. Univ. Kasan 38: 281.
Lasius flavus var. *odoratus* Ruzsky, 1902. Schrift. Naturforsch. Gesell. Univ. Kasan 38: 282-283. ☿.
Lasius flavus var. *flavo-myops* Forel, 1915. Mitt. Schweiz. Ent. Gesell. 12: 52.
Lasius (*Formicina*) *brevicornis microps* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 526. ☿.
Lasius (*Formicina*) *flavus claripennis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 527. ☿, ♀, ♂.
Formicina flava var. *morbosa* Bondroit, 1918. Soc. Ent. de France, Ann. 87: 28-29. ☿, ♀.
Lasius umbratus var. *apennina* Menozzi, 1924. Atti Soc. Nat. Mat. Modena 8: 15. ☿.
Lasius umbratus ibericus Santschi, 1925. Eos 1: 349-350. ☿.
Lasius umbratus ibericus var. *sancho* Santschi, 1925. Eos 1: 350. ☿.
Lasius flavus var. *olivacea* Karawajew, 1926. Konowia 5: 194. ☿.

Lasius (*Chthonolasius*) *helveolus* Cook, 1950. Ants of Calif., p. 327. ☿.
Lasius (*Chthonolasius*) *helvus* Cook, 1950. Ants of Calif., p. 326. ☿. In figs.

Taxonomy: Cole, 1940. Amer. Midland Nat. 24: 68-69. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 296. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 152-154 (larva). —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 651 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 396. —Goswald, 1932. Ztschr. Wiss. Zool. 142: 1-156 (in Germany). —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 100. —Cole, 1942. Amer. Midland Nat. 28: 375. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 253. —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 126-128. —Waloff, 1957. Insectes Sociaux 4: 391-408 (effect of number of queens on their survival and the development of first brood). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 189-191. —Gregg, 1963. Ants of Colo., pp. 465-469. —Marikovsky, 1965. Insectes Sociaux 12: 63. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 117.

nearcticus Wheeler. Que., Ont. s. to N. C., Tenn. w. to S. Dak., Wyo., Colo. Ecology: Subterranean; prefers dense, moist woodlands here it nests in soil under rocks or fallen logs.
Formica mellea Provancher, 1881. Nat. Canad. 12: 356. ☿. Preocc. by Say, 1836.
Lasius flavus nearcticus Wheeler, 1906. Psyche 13: 38. ☿.

Taxonomy: Cole, 1940. Amer. Midland Nat. 24: 68, 70. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 296, 297. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 151-152 (larva). —Francoeur and Beique, 1966. Canad. Ent. 98: 144 (Provancher types).

Biology: Wesson and Wesson, 1940. Amer. Midland Nat. 24: 100. —Headley, 1943. Ohio Jour. Sci. 43: 29. —Hicks, 1947. Canad. Ent. 79: 170-171 (unusual nesting site). —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 135-136. —Gregg, 1963. Ants of Colo., pp. 469-471.

Genus LASIUS Subgenus CHTHONOLASIUS Ruzsky

Chthonolasius Ruzsky, 1913. Arch. f. Naturgesch. 79: 59-61.
Type-species: *Formica umbrata* Nylander. Desig. by Emery, 1925.

Ants of this subgenus are more subterranean than those of the subgenus *Lasius*, and some build large earthen mounds. Food is largely honeydew derived from subterranean plant lice and mealybugs. Some forms are temporary parasites on ants of the subgenus *Lasius*.

atopus Cole. Calif. (3 mi. S. Leggett, Mendocino Co.). Ecology: The nest was found in dry soil under a stone in an unshaded area.
Lasius (*Chthonolasius*) *atopus* Cole, 1958. Tenn. Acad. Sci., Jour. 33: 75-77. ☿.

humilis Wheeler. Colo., N. Mex., Nev. Ecology: Colonies were found under stones in moist soil of a meadow and in moist open woods.
Lasius (*Formicina*) *humilis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 528. ☿, ♀.

Biology: Gregg, 1963. Ants of Colo., pp. 473-475.

minutus Emery. N. S., Maine s. to Va. w. to Minn., Iowa. Ecology: Most often found in sphagnum bogs, swampy meadows, or open dry forests. Taken most often in mounds or masonry domes. Some specimens have been associated with *L. alienus*.
Lasius umbratus minutus Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 37, 641. ☿, ♀, ♂.

Taxonomy: Wheeler, 1910. Psyche 17: 237, 238, 241-242.

Biology: Gaige, 1914. Univ. Mich., Mus. Zool., Occas. Papers 5: 3, 4, 21, 23. —Wheeler, 1915. Psyche 22: 206. —Morris, 1943. Ind. Acad. Sci., Proc. 52: 215. —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 182. —Kannowski, 1959. Insectes Sociaux 6: 136-138, 151-153 (colony founding; possible parasitism on *Lasius alienus* and *L. pallitarsis* (= *sitkaensis*)). —Kannowski, 1959. Ecology 40: 162-165 (radioactive phosphorus in study of colony distribution)

nevadensis Cole. Nev. (Kyle Canyon, Charleston Mts.). Ecology: Nests were found in an unshaded area in open forests; some were under stones and some were in exposed soil with a scattering of soil around the entrance.

Lasius (*Chthonolasius*) *nevadensis* Cole, 1956. Tenn. Acad. Sci., Jour. 31: 26-27. ☿, ♀, ♂.

speculiventris Emery. N. J., Pa. w. to Minn., Iowa, Kans. Ecology: Nests have been found under rocks and in rotting wood either in pastures or wooded areas.

Lasius speculiventris Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 637, 641. ☿, ♂.

Taxonomy: Wheeler, 1910. Psyche 17: 237, 242-243. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 592.

Biology: Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 173. —Kannowski, 1959. Insectes Sociaux 6: 138-141, 153-154 (parasitism on *minutus* and possible other *Lasius* spp.).

subumbratus Viereck. N. S., Maine w. to Sask., Wash., Oreg., s. to N. Mex., Ariz., Nev. Ecology: Nests under stones or rotting logs in meadows and forests. A temporary social parasite. Host: *Lasius pallitarsis* (Provancher).

Lasius umbratus subumbratus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 73. ♀.

Taxonomy: Wheeler, 1910. Psyche 17: 237-239. —Cole, 1942. Amer. Midland Nat. 28: 374.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 528. —Wheeler, 1917. Psyche 24: 167-176. —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 179-180. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 191-192. —Gregg, 1963. Ants of Colo., pp. 475-478.

umbratus (Nylander). N. S., N. B., Que. s. to Fla. w. to Idaho, Utah, Ariz.; Eurasia. Ecology: Prefers moist soil and most commonly nests under stones and in or under rotting logs and stumps. May foster subterranean plant lice and mealybugs; occasionally a house-infesting ant. A temporary social parasite. Host: *Lasius alienus* (Foerster), *L. niger* (L.), *L. neoniger* Emery (?).

Formica umbrata Nylander, 1846. Acta. Soc. Sci. Fenn. 2: 1048-1050. ♀, ♂.
Formica mixta Nylander, 1846. Acta. Soc. Sci. Fenn. 2: 1050-1052. ♀.
Formica affinis Schenck, 1852. Jahrb. Ver. Nat. Nassau 8: 62-63. ☿, ♀, ♂.
Formica aphidicola Walsh, 1862. Ent. Soc. Phila., Proc. 1: 310. ☿, ♂.
Lasuis umbratus var. *mixto-umbratus* Forel, 1874. Nouv. Mem. Soc. Helv. Sci. Nat., p. 48. ☿.
Lasius umbratus var. *exacutus* Ruzsky, 1904. Kasan Univ. Obschchestvo estestvoispytatelei Protokoly Zasiedanii, no. 206, p. 15. ☿.
Lasius umbratus var. *mixto-affinis* Ruzsky, 1904. Kasan Univ. Obschchestvo estestvoispytatelei Protokoly Zasiedanii, no. 206, p. 15. Nomen nudum.
Lasius umbratus var. *mixto-bicornis* Ruzsky, 1905. Schrift. Naturforsch. Gesell. Univ. Kasan 38: 292. Nomen nudum.
Lasius umbratus var. *affino-umbratus* Donisthorpe, 1914. Ent. Rec. 26: 40. ☿.
Lasius umbratus var. *przewalskii* Ruzsky, 1915. Mus. Zool. Acad. Sci. Petrograd 20: 434. ☿.
Formicina umbrata distinguenda Emery, 1916. Rend. Accad. Bologna, pp. 64-65. ☿, ♀.
Formicina umbrata var. *hybrida* Emery, 1916. Rend. Accad. Bologna, p. 66.
Formicina umbrata var. *nuda* Bondroit, 1917. Soc. Ent. de France, Bul. 86: 176.
Formicina umbrata var. *sabularum* Bondroit, 1918. Soc. Ent. de France, Bul. 87: 31.
Formicina belgarum Bondroit, 1918. Soc. Ent. de France, Bul. 87: 31. ☿, ♀.
Lasius bicornis var. *citrina* Emery, 1922. Soc. Ent. Ital., Bol. 54: 12. ☿.
Lasius umbratus var. *viehmeyeri* Emery, 1922. Soc. Ent. Ital., Bol. 54: 13-15. ☿, ♀.
Lasius silvestrii Wheeler, 1928. Lab. Zool. Portici, Bol. 20: 120-121. ♀.
Lasius viehmeyeri var. *dalmatica* Starcke, 1937. Tijdschr. Ent. 80: 53-54. ♀.
Lasius umbratus var. *hirtiscapus* Starcke, 1937. Tijdschr. Ent. 80: 43. ♀.
Lasius umbratus distinguendus var. *cereomicans* Starcke, 1937. Tijdschr. Ent. 80: 48-49. ☿, ♀, ♂.
Lasius silvestri (!) var. *osakana* Santschi, 1941. Mitt. Schweiz. Ent. Ges. 18: 278. ♀.
Chtonolasius(!) *affinis* var. *nyaradi* Roszler, 1943. Zool. Anz. 144: 47-48. ☿, ♀.
Lasius umbratus epinotalis Buren, 1944. Iowa State Col., Jour. Sci. 18: 296, 297. ☿.

Taxonomy: Wheeler, 1910. Psyche 17: 237-241. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 592. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 150-151 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 397. —Smith, 1928. Ent. News 39: 277-278. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 90, 101. —Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 161-165. —Kannowski, 1959. Insectes Sociaux 6: 141, 154-155 (possible parasitism on other *Lasius* spp.). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 192-194. —Gregg, 1963. Ants of Colo., pp. 478-481. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 84-86 (economic importance).

Morphology: Blum, *et. al*, 1968. Ent. Soc. Amer., Ann. 61: 1354-1359 (terpenes in mandibular glands). —Hung, 1969. Ent. Soc. Amer., Ann. 62: 456 (chromosome number).

vestitus Wheeler. B. C., Idaho, Oreg., Calif.
Lasius umbratus vestitus Wheeler, 1910. Psyche 17: 238, 242. ♀.
Lasius (*Chthonolasius*) *pilosus* Smith, 1934. Ent. Soc. Amer., Ann. 27: 384. ☿.

Biology: Wilson, 1955. Harvard Univ., Mus. Comp. Zool., Bul. 113: 173-175.

Genus ACANTHOMYOPS Mayr

Acanthomyops Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12: 699.
Type-species: *Formica clavigera* Roger. Monotypic.

The ants of this exclusively North American genus nest in the soil, usually beneath objects, and also in rotting logs and stumps. They are mostly subterranean in habit. The females and workers have a characteristic citronella or lemon-verbena odor. Species of *Acanthomyops* are sometimes of economic importance because they foster honeydew excreting insects and because of their objectionable habit of nesting around foundations of buildings and beneath basement floors. The winged forms are often mistaken for termites.

Revision: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 638, 642. —Wheeler, 1916. Psyche 23: 170-172. —Buren, 1950. Ent. Soc. Wash., Proc. 52: 184-190. —Wing, 1968. Cornell Univ., Agr. Expt. Sta., Mem. 405, 173 pp. (also biological notes for each species).

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 154-156 (larvae). —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 648 (larvae).

Biology: Kannowski, 1963. Pavia Univ., Symp. Genet. Biol. Ital. 12: 74-102 (flight activities). —Talbot, 1963. Ecology 44: 549-555 (local distribution and flight activities).

arizonicus (Wheeler). S. Ariz. Ecology: Most collections have been from under stones.
Lasius (*Acanthomyops*) *interjectus arizonicus* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 532. ☿.

bureni Wing. Wis. (Comstock, Barron Co.).
Acanthomyops bureni Wing, 1968. Cornell Univ., Agr. Expt. Sta., Mem. 405, pp. 135-138. ☿, ♀, ♂.

californicus (Wheeler). S. Calif. Ecology: Colonies have been found in soil under stones.
Lasius (*Acanthomyops*) *interjectus californicus* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 531. ☿, ♀.

claviger (Roger). Mass., Ont., N. Y. s. to Fla. w. to Minn., Nebr., Kans., Miss. Ecology: Found in woodlands, pastures, or open fields where they nest under stones, in rotting wood, and occasionally in exposed soil. A common house pest. Smaller yellow ant.
Formica clavigera Roger, 1862. Berlin. Ent. Ztschr. 6: 241. ♀.
Lasius (*Acanthomyops*) *parvula* Smith, 1934. Psyche 41: 213. ☿.

Taxonomy: Buren, 1944. Iowa State Col., Jour. Sci. 18: 296. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 155-156 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 398. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 296, 397. —Rau, 1945. Ent. News 56: 119. —Carter, 1962. Elisha Mitchell Sci. Soc., Jour. 78: 150-204. —Talbot, 1963. Ecology 44: 549-557 (local distribution, flight activities). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 86-87 (economic importance). —Talbot, 1973. Great Lakes Ent. 6: 20-21 (S. Mich.).

Morphology: Wheeler and McClendon, 1903. Biol. Bul. 4: 149-155. —Chadha, *et al.*, 1962. Jour. Ins. Physiol. 8: 175-179 (citronellal and citral in mandibular gland secretion). —Regnier and Wilson, 1968. Jour. Ins. Physiol. 14: 955-970 (alarm-defense system).

colei Wing. N. Mex., Ariz.
Acanthomyops colei Wing, 1968. Cornell Univ., Agr. Expt. Sta., Mem. 405, pp. 88-89. ☿, ♂.

coloradensis (Wheeler). Man., N. Dak., S. Dak., Colo., N. Mex. w. to Alta., Oreg., Utah.
Ecology: Most colonies have been found under stones. Confused with *A. claviger* in earlier literature.
Lasius (*Acanthomyops*) *interjectus coloradensis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 532. ☿, ♀, ♂.

Biology: Gregg, 1963. Ants of Colo., pp. 481, 483-484. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 195-197 (reported as *claviger*).

creightoni Wing. Utah (Moab, Grand Co.).
Acanthomyops creightoni Wing, 1968. Cornell Univ., Agr. Expt. Sta., Mem. 405, pp. 141-143. ☿, ♀, ♂.

interjectus (Mayr). Mass., N. Y. s. to Ga. w. to Mont., Idaho, Utah, N. Mex. Ecology: Found in woodlands, pastures or meadows. They may nest in exposed soil where the nest is sometimes surmounted by a mound, under stones or other objects, in rotting logs and stumps, or next to foundation walls of buildings. A frequent house pest. Larger yellow ant.
Lasius (*Acanthomyops*) *interjectus* Mayr, 1866. Zool.-Bot. Gesell. Wien, Verh. 16: 888. ♀.

Taxonomy: Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 592, 594. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 296. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 156 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 397-398. —Smith, 1928. Kans. Ent. Soc., Jour. 1: 14-18. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 296, 306. —Carter, 1962. Elisha Mitchell Sci. Soc., Jour. 88: 150-204. —Talbot, 1963. Ecology 44: 549-557 (local distribution, flight activities). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 197-200. —Gregg, 1963. Ants of Colo., pp. 484-486. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 88-89 (economic importance). —Talbot, 1973. Great Lakes Ent. 6: 22 (S. Mich.).

latipes (Walsh). Que., Maine w. to B. C. s. to S. C., Tenn., Ill., Iowa, Okla., N. Mex., Ariz., Calif.
Ecology: Found in open woodlands, meadows, or pastures where they may nest in exposed soil commonly surmounted by a mound, under stones or other objects, or at the base of stumps.
Formica latipes Walsh, 1862. Ent. Soc. Phila., Proc. 1: 311. ☿, ♀, ♂.

Taxonomy: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 638, 642. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 592. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 296. —Cole, 1954. Tenn. Acad. Sci., Jour. 29: 284. —Wing, 1968. Cornell Univ., Agr. Expt. Sta., Mem. 405, pp. 98-105 (hybrids described).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 398. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 21: 398. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 41: 79. —Talbot, 1963. Ecology 44: 549-557 (local distribution, flight activities). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 200-202. —Gregg, 1963. Ants of Colo., pp. 486-488. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 91-93 (economic importance). —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 20 (Nev. Test Site). —Talbot, 1973. Great Lakes Ent. 6: 22 (S. Mich).

Morphology: Wheeler and McClendon, 1903. Biol. Bul. 4: 149-155. —Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 41: 79.

murphyi (Forel). N. Y., Ont. s. to Ga. w. to Sask., Idaho, n. Calif., Utah, N. Mex. Ecology: Usually nests under or next to stones in open woodlands or edges of woodlands. Prefers sandy soil. Widely but sporadically distributed in N. Amer.
Lasius (*Acanthomyops*) *Murphii* Forel, 1901. Soc. Ent. de Belg., Ann. 45: 367. ☿, ♀, ♂.
Lasius (*Acanthomyops*) *murphyi* Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 398. Emend.

Taxonomy: Wing, 1968. Cornell Univ., Agr. Expt. Sta., Mem. 405, pp. 13-121 (hybrids described).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 398. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 530. —Talbot, 1963. Ecology 44: 549-557 (local distribution, flight activities). —Gregg, 1963. Ants of Colo., pp. 489-490. —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 89-91 (economic importance). —Talbot, 1973. Great Lakes Ent. 6: 21 (S. Mich.).

occidentalis (Wheeler). Man., Minn., Nebr., Colo., N. Mex. w. to B. C., Wash., Wyo., Utah. Ecology: Nests have been found under stones in dry sandy soil.
Lasius (*Acanthomyops*) *occidentalis* Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 83. ☿, ♀, ♂.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 530. —Gregg, 1963. Ants of Colo., pp. 490-493.

plumopilosus (Buren). N. C., Mich., Minn., Iowa. Ecology: Found under stones and in rotting logs.
Lasius (*Acanthomyops*) *plumopilosus* Buren, 1941. Iowa State Col., Jour. Sci. 15: 231-235. ☿, ♀, ♂.

Biology: Buren, 1944. Iowa State Col., Jour. Sci. 18: 296, 299.

pogonogynus (Buren). Iowa, Colo., Idaho. Listed as a hybrid of *murphyi* x *latipes* by Wing (1968).
Lasius (*Acanthomyops*) *pogonogynus* Buren, 1950. Ent. Soc. Wash., Proc. 52: 186. ☿, ♀.

Taxonomy: Wing, 1968. Cornell Univ., Agr. Expt. Sta., Mem. 405, pp. 117-119 (as a hybrid).

Biology: Gregg, 1963. Ants of Colo., pp. 493-494.

pubescens (Buren). Minn. Ecology: Nests with low mounds were found in soil in open woods.
Lasius (*Acanthomyops*) *pubescens* Buren, 1942. Iowa State Col., Jour. Sci. 16: 405. ☿, ♀.

subglaber (Emery). Maine s. to Ga., Tenn. w. to Sask., N. Dak., S. Dak. Ecology: Nests in woodlands or open areas, in mound nests, under stones, or in or under rotting logs and stumps.
Lasius claviger var. *subglaber* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 642. ☿, ♀, ♂.
Lasius (*Acanthomyops*) *clavigeroides* Buren, 1942. Iowa State Col., Jour. Sci. 16: 406. ☿, ♀, ♂.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 398. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 533. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 155 (larva). —Wing, 1968. Cornell Univ., Agr. Expt. Sta., Mem. 405, pp. 121-132 (hybrids described). —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 648, 649 (larva).

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 623. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 203-204. —Talbot, 1973. Great Lakes Ent. 6: 19-20 (S. Mich.).

Genus PARATRECHINA Motschulsky

Species of this genus often nest in the soil where the entrance may be surrounded by a small irregular crater of earth, under stones, or beneath moss. They are occasionally house pests. Because of the differences of opinion in recent literature regarding the status of subgenera, particularly *Nylanderia*, the two subgenera are listed as in previous catalogs.

Genus PARATRECHINA Subgenus PARATRECHINA Motschulsky

Paratrechina Motschulsky, 1863. Soc. Nat. Moscou, Bul. 36: 13.
Type-species: *Paratrechina currens* Motschulsky. Desig. by Wheeler, 1911.

longicornis (Latreille). S. C. s. to Fla. w. to Tex.; Calif.; Pantropical. Ecology: Highly adaptable and may nest in many situations such as trash, refuse, plant cavities, rotting wood, and in soil under stones. Workers are omnivorous and feed on live and dead insects, seeds, honeydew and household foods. Sometimes a household pest. Introduced into the U. S. Probably native to Africa or the Orient and spread to many parts of the world by

commerce. Sometimes found in northern states in greenhouses or other buildings. Crazy ant.

Formica longicornis Latreille, 1802. Hist. Nat Fourmis, p. 113. ☿.
Formica vagans Jerdon, 1851. Madras Jour. Lit. Sci. 17: 124. ☿.
Formica gracilescens Nylander, 1856. Ann. Sci. Nat. Zool. 5: 73. ☿.
Paratrechina currens Motschulsky, 1863. Soc. Nat. Moscou, Bul. 36: 14. ☿.

Taxonomy: Bingham, 1903. Fauna of British India 2: 326-327 (each caste). —Smith, 1936. Puerto Rico Univ., Jour. Agr. 20: 865, 869-870. —Wheeler and Wheeler 1953. Ent. Soc. Amer., Ann. 46: 143 (larva). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 87 (Polynesia).

Biology: Marlatt, 1928. U. S. Dept. Agr. Farmers' Bul. 740: 6-7. —Phillips, 1934. (Hawaii Univ.) Expt. Sta. Pineapple Prod. Coop. Assoc. Bul. 15: 18-19 —Turner, 1940. Conn. Agr. Expt. Sta. Bul. 434: 311-312. —Fox and Garcia-Moll, 1961. Jour. Econ. Ent. 54: 1065-1066. —Brown, 1964. Ent. News 75: 14-15. —Smith, 1965. U. S. Dept. Agr. Tech. Bul. 1326, pp. 74-76 (economic importance).

Genus PARATRECHINA Subgenus NYLANDERIA Emery

Nylanderia Emery, 1906. Soc. Ent. de Belg., Ann. 50: 134.
Type-species: *Formica vividula* Nylander. Orig. desig.

Members of this subgenus are in need of study. Existing keys are not adequate for species identification, and a number of the names may be wrongly applied. Species determination has always been considered difficult and male genitalia are believed to offer help in separating species. The segregates listed here are essentially as those proposed by Creighton, 1950. This subgenus is much better represented in the tropical regions of the world, and there are many tramp species which make the taxonomy more confusing.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 402-410.

Biology: Smith, 1965. U. S. Dept. Agr. Tech. Bul. 1326, pp. 76-77 (as house pests).

bourbonica (Forel). S. C., Fla.; Pantropical. Introduced. Probably native to tropical Asia and spread by commerce to Indian and Pacific Oceans and to New World tropics.
Prenolepis nodifera bourbonica Forel, 1886. Soc. Ent. de Belg., Ann. 30: 210. ☿, ♀, ♂.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 405 (a var. of *bourbonica* in U. S. ?). —Wilson and Taylor, 1967. Pacific Ins. Monog. 14: 87-89 (Polynesia).

Biology: Smith, 1930. Fla. Ent. 14: 23-24. —Wheeler, 1932. N. Y. Ent. Soc., Jour. 40: 16.

bruesii (Wheeler). Fla., Ala. w. to Okla., Tex., Ariz. (?).
Prenolepis bruesii Wheeler, 1903. Psyche 10: 106. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 211 (larva; Okla.; as *bruesi*).

Biology: Smith, 1924. Ent. News 35: 122.

fulva (Mayr). S. Tex. s. to Argentina. Sporadically in greenhouses as far north as N. J. Probably introduced. References to *P. fulva pubens* (Forel) from the U. S. pertain to this species.
Prenolepis fulva Mayr, 1862. Zool.-Bot. Gesell. Wien, Verh. 12: 698. ☿, ♀.

Taxonomy: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 636-637. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 406-407.

Biology: Marlatt, 1922. U. S. Dept. Agr. Farmers' Bul. 740: 8-9.

melanderi arenivaga (Wheeler). N. J. s. to Fla. w. to Iowa, Tex., Calif.
Prenolepis arenivaga Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 391. ☿, ♂.
Prenolepis (*Nylanderia*) *arenivaga* var. *faisonensis* Forel, 1922. Rev. Suisse de Zool. 30: 98. ☿.

Taxonomy: Buren, 1944. Iowa State Col., Jour. Sci. 18: 295. —Harper, 1965. Calif. Dept. Agr. Bul., Ann. Rpt. 45, 54: 81 (Calif. records).

Biology: Smith, 1928. Ent. News 39: 278.

melanderi melanderi (Wheeler). Tenn. w. to Kans., Tex., Ariz.; Mexico.
Prenolepis melanderi Wheeler, 1903. Psyche 10: 104. ☿, ♀, ♂.

Taxonomy: Emery, 1906. Soc. Ent. de Belg., Ann. 50: 132. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 144 (larva).

Biology: Mitchell and Pierce, 1912. Ent. Soc. Wash., Proc. 14: 74.

parvula (Mayr). Mass. s. to Fla. w. to N. Dak., Nebr., Kans., Tex., Ariz., Utah (?). Ecology: Nests under moss, in logs and stumps, beneath stones, or in open grassy areas where the nest may be surmounted by a small crater.
Prenolepis parvula Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 947. ☿, ♀, ♂.
Prenolepis (*Nylanderia*) *parvula* var. *grandula* Forel, 1922. Rev. Suisse des Sci. Nat., Bul. 20: 348. ☿.

Taxonomy: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 636 (worker, male). —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 100. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 295. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 211 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 390. —Talbot, 1934. Ecology 15: 420-422. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 295, 306. —Cole, 1940. Amer. Midland Nat. 24: 66. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 175-176.

vividula guatemalensis (Forel). S. Ariz.; Central Amer. Possibly introduced. According to Snelling (correspondence), the Ariz. record for *guatemalensis* is based on misidentified *arenivaga*.
Prenolepis vividula vividula var. *guatemalensis* Forel, 1884. Soc. Vaud. des Sci. Nat., Bul. 20: 348. ☿.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 392 (worker, male).

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 342. —Cole, 1934. Ent. Soc. Amer., Ann. 27: 401.

vividula vividula (Nylander). Fla., Miss. Sporadically in greenhouses in northern areas as far as Canada. Introduced.
Formica vividula Nylander, 1846. Acta Soc. Fenn. 2: 900. ☿, ♀, ♂.
Formica perminuta Buckley, 1866. Ent. Soc. Phila., Proc. 6: 162. ☿. Synonymy questionable.
Formica picea Buckley, 1866. Ent. Soc. Phila., Proc. 6: 163. ☿. Synonymy questionable.
Formica (*Tapinoma*) *terricola* Buckley, 1866. Ent. Soc. Phila., Proc. 6: 168. ☿, ♀, ♂. Synonymy questionable.

Taxonomy: Emery, 1906. Soc. Ent. de Belg., Ann. 50: 130 (each caste). —Emery, 1910. Deut. Ent. Ztschr., p. 131 (each caste).

Biology: Mitchell and Pierce, 1912. Ent. Soc. Wash., Proc. 14: 74. —Marlatt, 1922. U. S. Dept. Agr. Farmers' Bul. 740: 7.

Genus PRENOLEPIS Mayr

Prenolepis Mayr, 1861. Die Europaischen Formiciden, pp. 26, 52.
Type-species: *Tapinoma nitens* Mayr. Desig. by Bingham, 1903.

These ants usually nest in the soil in exposed situations or under cover in small to moderate sized colonies. Workers feed on honeydew, secretions of floral and extrafloral nectaries, exudates from galls, earthworms, arthropods, and ripened or decaying fruits. The ants often invade houses in search of food, and they sometimes forage even at freezing temperatures. Repletes are common. Males and females overwinter in the nest and are among the first of ants to take their nuptial flights in the spring.

Revision: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 635-637. —Wheeler, 1930. Ent. Soc. Amer., Ann. 23: 1-26.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 142 (larvae).

imparis arizonica Wheeler. S. Ariz.
Prenolepis imparis var. *arizonica* Wheeler, 1930. Ent. Soc. Amer., Ann. 23: 22. ☿, ♀, ♂.

imparis californica Wheeler. Oreg., Nev., Calif. Ecology: Reported to feed on succulent tissue of fruit and on fruit buds, damaging these by eating out the centers and leaving only the scales.

Prenolepis imparis var. *californica* Wheeler, 1930. Ent. Soc. Amer., Ann. 23: 23. ☿, ♀, ♂.

Taxonomy: Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Bul. 342: 27.

Biology: Essig, 1926. Ins. West. No. Amer., p. 866. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 77-78.

imparis coloradensis Wheeler. Colo., N. Mex.

Prenolepis imparis var. *coloradensis* Wheeler, 1930. Ent. Soc. Amer., Ann. 23: 22. ☿.

Biology: Gregg, 1963. Ants of Colo., pp. 496-498.

imparis imparis (Say). Conn., Ont. s. to Fla. w. to Wis., Iowa, Mo., Okla., Tex., N. Mex., Ariz. An annoying house infesting ant with habits similar to those given for the genus.

Formica imparis Say, 1836. Boston Jour. Nat. Hist. 1: 287. ♀, ♂.

Tapinoma polita Smith, 1855. Ent. Soc. London, Trans. 3: 112. ☿. Synonymy questionable.

Formica (*Tapinoma*) *Wichita* Buckley, 1866. Ent. Soc. Phila., Proc. 6: 169. ☿. Synonymy questionable.

Prenolepis nitens var. *americana* Forel, 1891. *In* Grandidier, Hist. Madagascar, v. 20, p. 94. ♂.

Prenolepis imparis var. *minuta* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 636. ☿, ♂.

Prenolepis imparis var. *testacea* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 636. ♀, ♂.

Prenolepis imparis var. *pumila* Wheeler, 1930. Ent. Soc. Amer., Ann. 23: 21. ☿, ♂.

Taxonomy: Wesson and Wesson, 1940. Amer. Midland Nat. 24: 100. —Cole, 1940. Amer. Midland Nat. 24: 66, 67. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 142-143 (larva).

Biology: Smith, 1924. Ent. News 35: 122. —Smith, 1928. Ent. News 39: 278. —Dennis, 1941. Ent. Soc. Amer., Ann. 34: 82-86. —Talbot, 1943. Ecology 24: 31-44 (population studies). —Talbot, 1943. Ecology 24: 345-352. (response to temperature and humidity changes). —Tarpley, 1965. N. Y. Ent. Soc., Jour. 73: 6 (nuptial flight). —Smith, 1965. U. S. Dept. Agr., Tech. Bul. 1326, pp. 78-79 (economic importance).

Genus MYRMECOCYSTUS Wesmael

Myrmecocystus Wesmael, 1838. Brussels Acad. Roy. de Belg., Bul. de Cl. des Sci. 5: 769. Type-species: *Myrmecocystus mexicanus* Wesmael. Monotypic.

This genus is native to Mexico and western United States and is especially typical of the arid plains and deserts. The ants nest in soil, the nest being surmounted by a small crater, usually in medium-sized colonies of 1,000 to 3,000 workers. Some forms are apparently entirely predaceous or carnivorous; others live on honeydew and nectar obtained from plants or the secretion of galls. They may be diurnal or nocturnal in their activity. Repletes are known to occur in many forms. Ants of this genus are commonly called "honey ants" because of the honeylike substance stored in the gasters of the repletes. Fluid stored in repletes is largely for use by adults of the colony with little or none for the larvae. Larval food consists of dead insects brought in by foraging workers. Owing to the high degree of polymorphism in many forms, these ants are not easily determined specifically without large series of workers, especially major ones.

Since this section was completed, Snelling (1976) published a revision of *Myrmecocystus*, the results of which cannot be entirely incorporated into this catalog at this date. Snelling recognizes 27 species in three subgenera, the typical subgenus, subgenus *Endiodioctes* Snelling (type-species: *Myrmecocystus melliger* Forel), and subgenus *Eremnocystus* Snelling (type-species: *Myrmecocystus creightoni* Snelling). Except for their arrangement by subgenus, all species treated by Snelling that fall within the scope of this catalog are given.

Revision: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 666-667. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 345-397. —Wheeler, 1912. Psyche 19: 172-181. —Snelling, 1976. Nat. Hist. Mus. of Los Angeles Co., Sci. Bul. 24: 1-163 (also biology).

Taxonomy: Snelling, 1969. Los Angeles Co. Mus., Contrib. Sci. 170: 1-9 (*melliger* complex). —Wheeler and Wheeler, 1970. Ent. Soc. Amer., Ann. 63: 651 (larvae).

Biology: Snelling, 1968. Los Angeles Co. Mus., Natur. Hist. Quart. 7: 14-18.

colei Snelling. S. Calif.
Myrmecocystus (*Eremnocystus*) *colei* Snelling, 1976. Nat. Hist. Mus. of Los Angeles Co., Sci. Bul. 24: 94-97. ☿, ♀, ♂.

creightoni Snelling. S. Calif.
Myrmecocystus creightoni Snelling, 1971. Los Angeles Co. Mus., Contrib. Sci. 214: 6-11. ☿, ♀, ♂.

Taxonomy: Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 213 (larva; misidentified as *M. lugubris*).

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 120.

depilis Forel. W. Tex., N. Mex., Ariz., s. Nev.; Mexico. Confused with *mimicus* in the earlier literature.
Myrmecocystus melliger var. *depilis* Forel, 1901. Soc. Ent. de Belg., Ann. 45: 135. ☿.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 354. —Wheeler, 1912. Psyche 19: 173.

ewarti Snelling. S. Calif.
Myrmecocystus ewarti Snelling, 1971. Los Angeles Co. Mus., Contrib. Sci. 214: 2-6. ☿, ♀, ♂.

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 120.

flaviceps Wheeler. Utah, Ariz., s. Nev., s. Calif.; Mexico.
Myrmecocystus yuma var. *flaviceps* Wheeler, 1912. Psyche 19: 174, 177. ☿.

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 121-122.

hammettensis Cole. Idaho, Nev., e. central Calif.
Myrmecocystus hammettensis Cole, 1938. Amer. Midland Nat. 19: 678. ☿, ♀, ♂.

kathjuli Snelling. S. Calif.
Myrmecocystus (*Endiodioctes*) *kathjuli* Snelling, 1976. Nat. Hist. Mus. of Los Angeles Co., Sci. Bul. 24: 59-62. ☿, ♀, ♂.

kennedyi Cole. S. Idaho, s.w. Utah, Ariz., s.e. Oreg., Nev., Calif.; Mexico. This species was called *M. semirufus* in the literature prior to Snelling, 1969.
Myrmecocystus melliger semirufus var. *kennedyi* Cole, 1936. Ent. News 47: 119. ☿, ♀, ♂.

Taxonomy: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 355, 368-369 (*semirufus;* also biology). —Wheeler, 1912. Psyche 19: 174, 176 (*semirufus;* also biology). —Cole, 1938. Amer. Midland Nat. 20: 371, 372. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 213 (larva; as *semirufus*). —Snelling, 1969. Los Angeles Co. Mus., Contrib. Sci. 170: 6.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 20 (*semirufus*). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 122.

koso Snelling. S. Nev., s. Calif.
Myrmecocystus (*Endiodioctes*) *koso* Snelling, 1976. Nat. Hist. Mus. of Los Angeles Co., Sci. Bul. 24: 74-78. ☿, ♀, ♂.

lugubris Wheeler. S. Nev., s. Calif.
Myrmecocystus lugubris Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 98. ☿.

Taxonomy: Wheeler, 1912. Psyche 19: 174, 176. —Creighton, 1956. Amer. Mus. Novitates 1807: 1.

Biology: Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 21.

melliger Forel. W. Tex.; Mexico. Used as food and medicine by Indians.
Formica melliger Llave, 1832. Reg. Trim. o. Collect. Mem. Hist. Lit., p. 463. ☿. Questionable placement.
Myrmecocystus melliger Forel, 1886. Soc. Ent. de Belg., Ann. 30: 201. ☿.
Myrmecocystus melliger mendax var. *comatus* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 352. ☿, ♀, ♂.

Taxonomy: Wheeler, 1912. Psyche 19: 173, 175. —Snelling, 1969. Los Angeles Co. Mus., Contrib. Sci. 170: 4. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 211-213 (larva).

mendax Wheeler. Tex., Colo., N. Mex., Ariz., s. Nev., s. Calif.; Mexico.
Myrmecocystus melliger mendax Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 351. ☿, ♀, ♂.
Myrmecocystus melliger orbiceps Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 349. ☿, ♀.

Taxonomy: Wheeler, 1912. Psyche 19: 173. —Cole, 1954. Tenn. Acad. Sci., Jour. 29: 284. —Snelling, 1969. Los Angeles Co. Mus., Contrib. Sci. 170: 2.

Biology: Wheeler, 1910. Ants, p. 376. —Cole, 1942. Amer. Midland Nat. 28: 386. —Gregg, 1963. Ants of Colo., pp. 643-645, 645-648 (misident. as *comatus*, p. 643-645).

mexicanus Wesmael. W. Tex., Colo., N. Mex., Utah, Ariz., Nev., Calif.; Mexico.
Myrmecocystus mexicanus Wesmael, 1838. Brussels Acad. Roy. de Belg., Bul. Cl. des Sci. 5: 770. ☿.
Myrmecocystus Melliger var. *hortus-deorum* McCook, 1881. Acad. Nat. Sci. Phila., Proc., pp. 65, 69. ☿, replete ☿, ♀, ♂.

Taxonomy: Forel, 1886. Soc. Ent. de Belg., Ann. 30: 202. —Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 666. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 356-360. —Wheeler, 1912. Psyche 19: 173, 178. —Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 213 (larva).

Biology: McCook, 1881. Acad. Nat. Sci. Phila., Proc., pp. 17-77. —McCook, 1882. The Honey Ants of the Garden of the Gods and the Occident Ants of the American Plains, pp. 17-74. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 81. —Gregg, 1963. Ants of Colo., pp. 648-651. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 122-124.

mimicus Wheeler. S.W. Kans., w. Okla., w. Tex., N. Mex., Ariz., Calif.; Mexico.
Myrmecocystus melliger mimicus Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 353. ☿, ♀, ♂.
Myrmecocystus melliger mimicus var. *jesuita* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 354. ☿.
Myrmecocystus melliger lomaensis Wheeler, 1912. Psyche 19: 174. ☿, replete ☿, ♀.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 446. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 213 (larva).

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27: 401-402. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 80. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 22 (Nev. Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 124-125. —Holldobler, 1976. Science 192: 192-194 (tournaments and slavery).

navajo Wheeler. Colo., w. Tex., N. Mex., Utah, Ariz., s. Nev., s. Calif.
Myrmecocystus mexicanus navajo Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 360. ☿, ♀.

Taxonomy: Wheeler, 1912. Psyche 19: 173, 179.

Biology: Cole, 1942. Amer. Midland Nat. 28: 386. —Gregg, 1963. Ants of Colo., pp. 651-653. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 125.

placodops Forel. Tex. N. Mex., Ariz.; Mexico.
Myrmecocystus melliger var. *placodops* Forel, 1908. Soc. Vaud. des Sci. Nat., Bul. 44: 70. ☿.

Taxonomy: Wheeler, 1912. Psyche 19: 173. —Snelling, 1969. Los Angeles Co. Mus., Contrib. Sci. 170: 6.

pyramicus Smith. Idaho, s.e. Oreg., Nev.
Myrmecocystus pyramicus Smith, 1951. Great Basin Nat. 11: 91-94. ☿.

Taxonomy: Cole, 1957. N. Y. Ent. Soc., Jour. 65: 129-130 (female, male).

romainei Cole. W. Kans., w. Okla., w. Tex., Colo., N. Mex., Utah, Ariz., Nev.; Mexico.
Myrmecocystus melliger semirufus var. *romainei* Cole, 1936. Ent. News 47: 120. ☿.

Biology: Cole, 1954. Tenn. Acad. Sci., Jour. 29: 285 (as *semirufa*, in part). —Gregg, 1963. Ants of Colo., pp. 653-655 (as *semirufus*, in part).

semirufus Emery. S. Calif.; Mexico.
Myrmecocystus melliger var. *semirufus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 667. ☿.

Taxonomy: Snelling, 1969. Los Angeles Co. Mus., Contrib. Sci. 170: 4-6 (The species previously considered to be *M. semirufus* by Wheeler and subsequent authors must now be known as *M. kennedyi* Cole.).

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 125-126 (misident. as *placodops* Forel).

tenuinodis Snelling. S. Nev., s.w. Ariz., s. Calif.; Mexico.
Myrmecocystus (*Eremnocystus*) *tenuinodis* Snelling, 1976. Nat. Hist. Mus. of Los Angeles Co., Sci. Bul. 24: 107-110. ☿, ♀.

testaceus Emery. Idaho, Utah, Wash. Oreg., Nev., Calif.; Mexico.
Myrmecocystus melliger var. *testaceus* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 667. ☿.
Myrmecocystus mexicanus mojave Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 360. ☿.
Myrmecocystus mexicanus idahoensis Cole, 1936. Ent. News 47: 118. ☿, ♀, ♂.

Taxonomy: Wheeler, 1912. Psyche 19: 173, 179-181. —Snelling, 1969. Los Angeles Co. Mus., Contrib. Sci. 170: 6. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 213 (larva).

Biology: Wheeler, 1910. Ants, p. 349. —Leonard, 1911. San Diego Soc. Nat. Hist., Trans. 1: 91-92. —Cole, 1934. Ent. Soc. Amer., Ann. 27: 403. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 81. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 22 (Nev. Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 126-127.

wheeleri Snelling. S. Calif.
Myrmecocystus wheeleri Snelling, 1971. Los Angeles Co. Mus., Contrib. Sci. 214: 11-15. ☿, ♀, ♂.

Biology: Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 127.

yuma Wheeler. W. Ariz., s. Nev., s. Calif.; Mexico.
Myrmecocystus yuma Wheeler, 1912. Psyche 19: 174, 176. ☿.

Taxonomy: Creighton, 1956. Amer. Mus. Novitates 1087: 1.

Tribe FORMICINI

Genus FORMICA Linnaeus

Formica Linnaeus, 1758. Syst. Nat., Ed. 10, v. 1, p. 579.
Type-species: *Formica rufa* Linnaeus. Desig. by Curtis, 1839.
Serviformica Forel, 1913. Soc. Ent. de Belg., Ann. 57: 361.
Type-species: *Formica fusca* Linnaeus. Orig. desig.
Raptiformica Forel, 1913. Soc. Ent. de Belg., Ann. 57: 361.
Type-species: *Formica sanguinea* Latreille. Orig. desig.
Formica subg. *Neoformica* Wheeler, 1913. N. Y. Acad. Sci., Ann. 23: 82.
Type-species: *Formica pallide-fulva* Latreille. Desig. by Wheeler, 1913.
Coptoformica Mueller, 1923. Soc. Adriat. di Sci. Nat. Trieste, Bol. 28: 133.
Type-species: *Formica exsecta* Nylander. Desig. by Donisthorpe, 1941.
Adformica Lomnicki, 1925. Polskie Pismo Ent. 3: 164.
Type-species: *Formica exsecta* Nylander. Desig. by Donisthorpe, 1941.

This is a large and complex holarctic genus, and the largest genus of ants in America north of Mexico. Various habit patterns are found in this genus including slave-making, temporary social parasitism of various types, and various methods of nest founding and nest construction. Subgenera are not recognized in the following listing, only species groups which more or less reflect the groupings by Creighton (1950) and Buren (1968). *Proformica*, apparently a valid genus found in Europe, is deleted from the North American fauna, and those species previously listed in that

subgenus along with a number of species excluded from *Raptiformica* by Buren are here listed in the species group *neogagates*. Those species included in the subgenus *Raptiformica* by Buren (1968) are listed here in the species group *sanguinea*. The species previously included in the subgenus *Neoformica* are listed here in the *pallidefulva* species group. The other species groups, *microgyna*, *exsecta*, *fusca*, and *rufa*, are essentially the same as before. Further studies may clarify the species groupings and determine the necessity of establishing subgenera.

Revision: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 643-654, 657-665. —Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 387-399, 401-536, 560-565. —Creighton, 1940. Amer. Mus. Novitates 1055: 1-10 (*rufa* subspp.). —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104:450-552. —Francoeur, 1973. Ent. Soc. du Quebec, Mem. 3, 316 pp. (*fusca* group).

Taxonomy: Yarrow, 1950. Internatl. Comm. Zool. Nomencl., Bul. Zool. Nomencl. 4: 408. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 160 (larvae). —Yarrow, 1955. Internatl. Comm. Zool. Nomencl., Bul. Zool. Nomencl. 9: 313-318 (type-species). —Wilson and Brown, 1955. Psyche 62: 108-129 (notes on *sanguinea* and *neogagates* groups). —Gregg, 1964. Colo. Univ. Mus., Leaflet No. 13, pp. 59-69 (distribution in mountains of Colo.). —Gregg, 1969. Ent. Soc. Wash., Proc. 71: 38-49 (geographical distribution of genus in world). —Buren, 1968. Ga. Ent. Soc., Jour. 3: 25-40 (fundamental taxonomic problems; subg. *Raptiformica*).

Biology: Gosswald, 1957. Insectes Sociaux 4: 335-348 (caste determination). —Kannowski, 1959. Insectes Sociaux 6: 147. —Kannowski and Johnson, 1969. Anim. Behaviour 17: 425:429 (male patrolling behavior and sex attraction). —Rosengren, 1971. Acta Zool. Fennica 133, 106 pp. (route fidelity, visual memory, recruitment behavior).

Morphology: Osman and Kloft, 1961. Insectes Sociaux 8: 383-395 (venom).

Species Group Neogagates

Species of this group nest in small colonies in the soil, sometimes under stones or beneath other objects. They are commonly enslaved by members of the *microgyna* and *sanguinea* groups.

Taxonomy: Wilson and Brown, 1955. Psyche 62: 108-129. —Buren, 1968. Ga. Ent. Soc., Jour. 3: 25-40.

bradleyi Wheeler. Man., Minn., Iowa w. to Alta., Mont., Wyo., Colo. Ecology: Nests only in sand or sandy soil among grass clumps or with low irregular mounds.
Formica bradleyi Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 389, 423. ☿, ♂.
Formica (*Proformica*) *neogagates neogagates* var. *morbida* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 400, 538. ☿, ♀.

Taxonomy: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 535. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 168-169 (larva). —Wilson and Brown, 1955. Psyche 62: 126-127.

Biology: Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 258-259. —Beamer and Michner, 1950. Kans. Ent. Soc., Jour. 23: 110-113 (relationship with leafhoppers). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 206-209. —Gregg, 1963. Ants of Colo., pp. 602-606. —Snelling, 1969. Ent. Soc. Wash., Proc. 71: 196-197. —Halverson, *et al.* 1976. Kans. Ent. Soc., Jour. 49: 280-303 (natural history of the sandhill ant).

lasioides Emery. N. S., Que. w. to B. C. s. to Mass., Mich., S. Dak., Colo., N. Mex., Ariz., Calif. Ecology: Commonly found in grasslands where it nests under stones or in nests with exposed entrances or small craters, but also found in other habitats.
Formica lasiodes Emery, 1893. Zool. Jahrb., Abt. f. System 7: 646, 664. ☿.
Formica lasoides var. *picea* Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 335. ☿. Preocc. by Nylander, 1846.
Formica lasioides var. *vetula* Wheeler, 1912. Psyche 19: 90. N. name for *picea* Emery.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 400, 540-541 (each caste). —Gregg, 1944. Ent. Soc. Amer., Ann. 37: 472. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 299.

Biology: Cole, 1942. Amer. Midland Nat. 28: 384. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 268-269. —Kincaid, 1963. Amer. Micros. Soc., Trans. 82: 101-105 (as pollinators of plants). —Wheeler and Wheeler, 1963. Ants of N. Dak. pp. 209-211, 502. —Gregg, 1963. Ants of Colo., pp. 498-500, 502. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 23 (Nev. Test Site).

limata Wheeler. Minn., N. Dak., Colo., N. Mex., Utah, Nev. Ecology: Commonly nests in grasslands under stones or in crater nests; tolerant of dry situations.

Formica (*Proformica*) *limata* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 400, 541. ☿.

Biology: Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 268. —Gregg, 1946. Amer. Midland Nat. 35: 750. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 211-212. —Gregg, 1963. Ants of Colo., pp. 502, 504. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 24 (Nev. Test Site).

manni Wheeler. Idaho, Utah, Wash., Oreg., Nev., Calif. Ecology: Nests are often under stones in gravelly or sandy soil of desert areas.

Formica manni Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 389, 420. ☿, ♀.

Taxonomy: Wilson and Brown, 1955. Psyche 62: 127-128.

Biology: Cole, 1942. Amer. Midland Nat. 28: 376, 378-379.

neogagates Emery. N. S., Que. w. to Alaska s. to N. C., Ill., Iowa, Nebr., N. Mex., Ariz., Calif. Ecology: Nests most often in grasslands in dry and stony situations, under stones or in the open with or without an irregular mound or crater.

Formica fusca subpolita var. *neogagates* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 646, 661. ☿, ♀, ♂.

Formica (*Proformica*) *neogagates neogagates* var. *vinculans* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 400, 539. ☿, ♀.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 400, 536-538 (each caste). —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 596. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 158-159 (larva).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 401. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 102. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 268. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 299. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 212-214. —Gregg, 1963. Ants of Colo., pp. 503-505. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 26 (Nev. Test Site).

obtusopilosa Emery. Minn. w. to Alta. s. to Nebr., N. Mex., Utah, Nev. Ecology: Small colonies are found under stones or in exposed soil usually with irregular mounds or craters in meadows and grasslands.

Formica sanguinea obtusopilosa Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 643, 648. ☿.

Formica munda Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 267. ☿, ♀.

Formica munda var. *alticola* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 534. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 389, 414-418. —Wilson and Brown, 1955. Psyche 62: 128.

Biology: Cole, 1942. Amer. Midland Nat. 28: 378. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 217-219. —Gregg, 1963. Ants of Colo., pp. 608-611. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 26 (Nev. Test Site).

oregonensis Cole. Oreg. (Pendleton).

Formica oregonensis Cole, 1938. Amer. Midland Nat. 20: 368. ☿.

Taxonomy: Cole, 1956. Tenn. Acad. Sci., Jour. 31: 212-214.

Biology: Kincaid, 1963. Amer. Micros. Soc., Trans. 82: 101-105 (pollinators of plants).

perpilosa Wheeler. Wyo., Colo., Kans., Okla., Tex. w. to Calif.; Mexico. Ecology: Usually constructs crater nests in the soil in grasslands and open fields.

Formica fusca subpolita var. *perpilosa* Wheeler, 1902. Soc. Cient. "Antonio Alzate" Mem. y Rev. 17: 141. ☿, ♀.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 389, 421-423 (each caste). —Cole, 1942. Amer. Midland Nat. 28: 376-378. —Wilson and Brown, 1955. Psyche 62: 128.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 534. —Cole, 1934. Ent. Soc. Amer., Ann. 27: 401. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 85. —LaBerge, 1952. Kans. Ent. Soc., Jour. 25: 59. —Gregg, 1963. Ants of Colo., pp. 611-613.

Species Group Pallidefulva

Members of this group nest in the soil under stones or at the base of tufts of grass. There is usually no mound or crater marking the nest. They serve as hosts of slave-making species of *Formica*.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 543-552 (subg. *Neoformica*).

archboldi Smith. Ga., Ala., Fla.
Formica pallide-fulva archboldi Smith, 1944. Fla. Ent. 27: 16. ☿.

Biology: Schneirla, 1944. Amer. Mus. Novitates 1261: 1-2.

pallidefulva nitidiventris Emery. Ont., Que. s. to Ga. w. to Wis., S. Dak., Wyo., Colo., N. Mex.
Formica pallide-fulva nitidiventris Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 645, 656. ☿, ♀, ♂.
Formica pallide-fulva schaufussi var. *incerta* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 645, 655. ☿, ♀, ♂.
Formica pallide-fulva fuscata Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 645, 656. ☿.
Formica pallide-fulva delicata Cole, 1938. Amer. Midland Nat. 20: 369. ☿, ♀.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 401. —Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 401, 554-557. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 595, 598. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 299, 309-310. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 159-160 (larva).

Biology: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 370-371. —Wheeler, 1917. Ind. Acad. Sci., Proc. 26: 465. —Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 211-212. —Wesson and Wesson, 1940. Amer. Midland Nat. 24: 102. —Talbot, 1946. Ecology 27: 65-70. —Schread and Chapman, 1948. Conn. (State) Agr. Expt. Sta. Bul. 515: 18. —Talbot, 1948. Ecology 29: 316-325. —Gregg, 1963. Ants of Colo., pp. 628-630.

pallidefulva pallidefulva Latreille. N. Y., N. J. s. to Fla. w. to Colo., Okla., Tex.
Formica pallide-fulva Latreille, 1802. Hist. Nat. Fourmis, p. 174. ☿.
Formica pallide-fulva var. *succinea* Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 369. ☿.

Taxonomy: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 645, 656-657. —Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 401, 548-552.

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31: 298, 306. —Cole, 1940. Amer. Midland Nat. 24: 81. —Schneirla, 1944. Amer Mus. Novitates 1261: 2-3. —Gregg, 1963. Ants of Colo., pp. 625-628.

schaufussi dolosa Wheeler. Va. s. to Fla. w. to Iowa, Colo., Tex.
Formica pallide-fulva schaufussi var. *meridionalis* Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 370. ☿. Preocc. by Ruzsky, 1889.
Formica pallide-fulva schaufussi var. *dolosa* Wheeler, 1912. Psyche 19: 90. N. name for *meridionalis* Wheeler.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 401, 554 (worker, female). —Cole, 1940. Amer. Midland Nat. 24: 73, 79. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 299.

Biology: Dennis, 1938. Ent. Soc. Amer., Ann. 31: 299, 306. —Gregg, 1963. Ants of Colo., pp. 630-632.

schaufussi schaufussi Mayr. Ont. s. to N. C., Tenn. w. to Wis., Iowa.
Formica Schaufussi Mayr, 1886. Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 53: 493. ☿.

Taxonomy: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 370. —Wheeler, 1913. Harvard Univ., Mus. Comp. Zool, Bul. 53: 401, 552-553 (each caste). —Cole, 1940. Amer. Midland Nat. 24: 73.

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 400. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 598. —Dennis, 1938. Ent. Soc. Amer., Ann. 31: 298, 306.

Species Group Fusca

Members of this group nest in the soil, and the nest is commonly started under objects or at the base of tufts of grass. Excavated soil may be spread out in the form of an irregular crater or low mound about the nest openings. Because of their ubiquity and usual docility, they are common hosts for many of the slave-making species of *Formica*.

Revision: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, 316 pp.

accreta Francoeur. B. C., Mont., Idaho, Wash., Oreg., Calif.
Formica accreta Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 182-189. ☿, ♀, ♂.

aerata Francoeur. Oreg., Nev., Calif. Ecology: Found in sandy soil where it nests under rocks.
Formica aerata Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 116-122. ☿, ♀.

altipetens Wheeler. Mont., Wyo., Colo., N. Mex., Idaho, Utah, Ariz., Calif. Ecology: Nests in forested and open areas in the soil; low mounds are sometimes built, but nests are also under objects.
Formica cinerea cinerea var. *altipetens* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 399, 523. ☿, ♀, ♂.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 52-60.

Biology: Gregg, 1963. Ants of Colo., pp. 507-509. —Funk, 1975. Lepidop. Soc., Jour. 29: 261-262 (association with Lycaenidae).

argentea Wheeler. Que. w. to B. C. s. to S. C., Ohio, Ill., Iowa, S. Dak., N. Mex., Ariz., Calif. Ecology: Found in open or semi-open situations usually in sandy soil under rocks or with a low mound.
Formica fusca var. *argentata* Wheeler, 1902. Amer. Nat. 36: 952. ☿. Preocc. by Fabricius, 1804.
Formica fusca var. *argentea* Wheeler, 1912. Psyche 19: 90. N. name for *argentata* Wheeler.
Formica fusca var. *blanda* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 398, 510. ♀.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 141-152 (also ecology).

Biology: Gregg, 1963. Ants of Colo., pp. 521-525.

canadensis Santschi. Man., Sask., N. Dak., S. Dak., Kans., Alta., Wyo., Colo., N. Mex., Idaho, Utah, Ariz., Calif. Ecology: Nests in open or wooded areas in the soil, sometimes with a low mound. This species has been confused with *lepida* in much of the literature.
Formica cinerea var. *canadensis* Santschi, 1913. Soc. Ent. de Belg., Ann. 57: 435. ☿, ♀.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 60-67.

foreliana Wheeler. S. Ariz.
Formica foreliana Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 391, 451. ☿.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 234-238.

fusca Linnaeus. Newfoundland (insular) w. to Yukon s. to N. C., Ill., Iowa, S. Dak., N. Mex., Ariz., Calif.; Holarctic. Ecology: Nests in a wide variety of situations, in forests or open areas, under rocks, logs, in soil, or in rotting wood. Two forms are recognized by Francoeur (1973), form *subaenescens* which is mostly eastern and form *marcida* which is mostly western in distribution.
Formica fusca Linnaeus, 1758. Syst. Nat., Ed. 10, v. 1, p. 580.
Formica fusca var. *subaenescens* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 646, 659-660. ☿, ♀.
Formica fusca fusca var. *marcida* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 398, 503. ☿, ♀.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 532. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 164-165 (larva). —Yarrow, 1954. Soc. Brit. Ent., Trans. 11: 229-244. —Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 189-201.

Biology: King, 1949. Iowa Acad. Sci., Proc. 56: 367-370 (in mixed colony with *Formica reflexa* Buren). —King, 1951. Iowa Acad. Sci., Proc. 58: 487-489. —Kannowski, 1959. Insectes Sociaux 6: 141-142. —Wallis, 1960. Insectes Sociaux 7: 187-190 (spinning movements of larvae). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 264-268. —Gregg, 1963. Ants of Colo., pp. 514-525. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 23 (Nev. Test Site).

glacialis Wheeler. Newfoundland (insular) s. to N. Y. w. to Man., N. Dak., Ill. Ecology: Found in woods or open fields where it builds its nests in the soil and with a low mound commonly covered with grass. This species has been confused with *fusca* L. in much of the literature.

Formica fusca var. *glacialis* Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 624. ☿, ♀, ♂.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 151-161 (also ecology).

gnava Buckley. Tex., Colo., N. Mex., Utah, Ariz., Nev., Calif.; Mexico. Ecology: Found in desert and semi-desert areas or open woods where it nests in the soil, normally under rocks.

Formica gnava Buckley, 1866. Ent. Soc. Phila., Proc. 6: 156. ☿, ♀, ♂.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 390, 518-521 (each caste). —Cole, 1942. Amer. Midland Nat. 28: 377, 380, 383. —Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 238-245.

Biology: Wheeler, 1902. Tex. Acad. Sci., Trans. 4: 20. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 541, 550. —Cole, 1934. Ent. Soc. Amer., Ann. 27: 388. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 86. —Gregg, 1963. Ants of Colo., pp. 539-541.

hewitti Wheeler. Que., Maine w. to B. C. s. to Minn., N. Mex., Utah, Calif. Ecology: Found in open or semi-open woods and forests where it nests in the soil under rocks or in rotting wood.

Formica hewitti Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 552. ☿, ♀, ♂.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 208-215.

Biology: Gregg, 1963. Ants of Colo., pp. 526-527.

lepida Wheeler. Calif. Has been found only in the north coastal region.

Formica cinerea cinerea var. *lepida* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 399, 526. ☿.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 122-125.

longipilosa Francoeur. Calif. (Mendocino Co.).

Formica longipilosa Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 125-128. ☿.

microphthalma Francoeur. Calif. Ecology: In mountains; may construct small crater nests in the soil.

Formica microphthalma Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 201-207. ☿, ♂.

moki Wheeler. Utah, Ariz., Nev., Calif. Ecology: Nests in soil under rocks; the nest is unmarked and the entrance is usually a hole near a bush or tree. Francoeur (1973) chose to use the name *occidua* for this species because *occidua* has been used more in the literature; however, the case has not been referred to the Commission.

Formica moki Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 343. ☿.

Formica rufibarbis var. *occidentalis* Wheeler, 1910. Ants, p. 570. Nomen nudum. Preocc. by Buckley, 1866.

Formica rufibarbis var. *occidua* Wheeler, 1912. Psyche 19: 90. Nomen nudum. N. name for *occidentalis* Wheeler.

Formica rufibarbis var. *occidua* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 398, 517. ☿, ♀.

Taxonomy: Smith, 1939. Ent. Soc. Amer., Ann. 32: 582-583. —Cole, 1943. Amer. Midland Nat. 29: 183. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 24-25 (male, also

biological notes). —Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 254-259 (as *occidua*).

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 550. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 30. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 86. —Cole, 1942. Amer. Midland Nat. 28: 385. —Wenner, 1959. Amer. Midland Nat. 62: 174. —Wheeler and Wheeler, 1973. Ants of Deep Canyon, pp. 128-129.

montana Emery. Ohio, Wis., Ill., Minn., Iowa, Man., N. Dak., S. Dak., Nebr., Kans., Colo. Ecology: A prairie species; nests in earthen mounds, often in natural hummocks, commonly covered with grass. Sometimes uses thatching.

Formica fusca subpolita var. ? *montana* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 646, 663. ☿.

Formica cinerea var. *neocinerea* Wheeler, 1910. Ants, p. 571. Nomen nudum.

Formica cinerea var. *neocinerea* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 524. ☿, ♀, ♂.

Formica cinerea cinerea var. *rutilans* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 399, 525. ☿.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 67-74.

Biology: Wheeler, 1902. Amer. Nat. 36: 948-952. —Wheeler, 1910. Ants, pp. 201, 203, 460-461, 475. —Wheeler, 1917. Psyche 22: 206. —Amstutz, 1943. Ohio Jour. Sci. 43: 172. —Gregg, 1948. Ent. Soc. Wash., Proc. 50: 183-186. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 263-264 (also as *altipetens*, pp. 260-261). —Gregg, 1963. Ants of Colo., pp. 513-514.

Morphology: Hung, 1969. Ent. Soc. Amer., Ann. 62: 455 (chromosome number).

neoclara Emery. N. Dak., S. Dak., Iowa, Kans., Tex. w. and northwest to N. W. T., B. C., Wash., Oreg., Calif. Ecology: Found in grasslands or open woods where it nests in the soil, usually preferring sandy soil; nests are sometimes at the base of plants and sometimes have loose mounds of vegetable debris or excavated soil.

Formica fusca var. *neoclara* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 646, 661. ☿.

Formica fusca pruinosa Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 548. ☿, ♀, ♂.

Formica fusca pruinosa var. *lutescens* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 549. ☿.

Taxonomy: Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 165 (larva). —Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 84-94.

Biology: Wheeler, 1910. Ants, pp. 201, 460-461, 463. —LaBerge, 1952. Kans. Ent. Soc., Jour. 25: 59. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 268-271. —Gregg, 1963. Ants of Colo., pp. 526, 528-530 (also as *pruniosa*, pp. 537-539).

neorufibarbis Emery. Newfoundland (Labrador) w. to Alaska s. to Mass., Mich., Minn., S. Dak., N. Mex., Ariz., Calif. Ecology: A dominant ant in the boreal and alpine forests of North America; usually nests in rotting wood but occasionally in the soil under rocks.

Formica fusca var. *neorufibarbis* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 646, 660. ☿.

Formica fusca var. *algida* Wheeler, 1915. Psyche 22: 205. ☿, ♀.

Formica fusca fusca var. *gelida* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 399, 505. ☿, ♀, ♂.

Taxonomy: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 546-547. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 165 (larva). —Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 215-228.

Biology: Brown, 1955. Ent. News 66: 47-50. —Kannowski, 1959. Insectes Sociaux 6: 142. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 271-273. —Gregg, 1963. Ants of Colo., pp. 530-536. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 26 (Nev. Test Site).

occulta Francoeur. Wyo., Colo., N. Mex., Utah, Ariz., Oreg.

Formica occulta Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 94-101. ☿, ♀, ♂.

pacifica Francoeur. B. C., Wash., Oreg., Calif.

Formica pacifica Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 131-135. ☿, ♀.

pilicornis Emery. Calif.; Mexico. Ecology: Found at low elevations in the coast ranges north to the San Francisco area; makes crater or mound nests in sandy soil, sometimes under rocks.

Formica pilicornis Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 646, 664. ☿, ♀, ♂.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 74-80.

Biology: Cole, 1934. Ent. Soc. Amer., Ann. 27: 401. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 7, 29. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 85.

podzolica Francoeur. N. S., Que. w. to Alaska s. to Pa., Wis., Iowa, S. Dak., N. Mex., Ariz., Calif. Ecology: A species of the boreal and alpine forests of North America. Nests are in the soil, commonly sandy soil on beaches or shores and are craterlike or moundlike. Has been confused with *F. fusca* L. in the literature.

Formica podzolica Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 167-172. ☿, ♀, ♂.

sibylla Wheeler. Oreg., Nev., Calif. Ecology: Makes crater nests in the soil, usually in woodlands.

Formica sibylla Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 399, 530. ☿, ♀.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 263-268.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 551. —Mallis, 1941. South. Calif. Acad Sci., Bul. 40: 87.

subelongata Francoeur. Calif. (Burney Junction, Shasta Co.).

Formica subelongata Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 268-270. ☿.

subpolita Mayr. B. C., Idaho, Wash., Oreg., Nev., Calif. Ecology: Usually found in semi-desert areas where it nests in sandy or gravelly soil; nests may be craterlike or moundlike.

Formica fusca var. *subpolita* Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36: 426. ☿, ♀.

Formica rufiventris Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 665. ♂. Preocc. by Fabricius, 1804.

Formica flammiventris Wheeler, 1912. Psyche 19: 90. N. name for *rufiventris* Emery.

Formica subpolita var. *camponoticeps* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 399, 535. ☿.

Formica subpolita var. *ficticia* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 561. ☿, ♀, ♂.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 106-115.

Biology: Wheeler, 1910. Ants, pp. 201, 460. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 553-554. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 87. —Cole, 1942. Amer. Midland Nat. 28: 384, 377. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 26 (Nev. Test Site). —Wheeler and Wheeler, 1973. Ants of Deep Canyon, p. 129.

subsericea Say. N. B., Que. s. to Fla. w. to Man., Mont., Iowa, Kans., Mo., Miss. Ecology: Occurs in open deciduous woodlands where it nests in the soil under stones or leaf litter; sometimes builds low mounds which may be covered with debris. This species has been confused with *F. fusca* L. in the literature.

Formica subsericea Say, 1836. Boston Jour. Nat. Hist. 1: 289. ☿, ♂.

Formica lecontei Kennedy and Dennis, 1937. Ent. Soc. Amer., Ann. 30: 542. ☿, ♀, ♂.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 172-181.

Biology: Kennedy and Dennis, 1937. Ent. Soc. Amer., Ann. 30: 542. —Wilson and Francoeur, 1974. Fla. Ent. 57: 115-116 (Fla.).

transmontanis Francoeur. Alta., B. C., Mont., Idaho, Calif.

Formica transmontanis Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 135-140. ☿, ♀, ♂.

xerophila Smith. Wash., Utah, Ariz., Calif.

Formica (*Neoformica*) *moki xerophila* Smith, 1939. Ent. Soc. Amer., Ann. 32: 583. ☿.

Formica moki grundmanni Cole, 1943. Amer. Midland Nat. 29: 184. ☿.

Taxonomy: Francoeur, 1973. Soc. Ent. du Quebec, Mem. no. 3, pp. 259-263.

SPECIES GROUP EXSECTA

Ants of this group build large conspicuous mounds in fields, woods, or at the edge of woods. The nest founding female may behave as a temporary social parasite, but colonies are also founded by budding.

Taxonomy: Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 510-515.

exsectoides Forel. N. S., Ont. s. to Ga. w. to Wis., Iowa, Kans., Colo., N. Mex. Ecology: A large aggregation of mounds of this species may occur in a single locality. Sometimes damages bark and cambium of small trees and shrubs. Host: *Formica fusca* L. Often locally called the Allegheny mound ant.

Formica exsectoides Forel, 1886. Soc. Ent. de Belg., Ann. (C. R.) 30: 38. ☿, ♀.

Formica exsectoides exsectoides var. *davisi* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 396, 484. ☿, ♀.

Formica exsectoides exsectoides var. *hesperia* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 396, 484. ☿.

Taxonomy: Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 643, 653 (worker, male). —Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 396, 481-483 (each caste). —Buren, 1944. Iowa State Col., Jour. Sci. 18: 300. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 164 (larva). —Cole, 1954. Tenn. Acad. Sci., Jour. 29: 166.

Biology: McCook, 1877. Amer. Ent. Soc., Trans. 6: 253-295. —Pierson, 1922. Jour. Forestry 20: 325-336. —Manter, 1925. Jour. Econ. Ent. 48: 348-351. —Andrews, 1925. Psyche 32: 75-87 (growth of mounds). —Andrews, 1926. Psyche 33: 127-150. —Andrews, 1929. Ent. Soc. Amer., Ann. 22: 369-391 (association with treehoppers). —Andrews, 1929. Quart. Rev. Biol. 4: 248-257. —Andrews, 1941. Sci. Monthly 43: 530-533. —Haviland, 1947. Jour. Econ. Ent. 40: 413-418 (biology and control). —Schread, 1949. Jour. Econ. Ent. 42: 501. —Gregg, 1963. Ants of Colo., pp. 597-599. —Christensen and Quick, 1970. Iowa Acad. Sci., Proc. 77: 207-209.

Morphology: Eisner and Happ, 1964. Science 134: 329-331 (haemorrhage of a coccinellid beetle and its repellent effect on ants).

opaciventris Emery. N. Dak., Mont., Wyo., Colo., N. Mex. Ecology: May construct either earthen mounds or thatched nests.

Formica exsectoides var. *opaciventris* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 643, 653. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 484-485 (worker, male). —Gregg, 1952. Psyche 59: 14-16 (female).

Biology: Cole, 1954. Tenn. Acad. Sci., Jour. 29: 166. —Scherba, 1961. N. Y. Ent. Soc., Jour. 69: 71-87 (reproduction, nest structure). —Scherba, 1963. N. Y. Ent. Soc., Jour. 71: 219-231. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 599-601. —Gregg, 1963. Ants of Colo., pp. 599-601. —Scherba, 1964. N. Y. Ent. Soc., Jour. 72: 231.

ulkei Emery. N. S. w. to Man. s. to Ohio, Ind., Ill., Iowa, N. Dak., Wyo. Ecology: The large mounds may be found in woods or grasslands and occasionally have a thin layer of plant debris on their surfaces. Host: *Formica fusca* L.

Formica ulkei Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 643, 653. ☿.

Formica ulkei var. *hebescens* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 396, 487. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 396, 485-487 (each caste). —Buren, 1944. Iowa State Col., Jour. Sci. 18: 300. —Gregg, 1944. Ent. Soc. Amer., Ann. 37: 472. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 168 (larva).

Biology: Holmquist, 1928. Ecology 9: 70-87. —Holmquist, 1928. Physiol Zool. 1: 325-327. —Park, 1929. Psyche 36: 195-215. —Dreyer and Park, 1932. Psyche 39: 127-133. —Creighton, 1934. Psyche 41: 185-200. —Park, 1936. Psyche 42: 216-231. —Scherba, 1958. Insectes Sociaux 5: 201-213 (reproduction, mounds). —Kannowski, 1959. Insectes Sociaux 6: 142-143. —Talbot, 1959. Amer. Midland Nat. 61: 128-132 (flight activities). —Scherba, 1959. Amer. Midland Nat. 61: 499-508 (moisture regulation in mounds). —Talbot, 1961.

Ecology 42: 202-205 (mounds). —Scherba, 1962. Amer. Midland Nat. 67: 373-385 (mound temperatures). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 256-258.

Morphology: Hung, 1969. Ent. Soc. Amer., Ann. 62: 456 (chromosome number).

Species Group Rufa

Nests of members of this group are varied, some species build mounds and others make considerable use of thatching. Nests are usually started beneath objects. Nest founding females of some species may behave as temporary social parasites.

Taxonomy: Creighton, 1940. Amer. Mus. Novitates 1055: 1-10 (N. Amer. variants of *Formica rufa*). —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 472-496.

aterrima Cresson. Colo. Known only from the type male which has not been associated with any other described form.
Formica aterrima Cresson, 1865. Ent. Soc. Phila., Proc. 4: 426. ♂.

Taxonomy: Brown, 1947. Ent. News 58: 8-9. —Gregg, 1963. Ants of Colo., pp. 544, 546.

calviceps Cole. N. Mex. (Capulin Mt. Natl. Mon.). Ecology: Colony found beneath large stones which were banked with detritus.
Formica (*Formica*) *calviceps* Cole, 1954. Tenn. Acad. Sci., Jour. 29: 164-165. ☿.

ciliata Mayr. Minn., N. Dak., Mont., Wyo., Colo., Utah. Ecology: Nests in meadows or open woods; sometimes utilizes thatching.
Formica ciliata Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36: 428. ☿.

Taxonomy: Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 19: 639-643 (each caste). —Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392-393, 452-454 (each caste).

Biology: Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 88. —Wheeler, 1910. Ants, pp. 114, 120, 205, 351, 444-445, 450. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 233-234. —Gregg, 1963. Ants of Colo., pp. 545-547.

comata Wheeler. S. Dak., Mont., Colo. Ecology: Nests under stones which are banked with thatch.
Formica comata Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 85. ☿, ♀, ♂.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 393, 454-456 (each caste). —Cole, 1942. Amer. Midland Nat. 28: 376, 379 (also biological notes).

Biology: Gregg, 1963. Ants of Colo., pp. 547-548, 550.

criniventris Wheeler. N. Dak., S. Dak., Mont. s. to Colo., Utah. Ecology: Found in meadows and open forests where it nests under stones banked with thatch.
Formica crinita Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 87. ☿, ♀. Preocc. by Smith, 1858.
Formica criniventris Wheeler, 1912. Psyche 19: 90. N. name for *crinita* Wheeler.

Taxonomy: Wheeler 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 393, 457-458. —Cole, 1942. Amer. Midland Nat. 28: 376, 379.

Biology: Wheeler, 1910. Ants, pp. 114, 444-445, 450. —Wheeler and Wheeler, 1944. N. Dak Hist. Quart. 11: 260. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 234-236. —Gregg, 1963. Ants of Colo., pp. 549-551.

dakotensis Emery. N. S., Ont. w. to Alaska, B. C. s. to Ohio, Iowa, N. Mex., Nev. Ecology: Usually found in grasslands where it nests in earthen mounds or under stones, about roots of plants, and in grass clumps banked with considerable detritus. Host: *Formica fusca* L., *F. lepida* Wheeler, *F. montana* Emery, *F. pallidefulva* Latreille. Some authors have recognized two subspecies, *dakotensis* east of the Rockies and *montigena* in the rockies and westward.
Formica dakotensis Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 644, 652. ☿.
Formica fusca subpolita var. ? *specularis* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 663. ♀.
Formica dacotensis var. *Wasmanni* Forel, 1904. Soc. Ent. de Belg., Ann. 48: 153. ☿, ♀, ♂.
Formica montigena Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 374. ☿, ♀, ♂.
Formica dakotensis var. *saturata* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 542. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 391, 393, 394, 462-465. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 299. —Brown, 1957. Ent. News 68: 167.

Biology: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 364-365. —Wheeler, 1910. Ants, pp. 113, 205, 444-445. —Abbott, 1926. Ent. News 37: 210-211. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 236-238. —Gregg, 1963. Ants of Colo., pp. 551-554.

Morphology: Abbott, 1937. Ent. Soc. Amer., Ann. 20: 117-122 (physiology).

ferocula Wheeler. Ill. (Rockford). Ecology: Type specimens were found nesting in a dry open field in small crater nests.

Formica ferocula Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 461. ☿.

fossaceps Buren. Que., Iowa, N. Dak. Ecology: Found in grasslands and wooded pastures nesting under stones or fallen logs banked with thatch or in low earthen mounds covered with fine thatch of grass materials.

Formica fossaceps Buren, 1942. Iowa State Col., Jour. Sci. 16: 402. ☿, ♀, ♂.

Biology: Buren, 1944. Iowa State Col., Jour. Sci. 18: 300, 302. —King, 1949. Iowa Acad. Sci., Proc. 56: 367-370 (mixed colony with *F. obscuriventris clivia*). —King, 1951. Iowa Acad. Sci., Proc. 58: 487-489. —King, 1952. Iowa Acad. Sci., Proc. 59: 469-474 (macropseudogynes, or ? pterergates). —King and Sallee, 1957. Iowa Acad. Sci., Jour. 64: 667-669 (mixed colony with *F. obscuriventris clivia*). —King and Sallee, 1959. Iowa Acad. Sci., Proc. 66: 472-473 (slave of *F. rubicunda*). —King and Sallee, 1962. Iowa Acad. Sci., Proc. 69: 531-539 (mixed colony with *F. obscuriventris clivia*). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 238-239. —Finnegan, 1973. Canad. Ent. 105: 441-444 (diurnal foraging activity).

haemorrhoidalis Emery. N. Dak., S. Dak., Colo. w. to B. C., Wash., Calif. Ecology: Found in areas of moderate to sparse cover where nests are usually started under logs or stones and later with moderate use of thatching.

Formica rufa integra var. *haemorrhoidalis* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 644, 652. ☿.

Formica truncicola integroides var. *ravida* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 560. ☿, ♀.

Formica truncicola integroides var. *tahoensis* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 538. ☿, ♀.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 394, 441-442 (each caste). —Cole, 1942. Amer. Midland Nat. 28: 376. —Brown, 1965. Ent. News 76: 181-186. —Cole, 1956. Tenn. Acad. Sci., Jour. 3: 260. —Wheeler and Wheeler, 1963. Ants. of N. Dak., p. 230 (forms B, C, and D).

Biology: Wheeler, 1910. Ants, pp. 206, 444. —Creighton, 1940. Amer. Mus. Novitates 1055: 6-7. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 88-89. —Gregg, 1963. Ants of Colo., pp. 554-557, 579-581.

integra Nylander. N. S. s. to Ga. w. to Mich., S. Dak., Ill., Miss. Ecology: Large colonies are found in open forests and woods where they nest in stumps and logs or under stones; plant debris commonly covers the nest.

Formica integra Nylander, 1856. Ann. des Sci. Nat., Zool. 5: 62. ☿.

Formica integra var. *similis* Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36: 425. ☿, ♀, ♂.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 394, 444-445 (each caste).

Biology: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 399. —Wheeler, 1910. Ants, pp. 204-206, 222, 351, 444. —Davis and Bequaert, 1922. Brooklyn Ent. Soc., Bul. 17: 18-19. —Creighton, 1940. Amer. Mus. Novitates 1055: 6. —Kloft, *et al.*, 1973. Fla. Ent. 56: 67-76 (habitat, nest structure, polygamy, biometry).

integroides coloradensis Wheeler. Colo., N. Mex., Idaho, Utah. Ecology: Found in forests at high elevations (mostly 8,000 to 10,000 feet); nests are started under stumps or logs and later may be large and dome-shaped with extensive use of thatch.

Formica truncicola integroides var. *coloradensis* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 393, 440. ☿, ♀.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 377, 381.

Biology: Creighton, 1940. Amer. Mus. Novitates 1055: 6-7. —Gregg, 1963. Ants of Colo. pp. 557-560.

integroides integroides Emery. Wash., Oreg., Calif. Ecology: Inhabits open woods in the coastal mountains and west slopes of the Cascades and Sierras where it nests under logs and stumps banked with plant debris.

Formica rufa obscuriventris var. *integroides* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 644, 649. ☿.

Formica truncicola integra var. *subcaviceps* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 540. ☿, ♂.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 393, 394, 438-439. —Creighton, 1940. Amer. Mus. Novitates 1055: 6-7.

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 537. —Miller, 1957. Insectes Sociaux 4: 253.

integroides planipilis Creighton. N. Dak., Colo., Nev. Ecology: Found in grasslands and open forests; nests are frequently started at bases of plants and extensive use is made of thatching; completed nests are moundlike.

Formica rufa planipilis Creighton, 1940. Amer. Mus. Novitates 1055: 7, 9. ☿.

Taxonomy: Cole, 1956. Tenn. Acad. Sci., Jour. 31: 259 (female).

Biology: Wheeler and Wheeler, 1963. Ants. of N. Dak., pp. 248-249. —Gregg, 1963. Ants of Colo., pp. 560-561. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 23 (Nev. Test Site).

integroides propinqua Wheeler. Colo., Utah, Wash., Calif. Ecology: Found on the east slopes of the Cascades and Sierras in Wash. and Calif.; inhabits forests where nests are started under logs and stumps and considerable use is made of thatching.

Formica truncicola integroides var. *propinqua* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 538. ☿.

Taxonomy: Creighton, 1940. Amer. Mus. Novitates 1055: 6-7. —Cole, 1956. Tenn. Acad. Sci., Jour. 31: 257-259 (female, male).

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 88. —Gregg, 1963. Ants of Colo., pp. 562-564.

integroides subfasciata Wheeler. Calif. (Mill Creek Canyon, Wilson Peak, 7500 ft., San Bernardino Mtns.).

Formica truncicola integroides var. *subfasciata* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 539. ☿.

Taxonomy: Creighton, 1940. Amer. Mus. Novitates 1055: 7. —Brown, 1965. Ent. News 76: 185 (possible syn. of *integroides* Emery).

laeviceps Creighton. N. Dak., S. Dak., Colo., Utah. Ecology: Nests mostly in open areas under stones and logs which are banked with little debris.

Formica rufa laeviceps Creighton, 1940. Amer. Mus. Novitates 1055: 7, 9. ☿, ♀.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 377, 380 (also biological notes).

Biology: Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 239-240. —Gregg, 1963. Ants of Colo., pp. 564-565.

lugubris Zetterstedt. Que.; Europe. Ecology: Populous colonies are found in large mound nests of thatch and debris in open forests. Introduced into Valcartier, Quebec in 1971 from Italy for use as a predator of the Swaine jack pine sawfly, *Neodiprion swainei* Midd. It is apparently established in Quebec.

Formica lugubris Zetterstedt, 1840. Ins. Lapponica, v. 1, p. 449. ♂.

Taxonomy: Yarrow, 1955. Soc. Brit. Ent., Trans. 12: 5, 10 (synonymy, also biological notes).

Biology: Pavan, 1959. Min. dell' Agr. e delle For. [Italy] 4: 5 (in Italy). —Pavan, 1963. Pavia Univ. Symp. Genet. et Biol. Ital. 11: 61-84 (use to protect alpine forests against insect damage). —Pavan, 1963. Pavia Univ. Symp. Genet. et Biol. Ital. 12: 122-131 (reconstruction of nest). —Klimetzek, 1970. Ztschr. f. Angew. Ent. 66: 84-95 (environmental factors and

distribution). —Williamson, 1973. Canad. Dept. Agr., Liberation Bul. no. 36, p. 2. (in Que.). —Finnegan, 1975. Canad. Ent. 107: 1271-1274 (introduction into eastern Canada).

mucescens Wheeler. Colo., Utah. Ecology: Found in open areas where it nests under stones; moderate use is made of thatching.

Formica truncicola mucescens Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 394, 442. ☿, ♀, ♂.

Taxonomy: Creighton, 1940. Amer. Mus. Novitates 1055: 6-7. —Cole, 1942. Amer. Midland Nat. 28: 376, 380.

Biology: Gregg, 1963. Ants of Colo., pp. 566-567.

obscuripes Forel. Que.; Mich., Ind., Man. w. to B. C. s. to N. Mex., Utah., Calif. Ecology: Nests are found in open areas where they are usually started at the base of a plant. Extensive use is made of thatching and the finished nest is a large mound of detritus. Probably the most common thatching ant of the western states. Introduced into Quebec from Manitoba for use as a predator of the Swaine jack pine sawfly, *Neodiprion swainei* Midd.

Formica rufa obscuripes Forel, 1886. Soc. Ent. de Belg., Ann. (C. R.) 30: 39. ☿.

Formica rufa obscuriventris var. *melanotica* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 644, 650. ☿.

Formica rufa obscuriventris var. *rubiginosa* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 644, 650. "♀" = ☿. Preocc. by Guillou, 1841.

Formica rufa aggerans Wheeler, 1912. Psyche 19: 90. N. name for *rubiginosa* Emery.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 394, 432-433 (each caste). —Creighton, 1940. Amer. Mus. Novitates 1055: 7. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 300. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 165-166 (larva).

Biology: Treherne, 1915. Canad. Ent. 47: 104. —Burrill and Smith, 1919. Ohio Jour. Sci. 19: 286. —Cole, 1932. Psyche 39: 30-33. —Weber, 1935. Ecol. Monog. 5: 165-206 (in N. Dak.). —Essig, 1926. Ins. West. No. Amer., p. 867. —Eckert and Mallis, 1937. Calif. Agr. Expt. Sta. Cir. 342: 30. —Weber, 1941. Canad. Ent. 73: 140-141. —Cole, 1942. Amer. Midland Nat. 28: 380. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 263-266. —Sallee and King, 1947. Iowa Acad. Sci., Proc. 54: 349-352. —King and Walters, 1950. Iowa Acad. Sci., Proc. 57: 469-47. —King and Sallee, 1953. Iowa Acad. Sci., Proc. 60: 656-659. —King and Sallee, 1957. Iowa Acad. Sci., Proc. 63: 721-723. —Talbot, 1959. Amer. Midland Nat. 61: 124-128 (flight activities). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 240-244. —Gregg, 1963. Ants of Colo., pp. 566-572. —Bradley, 1972. Canad. Ent. 104: 245-249 (transplanting colonies in jack pine stands in Man.). —Talbot, 1972. Kans. Ent. Soc., Jour. 45: 254-258 (flights and swarms). —Alpert and Akre, 1973. Ent. Soc. Amer., Ann. 66: 753-760 (association with inquiline, *Leptothorax diversipilosus* Smith, in Wash.). —Williamson, 1973. Canad. Dept. Agr., Liberation Bul. no. 36, p. 2 (introduction into Que.).

Morphology: Hung, 1969. Ent. Soc. Amer., Ann. 62: 456 (chromosome number).

obscuriventris clivia Creighton. Man., Wis., Iowa w. to B. C. s. to N. Mex., Utah. Ecology: Nests in forests under logs and stones; moderate use is made of thatching.

Formica rufa clivia Creighton, 1940. Amer. Mus. Novitates 1055: 8, 9. ☿, ♀, ♂.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 377. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 300, 302.

Biology: King, 1949. Iowa Acad. Sci., Proc. 56: 367-370 (mixed colony with *F. fossaceps* Buren). —King and Sallee, 1951. Iowa Acad. Sci., Proc. 58: 487-489. —King, 1955. Iowa Acad. Sci., Proc. 62: 509-513 (winged workers). —King and Sallee, 1959. Iowa Acad. Sci., Proc. 66: 472-473 (slave of *F. rubicunda* Emery). —King and Sallee, 1962. Iowa Acad. Sci., Proc. 69: 531-539 (mixed colonies with *F. fossaceps* Buren). —Gregg, 1963. Ants of Colo., pp. 574-577.

obscuriventris obscuriventris Mayr. Que., Maine s. to Va. w. to N. Dak., Iowa, Colo. Ecology: Nests in woods and grasslands under logs and makes moderate use of thatching.

Formica truncicola var. *obscuriventris* Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 951. ☿.

Formica dryas Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 268. ☿, ♀.

Formica dryas var. *gymnomma* Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 269. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 448. —Creighton, 1940. Amer. Mus. Novitates 1055: 8.

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 623. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 595, 597. —Buren, 1941. Iowa State Col., Jour. Sci. 15: 115. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 244-246. —Gregg, 1963. Ants of Colo., pp. 572-574. —Talbot, 1964. Anim. Behaviour 12: 154 (nest structure and flights).—Ayre, 1968. Canad. Ent. 100: 165-172 (prey finding, capture and transport).

oreas comptula Wheeler. Sask., N. Dak., Iowa w. to Alta., Wash., Idaho, Utah. Ecology: Nests in wooded areas or grasslands under stones or logs banked with detritus.
Formica oreas var. *comptula* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 391, 393, 460. ☿, ♀.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 376, 380.

Biology: Cole, 1934. Psyche 41: 227. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 246-248.

oreas oreas Wheeler. Mont., Wyo., Colo., N. Mex., Utah. Ecology: Nests in open woods or meadows under rocks or logs covered with detritus. Colonies may be abundant and have sizeable mounds.
Formica oreas Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 19: 643. ☿, ♀, ♂.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 391, 393, 458-460. —Cole, 1942. Amer. Midland Nat. 28: 376, 379.

Biology: Wheeler, 1910. Ants, pp. 114, 205, 351, 444. —Gregg, 1963. Ants of Colo., pp. 577-579.

prociliata Kennedy and Dennis. Ohio, Wis., Iowa. Ecology: Nests of the type specimens were under stones on ledges in open woods and lacked thatching.
Formica prociliata Kennedy and Dennis, 1937. Ent. Soc. Amer., Ann. 30: 531. ☿, ♀, ♂.

Taxonomy: Buren, 1944. Iowa State Col., Jour. Sci. 18: 300, 303.

reflexa Buren. Que., Minn., Iowa, N. Dak. Ecology: Has only been found in association with the host; a permanent inquiline ?. Host: *Formica fusca* L.
Formica reflexa Buren, 1942. Iowa State Col., Jour. Sci. 16: 399. ☿, ♀, ♂.

Taxonomy: Buren, 1944. Iowa State Col., Jour. Sci. 18: 299, 303.

Biology: King, 1949. Iowa Acad. Sci., Proc. 56: 367-379 (mixed colony with *F. fusca*). —King, 1951. Iowa Acad. Sci., Proc. 58: 487-489. —Wheeler and Wheeler, 1963. Ants of N. Dak., p. 249-250. —Francoeur and Beique, 1968. Nat. Canad. 95: 228 (Que.).

subnitens Creighton. N. Dak., Wyo., Colo., N. Mex., B. C., Oreg., Calif. Ecology: Usually nests in grasslands, under stones banked with debris or in dome-shaped mounds of thatch or detritus.
Formica rufa subnitens Creighton, 1940. Amer. Mus. Novitates 1055: 7, 10. ☿.

Taxonomy: Cole, 1955. Tenn. Acad. Sci., Jour. 30: 50. —Miller, 1957. Insectes Sociaux 4: 253-257 (each caste).

Biology: Cole, 1954. Tenn. Acad. Sci., Jour. 29: 165. —Ayre, 1957. Insectes Sociaux 4: 173-176 (ecological notes). —Ayre, 1958. Insectes Sociaux 5: 1-7. —Ayre, 1958. Insectes Sociaux 5: 147-157 (meterological factors affecting foraging). —Ayre, 1959. Insectes Sociaux 6: 105-114 (food habits). —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 250-252. —Gregg, 1963. Ants of Colo., pp. 581-584.

Species Group Microgyna

Species of this group are believed to be temporary social parasites of other species of *Formica*. The female in some way is adopted by workers of the host species. Host workers may remain in the colony after the intruding queen has established her own brood, but the host workers eventually die. Most species are found in open woods or meadows. The nests are usually of the thatch type, but the thatching is normally scattered about the nest openings and appears as a flattened disc.

Taxonomy: Letendre and Huot, 1972. Soc. Ent. Quebec, Ann. 17: 117-132 (preliminary considerations to a revision of the *microgyna* group).

densiventris Viereck. Colo., N. Mex., Utah w. to Calif. Ecology: Found in forests and open forests, under stones and logs; only occasionally with use of thatch.
Formica fusca var. *densiventris* Viereck, 1903. Amer. Ent. Soc., Trans. 29: 74. ☿.
Formica microgyna rasilis var. *spicata* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 395, 469. ☿, ♀, ♂.
Formica microgyna rasilis var. *pinetorum* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 542. ☿.

Taxonomy: Brown, 1947. Ent. News 58: 6-8. —Cole, 1955. Tenn. Acad. Sci., Jour. 30: 50.

Biology: Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 85. —Cole, 1954. Tenn. Acad. Sci., Jour. 29: 165. —Gregg, 1963. Ants of Colo., pp. 589-593.

difficilis Emery. Mass. s. to Ga. w. to Iowa. Ecology: Nests are in woodlands, sometimes under stones, and are packed with vegetable debris. Host: *Formica pallidefulva* (Latreille).
Formica rufa difficilis Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 645, 651. ☿, ♀, ♂.
Formica difficilis var. *consocians* Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 371. ☿, ♀, ♂.
Formica habrogyna Cole, 1939. Amer. Midland Nat. 22: 413. ☿, ♀.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 395, 477-480 (each caste). —Buren, 1944. Iowa State Col., Jour. Sci. 18: 306. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 164 (larva).

Biology: Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 347-373. —Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 50-64. —Wheeler, 1910. Ants, pp. 113-114, 205-206, 441-444.

dirksi Wing. Maine (Daigle, Aroostook Co.). Ecology: The host nest of the type queen was at the edge of a clearing under bark of a dry stump. Host: *Formica fusca* L.
Formica dirksi Wing, 1949. Canad. Ent. 81: 13-15. ♀.

impexa Wheeler. Mass., Mich., Minn. Host: *Formica fusca* L.
Formica impexa Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 273. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp Zool., bul. 53: 395-396, 472-473 (worker, female).

Biology: Wheeler, 1906. Psyche 13: 40. —Wheeler, 1910. Ants, pp. 113, 444.

indianensis Cole. Ind., Iowa. Ecology: Nest was in a grassy field under a stone and was surrounded with grass debris.
Formica indianensis Cole, 1940. Amer. Midland Nat. 23: 224. ☿, ♂.

Taxonomy: Buren, 1944. Iowa State Col., Jour. Sci. 18: 300, 306.

knighti Buren. Iowa (Bonaparte). Ecology: Nest was in a pasture under bushes and surmounted by a low dome of plant debris.
Formica (*Formica*) *knighti* Buren, 1944. Iowa State Col., Jour. Sci. 18: 300, 303-305. ☿.

microgyna Wheeler. Wyo., Colo., N. Mex., Utah, Nev. Ecology: Prefers meadows and open forests. Nests are usually started under stones which are piled with thatching, the thatching increasing in size as the nest grows. Host: *Formica argentea* Wheeler, *F. lasioides* Emery, *F. neogagates* Emery.
Formica microgyna Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 19: 645. ☿, ♀, ♂.
Formica microgyna microgyna var. *recidiva* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 395, 467. ☿, ♂.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 395-396, 465-467 (each caste).

Biology: Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 542. —Gregg, 1963. Ants of Colo., pp. 584-587. —Cole, 1966. Brigham Young Univ., Sci. Bul., Biol. Ser. 7: 24 (Nev. Test Site).

morsei Wheeler. Mass. (South Natick).
Formica morsei Wheeler, 1906. Psyche 13: 39. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp.Zool., Bul. 53: 394, 480-481.

nepticula Wheeler. Mass., Conn., Ill., Iowa. Ecology: Nests in open woods under stones or rotting limbs and are banked with vegetable debris.
Formica nepticula Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 270. ☿, ♀, ♂.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 394, 396, 475-477 (each caste). —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 595, 597. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 30, 306.

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 64. —Wheeler, 1910. Ants, pp. 113, 205, 444.

nevadensis Wheeler. Nev. (Ormsby Co.). Ecology: Nests in open forests under stones and surmounted by plant debris.
Formica microgyna var. *nevadensis* Wheeler, 1904. Amer. Mus. Nat. Hist., Bul. 20: 373. ♀.

Taxonomy: Wheeler, 1905. Amer. Mus. Nat. Hist., Bul. 21: 272. —Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 396, 470-472 (worker). —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 544. —Cole, 1956. Tenn. Acad. Sci., Jour. 31: 256-257 (also biology).

Biology: Wheeler, 1910. Ants, pp. 11, 444.

postoculata Kennedy and Dennis. Pa., Ind., Ill., Iowa. Ecology: Nest of type series from Indiana was in a pasture between two boulders and was covered with trash.
Formica postoculata Kennedy and Dennis, 1937. Ent. Soc. Amer., Ann. 30: 540-542. ☿.

querquetulana Kennedy and Dennis. New England to Ohio. Ecology: Nests found in pastures and sandy areas usually beneath objects and commonly covered with loose trash. Host: *Formica fusca* L.
Formica querquetulana Kennedy and Dennis, 1937. Ent. Soc. Amer., Ann. 30: 536-540. ☿, ♀.

rasilis Wheeler. Colo., N. Mex., Utah northwest to Wash. Ecology: Nests in open or semi-open areas usually under stones. Host: *Formica argentea* Wheeler, *F. fusca* L. Creighton (1950) stated that there is a great deal of intergradation between *rasilis* and *spicata* (see synonymy of *densiventris*); consequently, *rasilis* and *densiventris* may be conspecific.
Formica microgyna var. *rasilis* Wheeler, 1903. Amer. Mus. Nat. Hist., Bul. 19: 648. ☿, ♀, ♂.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 395-396, 468-469. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 506-507.

Biology: Cole, 1942. Amer. Midland Nat. 28: 376, 381. —Gregg, 1963. Ants of Colo., pp. 587-589.

scitula Wheeler. Ga. (Clayton).
Formica microgyna scitula Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 395, 470. ♀.

spatulata Buren. Minn., Iowa, N. Dak., Mont., B. C. Ecology: Nests under stones. Host: *Formica fusca* L.
Formica (*Formica*) *microgyna spatulata* Buren, 1944. Iowa State Col., Jour. Sci. 18: 300, 305. ☿, ♀, ♂.

Biology: Wheeler and Wheeler, 1963. Ants of N. Dak., p. 253.

whymperi adamsi Wheeler. Mich. to Minn. Ecology: Has been found in drier tamarack swamps in nests covered with leaves.
Formica adamsi Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 84. ☿.
Formica adamsi Wheeler, 1909. Mich. Geol. Survey, Bul. 5: 326. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ. Mus. Comp. Zool., Bul. 53: 395, 473-474. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 544.

Biology: Drooz, 1960. U. S. Dept. Agr., Tech. Bul. 1212, p. 36 (predator of larch sawfly).

whymperi alpina Wheeler. Colo., N. Mex., Idaho, Utah. Ecology: Found at high elevations, mostly above 9,000 feet where it nests in forests under stones or rotting logs and with some plant debris or thatch around these objects. Host: *Formica neorufibarbis* Emery.
Formica adamsi var. *alpina* Wheeler, 1909. N. Y. Ent. Soc., Jour. 17: 85. ☿.

Formica adamsi var. *alpina* Wheeler, 1909. Mich. Geol. Survey, Bul. 5: 327. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 395, 475. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 544.

Biology: Cole, 1954. Tenn. Acad. Sci., Jour. 29: 165-166. —Gregg, 1963. Ants of Colo., pp. 593-596 (also description of female).

whymperi californica Wheeler. Mont., Idaho., Wash. s. to Calif.

Formica microgyna californica Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 543. ☿.

Formica microgyna californica var. *hybrida* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 543. ☿.

whymperi whymperi Forel. Mont. w. to B. C., Wash. Ecology: Nests under stones and logs which it banks with plant debris. Host: *Formica neoclara* Emery.

Formica rufa obscuripes var. *whymperi* Forel, 1904. Soc. Ent. de Belg., Ann. 48: 152. ☿.

Formica microgyna rasilis var. *pullula* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 562. ☿, ♀.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 392, 434. —Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 544 (also biological notes).

Species Group Sanguinea

Members of this subgenus are social parasites. Nest founding females forceably enter small colonies of the host species and kill or drive off the host workers before rearing the host brood for her own use. Hosts are other species of *Formica*. Some species are known to regularly conduct slave raids, a habit unknown in other *Formica* species.

Taxonomy: Wilson and Brown, 1955. Psyche 62: 108-129. —Buren, 1968. Ga. Ent. Soc., Jour. 3: 25-40 (key to spp.).

Biology: Wheeler, 1910. Ants, pp. 458-470. —Creighton, 1950. Harvard Univ., Mus. Comp. Zool., Bul. 104: 460-461.

creightoni Buren. Mich., Ill., Iowa. Host: *Formica neogagates* Emery.

Formica (*Raptiformica*) *creightoni* Buren, 1968. Ga. Ent. Soc., Jour. 3: 35-36. ☿.

curiosa Creighton. B. C., Mont., Idaho, Oreg. Host: *Formica lasioides* Emery, *F. manni* Wheeler.

Formica curiosa Creighton, 1935. Amer. Mus. Novitates 773: 5. ☿, ♀.

Formica parcipappa Cole, 1946. Ent. Soc. Amer., Ann. 36: 616. ☿.

Taxonomy: Wilson and Brown, 1955. Psyche 62: 123-125. —Buren, 1968. Ga. Ent. Soc., Jour. 3: 32-33. —Snelling, 1969. Ent. Soc. Wash., Proc. 71: 194-196 (syn. of *parcipappa;* biological notes).

emeryi Wheeler. Colo. (Bradmoor, Colorado Springs). Host: *Formica neogagates* Emery.

Formica emeryi Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 389, 419. ☿, ♀.

Taxonomy: Wilson and Brown, 1955. Psyche 62: 118 (a syn. of *submuda*). —Gregg, 1963. Ants of Colo., pp. 606-608 (valid sp.). —Buren, 1968. Ga. Ent. Soc., Jour. 3: 34-35 (valid sp.).

pergandei Emery. Que., N. H. s. to N. C. w. to N. Dak., S. Dak., Iowa, Colo. Host: *Formica fusca* L., *F. pallidefulva* Latreille (?).

Formica pergandei Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 643, 646. ☿.

Formica sanguinea rubicunda var. *sublucida* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 390, 408. ☿, ♀.

Taxonomy: Buren, 1968. Ga. Ent. Soc., Jour. 3: 28-29.

Biology: Wheeler, 1901. Amer. Nat. 35: 722. —Gregg, 1946. Amer. Midland Nat. 35: 752. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 219-220. —Gregg, 1963. Ants of Colo., pp. 622-623. —Regnier and Wilson, 1971. Science 172: 267-269 (chemical communication). —Hung, 1973. Ent. News 84: 253-259 (reproductive biology). —Finnegan, 1973. Canad. Ent. 105: 441-444 (diurnal foraging activity; as *sublucida*).

puberula Emery. Man., N. Dak., S. Dak., Wyo., Colo., Tex. w. to B. C., Wash., Calif. Host: *Formica altipetens* Wheeler, *F. bradleyi* Wheeler, *F. fusca* L., *F. hewitti* Wheeler, *F. lasioides* Emery, *F. lepida* Wheeler, *F. montana* Emery, *F. neoclara* Emery, *F. neorufibarbis* Emery, *F. pallidefulva nitidiventris* Emery, *F. rasilis* Wheeler, *F. subpolita* Mayr.

Formica sanguinea puberula Emery, 1893. Zool. Jahrb., Abt. f. System 7: 643, 648. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 390, 413-414 (each caste). —Cole, 1942. Amer. Midland Nat. 28: 376. —Buren, 1968. Ga. Ent. Soc., Jour. 3: 30-31.

Biology: Wheeler, 1910. Ants, pp. 458-460. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 220-221. —Gregg, 1963. Ants of Colo., pp. 613-616. —Snelling, 1969. Ent. Soc. Wash., Proc. 71: 196-197.

rubicunda Emery. Ont. s. to N. C., Tenn. w. to Mont., Colo., N. Mex. Host: *Formica altipetens* Wheeler, *F. bradleyi* Wheeler, *F. fossaceps* Buren, *F. fusca* L., *F. lasioides* Emery, *F. lepida* Wheeler, *F. montana* Emery, *F. neoclara* Emery, *F. neogagates* Emery, *F. neorufibarbis* Emery, *F. obscuriventris clivia* Creighton, *F. pallidefulva nitidiventris* Emery, *F. schaufussi* Mayr.

Formica sanguinea rubicunda Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 643, 647. ☿, ♀.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 390, 406-408 (each caste). —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 595. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 299. —Buren, 1968. Ga. Ent. Soc., Jour. 3: 30.

Biology: Wheeler, 1910. Ants, pp. 458-470. —Smith, 1928. N. Y. Ent. Soc., Jour. 26: 327-329. —Talbot, 1934. Ecology 15: 421, 430-434. —King and Sallee, 1959. Iowa Acad. Sci., Proc. 66: 472-473. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 221-223. —Gregg, 1963. Ants of Colo., pp. 616-618.

subintegra Emery. Newfoundland, N. S., Ont. s. to S. C., Tenn. w. to N. Dak., Iowa, Kans. Host: *Formica fusca* L., *F. lasioides* Emery, *F. montana* Emery, *F. neogagates* Emery, *F. pallidefulva nitidiventris* Emery, *F. schaufussi* Mayr, *F. subpolita* Mayr.

Formica sanguinea rubicunda var. *subintegra* Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 643, 648. ☿.

Formica sanguinea subintegra var. *gilvescens* Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 390, 412. ☿.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 390, 410-412. —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 595. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 299. —Wilson and Brown, 1955. Psyche 62: 120. —Buren, 1968. Ga. Ent. Soc., Jour. 3: 29-30.

Biology: Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 624, 627-631. —Smith, 1928. N. Y. Ent. Soc. Jour. 36: 323-327. —Talbot and Kennedy, 1940. Ent. Soc. Amer., Ann. 33: 560-577. —Brown, 1958. Psyche 65: 39-40. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 225-227. —Kannowski, 1963. Pavia Univ., Symp. Genet. Biol. Ital. 12: 74-102 (mating behavior). —Regnier and Wilson, 1971. Science 172: 267-269 (chemical communication).

Morphology: Hung, 1969. Ent. Soc. Amer., Ann. 62: 456 (chromosome number).

subnuda Emery. Newfoundland w. to Yukon, Alaska s. to N. Y., Minn., N. Dak., Colo., N. Mex., Ariz., Calif. Host: *Formica altipetens* Wheeler, *F. fusca* L., *F. montana* Emery, *F. neorufibarbis* Emery, *F. subpolita* Mayr.

Formica sanguinea rubicunda var. *subnuda* Emery, 1895. Zool. Jahrb., Abt. f. System. 8: 335. ☿.

Formica sanguinea aserva Forel, 1901. Soc. Ent. de Belg., Ann. 45: 395. ☿, ♀.

Taxonomy: Wheeler, 1913. Harvard Univ., Mus. Comp. Zool., Bul. 53: 389, 404-406, 409-410 (each caste). —Wheeler, 1917. Conn. State Geol. and Nat. Hist. Survey Bul. 22: 595. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 299, 308. —Wheeler and Wheeler, 1953. Ent. Soc. Amer., Ann. 46: 170 (larva). —Wilson and Brown, 1955. Psyche 62: 118. —Buren, 1968. Ga. Ent. Soc., Jour. 3: 33-34.

Biology: Wheeler, 1906. Amer. Mus. Nat. Hist., Bul. 22: 85. —Wheeler, 1908. Amer. Mus. Nat. Hist., Bul. 24: 623, 631-633. —Wheeler, 1910. Ants, pp. 458-460, 468. —Wheeler, 1917. Harvard Univ., Mus. Comp. Zool., Bul. 61: 19. —Cole, 1942. Amer. Midland Nat. 28: 378. —Gregg, 1947. Colo. Univ. Studies 2: 393. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 223-225. —Gregg, 1963. Ants of Colo., pp. 618-621. —Chapman, 1957. Canad. Ent. 89: 392 (swarming on mountain tops). —Finnegan, 1973. Canad. Ent. 105: 441-444 (diurnal foraging activity).

wheeleri Creighton. N. Dak., Colo., N. Mex., Utah, Ariz. Host: *Formica altipetens* Wheeler, *F. bradleyi* Wheeler, *F. fusca* L., *F. lasioides* Emery, *F. lepida* Wheeler, *F. neogagates* Emery, *F. neorufibarbis* Emery.

Formica wheeleri Creighton, 1935. Amer. Mus. Novitates 773: 1-5. ☿, ♀.

Taxonomy: Wilson and Brown, 1955. Psyche 62: 125-126. —Buren, 1968. Ga. Ent. Soc., Jour. 3: 31-32.

Biology: Cole, 1942. Amer. Midland Nat. 28: 376, 378. —Cole, 1954. Tenn. Acad. Sci., Jour. 29: 104. —Wilson, 1955. Psyche 62: 130-133. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 227-228. —Gregg, 1963. Ants of Colo., pp. 623-625. —Halverson, *et al.*, 1976. Kans. Ent. Soc., Jour. 49: 299 (*bradleyi* as slave).

Genus POLYERGUS Latreille

Polyergus Latreille, 1804. Nouv. Dict. Hist. Nat., v. 24, p. 179.
Type-species: *Formica rufescens* Latreille. Monotypic.

The species of this genus are obligatory or true slave-making ants. In nest founding, the female enters a nest of the host species, eventually kills the rightful queen, and uses the host workers to tend her brood. A colony of *Polyergus* will conduct slave raids on nests of species of *Formica*, and workers of the host are taken and used by the *Polyergus* colony to feed and rear the brood and excavate the nest.

Revision: Smith, 1947. Amer. Midland Nat. 38: 150-161.

Taxonomy: Wheeler, 1968. Ent. Soc. Wash., Proc. 70: 156-164 (male genitalia and taxonomy).

Morphology: Forbes and Brassel, 1962. N. Y. Ent. Soc., Jour. 70: 79-87 (male genitalia and terminal segments).

breviceps Emery. Ont., Mich. w. to B. C. s. to Ind., Ill., Mo., Kans., N. Mex., Ariz., Calif. Host: *Formica altipetens* Wheeler, *F. argentea* Wheeler, *F. fusca* L., *F. lepida* Wheeler, *F. montana* Emery, *F. neoclara* Emery, *F. neorufibarbis* Emery, *F. pallidefulva nitidiventris* Emery, *F. schaufussi schaufussi* Mayr, *F. subpolita* Mayr.

Polyergus rufescens breviceps Emery, 1893. Zool. Jahrb., Abt. f. System. 7: 666. ☿.

Polyergus rufescens bicolor Wasmann, 1901. Allg. Ztschr. f. Ent. 6: 369. ☿, ♀, ♂.

Polyergus rufescens breviceps var. *Silvestrii* Santschi, 1909. Soc. Ent. Ital., Bol. 41: 7. ☿, ♂.

Polyergus rufescens breviceps var. *montezuma* Wheeler, 1914. N. Y. Ent. Soc., Jour. 22: 56. ☿, ♀, ♂.

Polyergus rufescens breviceps var. *umbratus* Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 419. ☿.

Polyergus rufescens laeviceps Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 420. ☿.

Polyergus rufescens breviceps var. *fusciventris* Wheeler, 1917. Amer. Acad. Arts and Sci., Proc. 52: 555. ☿.

Taxonomy: Cole, 1942. Amer. Midland Nat. 28: 385. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 310. —Smith, 1947. Amer. Midland Nat. 38: 152, 157-159, 161. —Wheeler, 1968. Ent. Soc. Wash., Proc. 70: 156-164. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 214 (larva, as *rufescens*).

Biology: Wheeler, 1910. Ants, pp. 475-482. —Wheeler, 1916. N. Y. Ent. Soc., Jour. 24: 107-118. —Smith, 1928. N. Y. Ent. Soc., Jour. 36: 329-333. —Mallis, 1941. South. Calif. Acad. Sci., Bul. 40: 82. —Wheeler and Wheeler, 1944. N. Dak. Hist. Quart. 11: 260. —Gregg, 1946. Amer. Midland Nat. 35: 754. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 275-277.

—Gregg, 1963. Ants of Colo., pp. 635-643. —Hung, 1973. Ent. News 84: 253-259 (reproductive biology).

lucidus longicornis Smith. N. C., S. C., Ga. Host: *Formica schaufussi schaufussi* Mayr. *Polyergus lucidus longicornis* Smith, 1947. Amer. Midland Nat. 38: 155. ☿.

lucidus lucidus Mayr. Mass. s. to S. C. w. to N. Dak., Iowa, Colo., N. Mex. Host: *Formica lasioides* Emery, *F. neogagates* Emery, *F. pallidefulva nitidiventris* Emery, *F. schaufussi schaufussi* Mayr.
Polyergus lucidus Mayr, 1870. Zool.-Bot. Gesell. Wien, Verh. 20: 952. ☿.
Polyergus lucidus montivagus Wheeler, 1915. Amer. Mus. Nat. Hist., Bul. 34: 419. ☿, ♀, ♂.

Taxonomy: Mayr, 1886. Zool.-Bot. Gesell. Wien, Verh. 36: 424. —Buren, 1944. Iowa State Col., Jour. Sci. 18: 310. —Smith, 1947. Amer. Midland Nat. 38: 152-156. —Wheeler and Wheeler, 1968. Ent. Soc. Amer., Ann. 61: 214 (larva).

Biology: McCook, 1880. Acad. Nat. Sci. Phila., Proc. 32: 376-384. —Burrill, 1908. N. Y. Ent. Soc., Jour. 16: 144-151. —Wheeler, 1910. Ants, pp. 482-486. —Smith, 1934. N. Y. Ent. Soc., Jour. 42: 360-361. —Wheeler and Wheeler, 1963. Ants of N. Dak., pp. 274-275. —Gregg, 1963. Ants of Colo., pp. 633-635. —Talbot, 1967. Psyche 74: 299-313 (slave raids). —Talbot, 1968. Psyche 75: 46-52 (flights). —Harman, 1968. Ent. News 79: 217-223 (ecology, near Chicago). —Marlin, 1968. Ill. State Acad. Sci., Trans. 61: 207-209 (colony formation). —Marlin, 1969. Kans. Ent. Soc., Jour. 42: 108-115 (raiding behavior). —Marlin, 1971. Amer. Midland Nat. 86: 181-189 (mating, nesting, and ant enemies).

Unplaced Taxa of Formicinae

Formica arenicola Buckley, 1866. Ent. Soc. Phila., Proc. 6: 160. ☿. Washington, D. C.
Formica atra Buckley, 1866. Ent. Soc. Phila., Proc. 6: 159. ☿. Washington, D. C.
Formica Connecticutensis Buckley, 1866. Ent. Soc. Phila., Proc. 6: 154. ☿, ♀. Conn., N. Y., D. C.
Formica lauta Say, 1836. Boston Jour. Nat. Hist. 1: 286. ♀, ♂.
Formica monticola Buckley, 1866. Ent. Soc. Phila., Proc. 6: 157. ☿, ♀, ♂. N. Y.
Formica Nortonii Buckley, 1866. Ent. Soc. Phila., Proc. 6: 153. ☿, ♀. Conn.
Formica Nova Anglae Buckley, 1866. Ent. Soc. Phila., Proc. 6: 153. ☿, ♀. Maine.
Formica occidentalis Buckley, 1866. Ent. Soc. Phila., Proc. 6: 157. ☿, ♀. Conn., N. Y.
Formica politurata Buckley, 1866. Ent. Soc. Phila., Proc. 6: 160. ☿. Mich.
Formica saxicola Buckley, 1866. Ent. Soc. Phila., Proc. 6: 166. ☿, ♀. Buchanan Co., Tex.
Formica semipunctata Kirby, 1837. Fauna Bor.-Amer., v. 4, p. 262. ♀. "Taken on a journey from New York to Cumberland House."
Formica septentrionale Buckley, 1866. Ent. Soc. Phila., Proc. 6: 161. ☿, ♀. Mich., Ill.
Formica tenuissima Buckley, 1866. Ent. Soc. Phila., Proc. 6: 159. ☿. Central Tex.
Formica Virginiana Buckley, 1866. Ent. Soc. Phila., Proc. 6: 159. ☿. Washington, D. C.

Unplaced Taxa of Formicidae

Formica dislocata Say, 1836. Boston Jour. Nat. Hist. 1: 288. ♀, ♂.
Formica Lincecumii Buckley, 1866. Ent. Soc. Phila., Proc. 6: 163. ☿, ♀, ♂. Tex.
Polyergus Texana Buckley, 1866. Ent. Soc. Phila., Proc. 6: 170. ♀. Buchanan Co., Tex.
Formica triangularis Say, 1836. Boston Jour. Nat. Hist. 1: 288. ♀, ♂.

Superfamily VESPOIDEA

By Karl V. Krombein

Included in this superfamily are several groups with quite diverse habits. The primitive family Masaridae includes the only solitary wasps which store pollen and nectar as food for their larvae rather than paralyzed or dismembered Arthropoda. The solitary eumenid wasps store paralyzed lepidopterous or coleopterous, or rarely hymenopterous, larvae as food for their young. All of the truly social wasps belong to the family Vespidae.

Taxonomy: Ashmead, 1902. Canad. Ent. 34: 163-166, 203-210, 219-221 (keys to families and genera). —Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, pp. 1-108, 6 pls. (keys and species catalog). —Bequaert, 1928. Ann. and Mag. Nat. Hist. (10)2: 138-176 (notes on vespoid types in British Museum). —Bequaert, 1928. Brooklyn Ent. Soc., Bul. 23: 53-63 (Fabricius types in Banks coll.). —Reid, 1942. Roy. Ent. Soc. London, Trans. 92: 285-331, 137 figs. (larval classification). —Richards, 1962. Revisional study of masarid wasps, pp. 3-27 (reclassification, key to subfamilies, phylogeny). —Charnley, 1973. Buffalo Soc. Nat. Sci., Bul. 26: 1-79 (value of propodeal orifice and male genitalia in higher classification).

Biology: Spradbery, 1973. Wasps, 408 pp., 28 pls., 131 text figs. (natural history of British Vespoidea).

Family MASARIDAE

Revision: Bradley, 1922. Calif. Univ., Pubs. Ent. 1: 361-464, 15 pls. (N. Amer. spp.). —Richards, 1962. Revisional study of masarid wasps, 294 pp., 241 figs. (species of world).

Taxonomy: Ashmead, 1902. Canad. Ent. 34: 219-221 (key to genera). —Bequaert, 1929. Psyche 36: 72-76, 81-88 (generic characters, distribution, phylogeny). —Bequaert, 1929. Psyche 36: 366-368 (fossil record).

Biology: Bequaert, 1929. Psyche 36: 76-80 (nesting habits, larval food).

Subfamily EUPARAGIINAE

This is the most primitive of the masarid wasps. The single included genus *Euparagia* is the only masarid known to prey upon insect larvae as food for its young.

Genus EUPARAGIA Cresson

Euparagia Cresson, 1879. Acad. Nat. Sci. Phila., Proc. (Ent. Sect.). 6: vi.
Type-species: *Euparagia scutellaris* Cresson. Monotypic.
Plesiomasaris Cameron, 1904. Amer. Ent. Soc., Trans. 30: 266.
Type-species: *Plesiomasaris maculiceps* Cameron. Monotypic.

The species, which are all rare, are usually collected in association with *Eriogonum* and generally on dry hillsides.

Revision: Bohart, 1948. Pan-Pacific Ent. 24: 149-154.

Taxonomy: Bequaert, 1928. Ann. and Mag. Nat. Hist. (10)2: 146 (generic syn.). —Bohart, 1938. Pan-Pacific Ent. 14: 136-139 (synopsis). —Torchio, 1970. Los Angeles Co. Mus., Contrib. Sci. 202: 24-25, figs. 30-33 (larva).

boregoensis Bohart. Calif. (southeastern); desert species, Lower Sonoran Zone.
Euparagia boregoensis Bohart, 1948. Pan-Pacific Ent. 24: 152. ♂, ♀.

desertorum Bohart. Calif.; desert species, Lower Sonoran Zone.
Euparagia desertorum Bohart, 1948. Pan-Pacific Ent. 24: 151. ♂, ♀.

platiniceps Bohart. Calif.; desert species, Lower Sonoran Zone.
Euparagia platiniceps Bohart, 1938. Pan-Pacific Ent. 14: 138. ♂.

richardsi Bohart, n. name. Tex., n. Mex., Ariz.
Psiloglossa simplicipes Rohwer, 1909. Ent. News 20: 357. ♀. Preocc. in *Euparagia*.

scutellaris Cresson. Calif.; Transition Zone. Prey: *Ceutorhynchus* sp.; *Anthonomus* sp. Makes shallow burrows in hard ground, topped with slender curved chimneys, burrows ending in one or more cells provisioned with weevil larvae.
Euparagia scutellaris Cresson, 1879. Acad. Nat. Sci. Phila., Proc. (Ent. Sect.) 6: vi. ♂, ♀.

Biology: Williams, 1927. Pan-Pacific Ent. 4: 38-39 (nest and prey). —Clement and Grissell, 1968. Pan-Pacific Ent. 44: 34-37 (nest and prey).

timberlakei Bohart. Calif., Nev., Ariz.; desert species, L. Sonor. Zone.
Euparagia timberlakei Bohart, 1948. Pan-Pacific Ent. 24: 150. ♂, ♀.

Subfamily MASARINAE

Pseudomasaris is the only masarine genus occurring in North America.

Genus PSEUDOMASARIS Ashmead

Pseudomasaris Ashmead, 1902. Canad. Ent. 34: 221.
Type-species: *Masaris occidentalis* Cresson. Orig. desig.
Toryna Bradley, 1922. Calif. Univ., Pubs. Ent. 1: 407.
Type-species: *Masaris vespoides* Cresson. Orig. desig.
Holopticus Bradley, 1922. Calif. Univ., Pubs. Ent. 1: 408.
Type-species: *Masaris texanus* Cresson. Orig. desig.
Cotyledon Bradley, 1922. Calif. Univ., Pubs. Ent. 1: 408.
Type-species: *Masaris edwardsii* Cresson. Orig. desig.

Nests are made of sand and mud, or mud alone, and are built on the upper or lower surfaces of stones or on twigs. Typically, they occur in clumps, and are provisioned with pollen and nectar. It appears that earlier flower records indicating that *Pseudomasaris* species are polytropic, visiting a wide range of flowers, may be erroneous. More recent investigations suggest that at least some of the species are oligotropic, visiting only a small number of closely related plants for pollen and nectar.

Revision: Richards, 1963. Calif. Univ., Pubs. Ent. 27: 283-310, 3 pls., 26 text figs.

Taxonomy: Richards, 1962. Revisional study of masarid wasps, pp. 276-281, figs. 236-241 (key to spp., generic synonymy). —Richards, 1966. Roy. Ent. Soc. London, Proc. 35: 47-55 (revised key).

Biology: Cooper and Bequaert, 1951 (1950). Psyche 57: 137-142 (flower visiting records). —Cooper, 1952. Amer. Midland Nat. 48: 103-110 (oligotropy, flower visiting records). —Torchio, 1970. Los Angeles Co. Mus., Contrib. Sci. 202: 25-27 (nests).

basirufus Rohwer. Ariz., Calif. Pollen: *Phacelia crenulata, P. pachyphylla.*
Pseudomasaris zonalis basirufus Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 452. ♀.
Pseudomasaris bariscipus Bradley, 1922. Calif. Univ., Pubs. Ent. 1: 418. ♂.

Taxonomy: Richards, 1963. Calif. Univ., Pubs. Ent. 27: 299 (synonymy).

coquilletti Rohwer. Ariz., Utah, Calif., Oreg. in U. Sonoran and Transition Zones. Ecology: Builds mud nest of 2-5 cells on rocks. Parasite: *Anthrax i. irroratus* Say. Pollen: *Phacelia distans, P. californica, P. imbricata, P. ramosissima, P. cicutaria; Ceanothus* sp.; *Eriodictyon* sp.; *Eschscholtzia* sp.
Pseudomasaris coquilletti Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 555. ♂, ♀.

Biology: Richards, 1963. Calif. Univ., Pubs. Ent. 27: 295, pls. 1-3 (nest).

edwardsii (Cresson). Wash., Idaho and Wyo., south to Calif. and Ariz., mostly in Transition Zone; Mexico (Baja California). Ecology: Builds mud nests of 1-10 cells attached to rocks, usually in somewhat sheltered sites. Parasite: *Chrysura densa* (Cr.). Pollen: *Eriodictyon tomentosum; Phacelia distans, P. crenulata, P. imbricata, P. hastata, P.* sp.; *Ceanothus parviflorus, C.* sp.; *Tamarix gallica; Oenothera clavaeformis* var. *aurantiaca, O.* sp.; *Mentha pulegium, Salvia columbariae; Cryptantha intermedia, C. muricata, Symphoricarpos* sp.; *Chaenactis glabriuscula; Eriodictyon trichocalyx* var. *lanatum*. Predator: *Philanthus zebratus nitens* (Bks.).
Masaris edwardsii Cresson, 1872. Amer. Ent. Soc., Trans. 4: 87. ♂, ♀.

Taxonomy: Torchio, 1970. Los Angeles Co. Mus., Contrib. Sci. 202: 23-24, figs. 26-29 (larva, pupa).

Biology: Hicks, 1929. Canad. Ent. 61: 121-123 (nest). —Torchio, 1970. Los Angeles Co. Mus., Contrib. Sci. 202: 2-20, figs. 1-23, 25 (nest, foraging, larval development).

macneilli Bohart. Calif., Utah Pollen: *Hydrophyllum occidentale.*
Pseudomasaris macneilli Bohart, 1963. *In* Richards, Calif. Univ., Pubs. Ent. 27: 291. ♂, ♀.

macswaini Bohart. Southern Calif. Pollen: *Phacelia* sp.
Pseudomasaris macswaini Bohart, 1963. *In* Richards, Calif. Univ., Pubs. Ent. 27: 301. ♂, ♀.

maculifrons (Fox). Calif., Nev., Utah, Ariz., N. Mex.; Mexico (Sonora, Baja California). Ecology: Builds delicate tubular mud cells on under surface of stones. Pollen: *Phacelia ramosissima, P. crenulata, P. distans, P. congesta* var. *rupestris, P. pachyphylla, P.* sp.; *Prunus* sp.; *Astragalus* sp.; *Sphaeralcea* sp.; *Eucnide urens; Cryptantha* sp.
Masaris maculifrons Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 12. ♀.
Pseudomasaris albifrons Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 451. ♂.
Pseudomasaris zonalis neomexicanus Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 452. ♀.
Pseudomasaris (*Holopticus*) *rohweri* Bradley, 1922. Calif. Univ., Pubs. Ent. 1: 417. ♂.

Taxonomy: Richards, 1963. Calif. Univ., Pubs. Ent. 27: 297 (synonymy).

Biology: Parker, 1967. Pan-Pacific Ent. 43: 213-214, figs. b, c, e, f (nest, life history).

marginalis (Cresson). B. C. and Alta. south to Calif. and N. Mex. in Canadian, Transition and U. Sonoran Zones. Pollen: *Phacelia heterophylla, P. sericea, P.* sp.
Masaris marginalis Cresson, 1864. Ent. Soc. Phila., Proc. 3: 677. ♀.

micheneri Bohart. Calif. (Inyo Co.).
Pseudomasaris micheneri Bohart, 1963. *In* Richards, Univ. Calif., Pubs. Ent. 27: 298, figs. 1, 14, 21. ♂, ♀.

occidentalis (Cresson). Tex., Kans., N. Mex.
Masaris occidentalis Cresson, 1871. Amer. Ent. Soc., Trans. 3: 348. ♀.

phaceliae Rohwer. Tex., N. Mex., Ariz. Ecology: Builds nests under or on side of stones. Pollen: *Phacelia congesta* var. *rupestris, P. popei* var. *similis, P. neomexicana, P.* sp.
Pseudomasaris phaceliae Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 450. ♂, ♀.

Taxonomy: Richards, 1966. Roy. Ent. Soc. London, Proc. 35: 49 (redescription male, female).

Biology: Parker, 1967. Pan-Pacific Ent. 43: 214-215, fig. a (nest). —Torchio, 1970. Los Angeles Co. Mus., Contrib. Sci. 202: 21 (nest).

texanus (Cresson). Tex. Pollen: *Phacelia popei.*
Masaris texanus Cresson, 1871. Amer. Ent. Soc., Trans. 3: 348. ♂, ♀.

Taxonomy: Richards, 1966. Roy. Ent. Soc. London, Trans. 35: 48-49 (redescription male, female; clarification of distribution).

vespoides (Cresson). Wash. to S. Dak. south to Calif. and N. Mex. in Transition and U. Sonoran Zones; Mexico (Baja California). Ecology: Builds nest of hard mud with 1-13 cells placed vertically with tops in a straight line, or occasionally of sandy material on twigs. Pollen: *Penstemon secundiflorus, P. heterophyllus P. alpinus, P. unilateralis, P. azurea, P. glaber, P. comarrhenus, P. payetensis,* p. *cyaneus, P. venustus, P. spectabilis, P. laetus, P. lyalli, P. attenuatus, P. gracilis, P.* sp.; *Salvia carduacea; Ranunculus* sp.; *Platystemon californicum; Clarkia* sp.; *Nama parryi; Phacelia* sp.; *Aster* sp., thistle.
Masaris vespoides Cresson, 1863. Ent. Soc. Phila., Proc. 2: 287. ♂, ♀.
Pseudomasaris vespoides robertsoni Cockerell, 1913. Ent. Soc. Wash., Proc. 15: 107. ♀.

Biology: Cockerell, 1913. Ent. Soc. Wash., Proc. 15: 107 (nest on stem). —Davidson, 1913. South. Calif. Acad. Sci., Bul. 12: 17-18 (nests on rocks and stems). —Hicks, 1927. Canad. Ent. 59: 75-79 (nests on rock). —Hicks, 1929. Canad. Ent. 61: 123-125 (behavior on flowers, nests on rocks and plant stems). —Cooper, 1952. Amer. Midland Nat. 48: 103-110 (*vespoides* probably oligolectic on *Penstemon* spp.). —Torchio, 1970. Los Angeles Co. Mus., Contrib. Sci. 202: 21, fig. 24 (nest on peach twig). —Torchio, 1974. Pan-Pacific Ent. 50: 226-234, 1 fig. (pollination mechanism in *Penstemon*).

wheeleri Bequaert. Calif. in Transition and U. Sonoran Zones; Mexico (Baja California). Pollen: *Eriodictyon tomentosum, E. crassifolium, E. californicum, E. trichocalyx* var. *lanatum, E.* sp.; *Penstemon spectabilis, P.* sp.; *Yucca* sp.; *Hyptis emoryi; Larrea glutinosa; Peucephyllum schotti.*
Pseudomasaris wheeleri Bequaert, 1929. Psyche 36: 61. ♂, ♀.

zonalis (Cresson). B. C., Wash. to Mont. and Nebr., south to Calif. and Colo. in Transition, Canadian and Hudsonian Zones. Ecology: Nest of 4 cells beneath rock overhang, the entrance upward, the cells of sandy matrix covered with hard mud. Parasite: *Chrysura densa* (Cr.). Pollen: *Phacelia heterophylla, P. frigida, P. hastata, P. humilis, P. nemoralis, P.* sp.; *Besseya plantaginea; Ranunculus* sp.; *Ceanothus parviflorus; Penstemon* sp.; *Arnica* sp., *Encelia farinosa, Grindelia* sp.
Masaris zonalis Cresson, 1864. Ent. Soc. Phila., Proc. 3: 674. ♂, ♀.
Pseudomasaris zonalis albopictus Bohart, 1950. Biol. Soc. Wash., Proc. 63: 78. ♂, ♀.

Taxonomy: Richards, 1963. Calif. Univ., Pubs. Ent. 27: 292 (synonymy).

Biology: Parker, 1967. Pan-Pacific Ent. 43: 215-216, fig. c (nest).

Family EUMENIDAE

The arrangement of genera adopted here is that used by van der Vecht and Fischer for the Palaearctic fauna with interpolation in the appropriate position of the genera restricted to North America or to the New World.

Taxonomy: Ashmead, 1902. Canad. Ent. 34: 203-210 (key to genera). —Isely, 1917. Ent. Soc. Amer., Ann. 10: 364-366 (synopsis of N. Amer. spp.). —Bohart, 1939. Pan-Pacific Ent. 15: 97-98 (key to *Odynerus, sens. lat.* subgenera). —Bohart, 1965. Pan-Pacific Ent. 41: 107-113 (status of spp. described by Cameron). —Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 173-174 (key to genera). —van der Vecht and Fischer, 1972. Hym. Cat. 8: 1-199 (Palaearctic spp.). —Goodpasture, 1974. Kans. Ent. Soc., Jour. 47: 364-372, 9 figs. (use of chromosomes in classification).

Biology: Krombein, 1961. Wash. Acad. Sci., Jour. 51: 89-93, 6 figs. (symbiosis between saproglyphid mites and eumenid wasps). —Cooper, 1967 (1966). Psyche 73: 238-250, 11 figs. (egg hatch, number of instars, adult emergence from nest).

Subfamily EUMENINAE

Genus ODYNERUS Latreille

Genus ODYNERUS Subgenus ODYNERUS Latreille

Odynerus Latreille, 1802-1803. Hist. Nat. Crust. Ins., v. 3, p. 362.
Type-species: *Vespa spinipes* Linnaeus. Desig. by Shuckard, 1837.
Odynera Illiger, 1807. Mag. Insektenk. 6: 196. Emend.

Epipone Kirby and Spence, 1815. Introduct. to Ent., v. 1, p. 349. Preocc.
Type-species: *Vespa spinipes* Linnaeus. Monotypic.
Oplopus Wesmael, 1836. Acad. Sci. Belg., Bul. 3: 45. Preocc.
Type-species: *Vespa spinipes* Linnaeus. Desig. by Girard, 1879.
Oplomerus Westwood, 1840. Introduct. Mod. Class. Ins., v. 2 (Synopsis), p. 84. N. name.
Hoplomerus Agassiz, 1846. Nomencl. Zool., Index Univ., p. 185. Emend.
Hoplopus Agassiz, 1846. Nomencl. Zool., Index Univ., p. 186. Preocc. Emend.
Epiponus Saussure, 1875. Smithsn. Inst. Misc. Collect. 254: 363.
Type-species: *Odynerus dilectus* Saussure. Monotypic.
Euepipona Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, p. 39.
Type-species: *Vespa spinipes* Linnaeus. Desig. by Richards, 1937.

The nests are usually made in the ground but *O. erythrogaster* utilizes twigs of elderberry (*Sambucus*).

Revision: Bohart, 1939. Pan-Pacific Ent. 15: 76-84 (N. Amer. spp.)

Taxonomy: Richards and van der Vecht, 1968. Ent. Ber. 28: 196 (type-species of *Odynerus*).

cinnabarinus Bohart. Calif., Ariz., Utah, Tex. in U. Sonor. Zone.
Odynerus cinnabarinus Bohart, 1939. Pan-Pacific Ent. 15: 83. ♂, ♀.

dilectus Saussure. N. Y., Minn., Mont., Wyo., Colo., N. Mex., Calif., Wash., Oreg., Alaska, Alta. in Canadian Zone. Ecology: Nests in ground burrows topped by erect turrets fashioned of mud pellets. Prey: *Hypera postica* (Gyll.), *H. punctata* F., larvae; caterpillars.
Odynerus (*Epipona*) *dilectus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 141. ♂.

Biology: Linsley and Michener, 1942. Pan-Pacific Ent. 18: 27 (nest, prey).

erythrogaster Bohart. Calif. in U. Sonor. and Transit. Zones; Mexico (Baja California).
Ecology: Nests in *Sambucus* twigs. Parasite: Sarcophagidae sp.; *Sphaeropthalma* (*Photopsis*) sp. Predator: *Trichodes ornatus* Say.
Monobia bicolor Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 421. ♀.
Preocc. in *Odynerus*.
Odynerus erythrogaster Bohart, 1939. Pan-Pacific Ent. 15: 81. ♂, ♀. N. name.

Biology: Parker and Bohart, 1968. Pan-Pacific Ent. 44: 3 (nest, parasites, predator).

margaretellus Rohwer. Colo., Oreg., Wash.
Odynerus margaretellus Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 242. ♂, ♀.

Genus PTEROCHEILUS Klug

The species are all ground nesting so far as is known and carry earth from their nests in "baskets" formed by the long, fringed labial palpi. Caterpillars are used in provisioning.

Revision: Bohart, 1940. Ent. Soc. Amer., Ann. 33: 162-208.

Taxonomy: van der Vecht, 1966. Ent. Ber. 26: 161-162 (type-species of *Pterocheilus* and *Nannopterocheilus*).

Genus PTEROCHEILUS Subgenus PTEROCHEILUS Klug

Pterocheilus Klug, 1805. Beitr. z. Naturkunde, v. 1, p. 143.
Type-species: *Vespa phalerata* Panzer. Desig. by Blanchard, 1840.
Nannopterocheilus Bluethgen, 1961. Akad. Wiss. Berlin, Abhandl. 1961: 62.
Type-species: *Vespa phalerata* Panzer. Orig. desig.

The typical subgenus does not occur in the New World.

Genus PTEROCHEILUS Subgenus MEGAPTEROCHEILUS Bohart

Pterocheilus subg. *Megapterocheilus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 173.
Type-species: *Pterochilus mirandus* Cresson. Orig. desig.

This subgenus may be a synonym of *Cephalochilus* Bluethgen, 1939, which van der Vecht considers to be of generic rank. Bohart noted that the Palaearctic *grandis* Lep. might belong to *Megapterocheilus;* it is the type-species of *Cephalochilus*.

arizonicus Bohart. Calif., Nev., Ariz., N. Mex., Tex. in L. Sonor. Zone deserts.
Pterocheilus (*Megapterocheilus*) *arizonicus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 174. ♂, ♀.

biplagiatus Cresson. Calif., Wash., Wyo. in U. Sonor. and Transit. Zones. Usually collected at *Phacelia*.
Pterochilus (!) *biplagiatus* Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xix. ♀ (♂ misdet.).

bradleyi Bohart. Ariz. (Nogales); Mexico (Sonora).
Pterocheilus (*Megapterocheilus*) *bradleyi* Bohart, 1950. Biol. Soc. Wash., Proc. 63: 195. ♂, ♀ (?).

crispocornis Bohart. Calif., Nev., Utah, Ariz. in L. Sonor. Zone.
Pterocheilus (*Megapterocheilus*) *crispocornis* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 178. ♂, ♀.

decorus decorus Cresson. Oreg., Mont., Wyo., Colo., Nebr., Ariz., Utah, Nev., Calif. in Canadian and Transition Zones.
Pterochilus (!) *decorus* Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xviii. ♀.
Pterochilus (!) *zonatus* Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xviii.
Odynerus (*Pachodynerus*) *cosmiogaster* Cameron, 1905. Invertebrata Pacifica 1: 123. ♂.

decorus leucotaenius Rohwer. Alta., Wash., Oreg., Calif., Nev., Wyo., in Transition and Canadian Zones.
Pterochilus (!) *leucotaenius* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 554. ♀.

denticulatus (Saussure). Ariz., N. Mex.; Mexico.
Leptochilus denticulatus Saussure, 1855. Rev. Mag. Zool. (2) 7: 373. ♂.
Pterochilus (!) *lewisii* Cresson, 1868. Amer. Ent. Soc., Trans. 1: 382. ♀.
Pterochilus (!) *aztecus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 141. ♀.

linsleyi Bohart. Western Tex., Ariz.; Mexico (Nuevo Leon).
Pterocheilus (*Megapterocheilus*) *linsleyi* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 176. ♂, ♀.

mirandus Cresson. Utah, Nev., Calif. in U. Sonor. and Transit. Zones.
Pterochilus (!) *mirandus* Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xvii. ♂, ♀.
Pterochilus (!) *luteicollis* Cameron, 1909. Pomona Col. Jour. Ent. 1: 84. ♀.

nigricaudus Bohart. Calif., Ariz., Nev.
Pterocheilus (*Megapterocheilus*) *nigricaudus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 181. ♀.
Pterocheilus (*Megapterocheilus*) *inyoensis* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 186. ♂.

oregonensis Bohart. Oreg. (Lakeview, Lake Co.).
Pterocheilus (*Megapterocheilus*) *oregonensis* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 182. ♀.

pedicellatus Bohart. Idaho, Calif., Ariz., Utah, Colo., N. Mex., Tex. in U. Sonoran Zone; Mexico.
Pterocheilus (*Megapterocheilus*) *pedicellatus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 188. ♂, ♀.

quinquefasciatus Say. B. C. Alta., Wash., Oreg., Idaho, Mont., Wyo., S. Dak. to Tex., N. Mex.
Ecology: Nests in sand; the obliquely vertical burrow is divided into two horizontal galleries ending in 1-3 cells. Prey: Noctuidae sp.
Pterochilus (!) *5-fasciatus* Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 347. ♀.

Biology: Isely, 1914. Kans. Univ. Sci. Bul. 8: 294-296, pl. 26, fig. 1 (nest, prey).

texanus Cresson. Tex., Fla., N. C. Ecology: Constructs 1-celled nest at end of vertical burrow in sandy soil. Prey: *Heliophana mitis* Grt.
Pterochilus (!) *texanus* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 244. ♂, ♀.

Biology: Evans, 1956. Ent. Soc. Wash., Proc. 58: 265-267, figs. 5, 6 (nest, prey).

trichogaster Bohart. Calif., Oreg. in Transition Zone. Ecology: Nests in sandy soil in aggregations. Parasite: *Fedtschenkia anthracina* (Ashm.). Prey: *Hydriomena* sp.
Pterocheilus (*Megapterocheilus*) *trichogaster* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 183. ♂, ♀.

Biology: Bohart and Schuster, 1972. Pan-Pacific Ent. 48: 149 (nesting habits, prey, parasite).

Genus PTEROCHEILUS Subgenus ONCHOPTEROCHEILUS Bohart

Pterocheilus subg. *Onchopterocheilus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 191. Type-species: *Pterochilus*(!) *comptus* Cresson. Orig. desig.

bakeri Cameron. Calif. in Transit. Zone from San Diego Co. to Butte Co.; Mexico (Baja California).
Pterochilus (!) *bakeri* Cameron, 1909. Pomona Col. Jour. Ent. 1: 123. ♀.

comptus Cresson. Calif. in L. Sonor., U. Sonor., and Transit. Zones.
Pterochilus (!) *comptus* Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xviii. ♀.

hirsutipennis Bohart. Calif., Nev., Ariz. in deserts in L. Sonoran Zone; Mexico (Baja California).
Pterocheilus (*Onchopterocheilus*) *hirsutipennis* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 200. ♂, ♀.

hurdi Bohart. Calif., Nev.
Pterocheilus (*Onchopterocheilus*) *hurdi* Bohart, 1950. Biol. Soc. Wash., Proc. 63: 197. ♂, ♀.

laticeps Cresson. Tex., Ariz., Calif. (Owens Valley and southern deserts) in L. Sonoran Zone; Mexico (Baja California, Sonora, Chihuahua, Coahuila, Durango).
Pterochilus (!) *laticeps* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 244. ♀.
Odynerus leucospilus Cameron, 1909. Pomona Col. Jour. Ent. 1: 133. ♀. Preocc.

micheneri Bohart. Calif., Nev., Utah, Idaho.
Pterocheilus (*Onchopterocheilus*) *micheneri* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 196. ♂, ♀.

panamintensis Bohart. Calif., Ariz.
Pterocheilus (*Onchopterocheilus*) *panamintensis* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 192. ♂.

pimorum (Viereck). Southern Calif., Nev., Ariz. in deserts, in L. Sonoran Zone; Mexico (Baja California).
Odynerus pimorum Viereck, 1908. Amer. Ent. Soc., Trans. 33: 405. ♂.

sculleni Bohart. Ariz., Colo., Tex.
Pterocheilus (*Onchopterocheilus*) *sculleni* Bohart, 1950. Biol. Soc. Wash., Proc. 63: 196. ♂, ♀.

timberlakei Bohart. Calif. in U. Sonoran and Transition Zones north to Eldorado Co., Ariz.
Pterocheilus (*Onchopterocheilus*) *timberlakei* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 194. ♂, ♀.

trachysomus Bohart. Calif. in L. Sonoran Zone of southern deserts and Owens Valley.
Pterocheilus (*Onchopterocheilus*) *trachysomus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 193. ♂ (♀ misdet.).

Genus PTEROCHEILUS Subgenus MICROPTEROCHEILUS Bohart

Pterocheilus subg. *Micropterocheilus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 201. Type-species: *Pterocheilus desertorum* Bohart. Orig. desig.

acuceps Bohart. Calif., Wyo.
Pterocheilus (*Micropterocheilus*) *acuceps* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 208. ♀.

cyathopus Bohart. Calif. in Transition Zone.
Pterocheilus (*Micropterocheilus*) *flavobalteatus cyathopus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 206. ♂, ♀.

desertorum Bohart. Wash., Calif., Nev., Ariz., N. Mex. in L. Sonoran Zone.
Pterocheilus (*Micropterocheilus*) *desertorum* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 202. ♂, ♀.

diversicolor Rohwer. Southern Calif., Nev., Ariz. in Desert of L. Sonoran Zone; Mexico (Baja California).
Pterochilus (!) *diversicolor* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 554. ♀.

morrisoni Cresson. Oreg., Calif., Nev., Utah, Ariz. in Transition, Canadian and Hudsonian Zones.
Pterochilus (!) *morrisoni* Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xix. ♂, ♀.
Pterochilus (!) *flavobalteatus* Cameron, 1909. Pomona Col. Jour. Ent. 1: 84. ♀.

Taxonomy: Bohart, 1965. Pan-Pacific Ent. 41: 109 (synonymy).

paenacuceps Bohart. Wyo., Idaho, Utah.
Pterocheilus (*Micropterocheilus*) *paenacuceps* Bohart, 1950. Biol. Soc. Wash., Proc. 63: 200. ♀.

provancheri albotinctus Bohart. Calif., Oreg., Wash., Wyo., Nev.
Pterocheilus (*Micropterocheilus*) *provancheri albotinctus* Bohart, 1950. Biol. Soc. Wash., Proc. 63: 199. ♂, ♀.

provancheri provancheri (Huard). Calif., Nev., Oreg., Utah, Transition to Canadian and Hudsonian Zones.
Odynerus truncatus Provancher, 1895. Nat. Canad. 22: 158. ♂, ♀. Preocc.
Odynerus provancheri Huard, 1897. Nat. Canad. 24: 25. N. name.
Leptochilus cratocerus Cameron, 1909. Pomona Col. Jour. Ent. 1: 122. ♂.

pruinosus Cameron. Ariz., Idaho in Transition Zone.
Pterochilus (!) *pruinosus* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 227. ♀.

seneconis Rohwer. Colo., Wyo., Mont., Idaho, Nev. in Canadian Zone.
Pterochilus(!) *seneconis* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 553. ♂, ♀.

sparsipunctatus Bohart. Calif.
Pterocheilus (*Micropterocheilus*) *sparsipunctatus* Bohart, 1950. Biol. Soc. Wash., Proc. 63: 198. ♂, ♀.

tricoloratus Bohart. Ariz. (Maricopa Co.), Calif. (San Bernardino Co.).
Pterocheilus (*Micropterocheilus*) *tricoloratus* Bohart, 1940. Ent. Soc. Amer., Ann. 33: 207. ♀.

Genus LEPTOCHILOIDES Bohart

Leptochiloides Bohart, 1940. Ent. Soc. Amer., Ann. 33: 165.
Type-species: *Leptochiloides utahensis* Bohart. Orig. desig.

arizonae Bohart. Ariz.
Leptochiloides arizonae Bohart, 1940. Ent. Soc. Amer., Ann. 33: 166. ♂.

brevicornis Bohart. South. Calif.
Leptochiloides brevicornis Bohart, 1940. Ent. Soc. Amer., Ann. 33: 167. ♂.

utahensis Bohart. Utah (Bellevue, Washington Co.).
Leptochiloides utahensis Bohart, 1940. Ent. Soc. Amer., Ann. 33: 166. ♀.

Genus HYPALASTOROIDES Saussure

Hypalastoroides Saussure, 1856. Etudes sur la famille des Vespides, v. 3, p. 328. Proposed originally as a division of *Alastor* subg. *Alastoroides* Sauss.; validated by Op. 189, Internatl. Comn. Zool. Nomencl., 1970.
Type-species: *Alastor brasiliensis* Saussure. Monotypic.

Revision: Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 322-323.

Taxonomy: van der Vecht, 1967. Bul. Zool. Nomencl. 24: 31 (request for validation of *Hypalastoroides* Sauss., 1856). —Internatl. Comn. Zool. Nomencl., 1970. Bul. Zool. Nomencl. 26: 187 (validation of *Hypalastoroides* Sauss., type-species *Alastor brasiliensis* Sauss.).

mexicanus (Saussure). Southern Tex.; Mexico to Canal Zone.
Alastor (*Alastoroides*) *mexicanus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 141. ♀.

slevini (Bohart). Ariz. (Baboquivari Mts.); Mexico (Baja California).
Alastoroides slevini Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 323. ♂, ♀.

Genus MICRODYNERUS Thomson

Microdynerus Thomson, 1874. Hym. Scand., v. 3, p. 58.
Type-species: *Odynerus exilis* Herrich-Schaeffer. Desig. by Jones, 1937.

Two North American species have been reared from nests in twigs; both species stored caterpillars as prey. A few Palaearctic species have been reported to nest in cavities in plants, walls or rocks, and to provision with larvae of small Curculionidae.

Taxonomy: Bohart, 1955. Ent. Soc. Wash., Proc. 57: 287-299, 19 figs. (review of trinodus group). —Parker, 1970. Pan-Pacific Ent. 46: 241-253, 52 figs. (key).

arenicolus (Bohart). Calif., Ariz., N. Mex.
Leptochilus arenicolus Bohart, 1955. Ent. Soc. Wash., Proc. 57: 299, fig. 19. ♂, ♀.

bakerianus (Cameron). Oreg., Calif., Nev., Utah, Ariz., N. Mex., Colo., Wyo. Ecology: Nests in *Sambucus* stems. Parasite: *Toxophora virgata* O. S., *Anthrax irroratus* Say; *Chrysis parkeri* Moore, *C. pattoni* Aar., *C. stenodyneri* Krom.; Mutillidae sp. Prey: Lepidoptera larvae. Predator: *Trichodes ornatus* Say.
Ancistrocerus bakerianus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 220. ♂.
Leptochilus occidentalis Bohart, 1955. Ent. Soc. Wash., Proc. 57: 291, figs. 3, 8, 10. ♂, ♀.

Taxonomy: Bohart, 1965. Pan-Pacific Ent. 41: 108 (synonymy).

Biology: Parker and Bohart, 1968. Pan-Pacific Ent. 44: 3 (parasites, predator). —Parker, 1970. Pan-Pacific Ent. 46: 242-243, figs. 51, 52 (nest, life history).

bechteli (Bohart). Calif., Ariz.; deserts.
Leptochilus bechteli Bohart, 1955. Ent. Soc. Wash., Proc. 57: 294, figs. 1, 12. ♂, ♀.

cavatus (Bohart). South. Calif.
Leptochilus cavatus Bohart, 1955. Ent. Soc. Wash., Proc. 57: 295, fig. 13. ♂, ♀.

gibboceps (Bohart). Calif.
Leptochilus gibboceps Bohart, 1955. Ent. Soc. Wash., Proc. 57: 296, fig. 17. ♂, ♀.

hurdi Parker. N. Mex., Ariz.; Mexico (Sonora, Baja California).
Microdynerus hurdi Parker, 1970. Pan-Pacific Ent. 46: 248, figs. 4, 21, 27, 34. ♂, ♀.

inusitatus Parker. Calif.
Microdynerus inusitatus Parker, 1970. Pan-Pacific Ent. 46: 248. ♂, ♀.

lissosomus (Bohart). Calif.
Odynerus lissosomus Bohart, 1940. Pan-Pacific Ent. 16: 88. ♂, ♀.

monolobus (Bohart). Tex., Fla.
Odynerus heterospilus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 201. ♀. Preocc. by Cameron, 1907.
Leptochilus monolobus Bohart, 1951. U. S. Dept. Agr., Agr. Monog. 2: 897. N. name.

patagoniae Parker. Ariz. (Patagonia).
Microdynerus patagoniae Parker, 1970. Pan-Pacific Ent. 46: 252, fig. 23. ♂.

sayi (Cameron). Calif., Nev., Oreg., Idaho.
Ancistrocerus sayi Cameron, 1908. Amer. Ent. Soc., Trans. 34: 221. ♂.
Leptochilus williamsi Bohart, 1955. Ent. Soc. Wash., Proc. 57: 297, fig. 14. ♂, ♀.

Taxonomy: Bohart, 1965. Pan-Pacific Ent. 41: 112 (synonymy).

schlingeri (Bohart). Calif.
Leptochilus schlingeri Bohart, 1955. Ent. Soc. Wash., Proc. 57: 298, figs. 4, 5, 18. ♂, ♀.

singulus (Bohart). S. Dak. south to Tex., west to Idaho, Ariz., Calif. Ecology: Nests in *Sambucus* stems. Prey: Lepidoptera larvae.
Leptochilus singulus Bohart, 1955. Ent. Soc. Wash., Proc. 57: 293, fig. 11. ♂, ♀.

Biology: Parker, 1970. Pan-Pacific Ent. 46: 243 (nest, life history).

trinodus (Bohart). Calif., Ariz., N. Mex., Tex.
Leptochilus trinodus Bohart, 1955. Ent. Soc. Wash., Proc. 57: 289, figs. 2, 6, 7, 9. ♂, ♀.

umbifer (Bohart). Calif.
Leptochilus umbifer Bohart, 1955. Ent. Soc. Wash., Proc. 57: 297, fig. 16. ♂, ♀.

Genus LEPTOCHILUS Saussure

Genus LEPTOCHILUS Subgenus LEPTOCHILUS Saussure

Leptochilus Saussure, 1853. Etudes sur la famille des Vespides, v. 1, p. 233.
Type-species: *Pterochilus* (!) *mauritanicus* Lepeletier. Desig. by Ashmead, 1902.
Zendalia Robertson, 1928. Flowers and Insects, p. 12.
Type-species: *Odynerus zendaloides* Robertson. Desig. by Bohart, 1951 (=*Leptochilus ornatus* Saussure).

Only the typical subgenus occurs in North America. The nests are constructed in pre-existing cavities, usually in stems or twigs, but a Mexican species is recorded as nesting in a rock crevice, and the type-species from Europe apparently nests only in empty snail shells. The species are known to prey upon larvae of Coleoptera or Lepidoptera, or sometimes a combination of both.

Revision: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 153-229, 239 figs., 18 maps (Nearctic spp.).

Species Group Mesolobus

mesolobus Parker. Southern Calif. in Mojave Desert.
Leptochilus mesolobus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 177, figs. 33, 38, 39, 42, 43, map 16. ♂, ♀.

Species Group Minutissimus

Taxonomy: Bohart, 1940. Pan-Pacific Ent. 16: 87 (group characters).

gibberus Parker. Southern Ariz. in mts.
Leptochilus gibberus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 180, figs. 34, 37, 40, 44, 45, map 1. ♂, ♀.

minutissimus (Bohart). Tex. to Calif., Nev.; Mexico (Baja California).
Odynerus minutissimus Bohart, 1940. Pan-Pacific Ent. 16: 87. ♂, ♀.

petilus Parker. Southwest Tex.; Mexico south to Oaxaca and Puebla. Ecology: Nest in old beetle burrow in dead twig. Prey: Leaf-mining larvae of Coleoptera.
Leptochilus petilus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 178, figs. 35, 36, 41, 46, 47, map 1. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 166, fig. 4 (nest, prey).

Species Group Erubescens

Both species nest in twigs and use macerated pith rather than mud in nest construction.

Taxonomy: Bohart, 1940. Pan-Pacific Ent. 16: 89 (group characters).

erubescens (Bohart). Wash. and Idaho south to Calif. and Nev. Ecology: Nests in *Sambucus* stems. Prey: Larvae of Coleoptera.
Odynerus erubescens Bohart, 1940. Pan-Pacific Ent. 16: 89. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 162 (nest, life history).

periallis Parker. Oreg., Calif., Nev., Utah, Ariz. Ecology: Nests in living and dead stems and twigs. Parasite: *Anthrax irroratus* Say; *Aritranis notata sierrae* Tow.; *Microdontomerus anthidii* (Ashm.); *Ceratochrysis thysana* Boh. Prey: Larvae of Gelechioidea.
Leptochilus periallis Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 182, figs. 50-54, 58, 59, map 2. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 160-162, fig. 2 (nest, life history).

Species Group Bellulus

autumnus Parker. Western Nev.
Leptochilus autumnus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 185. ♀.

bellulus (Cresson). Ga., Ala., Miss., Ark., Okla., Tex.; Mexico (Tamaulipas, Veracruz, Guanajuato).
Odynerus bellulus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 243. ♀.
Odynerus fedorensis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 200. ♂.

ellenae Parker. Calif., Ariz. Ecology: Nests in old beetle borings in dead *Ephedra* branches.
Leptochilus ellenae Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 185, figs. 60, 63-65, 71, 72, map 3. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 162 (nest).

marshi Parker. N. Mex., Ariz.
Leptochilus marshi Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 184, figs. 61, 69, 70, map 3. ♂, ♀.

Species Group Rufinodus

The species of this group build the most complex nests in the family Eumenidae. The known species construct a linear series of cells in old borings in twigs. Each cell is closed with a complex plug consisting of a layer of macerated pith above which is a layer of mud or sand. At maturity the larva moves through the pith layer into the earthen layer and moves the earthen particles around, spinning them together with silk to form a cocoon.

Taxonomy: Bohart, 1940. Pan-Pacific Ent. 16: 81-82 (key to spp., group characters).

chiricahua Parker. Southern Ariz. and Calif. Ecology: Nests in *Sambucus* stem traps. Parasite: *Macrosiagon c. cruentum* (Germ.); *Sphaeropthalma amphion* (Fox). Prey: Larvae of leaf-mining Coleoptera.
Leptochilus chiricahua Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 190, figs. 91, 97, 98, map 6. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 166 (nest, prey, parasite).

ornatus Saussure. Mass. to Fla., Nebr., Colo., Kans., Tex. Ecology: Nests in old borings in twigs of *Rhus* and *Sambucus*. Parasite: *Toxophora amphitea* Wlkr.; *Rhydinofoenus tarsatorius* (Say); *Epistenia osmiae* Ashm., *E. coeruleata* Westw.; *Ceratochrysis enhuycki* Coop. Prey: *Chalepus scapularis* Oliv.?, *C. dorsalis* Thunb. ?; *Brachys ovatus* complex; *Prionomerus calceatus* (Say); all are leaf-mining beetle larvae.
Leptochilus Ornatus Saussure, 1853. Etudes sur la famille des Vespides, v. 1, p. 236. ♀, ♂. Preocc. in *Odynerus*.
Odynerus republicanus Dalla Torre, 1889. Wien. Ent. Ztg. 8: 125. N. name.
Odynerus zendaloides Robertson, 1901. Amer. Ent. Soc., Trans. 27: 197. ♂.

Biology: Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 400-404 (nest, life history). —Krombein, 1959. Ent. News 70: 17-23 (nest, life history).

rubicundulus (Bohart). Calif.; Mexico (Baja California).
Odynerus rubicundulus Bohart, 1940. Pan-Pacific Ent. 16: 90. ♂, ♀.

rufinodus (Cresson). Wash. to Calif., east through Idaho to Wyo., western Kans. and N. Mex. Ecology: Nests in stems of *Sambucus*, *Foeniculum*, *Cirsium*, *Tetradymia*, *Nama*. Parasite: *Anthrax irroratus* Say; *Clistopyga canadensis* Prov.; *Eurytoma stigmi* Ashm.; *Epistenia odyneri* Ashm., *E.* sp.; *Ceratochrysis tuberella* Boh., Chrysis *derivata* Buyss., *C. parkeri* Moore?
Odynerus rufinodus Cresson, 1868. Amer. Ent. Soc., Trans. 1: 381. ♀.
Odynerus rufobasilaris Ashmead, 1896. Psyche 7: 335. ♀.
Odynerus bruesi Cameron, 1909. Pomona Col. Jour. Ent. 1: 81. ♂.

Biology: Davidson, 1896. Psyche 7: 335-336 (nest). —Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 163-165, figs. 5, 6 (nest, life history).

trachysomus (Bohart). Utah, Ariz., N. Mex., Tex.; Mexico. Ecology: Nests in trap-stems.
Odynerus trachysomus Bohart, 1940. Pan-Pacific Ent. 16: 84. ♂, ♀.

washo Parker. Calif., Nev., Utah, Ariz., N. Mex., western Tex.; Mexico (Chihuahua). Ecology: Nests in stems of *Argemone*, *Stanleya*, *Sambucus*. Parasite: *Macrosiagon c. cruentum* (Germ.); *Phaenacra* sp.; *Anthrax irroratus* Say; *Sphaeropthalma* (*Photopsis*) sp.; *Chrysis pattoni* Aar. Prey: Leaf-mining larvae of *Exema* sp.
Leptochilus washo Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 189, figs. 79, 80, 87, 88, 93, map 4. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 165 (nest, life history).

Species Group Acolhuus

Taxonomy: Bohart, 1940. Pan-Pacific Ent. 16: 85 (characters of *tylocephalus* group).

acolhuus (Saussure). N. J. to Fla., Ala., Tex. to Ariz.; Mexico to Costa Rica. Prey: Leaf-mining larvae of Gracilariidae from *Galactica*.
Odynerus (*Odynerus*) *acolhuus* Saussure, 1857. Rev. Mag. Zool. (2) 9: 280. ♀.
Odynerus tylocephalus Bohart, 1940. Pan-Pacific Ent. 16: 85. ♂, ♀.
Odynerus monotylus Bohart, 1940. Pan-Pacific Ent. 16: 86. ♂, ♀.

Biology: Krombein, 1964. Amer. Mus. Novitates 2201: 10 (prey).

californicus Parker. Southern Calif. in mts.
Leptochilus californicus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 195, figs. 104, 110, 115, 129, 130, map 7. ♂, ♀.

Species Group Paiute

paiute Parker. Nev., Calif.
Leptochilus paiute Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 199, figs. 132, 135, 136, 138, 139, 147, 148, map 9. ♂, ♀.

stangei Parker. N. Mex. (Jemez Springs); Mexico (Guanajuato). Ecology: Nests in hole in rock.
Leptochilus stangei Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 199, figs. 133, 149, 151, map 9. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 166 (nest).

Species Group Irwini

irwini Parker. Southern Tex. to Calif., Nev. Ecology: Nests in old *Harmolita* galls on *Hilaria*.
Leptochilus irwini Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 199, figs. 131, 137, 140, 144, 146, map 9. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 166-167 (nest).

krombeini Parker. Fla. (Highlands Co.). Ecology: May nest in dead twigs of live oak.
Leptochilus krombeini Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 201, figs. 134, 141, 143, map 9. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 167 (nest).

Species Group Electus

crocatus Parker. Ariz. (Huachuca Mts.); Mexico (Morelos, Guerrero, Puebla).
Leptochilus crocatus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 210, figs. 158, 159, map 12. ♂, ♀.

electus (Cresson). S. C., Fla., Kans., Colo., Tex., N. Mex., Ariz., Nev., Calif.; Mexico (Chihuahua, Sonora, Sinaloa, Zacatecas). Ecology: Nests in small branches of dead composite in desert. Parasite: *Microdontomerus anthidii* (Ashm.). Prey: Larvae of Lepidoptera.
Odynerus electus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 243. ♂.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 167, fig. 3 (nest, parasite).

ferrugineus Parker. Ariz. to Tex. in Chihuahuan Desert.
Leptochilus ferrugineus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 206, figs. 156, 157, 170, map 12. ♂, ♀.

levinodus Bohart. Calif. (Needles); Mexico (Baja California).
Leptochilus levinodus Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 324. ♂, ♀.

menkei Parker. Nev., Ariz., Calif.; Mexico (Baja California). Ecology: Nests in beetle burrow in *Ephedra*, and in gall on *Tetradymia*.
Leptochilus menkei Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 206, figs. 1, 152, 153, 164, 166, 167, 171, 175, map 12. ♂, ♀.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 167 (nest).

michelbacheri Bohart. Calif.; Mexico (Baja California).
Leptochilus michelbacheri Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 326. ♂, ♀.

tosquineti (Cameron). Calif., Nev. Ecology: Nests in twigs of *Sambucus* and in gall on *Tetradymia*. Prey: Yponomeutidae, larvae.
Odynerus tosquineti Cameron, 1909. Pomona Col. Jour. Ent. 1: 82. ♂.

Biology: Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 167 (nest, prey).

Species Group Chichimecus

boharti Parker. Calif.
Leptochilus boharti Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 217, figs. 210, 211, 226, 229, 233, map 18. ♂, ♀.

brachialis Parker. Southern Tex.; Mexico (Chihuahua, Queretaro, Zacatecas, Durango).
Leptochilus brachialis Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 215, figs. 214, 215, 230, 235, map 17. ♂, ♀.

chichimecus (Saussure). Southern Ariz. and Tex. south to El Salvador.
Odynerus chichimecus Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 280. ♀.

dolius Parker. Ariz. in Sonoran Desert; Mexico (Sonora, Sinaloa).
Leptochilus dolius Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 216, figs. 194, 195, 227, map 17. ♂, ♀.

humerus Parker. Calif., Nev., Ariz., Tex.
Leptochilus humerus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 220, figs. 202, 203, 220, map 10. ♂, ♀.

labrosus Parker. Southern Ariz. and Calif.
Leptochilus labrosus Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 218, figs. 196, 197, 218, 232, map 18. ♂, ♀.

milleri Parker. Southern Calif. in Colorado Desert.
Leptochilus milleri Parker, 1966. Ent. Soc. Amer., Misc. Pub. 5: 222, figs. 200, 201, 228, 231, map 10. ♂, ♀.

monticolus Parker. Nev., Ariz., N. Mex.
Leptochilus monticolus Parker, 1966. Ent. Soc. Amer. , Misc. Pub. 5: 220, figs. 204, 205, 221, map 10. ♂, ♀.

propodealis Bohart. Calif.; Mexico (Baja California).
Leptochilus propodealis Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 325, figs. 4-6. ♂, ♀.

Genus CEPHALODYNERUS Parker

Cephalodynerus Parker, 1965. Ent. Soc. Amer., Ann. 58: 364.
Type-species: *Cephalodynerus unicornis* Parker. Orig. desig.

Taxonomy: Parker, 1965. Ent. Soc. Amer., Ann. 58: 365 (key to spp.).

deformiceps (Bohart). Southern Ariz.
Odynerus deformiceps Bohart, 1942. Pan-Pacific Ent. 18: 153, figs. 1, 8, 11, 12. ♂, ♀.

russipes (Bohart). Calif., Nev. in U. Sonor. Zone.
Odynerus russipes Bohart, 1942. Pan-Pacific Ent. 18: 152, figs. 13, 15. ♂, ♀.

sculleni Parker. Tex. (Big Bend Natl. Park).
Cephalodynerus sculleni Parker, 1965. Ent. Soc. Amer., Ann. 58: 365, figs. 4, 9, 14. ♂.

unicornis Parker. Ariz., Utah.
Cephalodynerus unicornis Parker, 1965. Ent. Soc. Amer., Ann. 58: 365, figs. 1, 6, 15, 16, 19. ♂, ♀.

vanduzeei (Bohart), n. comb. (R. M. Bohart and J. van der Vecht). Western Tex., N. Mex., Ariz.; Mexico (Baja California). Ecology: Nests in borings in wood. Prey: Caterpillars.
Stenodynerus vanduzeei Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 327. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, p. 140 (nest, prey, life history).

Genus SMERINGODYNERUS Snelling

Smeringodynerus Snelling, 1975. Ent. Soc. Wash., Proc. 77: 56.
Type-species: *Odynerus morelios* Saussure. Orig. desig.

Taxonomy: Snelling, 1975. Ent. Soc. Wash., Proc. 77: 56-58, 7 figs.

morelios (Saussure). Ariz., N. Mex., western Tex.; Mexico (temperate parts).
Odynerus (*Odynerus*) *Morelios* Saussure, 1857. Rev. Mag. Zool. (2) 9: 276.
Odynerus Moreliae (!) Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 186.
Odynerus Morelii Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 299. ♂. Emend. of *morelios*.
Odynerus Morelos (!) Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 299.
Ancistrocerus (?) *nigro-hirsutus* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 203. ♀.
Odynerus (*Stenodynerus*) *canamexicus* Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 448. ♂.

Genus DOLICHODYNERUS Bohart

Odynerus subg. *Dolichodynerus* Bohart, 1939. Pan-Pacific Ent. 15: 101.
Type-species: *Odynerus* (*Dolichodynerus*) *turgiceps* Bohart. Orig. desig.

tanynotus (Cameron). Calif., Ariz., N. Mex., Tex.; Mexico (Nuevo Leon).
Odynerus (?) *tanynotus* Cameron, 1909. Pomona Col. Jour. Ent. 1: 133. ♀.

turgiceps (Bohart). Calif., Ariz., N. Mex.
Odynerus (*Dolichodynerus*) *turgiceps* Bohart, 1939. Pan-Pacific Ent. 15: 102, figs. 4-8. ♂, ♀.

vandykei Bohart. Ariz.
Dolichodynerus vandykei Bohart, 1950. Biol. Soc. Wash., Proc. 63: 80. ♂, ♀.

Genus MARICOPODYNERUS Viereck

Odynerus subg. *Maricopodynerus* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 397.
Type-species: *Odynerus* (*Maricopodynerus*) *maricoporum* Viereck. Monotypic.

One species has been reared from stems of *Sambucus*. It is presumed that all species nest in abandoned burrows or cavities in stems or twigs. The prey is unknown.

Revision: Bohart, 1950. Brooklyn Ent. Soc., Bul. 45: 17-25.

chisosensis Bohart. Western Tex.
Maricopodynerus chisosensis Bohart, 1950. Brooklyn Ent. Soc., Bul. 45: 20. ♂, ♀.

decorabilis Bohart. Oreg., Nev., Calif.
Maricopodynerus decorabilis Bohart, 1950. Brooklyn Ent. Soc., Bul. 45: 22. ♂, ♀.

lissus Bohart. Ariz., southeastern Calif.
Maricopodynerus lissus Bohart, 1950. Brooklyn Ent. Soc., Bul. 45: 23. ♂, ♀.

maricoporum (Viereck). Calif., Nev., Ariz., N. Mex., Tex.; Mexico (Baja California).
Odynerus (*Maricopodynerus*) *maricoporum* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 397. ♂.
Odynerus chelonogastrus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 202. ♀.

rudiceps Bohart. Nev., Calif., Idaho, Colo., Mont., Oreg., Wash., Utah, Ariz.
Maricopodynerus rudiceps Bohart, 1950. Brooklyn Ent. Soc., Bul. 45: 21. ♂, ♀.

sericifrons Bohart. Southern Calif., Ariz. Ecology: Nests in *Sambucus* stems.
Maricopodynerus sericifrons Bohart, 1950. Brooklyn Ent. Soc., Bul. 45: 19. ♂, ♀.

Biology: Parker and Bohart, 1968. Pan-Pacific Ent. 44: 2 (nest).

shannoni Bohart. Wash.
Maricopodynerus shannoni Bohart, 1950. Brooklyn Ent. Soc., Bul. 45: 24. ♂.

Genus STENODYNERUS Saussure

Stenodynerus Saussure, 1863. Soc. Phys. Hist. Nat. Geneve, Mem. 16: 228. Proposed originally as a division of *Odynerus* subg. *Leionotus* Sauss.; validated by Op. 893, Internatl. Comn. Zool. Nomencl., 1970.
Type-species: *Odynerus chinensis* Saussure. Desig. by Bohart, 1939.
Nannodynerus Bluethgen, 1938. Konowia 16: 281.
Type-species: *Lionotus teutonicus* Bluethgen. Orig. desig.

Most species utilize as nesting sites abandoned borings of other insects in twigs, stems or wood, or old mud-dauber nests. A few make burrows in soil for a nesting site; in at least one species a mud turret is constructed over the burrow entrance. Most species prey upon caterpillars, but two of the ground-nesting species use larvae of both Lepidoptera and Coleoptera.

Revision: Bohart, 1943. Brooklyn Ent. Soc., Bul. 38: 6-11 (Anormis group). —Bohart, 1944. Pan-Pacific Ent. 20: 69-75 (Fundatus group). —Bohart, 1948. Fla. Ent. 31: 71-77 (Fla. spp.). —Bohart, 1949. Ent. Soc. Wash., Proc. 51: 237-253 (Ariz. spp.).

Taxonomy: van der Vecht, 1966. Ent. Ber. 26: 163 (generic synonymy). —van der Vecht, 1967. Bul. Zool. Nomencl. 24: 31 (request for validation of *Stenodynerus* Sauss.). —Internatl. Comn. Zool. Nomencl., 1970. Bul. Zool. Nomencl. 26: 187 (validation of *Stenodynerus* Sauss., type-species *Odynerus chinensis* Sauss.).

ammonia ammonia (Saussure). Fla., S. C.
Odynerus (*Ancistrocerus*) *ammonia* Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 122. ♀.
Odynerus ammonis Smith, 1857. Cat. Hym. Brit. Mus., v. 5, p. 83. Emend.
Odynerus floridanus Robertson, 1901. Amer. Ent. Soc., Trans. 27: 197. ♀.

ammonia paraensis (Saussure). U. S. west to Tex., Kans., Minn.
Odynerus (*Ancistrocerus*) *paraensis* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 207. ♂.
Odynerus clypeatus Robertson, 1901. Amer. Ent. Soc., Trans. 27: 196. ♂, ♀. Preocc. N. syn. (J. van der Vecht).
Odynerus clypeolatus Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, p. 42. N. name. N. syn. (J. van der Vecht).
Odynerus bradleyi Robertson, 1925. Amer. Ent. Soc., Trans. 51: 82. N. name. Preocc. N. syn. (J. van der Vecht).

anatropus Bohart. Calif., southern Oreg., Nev. Ecology: Observed nesting in loose gravelly dirt on a 45 degree slope, the cells made of dirt stuck to a silk lining.
Stenodynerus anatropus Bohart, 1944. Pan-Pacific Ent. 20: 71. ♂, ♀.

anormiformis (Viereck). Southeastern Calif., Ariz.
Odynerus (*Stenodynerus*) *anormiformis* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 407. ♀.

anormis (Say). Transcontinental and widespread in U. S. and Canada. Ecology: Reared from cells in a pithy stem, the cells separated by mud partitions. Parasite: *Amobia* sp. Prey: Caterpillars.
Eumenes anormis Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 346. ♂.
Odynerus oculatus Say, 1837. Boston Jour. Nat. Hist. 1: 385. ♂.
Odynerus (*Odynerus*) *Persecutor* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 256. ♂.
Odynerus (*Ancistrocerus*) *philetas* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 214. ♀.
Ancistrocerus truncatus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 217. ♀. Preocc.
Odynerus approximatus Cameron, 1909. Pomona Col. Jour. Ent. 1: 79. ♀.
Odynerus crassispinus Cameron, 1909. Pomona Col. Jour. Ent. 1: 130. ♂.

Biology: Peckham and Peckham, 1905. Wasps, Social and Solitary, p. 91 (nest, life history, prey). —Rau and Rau, 1918. Wasp Studies Afield, pp. 331-332 (nest, parasite).

apache Bohart. Ariz., N. Mex., Tex., Colo., Wyo., Utah, Nev., Calif., Oreg.; Mexico.
Stenodynerus (*Stenodynerus*) *apache* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 244, fig. 1. ♂, ♀.

australis (Robertson). Fla.
Odynerus australis Robertson, 1901. Amer. Ent. Soc., Trans. 27: 197. ♂, ♀.

beameri Bohart. Fla. Ecology: Nests in borings in wood. Parasite: *Toxophora amphitea* Wlkr., *Anthrax a. argyropygus* Wied. Prey: Lepidoptera larvae.
Stenodynerus (*Stenodynerus*) *beameri* Bohart, 1948. Fla. Ent. 31: 75.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 126-128 (nest, prey, life history, parasites).

blandoides blandoides Bohart. Western U. S. except Ariz., east to N. Dak., Wyo., Colo., N. Mex. Ecology: Nests in *Sambucus* stems.
Stenodynerus blandoides blandoides Bohart, 1943. Brooklyn Ent. Soc., Bul. 38: 9. ♂, ♀.

Biology: Parker and Bohart, 1968. Pan-Pacific Ent. 44: 3 (nest).

blandoides owensi Bohart. Calif., Nev.
Stenodynerus blandoides owensi Bohart, 1943. Brooklyn Ent. Soc., Bul. 38: 10. ♂.

blandus blandus (Saussure). B. C., Wash., Idaho, Oreg., Calif., Ariz., Utah; Mexico (Baja California). Ecology: Nests in *Sambucus* stems.
Odynerus (*Odynerus*) *blandus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 105. ♀.
Odynerus mathewi Cameron, 1906. Entomologist 39: 268. ♂.
Odynerus giffardi Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 237. ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nest).

blandus catalinae Bohart. Calif.
Stenodynerus blandus catalinae Bohart., 1943. Brooklyn Ent. Soc., Bul. 38: 10. ♂, ♀.

blepharus Bohart. Md. south to Fla., west to W. Va., Tex., Kans.
Stenodynerus (*Stenodynerus*) *blepharus* Bohart, 1953. Biol. Soc. Wash., Proc. 66: 185. ♂, ♀.

canus canus Bohart. B. C., Wash., Idaho, Mont., Wyo., Colo., Utah, Nev. Ecology: Nests in crevices in volcanic outcroppings with entrance capped by mud turret. Prey: Gelechiidae, Gracilariidae.
Stenodynerus canus canus Bohart, 1966. Biol. Soc. Wash., Proc. 79: 73, figs. 1-4. ♂, ♀.

Taxonomy: Clement, 1973 (1972). Pan-Pacific Ent. 48: 274-275, figs. 2-5 (larva).

Biology: Clement, 1973 (1972). Pan-Pacific Ent. 48: 271-274, fig. 1 (nest, prey, life history).

canus helvolus Bohart. Oreg., Calif., Nev., Ariz.
Stenodynerus canus helvolus Bohart, 1966. Biol. Soc. Wash., Proc. 79: 76. ♂, ♀.

chisosensis Bohart. Tex.
Stenodynerus chisosensis Bohart, 1966. Biol. Soc. Wash., Proc. 79: 79. ♂, ♀.

claremontensis (Cameron). Calif., Nev., Oreg., Idaho. Ecology: Nests in ground and constructs mud turret over entrance. Parasite: *Senotainia trilineata* (Wulp), *Amobia floridensis* (Tns.); *Toxophora virgata* O. S.; *Tetrastichus* sp.; *Chrysis venustella* Boh. Prey: *Smicronyx* sp.; Hispinae, probably *Xenochalepus* sp.; *Plutella maculipennis* (Curt.); Carposinidae sp.; *Gnorimoschema* sp.; Yponomeutidae sp.
Odynerus (*Stenodynerus*) *claremontensis* Cameron, 1905. Invertebrata Pacifica 1: 122. ♀.
Odynerus mediatus Cameron, 1909. Pomona Col. Jour. Ent. 1: 79. ♀.

Biology: Markin, 1965. Pan-Pacific Ent. 41: 139 (nest, behavior). —Markin and Gittins, 1967. Univ. Idaho, Res. Bul. 74: 1-24, 13 figs. (nest, prey, life history, parasites).

cochisensis (Viereck). B. C., Wash., Idaho and Nebr., south to Calif., Ariz. and N. Mex. Ecology: Nests in twigs and *Sambucus* stems.
Odynerus (*Stenodynerus*) *cochisensis* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 395. ♂, ♀.
Ancistrocerus pelias Cameron, 1908. Amer. Ent. Soc., Trans. 34: 208. ♀.
Ancistrocerus pilias (!) Cameron, 1909. Pomona Col. Jour. Ent. 1: 78.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nest).

coniodes Bohart. Calif., Nev., Utah, Idaho, N. Mex., Tex. Ecology: Nests in *Tetradymia* stems.
Stenodynerus coniodes Bohart, 1966. Biol. Soc. Wash., Proc. 79: 75.
Stenodynerus conoides (!) Bohart, 1966. Biol. Soc. Wash., Proc. 79: 79, figs. 17-20. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest).

foxensis Bohart. Ariz., N. Mex.
Stenodynerus foxensis Bohart, 1944. Pan-Pacific Ent. 20: 73. ♂, ♀.

fundatiformis fundatiformis (Robertson). S. C., Ga., Fla., Ala., Miss., Tex., Ark., Mo. Ecology: Nests in sandy soil but does not construct a turret above entrance. Parasite: Bombyliidae sp.; Miltogrammini spp.? Prey: *Chlamisus* sp., Chlamisinae sp.; Pyralididae spp.; Gelechiidae sp.; Olethreutidae sp.; *Synchlora aerata* (F.); Psychidae sp.
Odynerus fundatiformis Robertson, 1901. Amer. Ent. Soc., Trans. 27: 197. ♂.

Biology: Evans, 1956. Ent. Soc. Wash., Proc. 58: 268, figs. 3, 4 (nest, prey). —Krombein, 1964. Amer. Mus. Novitates 2201: 4-10 (nest, prey, life history, parasites).

fundatiformis gonosceles Bohart. U. S. west to Mississippi Valley, mostly in central and northern states.
Stenodynerus fundatiformis gonosceles Bohart, 1944. Pan-Pacific Ent. 20: 74. ♂, ♀.

histrionalis histrionalis (Robertson). U. S. west to Tex., Okla., Kans. Ecology: Nests in borings in wood. Parasite: *Pseudoxenos robertsoni* Pierce; *Amobia erythrura* (Wulp); *Chrysis stenodyneri* Krom. Prey: Olethreutidae sp.; Gelechiidae sp.; Tortricidae sp.
Odynerus histrionalis Robertson, 1901. Amer. Ent. Soc., Trans. 27: 196. ♂, ♀.

Biology: Krombein, 1955. Ent. Soc. Wash., Proc. 57: 147-148 (nest, prey, life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 134-136 (nest, prey, life history, parasites).

histrionalis paenevagus (Viereck). Tex., Kans., Colo.
Odynerus paenevagus Viereck, 1906. Amer. Ent. Soc., Trans. 34: 224. ♀.
Nortonia (?) *basimacula* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 224. ♀.

histrionalis rufustus Bohart. Fla. Ecology: Nests in borings in wood. Parasite: *Amobia erythrura* (Wulp); *Chrysis stenodyneri* Krom. Prey: Olethreutidae sp.; Gelechiidae sp.; Tortricidae sp.
Stenodynerus histrionalis rufustus Bohart, 1974. Kans. Ent. Soc., Jour. 47: 468. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 134-136 (nest, prey, parasite, cocoon, life cycle; misdet. as *ammonia histrionalis* (Robt.)).

hoferi Bohart. Southern Ariz.
Stenodynerus (*Stenodynerus*) *hoferi* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 246, fig. 3. ♂, ♀.

hybogaster Bohart. Mo., Kans. and Colo. south to Miss. and N. Mex.
Stenodynerus hybogaster Bohart, 1966. Biol. Soc. Wash., Proc. 79: 76, figs. 5-8. ♂, ♀.

innobilis Bohart. Southern Calif.
Stenodynerus innobilis Bohart, 1966. Biol. Soc. Wash., Proc. 79: 77, figs. 15, 16. ♂, ♀.

kennicottianus antheus (Cameron). West. U. S. east to Wyo., Utah, N. Mex.
Ancistrocerus antheus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 210. ♂.
Ancistrocerus tityrus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 211. ♀.
Ancistrocerus satyrus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 211. ♂.

kennicottianus kennicottianus (Saussure). Transcont. in U. S. and Canada except southwest.
Odynerus (*Odynerus*) *Kennicottianus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 104.

krombeini Bohart. N. C. (Kill Devil Hills). Ecology: Nests in wood borings in sandy areas. Parasite: *Pyemotes ventricosus* (Newp.); Miltogrammini sp.; *Chrysis stenodyneri* Krom. Prey: Gelechiidae sp.; Olethreutidae sp.
Stenodynerus (*Stenodynerus*) *krombeini* Bohart, 1953. Biol. Soc. Wash., Proc. 66: 187. ♂, ♀.

Biology: Krombein, 1955. Ent. Soc. Wash., Proc. 57: 148 (nest, life history, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 128-130 (nest, prey, life history, parasites).

lindemanni (Cameron). Tex. (Lee Co.).
Ancistrocerus lindemanni Cameron, 1908. Amer. Ent. Soc., Trans. 34: 219. ♂.

lineatifrons Bohart. Fla., S. C., N. C. Ecology: Nests in borings in wood in sandy areas. Parasite: *Tozophora amphitea* Wlkr.; *Chrysis stenodyneri* Krom. Prey: Olethreutidae sp.; *Rhyacionia frustrana* (Comst.), Tortricidae sp.; Gelechiidae sp.; Olethreutidae sp.
Stenodynerus (*Stenodynerus*) *lineatifrons* Bohart, 1948. Fla. Ent. 31: 76. ♂, ♀.

Biology: Krombein, 1953. Ent. Soc. Wash., Proc. 55: 115 (prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 136-140 (nest, prey, life history, parasites).

lissolobus Bohart. Ariz., N. Mex.; Mexico
Stenodynerus (*Stenodynerus*) *lissolobus* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 246, fig. 8. ♂, ♀.

lixovestis Bohart. Calif. (southern), Ariz., N. Mex., western Tex.
Stenodynerus (*Stenodynerus*) *lixovestis* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 247, fig. 4. ♂, ♀.

lucidus (Rohwer). Que., Ont., B. C., Calif., Oreg., Wash., Idaho, Utah, Colo., Wyo., Mont., Minn.
Ancistrocerus lucidus Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 235. ♂.

microstictus (Viereck). U. S. east to Missouri River, north to S. Dak., Wyo., Calif.; Mexico. Ecology: Nests in ground and constructs an entrance turret to burrow. Prey: Phaloniidae sp.; Gelechiidae sp.; Cosmopterygidae sp.
Odynerus microstictus Viereck, 1906. Amer. Ent. Soc., Trans. 32: 199. ♀.
Odynerus (*Stenodynerus*) *gulielmi* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 408. ♀.
Ancistrocerus (*Nortonia*) *phoenixensis* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 225. ♂, ♀.

Biology: Evans, 1956. Ent. Soc. Wash., Proc. 58: 269, figs. 7, 8 (nest, prey, life history)

noticeps clarki Bohart. Calif.
Stenodynerus noticeps clarki Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 331. ♂, ♀.

noticeps noticeps Bohart. Calif., Nev., Oreg., Wash., Utah, Idaho, Wyo., Colo.
Stenodynerus noticeps noticeps Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 330. ♂, ♀.

ochrogonius Bohart. Ariz., N. Mex.
Stenodynerus ochrogonius Bohart, 1944. Pan-Pacific Ent. 20: 74. ♂, ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 155-156, fig. 3 (sleeping habits).

oculeus illinoensis (Robertson). Ill., Minn., Mich., N. Y., D. C., Va., northern Fla., La., Tex.
Odynerus illinoensis Robertson, 1901. Amer. Ent. Soc., Trans. 27: 197. ♂, ♀.

oculeus oculeus (Robertson). Fla., Ga.
Odynerus oculeus Robertson, 1901. Amer. Ent. Soc., Trans. 27: 197. ♂, ♀.

opalinus Bohart. Calif., Ariz., N. Mex.
Stenodynerus opalinus Bohart, 1966. Biol. Soc. Wash., Proc. 79: 80, figs. 10, 11. ♂, ♀.

painteri Bohart. Southern Ariz.
Stenodynerus (*Stenodynerus*) *painteri* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 248. ♂.

papagorum papagorum (Viereck). Sask., Idaho, Wyo., Colo., Kans., N. Mex., Utah, Ariz.; Mexico. Ecology: Nests gregariously in soil, the burrow entrance capped by a mud turret, stores 14-19 coleopterous leafminers per cell. Prey: Noctuidae sp.; Anthonomini sp.; *Xenochalepus* sp. Predator: *Philanthus pulcher* D. T.
Odynerus (*Stenodynerus*) *papagorum* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 394. ♂, ♀.

Biology: Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 256-271 (nest, prey, life history). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 479 (nest, prey, parasites?).

papagorum tinctifer Bohart. Wyo., Utah, Calif.
Stenodynerus papagorum tinctifer Bohart, 1944. Pan-Pacific Ent. 20: 71. ♂, ♀.

patagoniensis Bohart. Southern Ariz.
Stenodynerus (*Stenodynerus*) *patagoniensis* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 249, fig. 7. ♂.

percampanulatus (Viereck). Western Tex., Okla., Kans., N. Mex., Ariz., Utah, Wyo., Idaho, eastern Wash.; Mexico.
Odynerus percampanulatus Viereck, 1906. Amer. Ent. Soc., Trans. 32: 200. ♂.
Odynerus (*Stenodynerus*) *blawus* Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 240. ♀.
Odynerus (*Stenodynerus*) *odontoschius* Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 241. ♀.
Odynerus (*Stenodynerus*) *odontoschius* var. *dichrous* Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 241. ♀.

propinquus (Saussure). Ala., Miss., La., Tex., Ark., Kans., Mo., Okla., N. Mex. Parasite: *Pseudoxenos fundati* Pierce.
Odynerus (*Odynerus*) *propinquus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 104. ♀.
Odynerus fundatus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 242. ♀, ♂.

pulvinatus pulvinatus Bohart. Mass. south to Fla., Mo., Kans., Mich.
Stenorynerus (!) (*Stenodynerus*) *pulvinatus* Bohart, 1953. Biol. Soc. Wash., Proc. 66: 186. ♂, ♀.

pulvinatus surrufus Krombein. Fla. Ecology: Nests in borings in wood. Parasite: *Anthrax a. argyropygus* Wied.; Miltogrammini sp.; *Chrysis inaequidens* Dahlb. Prey: Gelechiidae sp.; Olethreutidae sp.; *Salebriaria* sp , Phycitinae sp.
Stenodynerus (*Stenodynerus*) *pulvinatus surrufus* Krombein, 1959. Ent. Soc. Wash., Proc. 61: 149. ♂, ♀.

Biology: Krombein, 1959. Ent. Soc. Wash., Proc. 61: 150 (nest, prey, life history, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 130-133 (nest, prey, life history, parasites).

pulvivestis Bohart. Ariz., Calif. in desert; Mexico.
Stenodynerus (*Stenodynerus*) *pulvivestis* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 249, fig. 6. ♂, ♀.

rudus Bohart. Ariz., southern Calif., eastern Wash., Wyo.
Stenodynerus (*Stenodynerus*) *rudus* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 250. ♂, ♀.

sonoitensis Bohart. Southern Ariz.
Stenodynerus (*Stenodynerus*) *sonoitensis* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 251, fig. 9. ♂, ♀.

superpendentis Bohart. Ariz., Idaho, western Tex., Nev.
Stenodynerus (*Stenodynerus*) *superpendentis* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 252, fig. 2. ♂, ♀.

toas (Cresson). Kans., Nebr., S. Dak., Wyo., Colo., Tex., N. Mex., Ariz., Calif. (San Diego Co.); Mexico. Parasite: *Pseudoxenos neomexicanus* Pierce. Predator: *Philanthus zebratus nitens* (Bks.).
Odynerus toas Cresson, 1868. Amer. Ent. Soc., Trans. 1: 381. ♂, ♀.
Odynerus taos (!) Cresson, 1872. Amer. Ent. Soc., Trans. 4: 243. Emend.
Odynerus (*Pachyodynerus* (!)) *cressoni* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 198. ♂, ♀.
Odynerus vegasensis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 210. ♂.
Odynerus pallidipictus Cameron, 1909. Pomona Col. Jour. Ent. 1: 83. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 156 (sleeping habits).

valliceps Bohart. U. S. east to Minn., Kans., western Tex.; Mexico (Sinaloa).
Stenodynerus valliceps Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 329. ♂, ♀.

ventones (Cameron). Tex. (Fedor).
Odynerus ventones Cameron, 1908. Amer. Ent. Soc., Trans. 34: 210. ♂.

williamsi Bohart. Ariz., N. Mex.
Stenodynerus (*Stenodynerus*) *williamsi* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 253, fig. 5. ♂, ♀.

xanthianus (Saussure). Southern Calif.; Mexico (Baja California).
Odynerus (*Odynerus*) *Xanthianus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 103. ♀.
Odynerus Xantianus (!) Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 204.

Genus PARANCISTROCERUS Bequaert

Ancistrocerus subg. *Parancistrocerus* Bequaert, 1925. Amer. Ent. Soc., Trans. 51: 64.
Type-species: *Odynerus* (*Ancistrocerus*) *fulvipes* Saussure. Orig. desig.

Most species make their nests in abandoned borings of other insects in twigs, stems or wood, in artificial borings in wood, in abandoned mud-dauber nests and insect galls, and in abandoned borings of ground-nesting wasps or bees in the ground. One species constructs multicellular mud nests attached to branches or twigs. The species have been reported as preying only upon larvae of Lepidoptera.

All species have a complex symbiotic relationship with saproglyphid mites, each wasp having a host-specific mite. Each species of wasp has developed an acarinarium, a chamber at the base of the second abdominal tergum which is covered by the apex of the first tergum. The hypopial stage of the mite congregates in large numbers in the acarinarium.

Revision: Bohart, 1948. Fla. Ent. 31: 71-74, 77-80 (Fla. spp.). —Bohart, 1949. Ent. Soc. Wash., Proc. 51: 237-241, 253-259 (Ariz. spp.). —Bohart, 1952. Ent. Soc. Wash., Proc. 54: 38-53 (Calif. spp., key to U. S. spp.).

acarigaster (Bohart). Wash., Oreg., Idaho, Utah, Calif., Nev., Ariz. Ecology: Nests in *Sambucus* stems and in abandoned mud-dauber nests. Parasite: *Chrysis parkeri* Moore.
Stenodynerus (*Parancistrocerus*) *acarigaster* Bohart, 1952. Ent. Soc. Wash. Proc. 54: 49, fig. 8. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nests, parasite).

acarophorus (Bohart). Wash., Oreg., Calif., Nev. Ecology: Nests in *Sambucus* stems. Parasite: *Chrysis coerulans* F.
Stenodynerus (*Parancistrocerus*) *acarophorus* Bohart, 1952. Ent. Soc. Wash., Proc. 54: 45, fig. 2 ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nest, parasite).

austrinus (Cresson), n. comb. Tex., Okla., Kans., N. Mex.; Mexico.
Odynerus austrinus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 243. ♂, ♀.

Odynerus excentralis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 198. ♀.

bicornis bicornis (Robertson), n. comb. Fla.
Odynerus bicornis Robertson, 1901. Amer. Ent. Soc., Trans. 27: 196. ♂, ♀.

bicornis ceanothi (Rohwer), n. comb. N. Y., Pa., Va., S. C., Mich., Tenn., Ark.
Ancistrocerus (*Stenancistrocerus*) *ceanothi* Rohwer, 1912. U. S. Natl. Mus., Proc. 51: 449. ♂, ♀.

bicornis cushmani (Bohart), n. comb. Western Tex., N. Mex., southern Ariz. Ecology: Nests in borings in wood. Parasite: Saproglyphidae sp.; Chrysididae sp.
Stenodynerus (*Parancistrocerus*) *bicornis cushmani* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 253. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 143-144 (nest, life history, parasites).

coronado (Bohart), n. comb. Ariz., N. Mex., Utah, Colo., western Tex.
Stenodynerus (*Parancistrocerus*) *coronado* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 255. ♂, ♀.

cotti (Bohart), n. comb. Calif., Oreg.
Stenodynerus (*Parancistrocerus*) *cotti* Bohart, 1952. Ent. Soc. Wash., Proc. 54: 52, fig. 11. ♂, ♀.

declivatus (Bohart), n. comb. South. Calif.; Mexico (Baja California).
Stenodynerus declivatus Bohart, 1948. Calif. Acad. Sci., Proc. (4) 24: 331, pl. 12, figs. 7, 8. ♂, ♀.

Taxonomy: Bohart, 1952. Ent. Soc. Wash., Proc. 54: 46, fig. 3.

fulvipes fulvipes (Saussure), n. comb. U. S. west to Mich., Ill., Kans., Okla., Tex. Ecology: Nests in borings in wood, in old mud-dauber nests, in abandoned borings of ground-nesting bees, and also constructs its own burrows in ground. Parasite: *Anthrax a. argyropygus* Wied.; *Vespacarus fulvipes* Bak. and Cunl. Prey: *Cymolomia* sp., Tortricidae sp.; *Characoma nilotica* Rog.
Odynerus flavipes Lepeletier, 1841. Hist. Nat. Ins. Hym., v. 2, p. 659. ♂. Preocc.
Odynerus (*Ancistrocerus*) *fulvipes* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 205. ♂, ♀. N. name.

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 340-344 (nests, prey). —Rau, 1935. Brooklyn Ent. Soc., Bul. 30: 112 (nest, prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 154-156, pl. 21, figs. 102, 104-107, pl. 22, figs. 109, 110 (nest, prey, life history, parasites).

fulvipes rufovestis (Bohart), n. comb. Fla., S. C. Ecology: Nests in borings in wood. Parasite: *Vespacarus rufovestis* Bak. and Cunl.; *Senotainia trilineata* (Wulp) (?). Prey: *Pyrausta tyralis* (Guen.), Pyraustidae sp.; *Trichotaphe* sp.; sp. of Olethreutidae or Phaloniidae.
Stenodynerus (*Parancistrocerus*) *fulvipes rufovestis* Bohart, 1948. Fla. Ent. 31: 78. ♂, ♀.

Biology: Evans, 1956. Ent. Soc. Wash., Proc. 58: 270 (nest, prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 156-157 (nest, life history, prey, parasites).

histrio (Lepeletier), n. comb. D. C. and Va. to Fla., La. Ecology: Nests in borings in wood. Parasite: *Vespacarus histrio* Bak. and Cunl.; *Pseudoxenos louisianae* (Pierce); *Chrysis stenodyneri* Krom. Prey: Caterpillars.
Odynerus histrio Lepeletier, 1841. Hist. Nat. Ins. Hym., v. 2, p. 638. ♂.

Biology: Krombein, 1955. Ent. Soc. Wash., Proc. 57: 148-149 (nest, prey, life history, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 145-146 (nest, prey, life history, parasite).

leionotus leionotus (Viereck). Ont., U. S. except Pacific Coast states.
Odynerus leionotus Viereck, 1906. Amer. Ent. Soc., Trans. 32: 198. ♀.

leionotus yumus (Viereck). Western Tex., N. Mex., Ariz., Colo.
Odynerus (*Stenodynerus*) *yumus* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 397. ♂.
Odynerus (*Ancistrocerus*) *arizonaensis* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 208. ♀.

macfarlandi (Cameron). Ariz., N. Mex.; Mexico.
Odynerus macfarlandi Cameron, 1909. Pomona Col. Jour. Ent. 1: 79. ♀.

Stenodynerus (*Parancistrocerus*) *chiricahuae* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 254. ♂, ♀.

mcclayi (Bohart), n. comb. Calif., Idaho, N. Mex.
Stenodynerus (*Parancistrocerus*) *mcclayi* Bohart, 1952. Ent. Soc. Wash., Proc. 54: 51, fig. 10. ♂, ♀.

minimoferus (Bohart), n. comb. Oreg., Calif., Ariz., Nev., Utah, Wyo., Tex. Ecology: Nests in old *Sceliphron* cells.
Stenodynerus (*Parancistrocerus*) *minimoferus* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 256. ♂, ♀.

Taxonomy: Bohart, 1952. Ent. Soc. Wash., Proc. 54: 47, fig. 5 (male redescription).

parapedestris arenosus (Bohart), n. comb. Calif., Nev., Ariz.
Stenodynerus (*Parancistrocerus*) *parapedestris arenosus* Bohart, 1952. Ent. Soc. Wash., Proc. 54: 48. ♂, ♀.

parapedestris parapedestris (Bohart), n. comb. South. Calif.
Stenodynerus (*Parancistrocerus*) *parapedestris* Bohart, 1952. Ent. Soc. Wash., Proc. 54: 47, fig. 6. ♂, ♀.

pedestris bifurcus (Robertson). Fla., Ga. Ecology: Nests in borings in wood.
Odynerus bifurcus Robertson, 1901. Amer. Ent. Soc., Trans. 27: 196. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, p. 142 (nest, life history).

pedestris pedestris (Saussure). Que., U. S. west to N. Mex., Kans., Minn. Ecology: Nests in borings in wood, sumac and elder. Parasite: *Vespacarus pedestris* Bak. and Cunl.; *Pseudoxenos louisianae* (Pierce); *Toxophora amphitea* Wlkr. Prey: Gelechiidae sp.
Odynerus (*Ancistrocerus*) *Fuscipes* Saussure, 1853. Etudes sur la famille des Vespides, v. 1, p. 143. ♂. Preocc.
Odynerus (*Ancistrocerus*) *pedestris* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 206. N. name.
Odynerus (*Ancistrocerus*) *Conformis* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 219. ♀.
Odynerus (*Ancistrocerus*) *proximus* Saussure, 1857. Rev. Mag. Zool. (2) 9: 274. ♂.
Ancistrocerus parvispinosus Cameron, 1906. Amer. Ent. Soc., Trans. 32: 332. ♀.
Ancistrocerus Foxeanus Cameron, 1906. Amer. Ent. Soc., Trans. 32: 333. ♂.
Odynerus (*Ancistrocerus*) *acanthopus* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 223. ♀.

Taxonomy: Giordani Soika, 1941. Soc. Veneziana Stor. Nat., Bol. (n. s.) 2: 272 (generic assignment).

Biology: Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 388-395 (nests, life history, parasite). —Rau, 1935. Brooklyn Ent. Soc., Bul. 30: 110 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 140-142 (nest, life history, prey, parasite).

pensylvanicus ignotatus (Bohart), n. comb. Calif., Oreg., Wash., Idaho, Minn., Mich., N. B.
Stenodynerus (*Parancistrocerus*) *pensylvanicus ignotatus* Bohart, 1952. Ent. Soc. Wash., Proc. 54: 46, fig. 4. ♂, ♀.

pensylvanicus pensylvanicus (Saussure), n. comb. Canada and north. U. S. south to Oreg., Colo., Kans., Mo., N. C., Tex., N. Mex. Ecology: Nests in borings in twigs. Parasite: Bombyliidae sp. Prey: Tortricidae sp.; Olethreutidae sp.
Odynerus (*Odynerus*) *Pensylvanicus* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 257. ♀.
Odynerus (*Odynerus*) *Huro* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 297. ♀.
Odynerus (*Odynerus*) *Mohicanus* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 297. ♀.
Odynerus (*Odynerus*) *Pennsylvanicus* Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 327. ♂, ♀. Emend.

Biology: Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 395-398 (nest, life history). —Reinhard, 1929. Witchery of wasps, pp. 221-223 (nest, prey). —Rau, 1935. Brooklyn Ent. Soc., Bul. 30: 110 (nest, parasite).

perennis anacardivora (Rohwer). N. Y., Md., Va., N. C., S. C., Ga., Fla., La. Ecology: Nests in borings in wood and twigs. Parasite: *Vespacarus anacardivorus* Bak. and Cunl. Prey: Olethreutidae spp.; Gelechiidae sp.
Odynerus (*Stenodynerus*) *anacardivora* Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 241. ♀.

Biology: Krombein, 1955. *In* Krombein and Evans, Ent. Soc. Wash., Proc. 57: 228-229 (nest, prey, life history, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 151-153 (nest, prey, life history, parasite).

perennis perennis (Saussure). U. S. west to Mississippi River, also Kans., Mo. Ecology: Nests in borings in twigs and sumac. Prey: Blastobasidae sp.
Odynerus (*Odynerus*) *perennis* Saussure, 1857. Rev. Mag. Zool. (2) 9: 277.
Odynerus (*Ancistrocerus*) *minnesotaensis* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 231. ♂.

Biology: Rau, 1935. Brooklyn Ent. Soc., Bul. 30: 110 (nest). —Krombein, 1960. Ent. News 71: 33. (nest, prey, life history).

polingi (Bohart), n. comb. Southern Ariz., N. Mex.
Stenodynerus (*Parancistrocerus*) *polingi* Bohart, 1949. Ent. Soc. Wash., Proc. 51: 257. ♂, ♀.

rectangulis frazieri (Bohart), n. comb. Calif., Oreg.
Stenodynerus (*Parancistrocerus*) *rectangulis frazieri* Bohart, 1952. Ent. Soc. Wash., Proc. 54: 45, fig. 1. ♂, ♀.

rectangulis rectangulis (Viereck). Ariz., N. Mex.; Mexico. Ecology: Nests in borings in wood and *Sambucus* stems. Parasite: *Toxophora virgata* O. S. Prey: Caterpillars.
Odynerus (*Stenodynerus*) *rectangulis* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 393. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 153-154 (nest, prey, life history). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 3 (nest, parasite).

salcularis rufulus (Bohart). Fla. Ecology: Nests in borings in wood and in old galls on scrub oak. Parasite: *Vespacarus saecularis* Bak. and Cunl.; *Megaselia aletiae* (Comst.) ?; *Amobia* ? sp.; *Anthrax a. argyropygus* Wied., *Toxophora amphitea* Wlkr.; *Melittobia chalybii* Ashm.; *Chrysis coerulans* F., *C. inaequidens* Dahlb. Prey: Olethreutidae sp.; Gelechiidae sp.; *Rhyacionia* sp., *Platynota rostrana* (Wlkr.), *P.* sp., Tortricidae sp.; Phaloniidae sp.; *Pyrausta tyralis* (Guen.), Pyraustinae sp., *Homoeosoma* sp., Phycitinae sp., Epipaschiinae sp. Predator: *Lepidophora lepidocera* (Wied.).
Stenodynerus (*Parancistrocerus*) *saecularis* (!) *rufulus* Bohart, 1948. Fla. Ent. 31: 79. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 146-151 (nest, prey, life history, parasites, predator).

salcularis salcularis (Saussure). Tex., Ga., N. C., Va., D. C., Md., N. J.
Odynerus (*Ancistrocerus*) *salcularis* Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 122.
Odynerus (*Ancistrocerus*) *Saecularis* (!) Saussure, 1853. Etudes sur la famille des Vespides, v. 1, p. 142. Misspelled *secularis*, p. 145.
Ancistrocerus leensis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 215. ♂.

siccus (Bohart), n. comb. Colo., Utah, Wash., Calif., Ariz.; Mexico (Baja California).
Stenodynerus (*Parancistrocerus*) *siccus* Bohart, 1952. Ent. Soc. Wash., Proc. 54: 50, fig. 9. ♂, ♀.

subtoltecus (Viereck), n. comb. Kans. (Hamilton Co.).
Odynerus subtoltecus Viereck, 1906. Amer. Ent. Soc. Trans. 32: 197. ♀, (♂ misdet.). Type possibly lost.

texensis (Saussure). Tex., N. Mex., Ariz., southern Calif.; Mexico. Ecology: Nests in borings in wood and in old mud-dauber nests. Parasite: Sarcophagidae sp.
Odynerus (*Odynerus*) *texensis* Saussure, 1870. Rev. Mag. Zool. (2) 22: 104. ♂.
Odynerus (*Ancistrocerus*) *lacunus* Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 111. ♀.

Taxonomy: Bohart, 1952. Ent. Soc. Wash., Proc. 54: 49, fig. 7 (male characters).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 144-145 (nest, life history, parasite).

toltecus (Saussure). Wash., Oreg., Idaho, Utah, Nev., Calif., Ariz., N. Mex., western Tex.: Mexico. Ecology: Nests in borings in wood and *Sambucus*. Parasite: *Vespacarus toltecus* Bak. and Cunl.; *Toxophora virgata* O. S.; *Melittobia chalybii* Ashm.; *Chrysis barri* Boh., *C. arizonica* Boh. Prey: Gelechiidae spp.; Phycitinae sp.
Odynerus (*Odynerus*) *toltecus* Saussure, 1857. Rev. Mag. Zool. (2) 9: 277. ♀, ♂.
Odynerus Packardi Cameron, 1906. Amer. Ent. Soc., Trans. 32: 335. ♀.

Taxonomy: Bohart, 1952. Ent. Soc. Wash., Proc. 54: 53, fig. 12 (male characters).

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nests, parasites). —Krombein, 1967. Trap-nesting wasps and bees, pp. 157-160 (nest, prey, life history, parasites).

vagus slossonae (Bohart), n. comb. Fla.
Stenodynerus vagus slossonae Bohart, 1948. Fla. Ent. 31: 77. ♀.

vagus vagus (Saussure), n. comb. Ont., B. C., U. S. except Pacific Coast states. Ecology: Builds multicellular mud nests attached to branches. Parasite: *Pseudoxenos louisianae* (Pierce), *P. jonesi* (Pierce); *Chrysis* sp.; *Monodontomerus mexicanus* Gahan.
Odynerus (*Odynerus*) *vagus* Saussure, 1857. Rev. Mag. Zool. (2) 9: 277.
Odynerus (*Odynerus*) *collega* Saussure, 1870. Rev. Mag. Zool. (2) 22: 61. ♂.
Odynerus colon Cresson, 1872. Amer. Ent. Soc., Trans. 4: 241. ♂, ♀.
Odynerus delodontus Viereck, 1906. Amer. Ent. Soc., Trans. 32: 196. ♀.

Biology: Evans, 1956. Ent. Soc. Wash., Proc. 58: 269-270 (nest, parasite).

vogti (Krombein), n. comb. Md. (Plummers Island). Ecology: Nests in borings in wood. Parasite: Saproglyphidae sp. Prey: Gelechiidae spp.; Tortricidae sp.
Stenodynerus (*Parancistrocerus*) *vogti* Krombein, 1962. Biol. Soc. Wash., Proc. 75: 6. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, p. 151 (nest, prey, life history, parasite).

Genus PSEUDEPIPONA Saussure

Genus PSEUDEPIPONA Subgenus PSEUDEPIPONA Saussure

Pseudepipona Saussure, 1856. Etudes sur la famille des Vespides, v. 3, p. 309. Proposed originally as a division of *Odynerus* subg. *Epipona* Shuckard; validated by Op. 893, Internatl. Comn. Zool. Nomencl., 1970.
Type-species: *Odynerus herrichii* Saussure. Monotypic.

Only the typical subgenus occurs in North America. The Palaearctic *h. herrichii* (Sauss.) nests gregariously, making short burrows in firm sandy soil and preys upon larvae of Microlepidoptera.

Taxonomy: van der Vecht, 1967. Bul. Zool. Nomencl. 24: 31 (request for validation of *Pseudepipona* Sauss., 1856). —Internatl. Comn. Zool. Nomencl., 1970 (1969). Bul. Zool. Nomencl. 26: 187, 189, 191 (validation of *Pseudepipona* Saussure (misspelled *Pseudopipona* on p. 187, and corrected in 1973 to *Pseudepipona* in Bul. Zool. Nomencl. 30: 66), type-species *Odynerus herrichii* Sauss.)).

herrichii aldrichi (Fox). Alaska, B. C., Alta., Wash., Idaho, Mont., Wyo., Colo., Utah, N. Mex. in Canadian and Transition Zones. Typical *herrichii* (Sauss.) is widespread in the Palaearctic Region.
Odynerus aldrichi Fox, 1892. Ent. News 3: 197. ♂, ♀.

Genus EUODYNERUS Dalla Torre

Some of our species belong to the subgenera *Pareuodynerus* and typical *Euodynerus*. Others belong to one or more apparently undescribed subgenera. So far as known the subgenera *Knemodynerus*, *Syneuodynerus* and *Xanthodynerus* do not occur in the New World.

Our species have quite diverse nesting habits. A few species make original mud nests on rocks and a few dig burrows in the soil. The majority of species nest in cavities in twigs, stems, struc-

tural lumber, in old mud-dauber nests, and sometimes in old *Polistes* cells. The prey in all known cases consists of caterpillars.

Euodynerus Dalla Torre, 1904. Gen. Ins., fasc. 19, p. 38. Proposed originally for Sect. II of Div. III of *Odynerus* subg. *Leionotus* Sauss.; validated by Op. 893, Internatl. Comn. Zool. Nomencl., 1970 (1969).
Type-species: *Vespa dantici* Rossi. Desig. by Bluethgen, 1938.
Euodynerus subg. *Pareuodynerus* Bluethgen, 1938 (1937). Konowia 16: 278.
Type-species: *Vespa notata* Jurine. Orig. desig.
Euodynerus subg. *Knemodynerus* Bluethgen, 1940. Ent. Tidskr. 61: 43.
Type-species: *Odynerus* (*Lionotus*) *excellens* Perez. Orig. desig.
Euodynerus subg. *Syneuodynerus* Bluethgen, 1951. Soc. Ent. Ital., Bol. 81: 75.
Type-species: *Odynerus egregius* Herrich-Schaeffer. Orig. desig.
Euodynerus subg. *Xanthodynerus* Bluethgen, 1954. Deut. Ent. Ztschr. 1: 265.
Type-species: *Odynerus* (*Rhynchium*) *octavus* Giordani Soika. Orig. desig.

Taxonomy: Bequaert, 1939. Ent. Soc. Amer., Ann. 32: 61-65 (color forms of *annectens* (Sauss.)). —Bohart, 1939. Brooklyn Ent. Soc., Bul. 34: 245-251 (Boscii Group). —Bohart, 1942. Pan-Pacific Ent. 18: 145-152 (Congressus Group). —Bohart, 1948. Brooklyn Ent. Soc., Bul. 43: 81-87 (subspp. of *foraminatus* (Sauss.), *fusus* (Cr.), *tempiferus* (Vier.)). —van der Vecht, 1967. Bul. Zool. Nomencl. 24: 29-30 (genotype). —Internatl. Comn. Zool. Nomencl., 1970. Bul. Zool. Nomencl. 26: 187-188 (validation of *Euodynerus* D. T., type-species *Vespa dantici* Rossi).

alvarado alvarado (Saussure). Ariz., N. Mex.; Mexico.
Odynerus (*Odynerus*) *Alvarado* Saussure, 1857. Rev. Mag. Zool. (2) 9: 276.
Odynerus Alvaradi Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 268. ♂, ♀. Emend.
Odynerus (*Pachodynerus*) *halmus* Cameron, 1905. Amer. Ent. Soc., Trans. 31: 389. ♂, ♀.

alvarado safranus (Bohart). Western Tex.
Rygchium alvarado safranum Bohart, 1948. Brooklyn Ent. Soc., Bul. 43: 86. ♂, ♀.

annectens (Saussure). Va., Ga., Fla. Ecology: The only nest described was of coarse sandy clay with 21 kidney-shaped cells surrounding a twig.
Odynerus (*Odynerus*) *annectens* Saussure, 1870. Rev. Mag. Zool. (2) 22: 59. ♀.
Odynerus tempiferus var. *macio* Bequaert, 1936. U. S. Natl. Mus., Proc. 84: 81. ♂, ♀.

Biology: Clark and Sandhouse, 1936. U. S. Natl. Mus., Proc. 84: 89-95 (nest).

annulatus annulatus (Say). Ariz., Utah, Wyo. east to Tex., Kans., N. Dak., Alta.; north. Mexico. Ecology: Nests in ground and builds curved mud tube above entrance; the cells diverge leaflike from the main burrow. Parasite: *Pseudoxenos hookeri* (Pierce). Prey: *Loxostege sticticalis* (L.).
Odynerus annulatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 348. ♂, ♀.
Odynerus (*Odynerus*) *Bairdi* Saussure, 1858. Rev. Mag. Zool. (1) 10: 169. ♂.
Odynerus verus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 237. ♂, ♀.
Odynerus rufícandis Cameron, 1906. Amer. Ent. Soc., Trans. 32: 328. ♀.
Pterochilus (!) *maculifrons* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 226. ♀.
Odynerus annulatus var. *birkmanni* Cameron, 1909. Pomona Col. Jour. Ent. 1: 124. ♂, ♀.
Odynerus annulatus var. *oslari* Cameron, 1909. Pomona Col. Jour. Ent. 1: 125.
Odynerus sulciventris Cameron, 1909. Pomona Col. Jour. Ent. 1: 130. ♀.

Biology: Hungerford and Williams, 1912. Ent. News 23: 250-253, pl. 14, figs. 5, 6 (nest, prey). —Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 277-281 (nest, prey). —Rau and Rau, 1918. Wasp Studies Afield, pp. 300-312 (nest, prey).

annulatus arvensis (Saussure). U. S. west to Tex., Okla., Kans., Nebr., S. Dak., N. Dak. Ecology: Makes vertical ground burrows with one to six cells topped by a thick-walled erect or bent chimney about 1 inch long. Parasite: *Pseudoxenos hookeri* (Pierce). Prey: *Loxostege sticticalis* (L.), *Elasmopalpus furfurellus* Hlst., Pyralididae spp.; Noctuidae sp. Predator: *Solenopsis* sp.
Odynerus (*Odynerus*) *arvensis* Saussure, 1870. Rev. Mag. Zool. (2) 22: 59. ♂, ♀.
Odynerus cultus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 236. ♂.
Odynerus firmus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 239. ♂, ♀.
Odynerus geminus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 240. ♀.

Odynerus orasus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 196. ♂, ♀.

Biology: Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 271-276 (nest, prey, predator). —Evans, 1956. Ent. Soc. Wash., Proc. 58: 267-268, figs. 1, 2 (nest, prey).

annulatus evectus (Cresson). Southwest U. S. including Tex., N. Mex., Ariz., Calif.; Mexico (Baja California).
Odynerus evectus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 235. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 153-154 (sleeping habits).

annulatus imperialis (Bohart). Southern Calif., Nev., Ariz., southwestern Utah; Mexico.
Rygchium sulphureum imperialis Bohart, 1945. Ent. Soc. Wash., Proc. 47: 48. ♂, ♀.

annulatus sulphureus (Saussure). Calif., Oreg., Wash., B. C., Idaho, Nev., Utah, Ariz. Parasite: *Pseudoxenos hookeri* (Pierce).
Odynerus (*Odynerus*) *sulphureus* Saussure, 1858. Rev. Mag. Zool. (2) 10: 170. ♀.

auranus albivestis (Bohart). Alta., Wash., Idaho, eastern Oreg., N. Dak., S. Dak., Wyo., Colo.
Odynerus boscii albivestis Bohart, 1939. Brooklyn Ent. Soc., Bul. 34: 249. ♂, ♀.

auranus aquilus Bohart. West. Kans. to west. Tex., west to Ariz.; Mexico (Coahuila, Durango).
Euodynerus auranus aquilus Bohart, 1974. Kans. Ent. Soc., Jour. 47: 463. ♂, ♀.

auranus auranus (Cameron). Calif., Oreg., Wash., Nev., Utah, Wyo., Colo. Ecology: Nests in the ground, making clumps of five or six complete jug-shaped mud pots. Parasite: *Sphaeropthalma orestes* (Fox).
Odynerus auranus Cameron, 1906. Invertebrata Pacifica, v. 1, p. 148. ♂.

auranus azotopus (Bohart). Southern Nev., Ariz., southeastern Calif.; Mexico (Baja California).
Odynerus boscii azotopus Bohart, 1939. Brooklyn Ent. Soc., Bul. 34: 248. ♂, ♀.

barberi (Bohart), n. comb. Tex. (Brownsville).
Rygchium barberi Bohart, 1945. Ent. Soc. Wash., Proc. 47: 56. ♀.

bidens (Saussure), n. comb. Fla., S. C., Tenn., N. J., Minn.
Odynerus (*Odynerus*) *bidens* Saussure, 1870. Rev. Mag. Zool. (2) 22: 58. ♂, ♀.

boscii boharti (Krombein). Fla.
Rygchium molestum boharti Krombein, 1959. Ent. Soc. Wash., Proc. 61: 145, fig. 1. ♂, ♀.

boscii boscii (Lepeletier). N. C. to northern Fla.
Odynerus boscii Lepeletier, 1841. Hist. Nat. Ins. Hym. 2: 637. ♂.

boscii molestus (Saussure). Eastern U. S. to northern Fla., west to Kans., Okla. and Tex. Ecology: Nests in borings in wood, and in burrows in structural lumber. Parasite: *Macrosiagon c. cruentum* (Germ.); Chrysididae sp. Prey: *Desmia funeralis* (Hbn.), *Framinghamia helvalis* (Wlkr.), Pyraustinae sp., *Tetralopha* sp., Epipaschiinae sp.
Odynerus (*Odynerus*) *turpis* Saussure, 1870. Rev. Mag. Zool. (2) 22: 60. ♀.
Odynerus (*Odynerus*) *molestus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 61. ♂.
Odynerus manifestus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 240. ♂, ♀. Preocc.
Odynerus primus Dalla Torre, 1889. Wien. Ent. Ztg. 8: 125. N. name.

Taxonomy: Krombein, 1959. Ent. Soc. Wash., Proc. 61: 148-149 (as first reviser, synonymized *turpis* under *molestus*).

Biology: Krombein, 1958. Ent. Soc. Wash., Proc. 60: 101 (prey, nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 83-84 (nest, prey, life history, parasites).

castigatus castigatus (Saussure). Most of U. S., particularly more southern states; Mexico. Predator: *Philanthus zebratus nitens* (Bks.).
Odynerus (*Leionotus*) *Castigatus* Saussure, 1853. Etudes sur la famille des Vespides, v. 1, p. 178. ♀, ♂.
Odynerus fusus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 238. ♂, ♀.
Odynerus fuscus (!) Dalla Torre, 1904. Gen. Ins., fasc. 19, p. 45.

castigatus rubrivestis (Bohart). Fla., Ga.
Rygchium fusum rubrivestis Bohart, 1948. Brooklyn Ent. Soc., Bul. 4: 84. ♂, ♀.

castigatus sanneovestis (Bohart). Calif. (Owens Valley).
Rygchium fusum sanneovestis Bohart, 1948. Brooklyn Ent. Soc., Bul. 4: 84. ♂, ♀.

cockerelli (Cameron). Pacific Coast states, Idaho, in Upper Sonoran and Transition Zones. Ecology: Constructs vertical ground burrows as nesting sites.
Ancistrocerus cockerelli Cameron, 1908. Amer. Ent. Soc., Trans. 34: 220. ♀.
Odynerus infuscipennis Bohart, 1942. Pan-Pacific Ent. 18: 146. ♂, ♀.

congressus (Viereck), n. comb. Tex., N. Mex., Ariz., Calif., Nev., L. Sonor. Zone; Mexico.
Odynerus (*Stenodynerus*) *congressus* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 405. ♀.

crypticus balteatus (Say). N. Y., Pa., N. J., Va., Ind., Ohio, Mich., Ill., Tex., Utah, Ont.
Rygchium balteatum Say, 1837. Boston Jour. Nat. Hist. 1: 383. ♀.
Monobia Sylvatica Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 95. ♀.

crypticus crypticus (Say). Ont., Alta., U. S. west to S. Dak., Wyo., Colo., Utah, Ariz.; Mexico. Ecology: Nests in small colonies, making vertical ground burrows usually with about three cells, one above the other, separated by clay partitions. Parasite: Bombyliidae sp.; Miltogrammini sp.; *Chrysis* sp. Prey: *Pyrgus c. communis* (Grt.), *Pholisora catullus* (F.).
Odynerus crypticus Say, 1823. West. Quart. Rptr. 2: 81.
Rygchium Louisianum Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 106. ♀.
Odynerus (*Odynerus*) *Iturbide* Saussure, 1857. Rev. Mag. Zool. (2) 9: 276.
Odynerus designatus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 235. ♀.
Odynerus Iturbidi (!) Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 265. ♂.

Biology: Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 281-294 (nest, prey, parasites). —Rau and Rau, 1918. Wasp Studies Afield, pp. 312-331 (nest, prey, life history, parasite). —Turner, 1922. Biol. Bul. 42: 153-172. —Rau, 1931. Brooklyn Ent. Soc., Bul. 26: 5-6. —Vest, 1936. Utah Acad. Sci. Arts and Letters, Proc. 13: 207-209. —Rau, 1945. Brooklyn Ent. Soc., Bul. 40: 29-30 (carnivorous habit, adult).

crypticus stricklandi (Bequaert). Alta., Wyo., S. Dak., Nebr., Colo.
Odynerus dorsalis stricklandi Bequaert, 1940. Canad. Ent. 72: 55. ♂, ♀.

delicatus (Cresson), n. comb. Tex.
Odynerus delicatus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 236. ♀.

digiticornis (Bohart), n. comb. Ariz., Utah; Mexico (Baja California).
Odynerus canaliculatus Viereck, 1906. Amer. Ent. Soc., Trans. 33: 392. ♂. Preocc.
Rygchium digiticornis Bohart, 1945. Ent. Soc. Wash., Proc. 47: 49. ♂. N. name.

discogaster (Bequaert), n. comb. Calif., Oreg., Wash., B. C., Idaho, Nev., Ariz., Colo., Wyo. Ecology: Makes mud nests in cracks between rocks, with about three cells in a clump.
Odynerus discogaster Bequaert, 1939. Ent. Soc. Amer., Ann. 32: 65. ♂, ♀.

exoglyphus albovittatus (Bohart), n. comb. Great Basin area including Wash., Oreg., Calif., Nev., Idaho, Wyo., Colo., N. Mex.
Odynerus exoglyphus albovittatus Bohart, 1939. Brooklyn Ent. Soc., Bul. 34: 251. ♂, ♀.

exoglyphus exoglyphus (Bohart), n. comb. Calif., Oreg., Idaho, Utah, Wyo., northern Ariz.
Odynerus exoglyphus Bohart, 1939. Brooklyn Ent. Soc., Bul. 34: 250. ♂, ♀.

foraminatus aequalis (Cameron). Western Tex. to Ariz., Colo., Utah, Idaho, Oreg. and Wash. in Upper Sonoran Zone. Ecology: Nests in old mud-dauber cells.
Odynerus aequalis Cameron, 1906. Amer. Ent. Soc., Trans. 32: 329. ♀.
Odynerus sapellvensis Cameron, 1906. Amer. Ent. Soc., Trans. 32: 331.
Odynerus sulfuritinctus Viereck, 1908. Amer. Ent. Soc., Trans. 33: 389. ♂, ♀.
Odynerus spectabiliformis Viereck, 1908. Amer. Ent. Soc., Trans. 33: 390. ♂, ♀.
Odynerus hidalgiformis Viereck, 1908. Amer. Ent. Soc., Trans. 33: 391. ♀.
Odynerus spectabiformis (!) Viereck, 1908. Amer. Ent. Soc., Trans. 33: 391.
Odynerus sapelloensis (!) Cameron, 1909. Pomona Col. Jour. Ent. 1: 125. ♂, ♀.
Odynerus deficiens Cameron, 1909. Pomona Col. Jour. Ent. 1:126. ♂.
Odynerus jeromensis Cameron, 1909. Pomona Col. Jour. Ent. 1: 131. ♂.

Biology: Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 299 (nest).

foraminatus apopkensis (Robertson). Central to southern Fla. Ecology: Nests in borings in wood. Parasite: *Pyemotes* sp.; *Pseudoxenos hookeri* (Pierce); *Macrosiagon c. cruentum* (Germ.); *Toxophora* sp.; *Amobia floridensis* (Tns.), *A. erythrura* (Wulp); *Chrysis coerulans* F., *C. inaequidens* Dahlb., *C. derivata* Buyss. Prey: Olethreutidae sp.

primarily; *Platynota* sp., Tortricidae sp., occasionally. Predator: *Lepidophora lepidocera* (Wied.) ?

Odynerus apopkensis Robertson, 1901. Amer. Ent. Soc., Trans. 27: 196. ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 62-70, pl. 25, fig. 119 (nest, prey, life history, parasites, predator).

foraminatus blakeanus (Cameron). Tex. (Lee Co.).

Odynerus blakeanus Cameron, 1909. Pomona Col. Jour. Ent. 1: 80. ♀.

Rygchium rugosum fedoris Bohart, 1945. Ent. Soc. Wash., Proc. 47: 46. ♂, ♀.

foraminatus foraminatus (Saussure). Southern Canada, U. S. west to Rocky Mts. Ecology: Nests in hollow twigs, burrows in logs, borings in wood, and old *Polistes* cells. Parasite: *Anthrax irroratus* Say; *Megaselia aletiae* (Comst.); *Pseudoxenos hookeri* (Pierce), *P. foraminati* Pierce; *Pimpla spatulata* Tow.; *Melittobia chalybii* Ashm.; *Lycogaster pullata* Shuck.; *Chrysis coerulans* F., *C. nitidula* F., *C. inaequidens* Dahlb. ?. Prey: *Gnorimoschema solidaginis* (Riley), Gelechiidae spp.; Oecophoridae spp.; Olethreutidae sp.; *Archips* sp., *Enarmonia* sp., Tortricidae spp.; *Thyris maculata* Harr.; *Desmia funeralis* (Hbn.), *Loxostege* sp., Pyraustinae spp., *Acrobasis* sp., Pyralidinae sp., *Epipaschia superatilis* Clem.

Odynerus (*Odynerus*) *Rugosus* Saussure, 1853. Etudes sur la famille des Vespides, v. 1, p. 179. ♂.

Odynerus (*Odynerus*) *Foraminatus* Saussure, 1853. Etudes sur la famille des Vespides, v. 1, p. 180. ♂, ♀.

Odynerus (*Odynerus*) *flavopictus* Saussure, 1857. Rev. Mag. Zool. (2)9: 276.

Odynerus Harringtoni Cameron, 1906. Amer. Ent. Soc., Trans. 32: 327. ♀.

Odynerus santa-feae Cameron, 1906. Amer. Ent. Soc., Trans. 32: 330. ♀.

Biology: Hungerford and Williams, 1912. Ent. News 23: 255 (nest). —Rau and Rau, 1918. Wasp Studies Afield, PP. 334-340 (nest, prey, parasite). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24, no. 7: 17-18 (nest). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 398-400 (nest, life history). —Rau, 1932. Ent. News 53: 119-121 (nest). —Rau, 1935. Brooklyn Ent. Soc., Bul. 30: 110-111 (cocoon). —Rau, 1944. Canad. Ent. 76: 129 (nest). —Hartman, 1944. Psyche 51: 1-4 (egg-laying). —Cooper, 1954. Ent. Soc. Wash., Proc. 56: 281-282 (nest, parasite). —Medler, 1964. Ent. Soc. Amer., Ann. 57: 56-60 (nest, prey, life history, parasites). —Markin, 1965. Ent. Soc. Amer., Ann. 58: 132-133, fig. 1 (nest, life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 56-62 (nest, prey, life history, parasites, predator).

foraminatus parvirudis (Bohart). Fla., S. C.

Rygchium foraminatum parvirudis Bohart, 1948. Brooklyn Ent. Soc., Bul. 4: 83. ♂, ♀.

foraminatus scutellaris (Saussure). Idaho, Oreg., Calif., Nev. Ecology: Nests in cavities in *Sambucus* and in twigs, and in old mud-dauber nests. Parasite: *Pseudoxenos hookeri* (Pierce); *Anthrax irroratus* Say; *Amobia floridensis* (Tns.); *Epistenia* sp.; *Lycogaster pullata nevadensis* (Cr.); *Chrysis coerulans* F., *C. derivata* Buyss., *C. parkeri* Moore, *C. inaequidens* Dahlb. Predator: *Trichodes ornatus* Say.

Odynerus (*Odynerus*) *scutellaris* Saussure, 1870. Rev. Mag. Zool. (2) 22: 58. ♂.

Odynerus visellus Cameron, 1906. Invertebrata Pacifica 1: 147. ♂.

Ancistrocerus rivularis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 215. ♂.

Odynerus blandinus Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 236. ♂, ♀.

Taxonomy: Goodpasture, 1974. Kans. Ent. Soc., Jour. 47: 364-372, figs. 7, 8 (chromosome number).

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nest, parasites). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 2 (nest, predator).

guerrero (Saussure). Western Tex., N. Mex., Ariz.; Mexico (Baja California). Ecology: Nests in borings in wood. Parasite: *Chrysis arizonica* Boh., *C. inflata* Aar. Prey: Pyraustinae sp.; Noctuidae sp.

Odynerus (*Odynerus*) *Guerrero* Saussure, 1857. Rev. Mag. Zool. (2) 9: 277.

Odynerus Guerreri Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 294. ♂, ♀. Emend.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 81-83, pl. 9, fig. 41 (nest, prey, life history, parasites).

hidalgo boreoorientalis (Bequaert). East Coast states, Ohio, Mo., eastern Kans. Ecology: Nests in borings in wood. Prey: *Homoeosoma electellum* (Hlst.).
Odynerus hidalgo var. *boreo-orientalis* Bequaert, 1937. Pan-Pacific Ent. 12: 11. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 77-79 (nest, prey, life history).

hidalgo hidalgo (Saussure). U. S. east to Miss., north to Mo., Kans., Colo., Calif.; Mexico. Ecology: Nests in abandoned bee burrows in a cliff, in a *Sceliphron* mud nest, and in an old *Polistes* nest. Prey: Caterpillars.
Odynerus (*Odynerus*) *Hidalgo* Saussure, 1857. Rev. Mag. Zool. (2) 9: 275.
Odynerus ductus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 238. ♂, ♀.
Odynerus Hidalgi Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 252. ♂, ♀. Emend.

Biology: Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 296-299 (nest, prey). —Bequaert, 1939. Ent. Soc. Amer., Ann. 32: 68-69 (nest). —Rau, 1943. Ent. Soc. Amer., Ann. 36: 533 (nest). —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 154 (sleeping habits).

hidalgo viereckii (Cameron). Calif., Nev., Utah, Idaho, Wash., Colo. Ecology: Nests in old *Sceliphron* mud nests, dividing each cell transversely in two.
Odynerus viereckii Cameron, 1909. Pomona Col. Jour. Ent. 1: 127. ♀.
Odynerus hidalgo var. *boreo-occidentalis* Bequaert, 1937. Pan-Pacific Ent. 12: 13. ♂, ♀.

leucomelas leucomelas (Saussure). North. and west. U. S. and Canada south to mountains of Tenn., N. Mex., Ariz. Ecology: Nests in cavities in sumac twigs. Parasite: *Amobia distorta* (Allen); *Chrysis coerulans* F., *C. nitidula* F. ?. Prey: *Sarrothiripus* sp., *Palthis angulalis* (Hbn.); *Rheumaptera hastata* L. ?; *Framinghamia helvalis* (Wlkr.), *Tetralopha* spp., *Acrobasis* spp., *Dioryctria reniculella* Grt., *D.* spp.; Pterophoridae sp.; Olethreutidae sp.; *Badebecia urticana* Hbn., *Exartema* spp., *Griselda radicana* Walsh, *Rhopobota naevana geminana* Steph., *Pseudexentera* spp., *Sparganothis reticulatana* Clem., *S.* sp., *Platynota* sp., *Pandemis* spp., *Archips argyrospilus* Wlkr., *A.* spp., *C. rosaceana* Harr., *C. fumiferana* (Clem.), *C. pinus* Free., *Argyrotaenia velutinana* Wlkr. ?, *Acleris variana* Fern., *A. logiana placidana* Rob., *A.* sp.; *Recurvaria* spp., *Eucordylea* spp., *Trichotaphe levisella* Fyles ?, *T.* spp., Gelechiidae spp.
Odynerus (*Odynerus*) *Leucomelas* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 255. ♂, ♀.

Biology: Medler, 1964. Ent. News 75: 26-27 (nest, life history, parasite). —Fye, 1965. Canad. Ent. 97: 718-722 (nest, prey, life history, parasites).

leucomelas oregonensis (Bohart). Wash., Oreg., Nev., Utah, Wyo.
Rygchium foraminatum oregonense Bohart, 1948. Brooklyn Ent. Soc., Bul. 43: 82. ♂, ♀.

macswaini (Bohart), n. comb. Calif. in Transit. Zone.
Rygchium macswaini Bohart, 1948. Brooklyn Ent. Soc., Bul. 43: 80. ♂, ♀.

martini (Bohart), n. comb. Tex., Colo., N. Mex., Ariz., Utah.
Odynerus martini Bohart, 1942. Pan-Pacific Ent. 18: 149. ♂, ♀.

megaera (Lepeletier). East. and south. U. S. north to N. Y., Ill., Pa., west to eastern Tex., Okla. Ecology: Nests in borings in wood. Parasite: *Toxophora amphitea* Wlkr., *Anthrax aterrimus* (Big.); *Chrysis coerulans* F., *C. inaequidens* Dahlb. Prey: *Archips* sp., *Platynota* sp., Tortricidae spp.; *Desmia funeralis* (Hbn.), *Framinghamia helvalis* (Wlkr.), *Tetralopha* sp., Epipaschiinae sp., *Nephopteryx nyssaecolella* (Dyar), *N. uvinella* (Rag.), Phycitinae sp.; *Psilocorsis* sp.; Olethreutidae sp.; *Palthis angulalis* Hbn.
Odynerus megaera Lepeletier, 1841. Hist. Nat. Ins. Hym., v. 2, p. 636. ♀.

Biology: Krombein, 1955. Ent. Soc. Wash., Proc. 57: 146-147 (nest, prey, life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 70-74, pl. 9, fig. 40, pl. 26, figs. 123, 124 (nest, prey, life history, parasites).

oslarensis (Cameron). Calif., Ariz. Ecology: Nests in borings in *Sambucus* stems and wood. Prey: Phycitinae sp.; Gelechiidae sp.; Cosmopterygidae sp.
Odynerus (*Pachyodernus* (*!*)) *oslarensis* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 199. ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 84-85 (nest, life history, prey).

planitarsis (Bohart), n. comb. South. Canada, Maine, N. H., Mich., Wis., Minn., Colo.
Rygchium planitarsis Bohart, 1945. Ent. Soc. Wash., Proc. 47: 45. ♂, ♀.

pratensis brumalis (Bequaert). Wash., Oreg., northeastern Calif., Idaho, Nev.
Odynerus pratensis var. *brumalis* Bequaert, 1936. U. S. Natl. Mus., Proc. 84: 86. ♂.

pratensis pratensis (Saussure). Ont., Southwest. U. S. east to Kans., Tex., west to Calif.; Mexico. Ecology: Nests in *Sambucus* stems and wood. Parasite: *Macrosiagon c. cruentum* (Germ.) ?; *Toxophora* sp.; *Trichrysis mucronata* (Br.). Prey: Caterpillars.
Odynerus (*Odynerus*) *pratensis* Saussure, 1870. Rev. Mag. Zool. (2) 22: 61. ♂, ♀.
Odynerus clusinus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 234. ♂, ♀.
Odynerus egregius Viereck, 1906. Amer. Ent. Soc., Trans. 32: 197. ♂. Preocc.
Odynerus congressensis Cameron, 1909. Pomona Col. Jour. Ent. 1: 132. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 79-81 (nest, prey, life history, parasites). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 2 (nest).

provisoreus (Viereck), n. comb. Ariz., southern Colo.
Odynerus (*Stenodynerus*) *provisoreus* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 396. ♂.

russatus (Bohart), n. comb. Calif., Ariz., Utah, N. Mex., Tex. in L. Sonor. Zone; Mexico (Coahuila).
Odynerus russatus Bohart, 1942. Pan-Pacific Ent. 18: 150, figs. 2, 9, 14. ♂, ♀.

schwarzi (Krombein). N. J., Pa., Md., D. C., Va., Okla. Ecology: Nests in borings in wood. Parasite: *Toxophora amphitea* Wlkr.; *Melittobia chalybii* Ashm.; *Chrysis nitidula* F. Prey: *Gelechia albisparsella* (Chamb.); *Psilocorsis* sp.; Tortricidae sp.; *Loxostege mancalis* (Led.).
Rygchium schwarzi Krombein, 1962. Biol. Soc. Wash., Proc. 75: 5. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 74-77, pl. 9, fig. 39 (nest, prey, life history, parasites).

tempiferus birepandus (Bohart). Nev. (Charleston Mountain Park).
Rygchium tempiferum birepandum Bohart, 1948. Brooklyn Ent. Soc. Bul. 43: 86. ♂.

tempiferus eldoradensis (Rohwer). B. C., Northwest. U. S. including Calif., Oreg., Wash., Nev., Idaho, Mont., Wyo., Colo.
Odynerus eldoradensis Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 238. ♂.
Odynerus robustus Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 238. ♀. Preocc.

tempiferus pritchardi (Bequaert). Okla.
Odynerus annectens var. *pritchardi* Bequaert, 1939. Ent. Soc. Amer., Ann. 32: 63. ♀.

tempiferus subrubeus (Bohart). Utah, Colo.
Rygchium tempiferum subrubeum Bohart, 1948. Brooklyn Ent. Soc., Bul. 43: 85. ♂, ♀.

tempiferus tempiferus (Viereck). Ariz., N. Mex., southern Colo., Utah, Wyo., S. Dak.
Odynerus (*Stenodynerus*) *tempiferus* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 392. ♂.
Odynerus trichiosomus Cameron, 1909. Pomona Col. Jour. Ent. 1: 127. ♂.

tetralobus (Bohart), n. comb. Calif.
Odynerus tetralobus Bohart, 1942. Pan-Pacific Ent. 18: 148. ♂, ♀.

Genus MONOBIA Saussure

Monobia Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 94.
Type-species: *Vespa quadridens* Linnaeus Desig. by Ashmead, 1902.
Triarthra Dalla Torre, 1904. Gen. Ins., fasc. 19, p. 28. Preocc.
Type-species: *Odynerus cyanipennis* Guerin. Desig. by Bequaert, 1940.
Tetrarthra Dalla Torre, 1904. Gen. Ins., fasc. 19, p. 28.
Type-species: *Vespa quadridens* Linnaeus. Desig. by Bequaert, 1940.

Most species occur in Central and South America. Nesting habits have been recorded for only a few species. The preferred nesting sites are in pre-existing cavities. Caterpillars are stored as prey.

Revision: Bequaert, 1940. Rev. de Ent. 11: 822-842 (New World spp.)

quadridens (Linnaeus). N. H. to Fla., west to Wis., Ill., Kans. and N. Mex. Ecology: Nesting sites are in pre-existing cavities such as carpenter bee tunnels, hollow stems, old mud-dauber cells, and occasionally in old burrows of ground-nesting bees. The nests consist of a linear series of cells separated by mud partitions; usually there is an empty intercalary cell between each stored cell. Parasite: *Tortonia quadridens* Bak.; *Monobiacarus quadridens* Bak. and Cunl.; *Anthrax aterrimus* (Big.); *Amobia erythrura* (Wulp); *Megaselia aletiae* (Comst.); *Pseudoxenos bishoppi* (Pierce); *Melittobia chalybii* Ashm.; *Chrysis smaragdula* F., *C. inaequidens* Dahlb. Prey: *Nephopteryx uvinella* (Rag.), *N.* sp., Phycitinae sp., *Epipaschia superatilis* Clem., *E.* sp., *Tetralopha asperatella* (Clem.), *T.* sp., Epipaschiinae sp., *Desmia funeralis* (Hbn.), Pyraustinae sp.; *Stenoma schlaegeri* Zell., *S.* sp., Stenomidae sp.; *Psilocorsis* sp.; Gelechiidae spp.; *Platynota* sp., Tortricidae spp. Predator: *Lecontella cancellata* (LeC.), Cleridae sp.; Dermestidae sp.

Vespa quadridens Linnaeus, 1763. Centuria Ins. Rar., p. 31.
Vespa quadricornis (!) Degeer, 1773. Mem. pour Servir a l'Hist. des Ins., v. 3, p. 584. Lapsus.
Vespa cincta Degeer, 1773. Mem. pour Servir a l'Hist. des Ins., v. 3, p. 584. Preocc.
Vespa uncinata Fabricius, 1775. Systema Ent. p. 367.
Vespa incincta (!) Fabricius, 1804. Systema Piezatorum, p. 259. Lapsus.

Biology: Ashmead, 1894. Psyche 7: 76-78 (nest). —Tandy, 1908. Ent. News 19: 231-232 (nest). —Rau and Raü, 1918. Wasp Studies Afield, pp. 346-354 (nest, prey, life history). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24, no. 7: 16 (nest). —Rau, 1926. Acad. Sci. st. Louis, Trans. 25: 199-200 (nest). —Reinhard, 1929. Witchery of Wasps, p. 86 (nest). —Rau, 1931. Brooklyn Ent. Soc., Bul. 26: 4-6 (lack of cocoon). —Rau, 1935. Ent. News 46: 57-58 (courtship, mating). —Frost, 1944. Ent. News 55: 10-14 (nest, prey, life history). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 101 (prey). —Krombein, 1967. Trap-nesting Wasps and Bees, pp. 46-56, pl. 7, figs. 24-29, pl. 8, figs. 30-38 (nest, prey, life history, associates). —Byers, 1972. Kans. Ent. Soc., Jour. 45: 235-238 (supersedure in *Osmia lignaria* Say nests, nest, prey).

texana (Cresson). Tex., Ariz.; Mexico (Baja California, Sonora, Veracruz).
Odynerus texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 234. ♀.
Monobia Californica Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 129. ♂.
Monobia variabilis Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 137. ♀.

Genus MONTEZUMIA Saussure

Montezumia Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 87.
Type-species: *Montezumia rufidentata* Saussure. Desig. by Ashmead, 1902.
Alpha Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 160.
Type-species: *Montezumia rufidentata* Saussure. Desig. by Bohart, 1951.
Beta Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 162.
Type-species: *Montezumia morosa* Saussure. Desig. by Bequaert, 1921.
Metazumia Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 114.
Type-species: *Montezumia huasteca* Saussure. Desig. by Bequaert, 1921.
Eumontezumia Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, p. 27. N. name.

Most species are restricted to America south of U. S. Two of the Neotropical species are supposed to build mud nests, but it has been suggested for one of them that it merely used abandoned mud-dauber nests. One species is reported as preying upon caterpillars.

Taxonomy: Bequaert, 1921. Rev. Zool. Afric. 9: 242-247 (diagnosis of typical subgenus, list of spp.). —Bequaert, 1940. Ent. Soc. Amer., Ann. 33: 96 (raises typical subgenus to generic rank).

arizonensis Bequaert. Southern Ariz.
Montezumia arizonensis Bequaert, 1940. Ent. Soc. Amer., Ann. 33: 96. ♀.

Genus PACHODYNERUS Saussure

Pachodynerus Saussure, 1870. Rev. Mag. Zool. (2) 22: 56. Proposed originally as a division of *Odynerus* subg. *Leionotus* Sauss.; validated by Op. 893, Internatl. Comn. Zool. Nomencl., 1970.

Type-species: *Odynerus* (*Odynerus*) *californicus* Saussure. Desig. by Bohart, 1951.

Most species nest in pre-existing cavities such as in stems, twigs, abandoned larval bagworm cases, and abandoned mud-dauber cells, but one species (perhaps erroneously) has been reported as also building mud nests attached to foliage. Caterpillars are stored as prey.

Taxonomy: van der Vecht, 1967. Bul. Zool. Nomencl. 24: 31 (request for validation of *Pachodynerus* Sauss., 1870). —Internatl. Comn. Zool. Nomencl., 1970. Bul. Zool. Nomencl. 26: 187 (validation of *Pachodynerus* Sauss., type-species *Odynerus californicus* Sauss.).

astraeus (Cameron). Southwestern Tex. to southern Calif.; Mexico (Baja California, Hidalgo). Ecology: Nests in cavities in wood, *Sambucus* stems, abandoned mud-dauber cells, abandoned larval bagworm cases; it is also reported, perhaps in error, as building mud nests attached to leaves of growing plants. Parasite: *Sphaeropthalma* (*Photopsioides*) *uro* (Bl.). Prey: Caterpillars. Predator: *Macrosiagon c. cruentum* (Germ.).

Odynerus (*Pachodynerus*) *astraeus* Cameron, 1905. Amer. Ent. Soc., Trans. 31: 390. ♀.

Odynerus pulverulenta Viereck, 1908. Amer. Ent. Soc. Trans. 33: 406. ♀.

Odynerus acuticarinatus Cameron, 1909. Pomona Col. Jour. Ent. 1: 82. ♀.

Biology: Rau, 1940. Ent. Soc. Amer., Ann. 33: 592 (nest). —Davis, 1964. U. S. Natl. Mus., Bul. 244: 13 (nest). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nest, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 85-87, pl. 24, figs. 115-118 (nest, prey, life history, predator).

erynnis (Lepeletier). S. C. to Fla., west to La., Mass. (rarely after storm). Ecology: Nests in pre-existing cavities such as borings in wood and abandoned cynipid galls. Parasite: *Megaselia* sp.; *Toxophora amphitea* Wlkr., *Anthrax a. argyropygus* Wied.; *Amobia erythrura* (Wulp); *Pseudoxenos erynnidis* Pierce; *Melittobia chalybii* Ashm.; *Chrysis inaequidens* Dahlb. Prey: Stenomidae spp.; Blastobasidae sp.; *Platynota* sp., Tortricidae sp.; *Psilocorsis* sp., Oecophoridae spp.; *Acrobasis* sp., *Etiella zinckenella* (Treitschke), Phycitinae spp.; Chrysaugidae sp.; *Palthis angulalis* (Hbn.).

Odynerus erynnis Lepeletier, 1841. Hist. Nat. Ins. Hym. 2: 645. ♀.

Odynerus (*Odynerus*) *Erinnys* (!) Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 245. ♂, ♀. Emend.

Odynerus errings (!) Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 240.

Biology: Ashmead, 1894. Psyche 7: 76-78 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 87-90 (nest, prey, life history, associates).

nasidens (Latreille). Southern Ariz., Tex. (Brownsville), Fla. (Plantation Key); Mexico, Central America, Antilles; adventive in Hawaii, Micronesia. Ecology: Nests in abandoned mud-dauber cells and makes mud cells behind wooden siding of buildings. Parasite: *Chrysis* sp.; *Melittobia chalybii* Ashm.; *Amobia floridensis* (Tns.). Prey: Epipaschiidae sp. Predator: *Crematogaster* spp.; *Macrosiagon* sp.

Odynerus nasidens Latreille, 1812. *In* Humboldt and Bonpland, Voy. aux Reg. Equinox, Zool., v. 2, p. 112. ♀.

Odynerus (*Odynerus*) *auratus* Saussure, 1858. Rev. Mag. Zool. (2) 10: 166.

Odynerus nasidens var. *minor* Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 233. ♂, ♀.

Odynerus clavilneatus Cameron, 1912. Timehri 2: 222. ♀, (♂ misdet.).

Odynerus clavilineatus (!) Bohart, 1951. U. S. Dept. Agr., Monog. 2: 892.

Biology: Dow, 1932. Psyche 39: 12 (nest). —Rau, 1933. Jungle bees and wasps of Barro Colorado Island, pp. 169-170 (nest, prey, parasite). —Freeman and Jayasingh, 1975. Oikos 26: 86-91, 1 fig., 4 tabs. (population dynamics, parasites, predators).

Genus PSEUDODYNERUS Saussure

Pseudodynerus Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 220. Proposed originally as a division of *Odynerus* subg. *Ancistrocerus* Wesmael; validated by Op. 893, Internatl. Comn. Zool. Nomencl., 1970.

Type-species: *Odynerus luctuosus* Saussure. Monotypic.

This is a primarily Neotropical genus of eumenid wasps, only one species being known from North America.

Revision: Bequaert, 1941. Amer. Mus. Novitates 1106: 1-10 (New World spp.).

Taxonomy: van der Vecht, 1967. Bul. Zool. Nomencl. 24: 31 (request for validation of *Pseudodynerus* Sauss., 1855). —Internatl. Comn. Zool. Nomencl., 1970. Bul. Zool. Nomencl. 26: 187 (validation of *Pseudodynerus* Sauss., type-species *Odynerus luctuosus* Sauss.).

quadrisectus (Say). N. J. to Fla., west to Ill., Kans., Okla., Tex., Colo. Ecology: Nests in cavities in wood and makes cell partitions of mud. Prey: Caterpillars.
Odynerus quadrisectus Harris, 1833. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 589. Nom. nud. ascribed to Say.
Odynerus quadrisectus Say, 1837. Boston Jour. Nat. Hist. 1: 385. ♂, ♀.
Odynerus bellone Lepeletier, 1841. Hist. Nat. Ins. Hym., v. 2, p. 660. ♂, ♀.

Biology: Bequaert, 1925. Amer. Ent. Soc., Trans. 51: 78 (nest). —Rau, 1935. Brooklyn Ent. Soc., Bul. 30: 111 (nest, prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 45-46 (nest, prey, life history).

Genus PARANORTONIA Bequaert

Pachymenes subg. *Paranortonia* Bequaert, 1940. Ent. Soc. Amer., Ann. 33: 100. Bertoni, 1934 (Rev. Soc. Cient. Paraguay 3: 109), proposed *Paranortonia* as a new genus. His name is invalid because he did not designate a type-species (Art. 13 (b), Internatl. Code Zool. Nomencl.).
Type-species: *Nortonia tolteca* Saussure. Orig. desig.

symmorphus sonorensis Bequaert. Colo., Ariz.
Pachymenes symmorphus sonorensis Bequaert, 1940. Ent. Soc. Amer., Ann. 33: 101. ♂, ♀.

symmorphus symmorphus (Saussure). U. S. west to Tex., Okla., Kans., Iowa.
Odynerus (*Odynerus*) *Symmorphus* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 246. ♂, ♀.

symmorphus toltecus (Saussure). Ariz., Tex.; Mexico (Sonora, Jalisco).
Nortonia Tolteca Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 140. ♂, ♀.

Genus ANCISTROCERUS Wesmael

Ancistrocerus Wesmael, 1836. Acad. Sci. Bruxelles, Bul. 3: 45.
Type-species: *Vespa parietum* Linnaeus. Desig. by Girard, 1879.
Euancistrocerus Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, p. 36. N. name.

Most species of *Ancistrocerus* nest in pre-existing cavities, such as borings in twigs, stems and structural lumber, in abandoned galls, in abandoned mud-dauber cells, and in old burrows of ground-nesting wasps and bees; a few species build complete mud cells. Only lepidopterous larvae have been recorded as prey of North American species, but a European species is reported to prey upon coleopterous larvae.

Revision: Bequaert, 1944. Ent. Amer. (n. s.) 23: 225-286 (N. Amer. spp.).

adiabatus adiabatus (Saussure). Transcontinental and widespread in southern Canada and U. S. Ecology: Nests have been reported from borings in twigs, stems and wood, galls of other insects, old mud-dauber nests, empty sawfly cocoons, and rubber tubing. Parasite: *Vespacarus tigris* Bak. and Cunl.; *Anthrax irroratus* Say; *Amobia distorta* (Allen), *A. floridensis* (Allen); *Pseudoxenos tigridis* Pierce; *Acroricnus junceus* (Cr.), *Ephialtes decumbens* (Tow.), *E.* sp., *Calliephialtes notandus* Cr., *Argothereutes lophyri*, n. subsp.; *Melittobia chalybii* Ashm.; *Monodontomerus dentipes* (Dalm.); *Chrysis coerulans* F., *C. nitidula* F. Prey: *Psilocorsis* sp., Oecophoridae sp.; *Griselda radicana* Wals., Olethreutidae spp. *Coleotechnites* sp., *Eucordylea* sp., Gelechiidae spp.; *Spilonota ocellana* (D. and S.), *Acleris variana* Fern., Tortricidae sp.; *Coleophora fletcherella* Fern.; Phaloniidae sp. Predator: *Philanthus zebratus nitens* (Bks.), *P. solivagus* Say.
Odynerus (*Ancistrocerus*) *adiabatus* Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 122. ♂.

Odynerus (*Ancistrocerus*) *pertinax* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 216. ♂.
Odynerus (*Ancistrocerus*) *tigris* Saussure, 1857. Rev. Mag. Zool. (2) 9: 273. ♂, ♀.
Odynerus (*Ancistrocerus*) *cervus* Saussure, 1858. Rev. Mag. Zool. (2) 10: 165.
Odynerus monteregalis Meade-Waldo, 1914. Ann. and Mag. Nat. Hist. (8) 14: 405. N. name for *canadaensis*, a nomen nudum.
Odynerus canadaensis Meade-Waldo, 1914. Ann. and Mag. Nat. Hist. (8) 14: 405. Manuscript name credited to Cameron. Preocc.
Ancistrocerus howardi Cameron, 1909. Pomona Col. Jour. Ent. 1: 78. ♀.
Ancistrocerus tenuatus Tucker, 1909. Kans. Acad. Sci., Trans. 22: 286. ♀.

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 344-345 (nest, prey). —Champlain, 1922. Psyche 29: 99 (parasite). —Bequaert, 1925. Amer. Ent. Soc., Trans. 51: 106 (nest, parasite). —Bequaert, 1943. Ent. Amer. (n. s.) 23: 260 (nest). —Boyce, 1946 (1945). Ent. Soc. Ontario, Ann. Rpt. 76, pp. 35-37 (nest, prey, life history). —Krombein, 1954. Brooklyn Ent. Soc., Bul. 49: 2-3 (nest, prey). —Coppel, 1961. Ent. News 72: 246-248, 2 figs. (nest). —Fye, 1965. Canad. Ent. 97: 731-734 (nest, prey, life history, parasite). —Medler, 1965. Kans. Ent. Soc., Jour. 38: 314-316 (nest, prey, life history, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 110-115 (nest, prey, life history, parasites). —Evans, 1973. Great Basin Nat. 33: 152-153 (nest, prey, parasites).

adiabatus albolacteus Bequaert. Que. to B. C., Alaska, Wash., Oreg., Idaho, Mont., S. Dak., Colo., Utah. Parasite: Stylopidae sp.
Ancistrocerus tigris albolacteus Bequaert, 1943. Ent. Amer. (n. s.) 23: 260. ♂, ♀.

adiabatus cytainus (Cameron). Calif., Oreg., Nev., Colo. in Transition, Upper Sonoran and Lower Sonoran Zones. Ecology: Nests in *Sambucus* stems and old mud-dauber nests. Parasite: *Chrysis coerulans* F.
Odynerus cytainus Cameron, 1906. Invertebrata Pacifica 1: 149. ♀.

Taxonomy: Goodpasture, 1974. Kans. Ent. Soc., Jour. 47: 364-372, figs. 1, 9 (chromosome number).

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nests, parasite).

antilope allegrus Bequaert. Calif., Oreg., Colo.
Ancistrocerus antilope allegrus Bequaert, 1943. Ent. Amer. (n. s.) 23: 276. ♂, ♀.

antilope antilope (Panzer). Transcontinental in southern Canada and U. S. except Fla. and Ala.; Holarctic, in the Old World throughout Europe and Siberia. Ecology: In North America it is reported to nest in borings in wood, stems of sumac and elder, and in old mud-dauber nests. Parasite: *Kennethiella trisetosa* (Coor.); *Amobia distorta* (Allen); *Melittobia chalybii* Ashm.; *Chrysis coerulans* F., *C. nitidula* F., *C.* spp. Prey: *Psilocorsis* sp., Oecophoridae sp.; *Anacampsis* (?) sp., Gelechiidae spp.; Olethreutidae sp.; *Archips cerasivorana* (Fitch), *A. fervidana* (Clem.), *A.* spp., Tortricidae spp.; *Tetralopha* sp. Epipaschiinae sp., *Mineola indigenella* (Zell.), *Salebria subcaesiella* (Clem.), *Nephopteryx* sp., Phycitinae spp., Pyralididae spp.; *Epizeuxis aemula* Hbn., Hypeninae sp., Noctuidae spp. Only the typical subspecies of *antilope* occurs in the Old World.
Vespa insolens ? Harris, 1780. Expos. Engl. Ins., p. 128, pl. 37, fig. 7. Type destroyed.
Vespa antilope Panzer, 1798. Faunae Ins. German. h. 53, pl. IX, with letterpress. ♀. Type destroyed.
Odynerus pictus Curtis, 1826. Brit. Ent., v. 3, p. 137 b, no. 2.
Odynerus (*Ancistrocerus*) *capra* Saussure, 1857. Rev. Mag. Zool. (2) 9: 273.
Ancistrocerus nearcticus Cameron, 1906. Amer. Ent. Soc., Trans. 32: 332. ♂.
Ancistrocerus lecontei Cameron, 1908. Amer. Ent. Soc., Trans. 34: 218. ♂, ♀.

Biology: Rau and Rau, 1918. Wasp studies afield, pp. 345-346 (nest, parasite). —Taylor, 1922. Psyche 29: 56-58 (nest, life history). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 405. —Buckle, 1929. Canad. Ent. 51: 265-266 (erroneous prey record). —Reinhard, 1929. Witchery of Wasps, pp. 86-91 (nest, parasite). —Cooper, 1953. Amer. Ent. Soc., Trans. 79: 13-35 (ecology, predation, life history, parasites). —Cooper, 1955. Amer. Ent. Soc., Trans. 80: 119-174, 1 pl., 6 text figs. (relations with mite, *Kennethiella*). —Medler and Fye, 1956.

Ent. Soc. Amer., Ann. 49: 97-102, 2 figs. (nest, prey, life history, parasites). —Fye, 1965. Canad. Ent. 97: 729-731 (nest, prey, life history, parasites; misidentified as *c. catskill* (Sauss.)). —Krombein, 1967. Trap-nesting wasps and bees, pp. 90-98, pl. 6, fig. 23 (nest, prey, life history, parasites).

antilope navajo Bequaert. Ariz., Calif., N. Mex., Colo., Mont. in U. Sonor. Zone. Ecology: Nests in borings in wood.

Ancistrocerus navajo Bequaert, 1925. Amer. Ent. Soc., Trans. 51: 92. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 98-99 (nest, life history).

antilope spenceri Bequaert. B. C.

Ancistrocerus antilope spenceri Bequaert, 1943. Ent. Amer. (n. s.) 23: 277. ♂, ♀.

bustamente bustamente (Saussure). Western U. S. east to western Tex. and Kans., north to Colo., Utah, Oreg.; Mexico. Ecology: Frequents arid areas; nests in *Sambucus* stems.

Odynerus (*Ancistrocerus*) *Bustamente* Saussure, 1857. Rev. Mag. Zool. (2) 9: 272. ♀.

Odynerus pictiventris Cameron, 1906. Amer. Ent. Soc., Trans. 32: 331. ♀.

Ancistrocerus neocallosus Bequaert, 1943. Ent. Amer. (n. s.) 23: 264. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 92 (nest).

bustamente discopictus Bequaert. Calif., Ariz.

Ancistrocerus neocallosus discopictus Bequaert, 1943. Ent. Amer. (n. s.) 23: 268. ♂, ♀.

campestris (Saussure). U. S. east of Rocky Mts., Ont. Ecology: Nests in borings in wood and sumac stems, and in abandoned mud-dauber nests. Parasite: *Toxophora amphitea* Wlkr.; *Amobia* (?) sp.; *Melittobia chalybii* Ashm. Prey: *Psilocorsis* sp.; *Gelechia albisparsella* (Chamb.), Gelechiidae sp. Predator: *Macrosiagon cruentum* (Germ.).

Odynerus (*Ancistrocerus*) *campestris* Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 123. ♀.

Biology: Rau and Rau, 1916. Jour. Anim. Behavior 6: 43 (nest, prey). —Snelling, 1963. Pan-Pacific Ent. 39: 88 (nest, predator). —Medler, 1966. Ent. Soc. Wash., Proc. 68: 143-144 (nest, life history, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 100-102 (nest, prey, life history, parasites).

catskill albophaleratus (Saussure). Transcontinental in Canadian and Transition Zones in Alaska, Labrador, Canada and U. S. south to mts. of Ariz., N. Mex., N. C. Ecology: Nests in borings in wood and sumac, in hollow stems, and in deserted galls. Parasite: Stylopidae sp.; *Melittobia* sp.; *Chrysis coerulans* F., *C. nitidula* F. Prey: Noctuidae sp.; Geometridae sp.; *Badebecia* near *urticana* Hbn., *Exartema punctanum* Wals., *Hedia ochroleucana* Hbn., *Anchylopera* sp., *Epiblema culminaria* Wals., *Gypsonoma* (?) sp., *Zeiraphera ratzeburgiana* Ratz., *Z. fortunana* Kft., *Z.* sp., *Griselda radicana* Wals., *Rhopobota naevana geminana* Steph., *Pseudexentera* sp., *Epinotia* spp., *Ptycholoma* (?) sp., *Pandemis* spp., *Choristoneura rosaceana* Harr., *C. fumiferana* (Clem.), *Argyrotaenia velutinana* (?) Wlkr., *A.* spp., *Acleris* spp., Olethreutidae spp.; *Recurvaria* spp., *Eucordylea* spp., Gelechiidae spp.; Oecophoridae spp.; *Salebria fructella* Hulst; *Pterophorus delawaricus* (Zell.). Predator: *Philanthus pulcher* D. T., *P. solivagus* Say.

Odynerus (*Ancistrocerus*) *Albophaleratus* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 217. ♂, ♀.

Ancistrocerus quebecensis Cameron, 1906. Amer. Ent. Soc., Trans. 32: 333. ♂.

Odynerus (*Hypodernus* (!)) *longipilosus* Cameron, 1908. Amer. Ent. Soc. Trans. 34: 199. ♀.

Odynerus allophaleralus (!) Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 240.

Biology: Packard, 1869. Guide Study Ins., pp. 155-156 (nest, prey). —Taylor, 1922. Psyche 29: 60-61 (nest, prey, life history). —Bequaert, 1925. Amer. Ent. Soc., Trans. 51: 104 (nest). —Bequaert, 1943. Ent. Amer. (n. s.) 23: 253 (nest, parasite). —Fye, 1965. Canad. Ent. 97: 723-729 (nest, prey, life history, parasites). —Krombein, 1967. Trap-nesting wasps and bees, pp. 104-110, pl. 3, fig. 11 (nest, prey, life history, parasites; a composite account based on nests of *c. albophaleratus*, *c. catskill*, and hybrids between them).

catskill catskill (Saussure). Southern Canada west to Alta., transcontinental in U. S. in Transition and Austral Zones. Ecology: Nests in pre-existing borings in wood, *Sambucus*, and sumac, in abandoned mud-dauber nests, and in deserted burrows of ground-nesting bees. Parasite: *Kennethiella* sp., *Vespacarus tigris* Bak. and Cunl.;

Toxophora virgata O. S., *Anthrax a. argyropygus* Wied., *A. irroratus* Say; *Megaselia* sp.; *Amobia* (?) sp.; *Microdontomerus anthidii* (Ashm.); *Chrysis coerulans* F., *C. nitidula* F.; *Sphaeropthalma amphion* (Fox), *S.* sp. Prey: Olethreutidae sp.; *Archips* sp., Tortricidae sp. Predator: *Philanthus solivagus* Say.

Odynerus (*Ancistrocerus*) *Catskill* Saussure, 1853. Etudes sur la famille des Vespides, v. 1, p. 136. ♂, ♀.

Odynerus (*Ancistrocerus*) *catskillensis* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 204. Emend.

Odynerus Catskilli(!) Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 168.

Ancistrocerus sexcingulatus Ashmead, 1901. Psyche 9: 185. ♂.

Ancistrocerus ormsbyensis Cameron, 1905. Invertebrata Pacifica 1: 120. ♂.

Ancistrocerus gunnisonensis Cameron, 1906. Invertebrata Pacifica 1: 146. ♂.

Ancistrocerus gunnistonensis (!) Cameron, 1908. Amer. Ent. Soc., Trans. 34: 213.

Biology: Myers, 1927. Ent. Monthly Mag. 53: 190-196 (nest, parasite). —Rau, 1935. Brooklyn Ent. Soc., Bul. 30: 111 (nest). —Rau, 1945. Ent. Soc. Amer., Ann. 38: 88 (nest). —Hobbs, Nummi, and Virostek, 1961. Canad. Ent. 93: 144 (nest). —Medler, 1964. Ent. Soc. Wash., Proc. 66: 210 (parasites). —Medler, 1966. Ent. Soc. Wash., Proc. 68: 139-142 (nest, prey, life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 104-110, pl. 3, fig. 11 (nest, prey, life history, parasites; a composite account based on nests of *c. albophaleratus, c. catskill,* and hybrids between them). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 2 (nest, parasites).

catskill halophila Viereck. Rocky Mts. west to Pacific Coast. Ecology: Nests in borings in twigs and *Sambucus* stems, in old oak galls, and possibly also in abandoned burrows of ground-nesting bees. Parasite: *Chrysis derivata* Buyss.

Ancistrocerus halophila Viereck, 1903 (1902). Acad. Nat. Sci. Phila., Proc. 54: 735. ♂.

Ancistrocerus trichionotus Cameron, 1905. Invertebrata Pacifica 1: 120. ♂.

Ancistrocerus fulvitarsis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 205. ♂, ♀.

Ancistrocerus tahoensis Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 235. ♀.

Biology: Bequaert, 1943. Ent. Amer. (n. s.) 23: 255 (nest). —Bohart, 1951. U. S. Dept. Agr., Monog. 2: 894 (nests). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 92-93 (nests, parasite).

durangoensis Cameron. Western Okla. and Tex., N. Mex., Ariz., Utah, Colo., Wyo. in Upper Sonoran Zone; Mexico. Ecology: Nests in borings in wood. Parasite: *Chrysis inflata* Aar. Prey: Lepidoptera larvae.

Ancistrocerus durangoensis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 216. ♂.

Ancistrocerus fulvicarpus Cameron, 1908. Amer. Ent. Soc., Trans. 34: 222. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 154-155, fig. 3 (sleeping aggregations). —Krombein, 1967. Trap-nesting wasps and bees, p. 102 (nest, prey, life history, parasite).

lineativentris kamloopsensis Bequaert. B. C., Oreg., Wyo.

Ancistrocerus lineativentris kamloopsensis Bequaert, 1943. Ent. Amer. (n. s.) 23: 280. ♂, ♀.

lineativentris lineativentris Cameron. West. U. S. east to S. Dak., west. Kans. mostly in Transition Zone. Ecology: Nests in *Sambucus* stems. Parasite: *Amobia floridensis* (Tns.), *Pimpla spatulata* Tow.; *Chrysis inflata* Aar.

Ancistrocerus lineativentris Cameron, 1906. Invertebrata Pacifica 1: 146. ♂.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nest, parasites).

lineativentris sinopis Bohart. Colo., west. Tex., Utah, Ariz.

Ancistrocerus lineativentris sinopis Bohart, 1974. Kans. Ent. Soc., Jour. 47: 466. ♂, ♀.

lutonidus Bohart. Mass. to S. C., Ind., Wis., Tex. Ecology: Nests are made of hardened clay, are attached to twigs of low bushes, and contain 6-20 or more cells arranged somewhat radially.

Ancistrocerus lutonidus Bohart, 1974. Kans. Ent. Soc., Jour. 47: 465. ♂, ♀.

Biology: Packard, 1869. Guide Study Ins., p. 156, pl. 5, fig. 12 (nest). —Riley, 1880. Amer. Ent. 3: 154. —Strand, 1914. Ent. Mitt. 3: 116-118. —Viereck, 1916. Conn. State Geol. and

Nat. Hist. Survey, Bul. 22, pl. 4, fig. 1 (nest). Misdet. as *birenimaculatus* (Sauss.) in preceding references.

paracallosus Bequaert. S. Dak., Ariz.
Ancistrocerus paracallosus Bequaert, 1943. Ent. Amer. (n. s.) 23: 269. ♂, ♀.

parietum (Linnaeus). Que., Ont., Mass. and R. I. south to D. C., Ohio, Mich.; Palaearctic in Europe and North Africa east to Manchuria, also in the Azores and Madeira. Ecology: Nests in crevices in mortar and glass tubing in North America; in Europe is reported to nest in tree stumps, rock crevices, and in burrows in clay banks. Adventive from Europe. Parasite: Stylopidae sp. Prey: Torticidae sp. in Ont.; in Europe the usual prey is caterpillars, but there is one record of storing coleopterous larvae, *Melasoma populi* L.
Vespa parietum Linnaeus, 1758. Syst. Nat., ed. 10, v. 1, p. 572.
Odynerus ? geoffroyanus Spinola, 1808. Insectorum Liguriae 2: 182.
Odynerus flavipes Curtis, 1826. Brit. Ent. 3: 137 b, no. 12.
Odynerus (*Ancistrocerus*) *Ochlerus* Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 131. ♀.
Odynerus parietum var. *incisoides* Verhoeff, 1890. Ent. Nachr. 16: 335. Type probably destroyed.
Odynerus parietum var. *incisus* Verhoeff, 1890. Ent. Nachr. 16: 335. Type destroyed.
Odynerus parietum var. *parietoides* Verhoeff, 1890. Ent. Nachr. 16: 335. Type destroyed.
Ancistrocerus tardinotus Taylor, 1922. Psyche 29: 49. A manuscript name attributed to Bequaert and validated under the provisions of Art. 12 and Art. 16 (a) (viii) of the Code.

Biology: Taylor, 1922. Psyche 29: 49-55 (nest, prey, life history). —Miller, 1954. Canad. Ent. 86: 197-198, 4 figs. (nest, prey). The foregoing references are to the north American population; biological references to the Palaearctic population are to be found in the Palaearctic eumenid catalog by van der Vecht and Fischer, 1972.

parredes (Saussure). Ariz. (Huachuca Mts.); Mexico, Central America to Panama.
Odynerus (*Ancistrocerus*) *Parredes* Saussure, 1857. Rev. Mag. Zool. (2) 9: 273. ♀.
Odynerus Parredesi (!) Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 180. ♀. Emend.

simulator Cameron. Nev., Calif. Ecology: Nests in old *Sceliphron* nests.
Ancistrocerus simulator Cameron, 1908. Amer. Ent. Soc., Trans. 34: 222. ♀.

Taxonomy: Goodpasture, 1974. Kans. Ent. Soc., Jour. 47: 364-372, figs. 4, 9 (chromosome number).

Biology: Goodpasture, 1974. Kans. Ent. Soc., Jour. 47: 365 (nest).

spilogaster Cameron. West. U. S. east to Mont., Wyo., Utah, northern Ariz. in Upper Sonoran and Transition Zones. Ecology: Nests in twigs and *Sambucus* stems, in old oak galls, and also makes complete mud cells on rocks. Parasite: *Aritranis notata sierrae* Tow.; *Chrysis coerulans* F., *C. pattoni* Aar.
Ancistrocerus spilogaster Cameron, 1905. Invertebrata Pacifica 1: 121. ♂.
Odynerus edwardsii Cameron, 1908. Amer. Ent. Soc., Trans. 34: 207. ♀.

Taxonomy: Goodpasture, 1974. Kans. Ent. Soc., Jour. 47: 364-372, figs. 2, 3, 9 (chromosome number).

Biology: Bequaert, 1943. Ent. Amer. (n. s.) 23: 248 (nest). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 93 (nests, parasites).

spinolae (Saussure). Conn. to Fla. west to Mich., Ill., Mo. and Tex. Ecology: Nests in borings in wood and in abandoned mud-dauber nests. Parasite: *Anthrax aterrimus* (Big.); Miltogrammini sp.; *Kennethiella trisetosa* (Coor.). Prey: Lepidoptera larvae.
Odynerus (*Ancistrocerus*) *spinolae* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 216. ♀.

Biology: Rau, 1946. Brooklyn Ent. Soc., Bul. 41: 10-11 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 99-100 (nest, prey, life history, parasites).

tuberculocephalus sutterianus (Saussure). Calif., Nev., Utah, Oreg., B. C. in Upper Sonoran and Transition Zones. Ecology: Nests in old mud-dauber nests. Parasite: *Chrysis coerulans* F., *C. inflata* Aar.
Odynerus (*Ancistrocerus*) *Sutterianus* Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 186. ♂, ♀.

Ancistrocerus sutteranus (!) Cameron, 1905. Invertebrata Pacifica 1: 123.

Taxonomy: Goodpasture, 1974. Kans. Ent. Soc., Jour. 47: 364-372, figs. 5, 6, 9 (chromosome number).

Biology: Bequaert, 1943. Ent. Amer. (n. s.) 23: 285 (nest).

tuberculocephalus tuberculocephalus (Saussure). S. Dak., Wyo., Utah, Colo., Ariz., N. Mex., western Tex.; Mexico in temperate regions south to Federal District. Ecology: Nests in borings in wood and *Sambucus*, and in abandoned mud-dauber nests. Parasite: Bombyliidae sp.; *Chrysis inflata* Aar. Prey: Gelechiidae sp. Predator: Cleridae sp., larva.
Odynerus (*Ancistrocerus*) *tuberculocephalus* Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 122. ♂, ♀.
Odynerus tuberculiceps Saussure, 1853. Etudes sur la famille des Vespides, v. 1, (errata). Emend.

Biology: Rau, 1940. Ent. Soc. Amer., Ann. 33: 593 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 102-104 (nest, prey, life history, associates). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 2 (nest).

unifasciatus seminole Bequaert. Fla.
Ancistrocerus unifasciatus seminole Bequaert, 1943. Ent. Amer. (n. s.) 23: 282. ♀.

unifasciatus unifasciatus (Saussure). Southern Canada and eastern U. S. west to Ont., Mich., Iowa, Kans. and Tex. Ecology: Nests in abandoned mud-dauber nests.
Odynerus (*Ancistrocerus*) *unifasciatus* Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 121. ♀.

Biology: Rau and Rau, 1913. Ent. News 24: 396-397 (nest).

waldenii excavatus Bequaert. B. C., Wash., Oreg., Calif., Mont., Wyo., Colo., Ariz. Ecology: Builds mud nests on rocks.
Ancistrocerus waldenii excavatus Bequaert, 1943. Ent. Amer. (n. s.) 23: 244. ♂, ♀.

Biology: Bequaert, 1943. Ent. Amer. (n. s.) 23: 246 (nest).

waldenii flavidulus Bequaert. Oreg., Calif. Ecology: Builds mud nests on rocks. Prey: Larvae of *Cnephasia longana* (Haw.), *Archips argyrospilus* Wlkr.
Ancistrocerus waldenii flavidulus Bequaert, 1943. Ent. Amer. (n. s.) 23: 246. ♂, ♀.

Biology: Bequaert, 1943. Ent. Amer. (n. s.) 23: 247 (nest). —Richards, 1962. Pan-Pacific Ent. 38: 145-146 (prey).

waldenii waldenii (Viereck). Alaska, Canada and U. S. south to Idaho, Wyo., N. Mex. (high mountains), Colo., S. Dak., Ill., Mich., Va. Ecology: Builds free mud nests on walls or rocks, or in cavities in mortar.
Odynerus waldonii (!) Viereck, 1906. Ent. News 17: 304. ♀.
Odynerus waldenii Viereck, 1906. Ent. News 17: 350. Emend.

Biology: Bequaert, 1943. Ent. Amer. (n. s.) 23: 243 (nest). —Morris, 1959. Canad. Ent. 91: 500 (nest).

Genus SYMMORPHUS Wesmael

Genus SYMMORPHUS Subgenus SYMMORPHUS Wesmael

Symmorphus Wesmael, 1836. Acad. Sci. Belg., Bul. 3: 45.
Type-species: *Vespa elegans* Wesmael. Desig. by Richards, 1935.
Odynerus subg. *Protodynerus* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 186. N. name for *Symmorphus*.

Only the typical subgenus occurs in North America. So far as is known, the American species nest in pre-existing cavities in twigs, stems, logs and structural lumber; a few European species are also known to nest in abandoned burrows of other wasps or bees in banks or mud walls. Partitions between cells are made of mud. Probably most of the North American species prey upon externally feeding chrysomelid larvae, but *canadensis* (Sauss.) is unique in that it preys upon leaf-mining coleopterous and lepidopterous larvae.

Revision: Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 151-157.

Taxonomy: van der Vecht, 1966. Ent. Ber. 26: 163 (discussion of type-species designation).

albomarginatus (Saussure). Que., Conn., N. Y., Md., Mich., Wis., Wyo., Alta., B. C., Alaska.
Ecology: Nests in borings in wood and sumac stems. Parasite: *Chrysis coerulans* F.; *Melittobia chalybii* Ashm.; *Amobia distorta* (Allen). Prey: *Chrysomela* spp., larvae.
Odynerus (*Protodynerus*) *albomarginatus* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 195. ♀.

Biology: Medler, 1966. Ent. Soc. Wash., Proc. 68: 144-145 (nest, prey, life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 120-122 (nest, prey, life history, associates).

canadensis (Saussure). Transcont. in Canada and U. S. (not known from Fla., Tex., N. Mex., Ariz.). Ecology: Nests in borings in wood, twigs, logs, structural lumber. Parasite: *Chrysis cembricola* Krom.; *Melittobia chalybii* Ashm.; *Monodontomerus* sp.; *Pyemotes ventricosus* (Newp.). Prey: *Chalepus dorsalis* Thunb.; *Prionomerus calceatus* (Say), *Apion* sp.; *Antispila nyssaefoliella* Clem.; *Lithocolletis ostensackenella* (Fitch), *L.* sp., *Parectopa robiniella* Clem., Gracilariidae sp.; *Aeaea ostryaeella* (Chamb.). Predator: *Trogoderma ornatum* Say; *Philanthus pulcher* D. T.
Odynerus (*Protodynerus*) *canadensis* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 196. ♀.
Odynerus (*Symmorphus*) *debilis* Saussure, 1870. Rev. Mag. Zool. (2) 22: 55. ♀.
Symmorphus cogitans Cameron, 1906. Amer. Ent. Soc., Trans. 32: 325. ♀.

Biology: Reinhard, 1929. Witchery of Wasps, pp. 72-83 (nest, prey, life history, parasite). —Krombein, 1952. Amer. Ent. Soc., Trans. 78: 91 (nest, prey). —Krombein, 1954. Brooklyn Ent. Soc., Bul. 49: 3 (nest, prey). —Krombein, 1956. Ent. Soc. Wash., Proc. 58: 155 (provisioning flights, prey). —Weaver and Dorsey, 1965. Ent. Soc. Amer., Ann. 58: 933-934 (prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 115-120, pl. 4, figs. 14, 15, pl. 5, figs. 16-18, pl. 6, fig. 19 (nest, prey, life history, associates).

cristatus cristatus (Saussure). Canada and north. U. S. south to Md., Ill. and mountains of Colo., Utah, Ariz., Calif. Ecology: Nests in borings in wood and sumac. Parasite: *Chrysis coerulans* F., *C. nitidula* F.; *Anthrax irroratus* Say; *Amobia distorta* (Allen). Prey: *Chrysomela crotchi* Brown, *C. scripta* (F.) complex, *C.* spp., Chrysomelinae sp., *Goniocteuus americanus* Brown.
Odynerus (*Protodynerus*) *cristatus* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 196. ♀.
Odynerus (*Protodynerus*) *Philadelphiae* Saussure, 1857. Rev. Mag. Zool. (2) 9: 272. ♀.
Symmorphus hornii Cameron, 1909. Pomona Col. Jour. Ent. 1: 123. ♀.

Biology: Fye, 1965. Canad. Ent. 97: 734-735 (nest, life history, prey, parasite; note data corrections for Fye in Krombein, 1967). —Krombein, 1967. Trap-nesting wasps and bees, pp. 122-126, pl. 6, figs. 20-22 (nest, prey, life history, parasites). —Evans, 1973. Great Basin Nat. 33: 151-152 (nest, prey, parasites).

cristatus nevadaensis (Cameron). Wash., Oreg., Nev., Calif. Ecology: Nests in *Sambucus* stems. Parasite: *Chrysis derivata* Buyss.
Nortonia nevadaensis Cameron, 1905. Invertebrata Pacifica 1: 124. ♂.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, parasite).

meridionalis Viereck. B. C., Oreg., Calif., Utah, Colo., Nebr., Wyo., N. Mex. Ecology: Nests in *Sambucus* stems. Predator: *Philanthus zebratus nitens* (Bks.).
Symmorphus meridionalis Viereck, 1903. Amer. Ent. Soc., Trans. 29: 69. ♂.
Symmorphus trisulcatus Cameron, 1906. Amer. Ent. Soc., Trans. 32: 327. ♂.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest).

projectus Bohart. Calif. (sea level to 10,000 feet), Oreg., Wash., Idaho, Wyo., Mont., Ariz.
Ecology: Nests in *Sambucus* stems.
Symmorphus projectus Bohart, 1950. Biol. Soc. Wash. Proc. 63: 81. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest).

walshianus (Saussure). U. S. west to Tex., Iowa.
Odynerus (*Symmorphus*) *Walshianus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 55. ♀.

Genus EUMENES Latreille

Genus EUMENES Subgenus EUMENES Latreille

Eumenes Latreille, 1802. Hist. Nat. Crust. Ins., v. 3, p. 360.
Type-species: *Vespa coarctata* Linnaeus. Desig. by Latreille, 1810.
Alpha Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 128.
Type-species: *Vespa coarctata* Linnaeus. Desig. by Bequaert, 1926.
Eumenis Kriechbaumer, 1879. Ent. Nachr. 5: 57. Emend.
Eumenidion Schulthess, 1913. Soc. Ent. 28: 2.
Type-species: *Vespa coarctata* Linnaeus. Orig. desig.

Only the typical subgenus occurs in America north of Mexico.
So far as is known, all species make juglike mud nests, which are usually attached to twigs and are provisioned with caterpillars.

Revision: Isely, 1917. Ent. Soc. Amer., Ann. 10: 345-363 (N. Amer. spp.). —Bequaert, 1938. Brooklyn Ent. Soc., Bul. 33: 59-70 (spp. northeastern U. S. and eastern Canada). —Bequaert, 1944. Nat. Canad. 71: 75-88 (Canad. spp.).

aureus Isely. Okla., western Tex. to southern Calif.; Mexico (Baja California).
Eumenes belfragei aureus Isely, 1917. Ent. Soc. Amer., Ann. 10: 352. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 152-153, figs. 1, 2 (sleeping habits).

bollii bollii Cresson. Western half of U. S. north to Nebr., Colo., Utah, Nev., Calif., Alta., Mo., Iowa, Minn.; Mexico (Baja California).
Eumenes bollii Cresson, 1872. Amer. Ent. Soc., Trans. 4: 232. ♂, ♀.

Biology: Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 299-301 (nest).

bollii oregonensis Bequaert. Wash., Oreg., Idaho, Nev.
Eumenes bollii var. *oregonensis* Bequaert, 1938. Brooklyn Ent. Soc., Bul. 33: 66. ♀.

crucifera bolliformis Viereck. Ariz., N. Mex.; Mexico.
Eumenes (*Pachymenes*) *bolliformis* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 387. ♂, ♀.
Eumenes robustus Isely, 1917. Ent. Soc. Amer., Ann. 10: 360. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 153 (sleeping habits).

crucifera crucifera Provancher. Western U. S. east to Colo., S. Dak. and north to Wyo., B. C., Alta.
Eumenes crucifera Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 421. ♀.
Eumenes (*Alpha*) *marginilineatus* Viereck, 1907. Amer. Ent. Soc., Trans. 33: 381. ♂.
Eumenes emarginilineatus (!) Viereck, 1907. Amer. Ent. Soc., Trans. 33: 388.
Eumenes sternalis Isely, 1917. Ent. Soc. Amer., Ann. 10: 353. ♂.
Eumenes xanthogaster Isely, 1917. Ent. Soc. Amer., Ann. 10: 353. ♂.

crucifera flavitinctus Bohart. Calif.
Eumenes crucifera flavitinctus Bohart, 1950. Biol. Soc. Wash., Proc. 63: 79. ♂, ♀.

crucifera nearcticus Bequaert. Transcontinental north to 63 degrees N. Latitude, south to Oreg., Utah, Colo., Ky., N. J.
Eumenes minuta Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 39. ♂. Preocc.
Eumenes (*Alpha*) *Globulosus* Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 139. ♀. Preocc.
Eumenes nearcticus Bequaert, 1944. Nat. Canad. 71: 82. ♂, ♀. N. name for *globulosus*.

crucifera stricklandi Bequaert. Alta. (Cypress Hills).
Eumenes coloradensis stricklandi Bequaert, 1944. Nat. Canad. 71: 84. ♀.

fraternus Say. Ont., U. S. west to Tex., Okla., Kans., Nebr., Minn. Parasite: *Chrysis conica* Br.; *Timulla ferrugata* (F.).
Eumenes fraterna Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 344.
Eumenes Fervens Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 40. ♂, ♀.

Biology: Isely, 1914. Kans. Univ. Sci. Bul. (2) 8: 301 (nest).

iturbide iturbide Saussure. Colo., N. Mex., Ariz.; Mexico.
Eumenes (*Alpha*) *Iturbide* Saussure, 1857. Rev. Mag. Zool. (2) 9: 271.
Eumenes (*Alpha*) *globulosiformis* Viereck, 1908. Amer. Ent. Soc., Trans. 33: 386. ♂, ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 153 (sleeping habits).

iturbide pedalis Fox. B. C., Wash., Idaho, Mont., Wyo., Colo., Utah, Calif.; Mexico (Baja California).
Eumenes pedalis Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 109. ♂, ♀.
Eumenes crassicornis Isely, 1917. Ent. Soc. Amer., Ann. 10: 362. ♂.
Eumenes pachygaster Isely, 1917. Ent. Soc. Amer., Ann. 10: 362. ♀.

sculleni Bohart. Nev., Utah.
Eumenes sculleni Bohart, 1950. Biol. Soc. Wash., Proc. 63: 78. ♂, ♀.

smithii americanus Saussure. Colo., Nebr., Kans., Mo., Ark., Okla., Tex.; Mexico (Michoacan, Guadalajara). Prey: Geometridae larvae.
Eumenes americanus Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 39. ♀.
Eumenes belfragei Cresson, 1872. Amer. Ent. Soc., Trans. 4: 232. ♂, ♀.
Eumenes brunneus Isely, 1917. Ent. Soc. Amer., Ann. 10: 348. ♂. Preocc.

Biology: Hartman, 1913. Jour. Anim. Behavior 3: 353-360, 7 figs. (nest building, prey, life history).

smithii smithii Saussure. N. C., Ga., Fla., Ala., Miss.
Eumenes Smithii Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 43. ♂, ♀.

Biology: Isely, 1917. Ent. Soc. Amer., Ann. 10: 350 (nest).

verticalis coloradensis Cresson. Western U. S. and Canada (except Oreg., Calif.) east to Sask., S. Dak., Colo., N. Mex.; Mexico.
Eumenes coloradensis Cresson, 1875. Rpt. Geog. Geol. Expl. and Survey west of 100th Meridian, v. 5, p. 717. ♂, ♀.
Eumenes (Alpha) cruciferorum Viereck, 1908. Amer. Ent. Soc., Trans. 33: 388. ♂, ♀.
Eumenes (Alpha) enigmatus Viereck, 1908. Amer. Ent. Soc., Trans. 33: 389. ♂.
Eumenes stenogaster Isely, 1917. Ent. Soc. Amer., Ann. 10: 353. ♂, ♀.
Eumenes enigmaticus (!) Bequaert, 1938. Brooklyn Ent. Soc., Bul. 33: 69.

verticalis neoboreus Bequaert. Que., Ont., Alta., B. C.
Eumenes verticalis neoboreus Bequaert, 1944. Nat. Canad. 71: 87. ♂, ♀.

verticalis tricinctus Isely. Alta., Idaho, Utah, Nev., Oreg., Calif., Ariz.; Mexico (Baja California).
Eumenes tricinctus Isely, 1917. Ent. Soc. Amer., Ann. 10: 361. ♀.

verticalis verticalis Say. Ont., Man., north. and east. U. S. south to N. C., Mo. and west to N. Dak., S. Dak.
Eumenes verticalis Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 346.

Subfamily ZETHINAE

Tribe ZETHINI

There are only four genera in this tribe. *Zethus* is primarily Neotropical with a few species entering the Nearctic Region. The other genera are Australian.

Genus ZETHUS Fabricius

The genus is primarily Neotropical in distribution, but it occurs also in the Nearctic, Oriental and Ethiopian Regions. Very little is known of the biology of the North American species. Overall, the species range from the more primitive solitary taxa which nest in abandoned borings of other insects to subsocial species in which several females build a common nest of vegetable matter and resin, and feed their larvae progressively with lepidopterous larvae.

Revision: Bohart and Stange, 1965. Univ. Calif., Pubs. Ent. 40: 1-208, 354 figs. (New World spp.).

Taxonomy: Porter, 1975. Fla. Ent. 58: 303-306, 5 figs. (key to U. S. spp.).

Genus ZETHUS Subgenus ZETHUS Fabricius

Zethus Fabricius, 1804. Systema Piezatorum, pp. xii, 282.
Type-species: *Vespa coeruleopennis* Fabricius. Desig. by Ashmead, 1902.

Didymogastra Perty, 1833. Delect. anim. artic. Brasil, p. 145.
Type-species: *Didymogaster fusca* Perty. Desig. by Ashmead, 1902.
Lethus (!) Say, 1836. Boston Jour. Nat. Hist. 1: 209. Misspelling.
Heros Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 115.
Type-species: *Zethus gigas* Spinola. Monotypic.
Wettsteinia Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, p. 13.
Type-species: *Labus sichelianus* Saussure. Desig. by Bohart and Stange, 1965.
Euzethus Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, p. 14. N. name.
Laboides Zavattari, 1912. Arch. f. Naturgesch. 78, Abt. A, H. 4: 65.
Type-species: *Labus sichelianus* Saussure. Desig. by Bohart and Stange, 1965.

miscogaster Saussure. Tex. (Hidalgo Co.), Ariz. (Baboquivari Mts.); Mexico to Argentina.
Zethus Miscogaster Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 18. ♀.
Zethus Zendalus Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 53. ♀.
Zethus emarginatus Fox, 1899. Acad. Nat. Sci. Phila., Proc., p. 429. ♀.
Zethus claripennis Cameron, 1907. Entomologist 40: 63. ♂.
Zethus punctinodis Cameron, 1907. Entomologist 40: 79. ♀.
Didymogastra brethesi Zavattari, 1911. Zool. Jahrb. 31: 42. ♀.
Zethus pavidus Zavattari, 1912. Arch. f. Naturgesch. 78, Abt. A, 4: 72. ♀.
Zethus binghami Zavattari, 1913. Arch. f. Naturgesch. 79, Abt. A, 1: 114. ♂.

montezuma Saussure. Tex. (Hidalgo Co.) south to Colombia.
Zethus montezuma Saussure, 1857. Rev. Zool. (2) 9: 270. ♀.

spinipes spinipes Say. Mass. to N. C. west to Ill., Kans., Ark.
Lethus (!) *spinipes* Say, 1837. Boston Jour. Nat. Hist. 1: 387. ♀.
Eumenes substricta Haldeman, 1844. Acad. Nat. Sci. Phila., Proc. 2: 54.
Eumenes pensilvanica Haldeman, 1853. Acad. Nat. Sci. Phila., Proc. 6: 365.
Zethus pensylvanica Saussure, 1875. Smithsn. Inst., Misc. Collect. 254: 29. Emend.
Zethus Pennsylvanica Dalla Torre, 1894. Cat. Hym., v. 9, p. 14. Emend.

spinipes variegatus Saussure. Md. to Fla., Ala., La., Tex., Okla. Prey: *Rhyacionia frustrana* (Comst.).
Zethus variegatus Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 13. ♀.
Zethus bicolor Saussure, 1852. Etudes sur la famille des Vespides, v. 1, p. 17. ♂.

Biology: Lashomb and Steinhauer, 1975. Ent. Soc. Wash., Proc. 77: 164 (prey capture).

Genus ZETHUS Subgenus ZETHUSCULUS Saussure

Zethusculus Saussure, 1855. Etudes sur la famille des Vespides, v. 3, p. 118.
Type-species: *Zethus jurinei* Saussure. Desig. by Ashmead, 1902.

slossonae Fox. Southern Fla. Ecology: Nests in twigs.
Zethus slossonae Fox, 1892. Ent. News 2: 29. ♂, ♀.

Biology: Bohart and Stange, 1965. Univ. Calif., Pubs. Ent. 40: 16 (nest).

Genus ZETHUS Subgenus ZETHOIDES Fox

Zethoides Fox, 1899. Acad. Nat. Sci. Phila., Proc., p. 436.
Type-species: *Zethoides smithii* Fox. Monotypic.
Baeoprymna Cameron, 1912. Timehri 2: 225.
Type-species: *Baeoprymna rufoornata* Cameron. Monotypic.
Protozethus Bertoni, 1925. Soc. Cient. Paraguay, Rev. 2: 75.
Type-species: *Zethus olmecus* Saussure. Orig. desig.

aztecus Saussure. Tex. (Hidalgo Co.) south to Guatemala and El Salvador.
Zethus aztecus Saussure, 1857. Rev. Zool. (2) 9: 270. ♂.
Zethus campestris Zavattari, 1913. Arch. f. Naturgesch. 79, Abt. A, h 1: 108. ♀.

guerreroi arizonensis Bohart. Ariz., N. Mex.; Mexico (Sonora, Sinaloa). Typical *guerreroi* Zavattari occurs in Mexico and El Salvador.
Zethus (*Zethusculus*) *arizonensis* Bohart, 1950. Biol. Soc. Wash., Proc. 63: 77. ♂, ♀.

Unplaced Taxa of Eumenidae

Odynerus bimaculatus Provancher, 1895. Nat. Canad. 22: 157. ♀. Type in Laval Univ., Que.

Odynerus bisstrigatus Spinola, 1808. Insectorum Liguriae, v. 1, p. 180. Amer. sept. Described originally as *bis-strigatus;* location of type unknown.
Odynerus (?) *bradleyi* Cameron, 1909. Pomona Col. Jour. Ent. 1: 81 ♀. Colo. (Durango). Type depository unknown.
Odynerus crotchii Cameron, 1908. Amer. Ent. Soc., Trans. 34: 197. ♂, ♀. Tex. (Lee Co.). Lectotype in British Museum (Nat. Hist.); possibly a *Leptochilus.*
Odynerus (*Odynerus*) *nortonianus* Saussure, 1870. Rev. Mag. Zool. (2) 22: 105. ♀. Conn.
Odynerus pulchrinervis Cameron, 1906. Amer. Ent. Soc., Trans. 32: 328. ♀. N. Mex. Type depository unknown, the type probably lost.
Odynerus robustus Provancher, 1895. Nat. Canad. 22: 157. ♀. Calif. (Los Angeles). Type in Laval Univ., Que.
Odynerus scudderi Cameron, 1908. Amer. Ent. Soc., Trans. 34: 196. ♀. Southwest. U. S. Type depository unknown, the type probably lost.
Odynerus tricolor Provancher, 1895. Nat. Canad. 22: 158. ♂. Calif. (Los Angeles). Type in Laval Univ., Que.

Nomina Nuda in Eumenidae

Ancistrocerus behrensi Tucker, 1909. Kans. Acad. Sci., Trans. 22: 286.
Leionotus scrophulariae Robertson, 1928. Flowers and Insects, p. 11.
Leionotus ziziae Robertson, 1928. Flowers and Insects, p. 12.
Odynerus daedalus Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 589.

Family VESPIDAE

The wasps belonging to this family are all social species, the colonies consisting of one or more fertile queens, workers which are frequently numerous and usually infertile, and, at times, males and new queens.

Taxonomy: Lewis, 1897. Amer. Ent. Soc., Trans. 24: 169-192, 1 pl. (N. Amer. spp.) —Bohart and Bechtel, 1957. Calif. Ins. Survey, Bul. 4: 73-102, 8 pls., 34 figs., 7 maps (Calif. spp.).

Biology: Rau, 1929. Canad. Ent. 61: 219-221 (cocoon spinning). —Jeanne, 1975. Quart. Rev. Biol. 50: 267-287, 9 figs. (adaptiveness of nest architecture).

Morphology: van der Vecht, 1968. K. Nederland. Akad. van Wetensch., Proc., Ser. C, 71: 411-422, 5 figs. (terminal gastral sternite, female, worker).

Subfamily POLISTINAE

These are commonly called paper wasps in North America. The nests consist of a single comb which is not enclosed in a paper envelope. In most of the Temperate Zone species the nests are annual, each being founded by one or more overwintering females. One of the females becomes dominant and is the only one to lay eggs.

The normal larval food consists of dismembered caterpillars. Some species of *Polistes* exert considerable predator pressure on economically important insects such as the tobacco hornworm and cotton bollworm. In an attempt to utilize the wasps as a biological control agent, shelters are sometimes placed in cultivated fields to afford nesting sites to founding females.

Taxonomy: Yoshikawa, 1962. Jour. Biol. 13: 19-43, 1 map (list of world spp., distribution).

Biology: Yoshikawa, 1962. Jour. Biol. 13: 45-64 (evolution of sociality).

Genus POLISTES Latreille

Polistes Latreille, 1802. Hist. Nat. Crust. Ins., v. 3, p. 363.
Type-species: *Vespa gallica* Linnaeus. Desig. by Blanchard, 1840.

Richard's (1973) reclassification of the subgenera of *Polistes,* listed below in Taxonomy, was received too late to assign the North American species to subgenera in the format used elsewhere in the catalog for subgenera. Our species are assigned to the following subgenera.

Polistes subg. *Fuscopolistes* Richards, 1973, pp. 95, 100 (type-species, *Vespa fuscata*

Fabricius, orig. desig.)-- *apachus, bellicosus, carolina, dorsalis, flavus, fuscatus, metricus* and *perplexus.*

Polistes subg. *Palisotius* Richards, 1973, pp. 95, 100 (type-species, *Polistes major* Beauvois, orig. desig.)--*major.*

Polistes subg. *Onerarius* Richards, 1973, pp. 94, 101 (type-species, *Vespa carnifex* Fabricius, orig. desig.)--*carnifex.*

Polistes subg. *Polistarchus* Richards, 1973, pp. 94, 101 (type-species, *Vespa canadensis* Linnaeus, orig. desig.)--*annularis, canadensis, exclamans* and *instabilis.*

Polistes subg. *Epicnemius* Richards, 1973, pp. 96, 102 (type-species, *Polistes bicolor* Lepeletier, orig. desig.)--*pacificus.*

The typical subgenus does not occur in North America.

In the extensive series of papers listed below, Rau consistently used two misidentifications: *pallipes* for the taxon now recognized as *metricus*, and *variatus* for the taxon now recognized as typical *fuscatus;* he also used *rubiginosus* for *carolina*, a senior synonym.

Revision: Bequaert, 1937. Arch. Inst. Biol. Veg., Rio de Janeiro 3: 171-205 (New World taxa of Gallicus and Bicolor species groups). —Bequaert, 1940. N. Y. Ent. Soc., Jour. 48: 1-31 (N. Amer. taxa). —Bequaert, 1943. Ent. Venezolana, Bol. 2: 107-124 (New World vars. of *canadensis* (L.)). —Snelling, 1955. Amer. Mus. Novitates 1701: 1-9 (subspp. of *major* Beauv. and *exclamans* Vier.).

Taxonomy: Enteman, 1904. Carnegie Inst. Wash., Pub. 19: 1-88, 6 pls., 27 figs. (coloration). —Rau, 1942. Ent. Soc. Amer., Ann. 35: 335-338 (behavioral characters of *carolina, f. fuscatus, metricus*). —Richards, 1973. Rev. Ent. Brasil. 17: 85-103, 12 figs. (classification of subgenera). —Snelling, 1974. Ent. Soc. Wash., Proc. 76: 476-479 (status of some N. Amer. taxa).

Biology: Rau, 1928. Biol. Bul. 54: 503-519 (honey-gathering by *annularis, f. fuscatus, metricus*). —Rau, 1928. Psyche 35: 147-150, 4 figs. (modification of nests by *carolina, annularis, metricus*). —Rau, 1928. Brooklyn Ent. Soc., Bul. 23: 230-235 (hibernation, colony founding by *annularis, metricus*). —Duncan, 1928. Pan-Pacific Ent. 5: 90 (building material). —Rau, 1928. Psyche 35: 151-152 (reconstruction of destroyed nests by *f. fuscatus, metricus*). —Rau, 1929. Ecology 10: 191-200, 4 figs. (nesting habitat of *annularis, carolina, f. fuscatus, metricus*). —Rau, 1930. Compar. Psychol., Jour. 10: 267-286 (interspecific animosity and tolerance in workers of *f. fuscatus, metricus, annularis*). —Rau, 1930. Ent. Soc. Amer., Ann. 23: 461-466 (hibernation behavior of *carolina, f. fuscatus, metricus, annularis*). —Rau, 1931. Ecology 12: 690-693 (use of water by *annularis, metricus, f. fuscatus, carolina*). —Rau, 1931. Ent. Soc. Amer., Ann. 24: 515-518 (hibernation behavior of *annularis, metricus*). —Rau, 1939. Compar. Psychol., Jour. 27: 259-269 (inter- and intraspecific animosity and tolerance of female *annularis, f. fuscatus, metricus*). —Rau, 1939. Ecology 20: 439-442 (population and caste studies of *metricus, f. fuscatus, annularis*). —Rau, 1941. Ent. Soc. Amer., Ann. 34: 355-366 (parasites of *carolina, annularis, metricus, f. fuscatus*). —Rau, 1941. Ent. Soc. Amer., Ann. 34: 580-584 (swarming of *annularis, f. fuscatus, metricus*). —Rau, 1946. Ent. Soc. Amer., Ann. 39: 11-27 (nest and cell size of *f. fuscatus, metricus*). —Rabb and Lawson, 1957. Econ. Ent., Jour. 50: 778-784, 2 figs. (predation on tobacco hornworm in N. C. by *e. exclamans, f. fuscatus*). —Rabb, 1960. Ent. Soc. Amer., Ann. 53: 111-121 (nest founding, life history, adult and larval food, prey, foraging, parasites in N. C. in *f. fuscatus, annularis, e. exclamans, metricus, d. dorsalis, carolina*). —West, 1967. Science 157: 1584-1585 (female dominancy hierarchies in *canadensis, fuscatus*). —Nelson, 1968. Ent. Soc. Amer., Ann. 61: 1528-1539, 3 figs. (parasites, symbionts). —Eberhard, 1969. Mich. Univ., Mus. Zool., Misc. Pub. 140: 1-101, 23 figs. (social biology of *f. fuscatus, canadensis erythrocephalus* Latr., *c. infuscatus* Lep.). —Kirkton, 1970. Tall Timbers Conf., Proc. 2: 243-245 (population management in Ark.). —Gillaspy, 1971. Ent. Soc. Amer., Ann. 64: 1357-1361, 4 figs. (population management in Tex., Calif.). —Gillaspy, 1973. Amer. Midland Nat. 90: 1-12, 5 figs. (behavior of *metricus, annularis, major, bellicosus, exclamans, apachus, carolina* in artificial nesting sites).

annularis (Linnaeus). Conn. to Fla., west to S. Dak. and central Tex. Ecology: Nests suspended from twigs and branches of shrubs and trees in exposed situations, and

occasionally in sheltered sites on buildings. Parasite: *Xenos pallidus* Brues; *Sarcophaga* sp.; *Apanteles carpatus* (Say); *Pachysomoides fulvus* (Cr.), *P. stupidus* (Cr.); *Elasmus polistis* Burks. Prey: *Halisidota tessellaris* (Sm.), *Hyphantria cunea* (Dru.); *Anisota virginiensis* (Dru.), *A. senatoria* (Sm.), *A. stigma* (F.), *Citheronia regalis* (F.); Geometridae spp.; Limacodidae sp.; *Hemerocampa leucostigma* (Sm.); *Datana* spp., *Heterocampa manteo* (Dbldy.), *H.* spp., *Nadata gibbosa* (Grt.), *Peridea angulosa* (A. and S.), *Schizura leptinoides* (Grt.), *S.* spp.; *Basilarchia* sp.; *Psilocorsis* sp.; *Acronicta afflicta* Grt., *A. retardata* (Wlkr.), *A.* spp. *Autographa* sp., *Catocala* sp., *Heliothis zea* (Boddie), *Hypsoropha hormos* Hbn., *Phosphila turbulente* (Hbn.); *Tropaea luna* (L.); *Ampeloeca myron* (Cram.), *Cressonia juglandis* (A. and S.), *Protoparce sexta* (Johan.); prey is usually obtained in wooded areas. Predator: *Dicymolomia pegasalis* (Wlkr.), *Chalcoela iphitalis* Wlkr.

Vespa annularis Linnaeus, 1763. Centuria Ins. Rar., p. 30.
Vespa cincta Drury, 1773. Illus. Nat. Hist., Index to pt. 1 published with pt. 2.

Biology: Fox, 1896. Ent. News 7: 57 (nest). —Brimley, 1908. Ent. News 19: 107 (male hibernation). —Rau and Rau, 1918. Wasp Studies Afield, pp. 283-290, fig. 52 (hibernation, colony founding). —Rau, 1930. Canad. Ent. 62: 81-83 (hibernation mortality). —Rau, 1930. Canad. Ent. 62: 119-120 (behavior on nest). —Rau, 1931. Brooklyn Ent. Soc., Bul. 26: 116-118, fig. 5 (nest). —Rau, 1940. Ent. Soc. Amer., Ann. 33: 617-620 (cooperative nest founding). —Rau, 1942. Ent. Soc. Amer., Ann. 35: 94-96 (temperature inducing hibernation). —Balduf, 1961. Ent. News 72: 259-260 (autumnal swarming). —Hermann and Dirks, 1974. Ga. Ent. Soc., Jour. 9: 1-8, 3 figs. (smearing on nest by sternal glands). —Hermann, Gerling and Dirks, 1974. Ga. Ent. Soc., Jour. 9: 203-204 (hibernation, spring mating). —Hermann and Dirks, 1975. Psyche 82: 97-108 (spring nesting behavior).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): 48-49, figs. 16 I-P (male genitalia). —Hunt and Hermann, 1971. Ga. Ent. Soc., Jour. 5: 210-216, 2 figs. (poison apparatus).

apachus Saussure. Western Kans. and Tex., to southern Colo., introduced into Calif.; Mexico (Nuevo Leon, San Luis Potosi, Coahuila, Sonora, Durango). Ecology: Nests suspended from branches, usually at tops of low trees. Parasite: *Pachysomoides fulvus* Cr.; *Sarcophaga* sp.; *Xenos peckii* Kby. Predator: *Chalcoela iphitalis* Wlkr. This is commonly called the Apache wasp in California where it is a pest in fig trees.
Polistes apachus Saussure, 1857. Soc. Ent. France, Ann. (3) 5: 314.
Polistes texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 246. ♂, ♀.

Biology: Rau, 1943. Ent. Soc. Amer., Ann. 36: 522, fig. 15 (nest). —Simmons, Fisher and Tyler, 1948. Ent. Soc. Amer., Ann. 41: 450-455, 1 pl. (nest, life history). —Snelling, 1952. Pan-Pacific Ent. 28: 177 (hibernation).

canadensis (Linnaeus). Southern Ariz. to Peru, Bolivia and Paraguay. Ecology: Nests in trees, culverts and under eaves of buildings.
Vespa canadensis Linnaeus, 1758. Syst. Nat., ed. 10, v. 1, p. 574.

Biology: Rau, 1943. Ent. Soc. Amer., Ann. 36: 524, fig. 11 (nest).

carnifex carnifex (Fabricius). South. Tex., Ariz. (Nogales); Mexico to Argentina. Ecology: Nests under eaves, in culverts and in shrubby trees. Other subspecies occur in South America.
Vespa carnifex Fabricius, 1775. Syst. Ent., p. 365. ♀.
Polistes onerata Lepeletier, 1836. Hist. Nat. Ins., Hym. 1: 524. ♂.
Polistes valida Say, 1837. Boston Jour. Nat. Hist. 1: 389. ♀, ♂.
Polistes transverso-strigata Spinola, 1851. Accad. Sci. Torino, Mem. (2) 13: 78. ♀.

Biology: Rau, 1943. Ent. Soc. Amer., Ann. 36: 521, figs. 3, 4 (nest). —Corn, 1973 (1972). Psyche 79: 150-157, 2 figs. (nest, behavior).

carolina (Linnaeus). Eastern U. S., Pa. to Fla., west to Kans. and central Tex. Ecology: Nests in very sheltered situations, such as in hollow trees or in sidings of houses. Parasite: *Xenos nigrescens* Brues, *X. rubiginosi* (Pierce); *Pachysomoides fulvus* (Cr.). Predator: *Dicymolomia pegasalis* (Wlkr.); *Chalcoela iphitalis* Wlkr. *P. carolina* (L.) has been

confused with *perplexus* Cr. in the past. Some of the parasite-predator records and biological references listed here may actually refer to the latter species.
Vespa carolina Linnaeus, 1767. Syst. Nat., Ed. 12, v. 1 (pt. 2), p. 948. ♂.
Polistes rubiginosa Lepeletier, 1836. Hist. Nat. Ins., Hym. v. 1, p. 524. ♂.

Biology: Girault, 1907. Canad. Ent. 39: 355-356 (as predator). —Rau and Rau, 1918. Wasp Studies Afield, pp. 280-283 (prey forage, hibernation). —Rau, 1929. Ent. News 40: 7-13 (behavior female, male at end of season). —Rau, 1931. Brooklyn Ent. Soc., Bul. 26: 115-116 (nest). —Rau, 1931. Psyche 38: 129-144, 6 figs. (nesting habits, pleometrosis). —Wilson, 1933. Fla. Entomologist 17: 12 (as predator). —O'Byrne, 1938. Ent. News 49: 288-289 (nest site).

comanchus comanchus Saussure. Southwestern Tex.; Mexico (Coahuila, Durango).
Polistes comanchus Saussure, 1857. Soc. Ent. France, Ann. (3) 5: 314.

comanchus navajoe Cresson. Western Tex. to Ariz.; Mexico (Sonora, Chihuahua, Durango, Sinaloa). Ecology: Nests in cavities having very small openings.
Polistes navajoe Cresson, 1868. Amer. Ent. Soc., Trans. 1: 383. ♀.

dorsalis californicus Bohart. Calif., Ariz.; Mexico (Baja California, Sonora, Sinaloa). Parasite: *Xenos peckii* Kby.
Polistes hunteri californicus Bohart, 1949. Pan-Pacific Ent. 25: 101. ♂, ♀.

dorsalis dorsalis (Fabricius). Va. to Fla., west to Colo., Okla., Tex., N. Mex. south to Honduras. Ecology: Nests in shrubbery and beneath eaves. Parasite: *Xenos peckii* Kby.
Vespa dorsalis Fabricius, 1775. Systema Ent., p. 367. ♀.
Polistes fuscatus hunteri Bequaert, 1940. N. Y. Ent. Soc., Jour. 48: 23. ♀, ♂.

Taxonomy: van der Vecht, 1970. K. Nederland. Akad. van Wetensch., Proc., Ser. C, 71: 23 (identity of Fabrician type).

Biology: Spieth, 1948. N. Y. Ent. Soc., Jour. 56: 155-169 (nest, life history). —Hermann, Gerling and Dirks, 1974. Ga. Ent. Soc., Jour. 9: 203-204 (hibernation).

exclamans arizonensis Snelling. Ariz., Calif.; Mexico (Sonora).
Polistes exlamans arizonensis Snelling, 1954. Kans. Ent. Soc., Jour. 27: 152. ♀, ♂.

Biology: Hopkins, 1955. Jour. Econ. Ent. 48: 161-163 —Fye, 1972. Envir. Ent. 1: 55-57 (colony manipulation).

exclamans bahamensis Bequaert and Salt. La. to Fla.; Bahamas.
Polistes bahamensis Bequaert and Salt, 1931. Ent. Soc. Amer., Ann. 34: 794. ♀, ♀, ♂.
Polistes exclamans louisianus Bequaert, 1940. N. Y. Ent. Soc., Jour. 48: 14. ♀.

exclamans exclamans Viereck. N. J. to Fla., west to Nebr., Colo., and Tex.; Mexico (Nuevo Leon, Coahuila). Ecology: Nests are usually in sheltered sites, frequently under eaves or roofs. Parasite: *Sarcophaga polistensis* Hall, *S.* sp.; *Pachysomoides stupidus* (Cr.), *P. fulvus* (Cr.); *Elasmus polistis* Burks; *Monodontomerus minor* (Ratz.). Prey: Arctiidae sp.; *Anisota senatoria* (Sm.); Hesperiidae sp.; *Heterocampa* sp.; *Alabama argillacea* (Hbn.), *Autographa* spp., *Feltia subterranea* (F.), *Heliothis zea* (Boddie), *Laphygma frugiperda* (Sm.), *Plathypena scabra* (F.), *Prodenia* prob. *ornithogalli* Guen.; *Colias philodice eurytheme* Bdv.; *Loxostege similalis* (Guen.); *Protoparce sexta* (Johan.); usually obtained from herbaceous vegetation in open fields. Predator: *Dicymolomia pegasalis* (Wlkr.), *Chalcoela iphitalis* Wlkr.
Polistes exclamans Viereck, 1906. Amer. Ent. Soc., Trans. 32: 201. ♀.

Taxonomy: Snelling, 1955. Amer. Mus. Novitates 1701: 5-6 (synonymy). —Eickwort, 1969. Evolution 23: 391-405 (variation between sexes and castes).

Biology: Rau, 1943. Ent. Soc. Amer., Ann. 36: 525-526, figs. 7-9 (nest). —Hodapp and Bickley, 1959. Ent. Soc. Wash., Proc. 61: 73 (autumnal swarming). —West, 1968. Psyche 75: 118-123 (distribution, nest founding). —Eickwort, 1969. Insectes Sociaux 16: 67-72 (caste separation female, worker). —Lin, 1972. Ent. Soc. Wash., Proc. 74: 148-155 (male territoriality). —Hermann, Gerling and Dirks, 1974. Ga. Ent. Soc., Jour. 9: 203-204 (hibernation). —Hermann and Dirks, 1974. Ga. Ent. Soc., Jour. 9: 1-8 (smearing on nest by sternal glands). —Hermann, Barron and Dalton, 1975. Ent. News 86: 173-178 (nest founding behavior in spring).

Morphology: Crouch and Smith, 1958. Tex. Jour. Sci. 10: 38-59, 20 figs. (sting and associated glands).

flavus Cresson. Southern Calif., Nev., Utah, Ariz., N. Mex., western Tex.; Mexico (Sonora, Chihuahua, Coahuila). Parasite: *Xenos peckii* Kby.
Polistes flavus Cresson, 1868. Amer. Ent. Soc., Trans. 1: 383. ♀.

fuscatus aurifer Saussure. B. C. to Mont., south to Calif. and Nev.; Mexico (Baja California). Ecology: Nests in sheltered situations. Adventive in Hawaii, Johnston, Niihau and Society Islands. Parasite: *Gordius* sp.; *Xenos peckii* Kby.
Polistes aurifer Saussure, 1853. Etudes sur la famille des Vespides, v. 2, p. 78. ♀.
Polistes anaheimensis Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 423. ♂, ♀.
Polistes fuscatus var. *utahensis* Hayward, 1933. Utah Acad. Sci., Proc. 10: 142. ♂, ♀.
Polistes fuscatus connectens Bequaert, 1940. N. Y. Ent. Soc., Jour. 48: 21. ♀, ♂.
Polistes fuscatus montanus Bequaert, 1940. N. Y. Ent. Soc., Jour. 48: 26. ♀, ♂.

Taxonomy: Snelling, 1954. Kans. Ent. Soc., Jour. 27: 154 (synonymy).

Biology: Duncan, 1928. Pan-Pacific Ent. 5: 90 (nest materials). —Bohart, 1942. Pan-Pacific Ent. 18: 30 (feeding, hibernation). —Snelling, 1952. Pan-Pacific Ent. 28: 177 (hibernation). —Snelling, 1954. Kans. Ent. Soc., Jour. 27: 154 (nest site).

fuscatus bellicosus Cresson. S. C. to Fla., west to Tex.
Polistes bellicosus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 247. ♂, ♀.

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 294-295 (drinking habits).

fuscatus centralis Hayward. Western Tex., Colo., N. Mex., Ariz., Utah, Calif.; Mexico (Baja California, Sonora, Chihuahua, Coahuila). Ecology: Nests in sheltered situations.
Polistes fuscatus var. *centralis* Hayward, 1933. Utah Acad. Sci., Proc. 10: 143. ♂, ♀.

fuscatus fuscatus (Fabricius). U. S. east of Rocky Mts. except in extreme southeast and Mich. where it is replaced by *f. bellicosus* Cr. and *f. laurentianus* Beq. respectively. Ecology: Nests in sheltered situations, frequently beneath eaves and roofs, or in cavities near ground. Parasite: *Xenos peckii* Kby.; *Pachysomoides fulvus* (Cr.); *Elasmus polistis* Burks; *Dasymutilla castor* (Bl.). Prey: *Estgimene acrea* (Dru.), *Hyphantria cunea* (Dru.); Geometridae spp.; Hesperiidae sp.; *Everes comyntes* (Godt.); *Dasylophia anguina* (A. and S.), *Heterocampa manteo* (Dbldy.); *Euptoieta* sp., pupa; *Acronicta* sp., *Autographa* spp., *Feltia subterranea* (F.), *Heliothis zea* (Boddie), *H. virescens* (F.), *Hypsoropha hormos* Hbn., *Laphygma frugiperda* (Sm.), *Peridroma margaritosa* (Haw.), *Plathypena scabra* (F.), *Prodenia* prob. *ornithogalli* Guen., *Schinia* sp.; *Colias philodice eurytheme* Bdv., *Phoebis* sp.; *Loxostege* sp.; *Protoparce sexta* (Johan.); Orthoptera spp.; usually obtained from herbaceous vegetation in open fields. Predator: *Dicymolomia pegasalis* (Wlkr.), *Chalcoela iphitalis* Wlkr.
Vespa fuscata Fabricius, 1793. Ent. System., v. 2, p. 260.
Vespa nestor Fabricius, 1798. Sup. Ent. System., p. 262.
Polistes pallipes Lepeletier, 1836. Hist. Nat. Ins. Hym., v. 1, p. 530. ♀.
Polistes exilis Saussure, 1853. Etudes sur la famille des Vespides, v. 2, p. 85.
Polistes variatus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 247. ♂, ♀.
Polistes pallidipes Dalla Torre, 1894. Cat. Hym., v. 9, p. 133. Emend.

Biology: Girault, 1911. Wis. Nat. Hist. Soc., Bul. 9: 49-63 (observations on female). —Davis, 1919. Brooklyn Ent. Soc., Bul. 14: 122-123 (nest). —Bequaert, 1923. Brooklyn Ent. Soc., Bul. 18: 73-80 (vestigial pleometrosis). —Davis, 1924. Staten Island Inst. Arts and Science 2: 137-138 (nest). —Bugbee, 1936. Ent. Soc. Amer., Ann. 29: 614-616 (nest). —Gaul, 1940. N. Y. Ent. Soc., Jour. 48: 391-393 (artificial brood rearing). —Beall, 1942. Canad. Field-Nat. 56: 64-67 (autumnal swarming). —Eberhard, 1969. Mich. Univ., Mus. Zool., Misc. Pub. 140: 1-101 (social biology). —Gibo, 1972. N. Y. Ent. Soc., Jour. 80: 105-108 (hibernation sites, temperature tolerance). —Hermann and Dirks, 1974. Ga. Ent. Soc., Jour. 9: 1-8 (smearing on nest by sternal glands). —Hermann, Gerling and Dirks, 1974. Ga. Ent. Soc., Jour. 9: 203-204 (hibernation). —Gibo, 1974. Canad. Ent. 106: 101-106 (colony founding in lab.). Rau published many notes on this taxon as *variatus;* they are cited under the generic heading.

Morphology: Marshall and Dernehl, 1905. Ztschr. f. Wiss. Biol. 80: 122-154, 2 pls. (embryology). —Marshall, 1907. Ztschr. f. Wiss. Biol. 86: 173-213, 3 pls. (embryology).

fuscatus laurentianus Bequaert. Que., Ont., Mich.
Polistes fuscatus laurentianus Bequaert, 1942. Canad. Ent. 74: 159. ♂, ♀.

instabilis Saussure. South. Tex.; Mexico to Costa Rica. Ecology: Nests in trees, in culverts, under bridges and overhanging rocks. Predator: *Chalcoela iphitalis* Wlkr.
Polistes instabilis Saussure, 1853. Etudes sur la famille des Vespides, v. 2, p. 91, pl. 10, fig. 2, pl. 11, fig. 1. ♀.

Biology: Rau, 1943. Ent. Soc. Amer., Ann. 36: 524-525, figs. 5, 6, 13 (nest).

kaibabensis Hayward. Ariz. (Grand Canyon), southern Utah.
Polistes canadensis var. *kaibabensis* Hayward, 1932. Utah Acad. Sci., Proc. 9: 89. ♂, ♀.

major castaneicolor Bequaert. Southern N. Mex. and Ariz.; Mexico (Baja California, Sonora, Chihuahua, Jalisco), Colombia.
Polistes major var. *castaneicolor* Bequaert, 1936. Ent. News 47: 12. ♀, ♂.

major major Beauvois. Southern Fla., Tex., N. Mex. and Ariz.; Mexico south to Brazil; Antilles. Ecology: Nests in shrubbery, in culverts and beneath eaves. Parasite: *Elasmus polistis* Burks. Predator: *Chalcoela iphitalis* Wlkr.
Polistes Major Beauvois, 1818. Ins. Afr., Amer., p. 206.
Polistes major bakeri Bequaert, 1940. N. Y. Ent. Soc., Jour. 48: 15. ♂, ♀.

Biology: Rau, 1943. Ent. Soc. Amer., Ann. 36: 522, fig. 12 (nest).

major palmarum Bequaert. Southern Calif.; Mexico (Baja California).
Polistes major var. *palmarum* Bequaert, 1936. Ent. News 47: 11. ♀.

metricus Say. Eastern U. S. from N. Y. to Fla., west to Nebr., Okla. and Tex. Ecology: Nests in shrubbery. Parasite: *Xenos peckii* Kby.; *Sarcophaga polistensis* Hall, *S.* sp.; *Sphecophaga vesparum burra* (Cr.); *Pachysomoides fulvus* (Cr.). Predator: *Dicymolomia pegasalis* (Wlkr.), *Chalcoela iphitalis* Wlkr.
Polistes metrica Say, 1831. Indiana: School Press, New Harmony, p. 15.

Taxonomy: Rau, 1929. Psyche 36: 34-36 (color variation).

Biology: Turner, 1912. Psyche 19: 184-190 (orphan nest, feeding, homing, hunting). —Pellett, 1916. Iowa Acad. Sci., Proc. 23: 275-284 (life history, behavior in lab.). —Rau and Rau, 1918. Wasp Studies Afield, pp. 244-280, 291-294 (homing experiments with female, worker; nest sites). —Rau, 1928. Psyche 35: 153-156 (trophallaxis). —Rau, 1929. Canad. Ent. 61: 25-30 (feeding experiments). —Rau, 1929. Ent. News 40: 226-232, 256-259 (orphan nests). —Rau, 1930. Canad. Ent. 62: 143-147, 2 figs. (life history, nest destruction). —Rau, 1931. Brooklyn Ent. Soc., Bul. 26: 111-113 (nest, nest site). —Rau, 1935. Ent. News 46: 25-27 (female duties). —Madden and Chamberlain, 1938. Jour. Econ. Ent. 31: 705 (as predator). —Hermann, Gerling and Dirks, 1974. Ga. Ent. Soc., Jour. 9: 203-204 (hibernation). In these papers Rau cited *metricus* as *pallipes*.

pacificus pacificus Fabricius. South. Tex. to South America. Other subspp. occur in Central and South America.
Polistes pacifica Fabricius, 1805. Systema Piezatorum, p. 274. ♀.

Taxonomy: Bequaert, 1937. Inst. Biol. Veget. Arch. 3: 196.

perplexus Cresson. Md. to Ga., west to southern Ill., Kans., Okla. and Tex. *P. perplexus* Cr. has been confused with *carolina* (L.) in the past. Some of the parasite-predator records and biological references listed under the latter species may actually refer to *perplexus*.
Polistes perplexus Cresson, 1870. Amer. Ent. Soc., Trans. 4: 245. ♂.
Polistes generosus Cresson, 1870. Amer. Ent. Soc., Trans. 4: 246. ♂.

Unplaced Taxon of Polistes Latreille

nigripennis (DeGeer). Pa.
Vespa nigripennis Degeer, 1773. Mem. Serv. Hist. des Ins., v. 3, p. 582, pl. 29, fig. 10.
Bequaert suggested that this was possibly the same as *rubiginosus* (= *carolina*).

Subfamily POLYBIINAE

Revision: Bequaert, 1933. Ent. Amer. (n. s.) 13: 87-150, 3 pls. (Nearctic taxa).

Genus MISCHOCYTTARUS Saussure

The nests are similar to those of *Polistes*, but average somewhat smaller. They consist of a single free comb of hexagonal paper cells and are attached by a short pedicel in North American forms to a natural or man-made support usually some distance from the ground. Each colony is generally started by a single fertile female or queen.

Revision: Richards, 1945. Roy. Ent. Soc., London, Trans. 95: 295-462, 4 pls., 119 figs. (New World spp.).

Biology: Jeanne, 1972. Mus. Comp. Zool., Bul. 144: 63-150, 46 figs., 4 pls. (biology, social behavior of *M. drewseni* Sauss.).

Genus MISCHOCYTTARUS Subgenus MISCHOCYTTARUS Saussure

Mischocythorus (!) Saussure, 1853. Etudes sur la famille des Vespides, v. 1, Introduct. p. VIII. Nom. nud.

Mischocyttarus Saussure, 1853. Etudes sur la famille des Vespides, v. 2, p. 19.
Type-species: *Zethus labiatus* Fabricius. Desig. by Ashmead, 1902.

The species occur in Mexico, Central America, and South America.

Genus MISCHOCYTTARUS Subgenus KAPPA Saussure

Kappa Saussure, 1854. Etudes sur la famille des Vespides, v. 2, p. 200.
Type-species: *Polybia injucunda* Saussure. Desig. by Bequaert, 1933.

cubensis cubensis (Saussure). Ga., Fla., Ala.; Bahamas, Cuba.
Polybia cubensis Saussure, 1854. Etudes sur la famille des Vespides, v. 2, p. 202. ♂, ♀.
Polybia phthisica Cresson, 1865. Ent. Soc. Phila., Proc. 4: 167. ♂, ♀.

cubensis mexicanus (Saussure). Tex. (Brownsville); Mexico, Central America.
Polybia mexicana Saussure, 1854. Etudes sur la famille des Vespides, v. 2, p. 203. ♀.

flavitarsis centralis Bequaert. Utah, Colo., Nebr., N. Mex., western Tex.
Mischocyttarus flavitarsis var. *centralis* Bequaert, 1933. Ent. Amer. (n. s.) 13: 129. ♀, ♂.

flavitarsis flavitarsis (Saussure). Calif., Oreg., Utah, Colo., Nebr., Ariz.
Polybia flavitarsis Saussure, 1854. Etudes sur la famille des Vespides, v. 2, p. 199. ♀.

Biology: Smith, 1944. Pan-Pacific Ent. 20: 80 (hibernation site). —Snelling, 1953. Kans. Ent. Soc., Jour. 26: 143-145 (hibernation, nest size and site).

flavitarsis idahoensis Bequaert. B. C., Wash., Oreg., Idaho, Mont., Nev., Utah, Colo.
Mischocyttarus flavitarsis var. *idahoensis* Bequaert, 1933. Ent. Amer. (n. s.) 13: 133. ♀, ♂.

flavitarsis kaibabensis Bequaert. Ariz. (Grand Canyon, Kayenta).
Mischocyttarus flavitarsis var. *kaibabensis* Bequaert, 1933. Ent. Amer. (n. s.) 13: 133. ♀.

flavitarsis navajo Bequaert. Ariz.; Mexico (Chihuahua).
Mischocyttarus flavitarsis var. *navajo* Bequaert, 1933. Ent. Amer. (n. s.) 13: 131. ♀, ♂.

Genus BRACHYGASTRA Perty

Brachygastra Perty, 1833. Delect. Anim. Articul. Brasil, p. 145.
Type-species: *Brachygastra analis* Perty Desig. by Bequaert, 1933 (=*Polistes lecheguana* Latreille).

Nectarina Swainson and Shuckard, 1840. On the history and natural arrangement of insects, p. 183. N. name for *Brachygastra*.

Melissaia Shuckard, 1841. *In* White, Ann. and Mag. Nat. Hist. 7: 320. N. name for *Nectarina*.

Caba Ihering, 1904. Rev. Mus. Paulista 6: 103. N. name for *Nectarina*.

The genus is essentially Neotropical but one species extends its range into southern United States. The perennial paper nests are attached to branches of low trees and are begun by small

swarms of fertile queens and workers. An average nest is subglobular, is enclosed in a single sheet of papery material, is about 1 foot in diameter, contains about 50,000 cells arranged in layers, has several entrances, and has spiral ramps connecting the tiers of cells. The adults collect and store honey but do not cap the cells.

Revision: Buysson, 1905. Soc. Ent. France, Ann. 74: 537-566, 6 pls. —Naumann, 1968. Kans. Univ. Sci. Bul. 47: 929-1003, 69 figs. (New World spp.).

mellifica (Say). Southern Tex. and Ariz. to Costa Rica and Panama (?).
Polistes mellifica Say, 1837. Boston Jour. Nat. Hist. 1 (pt. 4): 390. ♂, ♀.
Nectarina mellifera Dalla Torre, 1904. Gen. Ins., fasc. 19, p. 86. Emend.
Chartergus aztecus Cameron, 1906. Invertebrata Pacifica 1: 154. ♀. Preocc.
Chartergus arizonaensis Cameron, 1907. Invertebrata Pacifica 1: 181. ♀.
Chartergus centralis Cameron, 1907. Invertebrata Pacifica 1: 181. ♀.
Nectarina cameroni Meade-Waldo, 1911. Ann. and Mag. Nat. Hist. (8) 7: 112. N. name.

Biology: Barber, 1905. Ent. Soc. Wash., Proc. 7: 25 (nest). —Schwarz, 1929. Nat. Hist. 29: 421-426, 5 figs. (nest, honey production).

Genus POLYBIA Lepeletier

Polybia Lepeletier, 1836. Hist. Nat. Ins. Hym., v. 1, p. 533.
Type-species: *Polistes liliacea* Fabricius Desig. by Ashmead, 1902.
Myrapetra White, 1841. Ann. and Mag. Nat. Hist. 7: 320.
Type-species: *Myrapetra scutellaris* White. Monotypic.
Myraptera Curtis, 1844. Linn. Soc. London, Proc., p. 188. Emend.
Alpha Saussure, 1853. Etudes sur la famille des Vespides, v. 2, p. 167.
Type-species: *Polybia bifasciata* Saussure. Desig. by Bequaert, 1944.
Eupolybia Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, p. 76.
Type-species: *Polistes liliacea* Fabricius. Present desig. by Richards.

The species of *Polybia* build phragmocyttarous nests which consist of one to many combs attached to a branch, leaf or rock, surrounded by an envelope of carton or of mud containing an exit hole at the side or bottom of the comb. A number of species enlarge the nest by adding successive combs, each covered by the envelope, so that access to the upper combs is through the exit-holes of earlier stages of the nest. Some of the taxa store large quantities of honey, or sexual castes of ants or termites, some of which are fed to larvae and some of which maintain the adults during hibernation. Larvae may also be fed on partially masticated insects.

Taxonomy: Richards, 1951. *In* Richards and Richards, Royal Ent. Soc. London, Trans. 102: 129-150, figs. 11-16 (taxa allied to *occidentalis* (Oliv.) with key including the two taxa occurring in America north of Mexico).

diguetana Buysson. Ariz. (Nogales); Mexico, Central America, Peru. Ecology: Buysson noted that the nest was like that of typical *occidentalis* which consists of as many as 6 combs surrounded by a carton envelope.
Polybia occidentalis var. *diguetana* Buysson, 1905. Soc. Ent. France, Bul., p. 9. ♀, ♀, ♂.

occidentalis nigratella Buysson. Ariz. (Nogales); Mexico, Guatemala, Honduras. Typical *occidentalis* (Oliv.) occurs in South America.
Polybia occidentalis var. *nigratella* Buysson, 1905. Soc. Ent. France, Bul., p. 9. ♀, ♀.
Polybia occidentalis nausicaa Richards, 1951. *In* Richards and Richards, Royal Ent. Soc. London, Trans. 102: 140. ♀, ♂. N. syn. (O. W. Richards).

Subfamily VESPINAE

This is morphologically the most specialized subfamily of the social wasps. Component species are commonly called hornets (those nesting above ground in North America) and yellow jackets (those nesting usually subterraneously). The nests consist of several to many combs of hexagonal cells composed of paper; cells constructed early in the year may be used for several larvae in succession. The combs are usually enclosed in a paper envelope. The nests are annual, new queens and males being produced late in the summer or early in the fall; the newly fertilized queens overwinter and begin new nests in the spring. There are relatively few precise records

of the insects used to feed vespine larvae; apparently dismembered and masticated adult Diptera and honeybees are commonly used; the wasps may also obtain bits of flesh from fresh and decaying carcasses. Adult vespines feed on liquid foods, primarily nectar or honey; some species are known to prey upon adult honeybees, which they kill and extract nectar from the crop.

Revision: Bequaert, 1932. Ent. Amer. (n. s.) 12: 71-138, 6 figs. (N. Amer. taxa).

Taxonomy: McFarland, 1888. Amer. Ent. Soc., Trans. 15: 297 (key). —Bequaert, 1930. Brooklyn Ent. Soc., Bul. 25: 59-70 (generic and subgeneric classification). —Bequaert, 1935. Brooklyn Ent. Soc., Bul. 30: 119-124 (check list, correction, additions). —Duncan, 1939. Stanford Univ., Pubs., Univ. Ser. Biol. Sci. 8 (1): 85-97 (genera). —Bequaert, 1941. Brooklyn Ent. Soc., Bul. 36: 111-117 (corrections, additions).

Biology: Duncan, 1939. Stanford Univ., Pubs., Univ. Ser. Biol. Sci. 8 (1): 98-176 (composite summary for American spp.).

Genus VESPA Linnaeus

Vespa Linnaeus, 1758. Syst. Nat., ed. 10, v. 1, p. 343.
Type-species: *Vespa crabro* Linnaeus. Desig. by Lamarck, 1801.
Macrovespa Dalla Torre, 1904. *In* Wytsman, Gen. Ins., fasc. 19, p. 64.
Type-species: *Vespa crabro* Linnaeus. Desig. by Bequaert, 1930.

The giant hornets are conspicuous members of the wasp fauna in the Palaearctic and Oriental Regions; one taxon is adventive in North America. The species of *Vespa* are quite diverse in nesting habits; some construct aerial nests in trees, others nest in sheltered sites above ground, such as in hollow trees, and still others are subterranean. The nests, especially in exposed situations, are usually enclosed in a paper envelope.

crabro germana Christ. Ont., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., N. C., S. C., Ga., Ala., W. Va., Ohio, Ind., Ky., Tenn., Wis., N. Dak., S. Dak.; central and western Europe. Ecology: Nests in very sheltered sites above ground, frequently in hollow trees, attics, porches, sheds, and rarely in underground cavities; exposed nests have a complete paper envelope, but in quite sheltered sites the envelope may be only partial or completely lacking. Adventive from Europe in mid-1800's. The official common name is the giant hornet; in some rural areas of the mid-Atlantic states it is known as the hybrid bee. Typical *crabro* L. and other subspecies occur in the Palaearctic Region.
Vespa crabro germana Christ, 1791. Naturgesch. Insekt. Bienen, Wespen u. Ameisengeschl., p. 215.
Vespa crabro vulgata Birula, 1925. Arch. f. Naturgesch. 90, Abt. A, H. 12, p. 100. ♀, ☿, ♂.

Taxonomy: Bequaert, 1931. Konowia 10: 101-109 (color forms of *crabro* L. with key).

Biology: Beutenmuller, 1898. N. Y. Ent. Soc., Jour. 6: 199, pls. 9-10 (nest). —Felt, 1915. N. Y. State Mus., Bul. 180: 71-73, pl. 2 (nest). —Cory, 1931. Jour. Econ. Ent. 24: 50-52 (nest, injury to lilac, apples). —Ikan *et al.*, 1969. Jour. Insect Physiol. 15: 1703-1712 (queen pheromones). —Islay and Schaudinschky, 1973. Acoust. Soc. Amer., Jour. 53: 640-649 (acoustical communication).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Coll. 99 (14): 49-50, pl. 17, figs. I-Q, pl. 18, figs. A-D (male genitalia).

Genus VESPULA Thomson

These smaller social vespines are restricted to the Holarctic Region.

Revision: Miller, 1961. Canad. Ent., Sup. 22, v. 93: 1-52, 84 figs., 15 maps.

Taxonomy: Sladen, 1918. Ottawa Nat. 32: 71-72 (key to Canadian spp.). —Miller, 1958 (1956). Tenth Internatl. Cong. Ent., Proc. 1: 257-264 (nomenclature and distribution). —Fluno, 1973. Ent. Soc. Wash., Proc. 75: 80-83, 1 fig. (differentiation of subgenera by attraction to chemical).

Biology: Taylor, 1939. Ent. Soc. Amer., Ann. 32: 304-315 (origin and evolution of social parasitism). —Gaul, 1941. Psyche 48: 16-19 (artificial housing of colonies). —Gaul, 1942.

Brooklyn Ent. Soc., Bul. 37: 57-61 (brood rearing). —Morse and Gary, 1961. Bee World 42: 179-181 (predation on honeybees). —Akre, Hill and MacDonald, 1973. Jour.Econ. Ent. 66: 803-805, 4 figs. (artificial housing of colonies).

Genus VESPULA Subgenus VESPULA Thomson

Vespula Thomson, 1869. Opusc. Ent., v. 1, p. 79.
Type-species: *Vespa austriaca* Panzer. Desig. by Ashmead, 1902.
Pseudovespa Schmiedeknecht, 1881. Ent. Nachr. 7: 314.
Type-species: *Vespa austriaca* Panzer. Monotypic.
Paravespula Bluethgen, 1938. Konowia 16: 271.
Type-species: *Vespa vulgaris* Linnaeus. Orig. desig.
Allovespula Bluethgen, 1943. Stettin. Ent. Ztg. 104: 149.
Type-species: *Vespa rufa* Linnaeus. Orig. desig.

Nests are usually underground or close to it in hollow logs or stumps. Combs, except for a small conical area around the main suspensorium, are usually essentially plane. Members of this subgenus are commonly called yellow jackets.

acadica (Sladen). Transcontinental in Canadian Zone from Newfoundland to Yukon Terr. and Alaska, Maine to Minn., west of 100th meridian south to N. Mex. and Calif. Ecology: Location of nests variable, sometimes aerial, subterranean or in rotten logs.
Vespa rufa var. *americana* Buysson, 1905. Soc. Ent. France, Ann. 63: 499. ♂. Preocc.
Vespa acadica Sladen, 1918. Ottawa Nat. 32: 72. ♂, ♀, ☿.
Vespula rufa sladeni Bequaert, 1931. Ent. Amer. (n. s.) 12: 102. ♂, ♀, ☿.

Biology: Sladen, 1918. Ottawa Nat. 32: 72 (nest site). —MacDonald, Akre and Hill, 1975. Kans. Ent. Soc., Jour. 48: 114-121 (nest location and structure).

atropilosa (Sladen). Canada and U. S. west of 100th meridian mostly in Canadian and Transition Zones; Mexico (Baja California). Ecology: Most nests are subterranean and usually in rodent burrows. Parasite: *Sphecophaga vesparum burra* (Cr.); *Triphleba lugubris* (Meig.).
Vespa atropilosa Sladen, 1918. Ottawa Nat. 22: 72. ♀, ☿.

Biology: MacDonald, Akre and Hill, 1974. Melanderia 18: 1-93, 13 figs. (comparative biology and behavior). —MacDonald, Akre and Hill, 1975. Kans. Ent. Soc., Jour. 48: 53-63 (nest associates). —MacDonald, Akre and Hill, 1975. Kans. Ent. Soc., Jour. 48: 114-121, 2 figs. (nest location and structure).

austriaca (Panzer). Que., Ont., Man., Sask., Alta., B. C., N. W. T., Alaska, Maine, N. Y., N. J., Colo., N. Mex., Utah, Calif., Oreg., Wash., Idaho; Holarctic. Host: Inquiline in nests of *rufa* (L.) in Europe; North American host(s) unknown. The worker caste is absent.
Vespa austriaca Panzer, 1799. Faunae Ins. German., h. 63, pl. 2. ♂.
Vespa borealis Smith, 1843. Zoologist 1: 170. ♀. Preocc.
Vespa arborea Smith, 1849. Zoologist 7, App., p. lx. N. name.
Vespa infernalis Saussure, 1853. Études sur la famille des Vespides, v. 2, p. 139. ♀.
Vespa tripunctata Packard, 1870. Chicago Acad. Sci., Trans. 2: 26. ♀.

consobrina (Saussure). Transcontinental in Canada and northern U. S. in Canadian and Transition Zones, W. Va., N. C., Ga., Colo., N. Mex., Ariz., Calif. Ecology: Nests are usually subterranean, but occasionally are in shrubs just above the ground surface.
Vespa consobrina Saussure, 1864. Etudes sur la famille des Vespides, v. 2, p. 141. ☿.
Vespa scelesta McFarland, 1888. Amer. Ent. Soc., Trans. 15: 298. ♂, ♀, ☿.
Vespa sulcata Howard, 1901. Insect Book, pl. 6, fig. 18. ☿.

Biology: Dow, 1930. Boston Soc. Nat. Hist., Bul. 56: 12, 1 fig. (nest).

germanica (Fabricius). N. Y., N. J., Pa., Del., Md.; Europe. Ecology: Nests in sheltered situations, frequently in structures. Adventive from Europe, apparently in mid-20th century. References to taxonomy, biology and morphology of the Palaearctic population will be found in Guiglia, 1973 (1972), Les Guepes Sociales d'Europe Occidentale et Septentrionale, vol. 6 of Faune de l'Europe et du Bassin Mediterraneen.
Vespa Germanica Fabricius, 1793. Ent. System., v. 2, p. 256.

Taxonomy: Menke and Snelling, 1975. U. S. Dept. Agr., Coop. Ins. Rpt. 25: 193-200, 33 figs. (characters to distinguish from native North American spp.).

intermedia (Buysson). Newfoundland, Que., Man., Sask., Alta., N. W. T., Yukon Terr., Alaska in Hudsonian Zone.

Vespa rufa var. *intermedia* Buysson, 1905. Soc. Ent. France, Ann. 73: 591. ♂, ♀.

maculifrons (Buysson). Southern Canada and U. S. east of 100th meridian in Transition and Austral Zones. Ecology: Nests are usually subterranean, occasionally in decayed stumps or logs; nest usually contains 4-8 combs, rarely only a single comb. It may live as an inquiline in nests of *vulgaris* (L.) and interbreed with it. Parasite: *Vespula squamosa* (Dru.). *V. maculifrons* was frequently misidentified as *germanica* in publications prior to 1931.

Vespa maculifrons Buysson, 1905. Soc. Ent. France, Ann. 63: 608.

Vespa communis var. *flavida* Sladen, 1918. Ottawa Nat. 32: 71. ♀.

Biology: Couper, 1870. Canad. Ent. 2: 49-53 (nest). —Marlatt, 1891. Ent. Soc. Wash., Proc. 2: 80-83 (nest). —Rau and Rau, 1918. Wasp Studies Afield, pp. 295-297, fig. 53 (foraging, nest). —Beamer, 1925. Ent. News 36: 309-310 (hibernation female). —Rau, 1930. Ent. News 41: 185-190, pl. 19 (life history, nest). —Rau, 1931. Brooklyn Ent. Soc., Bul. 26: 85-89, pl. 4 (nest, colonization). —Bromley, 1931. N. Y. Ent. Soc., Jour. 39: 129 (foraging, predation). —Gaul, 1948. Brooklyn Ent. Soc., Bul. 43: 37-41 (interspecific tolerance). —Haviland, 1962. Ent. Soc. Wash., Proc. 64: 181-183 (colony size). —Kurczewski, 1968. N. Y. Ent. Soc., Jour. 76: 84-86 (predation). —Balduf, 1968. Ent. Soc. Wash., Proc. 70: 336-338, 1 fig. (inquilinism and interbreeding with *vulgaris*). —Simon and Benton, 1968. Ent. Soc. Amer., Ann. 61: 542 (winter activity in aerial nest). —Green, Heckman, Benton and Coon, 1970. Ent. Soc. Amer., Ann. 63: 1197-1198, 2 figs. (exposed aerial nest). —MacDonald and Matthews, 1975. Science 190: 1003-1004, 1 fig. (parasite).

pensylvanica (Saussure). Canada and western U. S. west of 100th meridian in Canadian and Transition Zones; Mexico (Michoacan, Mexico). Ecology: Nests are subterranean. Parasite: *Bareogonalos canadensis* (Harr.); *Sphecophaga vesparum burra* (Cr.); *Triphleba lugubris* (Meig.).

Vespa pensylvanica Saussure, 1857. Stettin. Ent. Ztg. 18: 117. ♀.

Vespa occidentalis Cresson, 1874. Amer. Ent. Soc., Trans. 5: 100. ♀, ☿. Preocc.

Biology: Snow, 1882. Psyche 3: 339 (predation). —Metzmain, 1903. Entomologist 36: 137 (female hibernation). —Duncan, 1939. Stanford Univ., Pubs., Univ. Ser. Biol. Sci. 8 (1): 98-173 (nest, life history). —Smith, 1956. Ent. News 67: 141-146, 1 pl. (nest). —Chapman, 1963. Ecology 44: 766-767 (predation). —MacDonald, Akre and Hill, 1974. Melanderia 18: 1-93, 13 figs. (comparative biology and behavior).

Morphology: Duncan, 1939. Stanford Univ., Pubs., Univ. Ser. Biol. Sci. 8 (1): 13-84, pls. I-XXVII (female, male).

squamosa (Drury). Ont., N. Y. to Wis. and Iowa, south to Fla. and Tex., most common in Austral Zones; Mexico, Guatemala. Host: *Vespula maculifrons* (Buyss.), *V. vidua* (Sauss.); the *squamosa* queen is a temporary, apparently facultative social parasite.

Vespa squamosa Drury, 1773. Illus. Nat. Hist., Index to pt. 1 published with pt. 2.

Vespa lineata Fabricius, 1775. Systema Ent., p. 365.

Vespa conchacea Christ, 1791. Naturgesch. Insekt. Bienen, Wespen u. Ameisengeschl., p. 259.

Vespa cuneata Fabricius, 1804. Systema Piezatorum, p. 258.

Vespa cruciata Lepeletier, 1836. Hist. Nat. Ins. Hym., v. 1, p. 513. Emend. of *cuneata*.

Vespa bistriata MacFarland, 1888. Amer. Ent. Soc., Trans. 15: 298. ♀. Preocc.

Vespa macfarlandi Lewis, 1897. Amer. Ent. Soc., Trans. 24: 172. ♀. N. name.

Vespula squamosa var. (or subsp.) *michoacana* Bequaert, 1941. Ent. News 52: 249. ☿.

Taxonomy: Turner, 1908. Psyche 15: 1-3, 1 pl. (coloration worker, male).

Biology: Taylor, 1939. Ent. Soc. Amer., Ann. 32: 310-313 (temporary parasitism by female in nest of *vidua*). —Gaul, 1947. Brooklyn Ent. Soc., Bul. 42: 87-96 (behavior, nest). —Gaul, 1948. Brooklyn Ent. Soc., Bul. 43: 37-41 (interspecific tolerance). —Tissot and Robinson, 1954. Fla. Ent. 37: 73-92 (aerial and subterranean nests). —MacDonald and Matthews, 1975. Science 190: 1003-1004, 1 fig. (host, nest).

sulphurea (Saussure). Oreg., Calif., Nev., Ariz.; Mexico (Baja California). Ecology: Nests are subterranean.
Vespa sulphurea Saussure, 1854. Etudes sur la famille des Vespides 2: 137. ♀.

Biology: Bequaert, 1931. Ent. Amer. (n. s.) 12: 112 (nest).

vidua (Saussure). N. S., N. B., Ont., in northeastern U. S. from Maine to N. Dak., south to Va. and Iowa, south in Appalachian Mts. to N. C., Ga., mostly in Transition and U. Austral Zones. Ecology: Nests are subterranean. Parasite: *Sphecophaga vesparum burra* (Cr.); *Vespula squamosa* (Dru.), the queen of which is a temporary social parasite.
Vespa vidua Saussure, 1854. Etudes sur la famille des Vespides, v. 2, p. 136.

Biology: Taylor, 1939. Ent. Soc. Amer., Ann. 32: 310-313 (nest, parasitism by *squamosa*).

vulgaris (Linnaeus). Alaska, Canada, U. S. south to Calif., Ariz., N. Mex., S. Dak., Iowa, Ind., Ill., Ohio, N. C., mostly in Canadian and Transition Zones; Mexico (Michoacan, Mexico); widely distributed in Palaearctic Region; Ecology: Nests are usually subterranean or in stumps with paper envelope present or absent; aerial nests are close to ground and always with envelope. adventive in New Zealand. Parasite: *Sphecophaga vesparum burra* (Cr.). May interbreed with *maculifrons* (Buyss.).
Vespa vulgaris Linnaeus, 1758. Syst. Nat., ed. 10, v. 1, p. 572. ♀.
Vespa communis Saussure, 1857. Stettin. Ent. Ztg. 18: 117. ♀.
Vespa alascensis Packard, 1870. Chicago Acad. Sci., Trans. 2: 27. ♀.
Vespa westwoodii Shipp, 1893. Psyche 6: 450.

Biology: Bequaert, 1931. Ent. Amer. (n. s.) 12: 92-93 (nest). —Balduf, 1968. Ent. Soc. Wash., Proc. 70: 332-336, 1 fig. (nest, life history).

Genus VESPULA Subgenus DOLICHOVESPULA Rohwer

Dolichovespula Rohwer, 1916. Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 642.
Type-species: *Vespa maculata* Linnaeus. Orig. desig.
Pseudovespula Bischoff, 1931. Gesell. Naturf. Freunde Sitzber. (1930), p. 346.
Type-species: *Vespa norwegica* var. *adulterina* Buysson. Orig. desig.
Boreovespula Bluethgen, 1943. Stettin. Ent. Ztg. 104: 149.
Type-species: *Vespa norwegica* Fabricius. Orig. desig.
Metavespula Bluethgen, 1943. Stettin. Ent. Ztg. 104: 149.
Type-species: *Vespa silvestris* Scopoli. Orig. desig.

Nests are usually aerial, suspended at some height or in bushes near the ground. Combs are usually turned up at the margins so as to be concave above.

albida (Sladen). Labrador, Newfoundland, Que., Maine, Man., Alta., B. C., N. W. T., Yukon Terr., Alaska, chiefly in Hudsonian Zone. Ecology: Nests are small and subterranean.
Vespa marginata Kirby, 1837. Fauna Bor.-Amer., v. 4, p. 265. ♀. Preocc.
Vespa albida Sladen, 1918. Ottawa Nat. 32: 71. ♂, ♀.

Biology: Sladen, 1919. Rpt. Canad. Arctic Exped. 1913-18, v. 3, p. 26g (nest).

arctica Rohwer. Newfoundland to Yukon Terr., Alaska, in lower U. S. chiefly in Canadian Zone. Host: *Vespula arenaria* (F.). The worker caste is absent.
Vespa borealis Lewis, 1897. Amer. Ent. Soc., Trans. 24: 171. ♂, ♀. Preocc.
Vespula arctica Rohwer, 1916. Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 642. N. name.

Biology: Wheeler and Taylor, 1921. Psyche 28: 135-144, 3 figs. (permanent social parasitism of *arctica* in nests of *arenaria*). —Wheeler, 1939. Ent. Soc. Amer., Ann. 32: 305-310 (social parasitism in *arenaria* nests).

arenaria (Fabricius). In Canada from Newfoundland to Yukon Terr., Alaska, in lower U. S. transcontinental chiefly in Canadian and Transition ones. Ecology: Nests are usually aerial but placed close to ground in shrubbery, occasionally under eaves or roofs, rarely the nests may be attached to tree roots and only partly exposed. Parasite: *Sphecophaga vesparum burra* (Cr.); *Vespula arctica* Roh.
Vespa arenaria Fabricius, 1775. Systema Ent., p. 365.
Vespa borealis Kirby, 1837. Fauna Bor.-Amer., v. 4, p. 264. Preocc.

Vespa diabolica Saussure, 1854. Etudes sur la famille des Vespides, v. 2, p. 138. ♀, ♀.
Vespa fernaldi Lewis, 1897. Amer. Ent. Soc., Trans. 24: 171. ♀, ♀.

Biology: Wheeler and Taylor, 1921. Psyche 28: 135-144, 3 figs. (nest, parasite). —Hungerford, 1930. Ent. News 41: 329-330, 1 pl. (nest). —Taylor, 1939. Ent. Soc. Amer., Ann. 32: 305-310 (nest, parasite). —Gaul, 1941. N. Y. Ent. Soc., Jour. 49: 367-369 (taste sensitivity of adults, larvae). —Gaul, 1941. Psyche 48: 16-19 (colony housing, interspecific tolerance). —Gaul, 1942. Brooklyn Ent. Soc., Bul. 37: 57-61 (brood rearing, mating). —Gaul, 1948. Brooklyn Ent. Soc., Bul. 43: 73-79 (distribution of labor). —Sailer, 1950. Kans. Ent. Soc., Jour. 23: 134-137, 3 figs. (nest temperature). —Gaul, 1952. N. Y. Ent. Soc., Jour. 60: 17-20 (flight in stormy weather). —Gaul, 1952. Brooklyn Ent. Soc., Bul. 47: 79-92 (temperature regulation in nest). —Gibo, 1972. N. Y. Ent. Soc., Jour. 80: 105-108 (hibernation sites, temperature tolerance). —Gibo, Yarascavitch and Dew, 1974. Canad. Ent. 106: 503-507, 1 fig. (colony thermoregulation). —Gibo, Dew and Hajduk, 1974. Canad. Ent. 106: 873-879, 2 figs. (relation of colony biomass to calorie production).

maculata (Linnaeus). In Canada from Nova Scotia to Yukon Terr., Alaska, in lower U. S. from Maine to Fla., west to 100th meridian in Canadian, Transition, U. and L. Austral Zones, west of 100th meridian chiefly in Canadian, Transition and U. Sonoran Zones. Ecology: Nests are always aerial and are usually suspended from limbs or beneath eaves and roofs. Parasite: *Sphecophaga vesparum burra* (Cr.). The official common name is the bald-faced hornet; sometimes it is also called the white-faced hornet.
Vespa maculata Linnaeus, 1763. Centuria Ins. Rar., p. 30.
Vespa maculata americana Christ, 1791. Naturgesch. Insekt. Bienen, Wespen u. Ameisengeschl., p. 239.

Biology: Couper, 1870. Canad. Ent. 2: 49-53 (nest). —Fyles, 1903. 33rd Ann. Rpt., Ent. Soc. Ontario, pp. 69-70, figs. 47-48 (nest). —Howard, 1915. Ent. Soc. Wash., Proc. 17: 148 (nest color). —Rau and Rau, 1918. Wasp Studies Afield, pp. 297-298 (predation). —Davis, 1919. Brooklyn Ent. Soc., Bul. 14: 119-123, 1 pl. (nest). —parker, 1928. Ent. Soc. Wash., Proc. 30: 14 (succession of brood in one cell). —Rau, 1929. Ent. Soc. Amer., Ann. 22: 659-675, 10 figs. (nesting habits). —Bromley, 1931. N. Y. Ent. Soc., Jour. 39: 126-128 (predation). —Betz, 1932. Quart. Rev. Biol. 8: 197-209, 4 figs. (colony size). —Rau, 1934. Brooklyn Ent. Soc., Bul. 19: 170 (hibernating female). —Rau, 1934. Brooklyn Ent. Soc., Bul. 19: 171 (predation). —Balduf, 1936. Canad. Ent. 68: 138-139 (colony size). —Gaul, 1941. Psyche 48: 16-19 (colony housing, interspecific tolerance). —Gaul, 1952. N. Y. Ent. Soc., Jour. 60: 21-24 (metabolic cycles and flight). —Balduf, 1954. Ent. Soc. Amer., Ann. 47: 445-458, 3 pls. (nest structure and growth, foraging, life history, population size). —Gibo, 1972. N. Y. Ent. Soc., Jour. 80: 105-108 (hibernation sites, temperature tolerance). —Howell, 1973. Ent. News 84: 141-142 (predation on *Vespula maculifrons* (Buyss.)). —Gibo, Yarascavitch and Dew, 1974. Canad. Ent. 106: 503-507, 1 fig. (colony thermoregulation). —Gibo, Dew and Hajduk, 1974. Canad. Ent. 106: 873-879, 2 figs. (relation of colony biomass to calorie production).

Morphology: Bequaert, 1932. Ent. Amer. (n. s.) 12: 73-75, fig. 1 (male genitalia). —Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): 49, pl. 17, figs. A-H (male genitalia). —Hermann and Krispyn, 1975. Ga. Ent. Soc., Jour. 10: 307-313, 8 figs. (venom apparatus).

norvegicoides (Sladen). In Canada from Newfoundland to Yukon Terr., Alaska, in lower U. S. transcontinental chiefly in Canadian Zone. Ecology: Nests in low shrubbery.
Vespa norvegicoides Sladen, 1918. Ottawa Nat. 32: 71. ♂, ♀.

Biology: Bequaert, 1932. Ent. Amer. (n. s.) 12: 119 (nest).

Superfamily POMPILOIDEA

By Karl V. Krombein

This superfamily includes two families, the very large and abundant Pompilidae and the very small and rare Rhopalosomatidae.

Members of the Pompilidae are commonly called spider wasps because they prey exclusively on spiders. Only a single larger spider is stored per cell, rather than a number of smaller spiders as in the spider-preying sphecoid genera such as *Trypoxylon*, *Trypargilum* and *Sceliphron*. The majority of species, including the more primitive forms, capture the spider before preparing a burrow in the soil. Some Pepsinae make multicellular nests in pre-existing cavities in twigs or in the ground, and some build individual mud cells which may be joined in a series; in both types the cell is constructed before the spider is captured. Some genera, such as *Pepsis*, may use the burrow of the prey spider as a nesting site. The peculiar genus *Minagenia* is a spider ectoparasite.

The Rhopalosomatidae are ectoparasites of nymphal crickets.

Family POMPILIDAE

The entire pompilid fauna of America north of Mexico has been adequately monographed in recent years by Bradley, Evans, Hurd and Townes. References will be found under the headings Pepsinae, *Pepsis*, Aporini, Pompilinae, Pompilini, and Ceropalinae.

Taxonomy: Ashmead, 1900-1902. Canad. Ent. 32: 145-155, 185-188, 295-296; 34: 79-88, 131-137 (keys to world genera). —Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 219-237 (eastern species). —Banks, 1919. Mus. Compar. Zool., Bul. 63: 229-248 (western species). —Brimley, 1936. Elisha Mitchell Sci. Soc., Jour. 52: 107-131 (N. C. species). —Pate, 1946. Amer. Ent. Soc., Trans. 72: 65-137 (generic names and type-species). —Dreisbach, 1948 (1946). Mich. Acad. Sci., Arts, and Letters, Papers 32: 239-247 (key to Mich. genera). —Dreisbach, 1949. Mich. Acad. Sci., Arts, and Letters, Papers 33: 63-71 (American genera). —Evans, 1959. Ent. Soc. Amer., Ann. 52: 430-444, 51 figs. (larva). Except for Evans' paper on larvae, the foregoing references are obsolete for identification purposes; they are superseded by the revisionary papers cited under several of the following subfamily, tribal and generic headings.

Biology: Evans, 1953. Syst. Zool. 2: 155-172 (comparative ethology). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 65-119 (ecology, nesting behavior and prey of northeastern spp.). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 24-33 (prey selection factors).

Subfamily PEPSINAE

Revision: Townes, 1957. U. S. Natl. Mus., Bul. 209: 1-220, 129 figs.

Tribe PEPSINI

Taxonomy: Dreisbach, 1952. N. Y. Ent. Soc., Jour. 60: 119-125 (key to New World genera).

Genus CHIRODAMUS Haliday

Chirodamus Haliday, 1837. Linn. Soc. London, Trans. (3) 17: 326.
Type-species: *Chirodamus kingii* Haliday. Monotypic.
Calopompilus Ashmead, 1900. Canad. Ent. 32: 188.
Type-species: *Pompilus maculipennis* Smith. Orig. desig.
Dinocnemis Banks, 1925. Mus. Compar. Zool., Bul. 67: 336.
Type-species: *Pompilus fortis* Cresson. Desig. by Bradley, 1944.
Onochares Banks, 1933. Psyche 40: 9.
Type-species: *Onochares brazoria* Banks (=*Priocnemis Heiligbrodtii* Cresson).
Trichocurgus Haupt, 1937. Ztschr. f. Naturw. 91: 127, 134.
Type-species: *Pompilus monachus* Smith. Orig. desig.
Chrysocurgus Haupt, 1937. Ztschr. f. Naturw. 91: 127, 134.
Type-species: *Sphex nitida* Fabricius. Orig. desig.
Derochilus Banks, 1941. Canad. Ent. 73: 119, 120.
Type-species: *Pompilus validus* Cresson. Orig. desig.
Reedimia Banks, 1946. Mus. Compar. Zool., Bul. 96: 482.
Type-species: *Agenia hirsutula* Spinola. Orig. desig.
Anacyphonyx Banks, 1946. Mus. Compar. Zool., Bul. 96: 520.
Type-species: *Anacyphonyx fidelis* Banks. Orig. desig.

albopilosus (Cresson). N. Y. to Ga., W. Va. in Transition Zone. Ecology: Occurs in rich moist woods from early to late summer.
Pompilus (Agenia) albopilosus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 125. ♂.
Priocnemis fortella Banks, 1915. Canad. Ent. 47: 401. ♀.
Pseudagenia najacra Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 203. ♂.

Taxonomy: Bradley, 1944. Canad. Ent. 76: 132 (synonymy of *fortella*, male description).

deceptus (Banks). Tex.
Priocnemis decepta Banks, 1926. Canad. Ent. 58: 201. ♀.

feroculis (Banks). Va., Tex.
Pseudagenia feroculis Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 232. ♂.

fortis (Cresson). N. Y. to S. C. in Transition Zone. Ecology: Occurs in woods.
Pompilus (Priocnemis) fortis Cresson, 1867. Amer. Ent. Soc., Trans. 1: 113. ♀.
Pompilus (Agenia) nigropilosus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 124. ♂.
Pseudagenia mariva Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 202. ♂.

Taxonomy: Bradley, 1944. Canad. Ent. 76: 131-132 (male description).

heiligbrodtii (Cresson). Tex.
Priocnemis Heiligbrodtii Cresson, 1872. Amer. Ent. Soc., Trans. 4: 204. ♀.
Agenia Belfragei Cresson, 1872. Amer. Ent. Soc., Trans. 4: 205. ♂.
Onochares brazoria Banks, 1933. Psyche 40: 9. ♀.

maculipennis (Smith). Kans., Mo., Ark., Tex., Miss., Ala., Ga., N. C.
Pompilus maculipennis Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 157. ♀.

pyrrhomelas (Walker). B. C., Wash., Oreg., Calif., Idaho, Nev., Utah, Ariz., N. Mex., commonest in Canad. Zone; Mexico. Prey: *Antrodiaetus pacificus* Simon.
Pompilus pyrrhomelas Walker, 1866. *In* Lord, Naturalist in Vancouver Isl. and B. C., v. 2, p. 341. ♀.
Cryptocheilus rugosus Banks, 1917. Mus. Compar. Zool., Bul. 61: 101. ♀.
Cryptocheilus inaequalis Banks, 1917. Mus. Compar. Zool., Bul. 61: 102. ♂.

Taxonomy: Bradley, 1944. Canad. Ent. 76: 132 (male description).

Biology: Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 170 (prey).

validus (Cresson). N. C., S. C., Ga., Fla., Ala., in Lower Austral zone.
Pompilus (Priocnemis) validus Cresson, 1867, Amer. Ent. Soc., Trans. 1: 116. ♀.

Genus PEPSIS Fabricius

The species, commonly called tarantula hawks, are most frequently encountered at the flowers of various woody and suffrutescent plants of which the milkweed genus *Asclepias* appears to be the preferred floral host. So far as is known, all the species are predaceous on spiders of the family Theraphosidae (= Avicularliidae), most commonly on species of *Bothriocyrtum*, *Aphonopelma* and *Mygale*. The wasps may prepare a burrow before hunting for prey, or they may utilize the burrow of the tarantula itself as a nesting site.

Pepsis occurs only in the New World, and the majority of species are Neotropical.

Revision: Lucas, 1895 (1894). Berlin. Ent. Ztschr. 39: 449-839, pls. XXII-XXXIII (New World spp.). —Fox, 1898. Ent. Soc. Wash., Proc. 4: 140-148 (U. S. spp.). —Hurd, 1952. Amer. Mus. Nat. Hist., Bul. 98: 257-334, 49 figs., 2 tables (Nearctic spp., list of spp. in genus).

Taxonomy: Banks, 1921. Ent. Soc. Amer., Ann. 14: 22-23 (key to U. S. spp.).

Biology: Williams, 1956. Ent. Soc. Amer., Ann. 49: 447-466, 24 figs. (life history, prey, nesting behavior).

Morphology: Snodgrass, 1910. U. S. Natl. Mus., Proc. 39: figs. 61, 69 (lateral view of thorax and base of abdomen, base of forewing).

Genus PEPSIS Subgenus PEPSIS Fabricius

Pepsis Fabricius, 1804. Systema Piezatorum, pp. 207-208.
Type-species: *Sphex stellata* Fabricius. Desig. by Latreille, 1810.

chrysothemis chrysothemis Lucas. Tex. to Okla. w. into Calif.; Mexico (Sonora, Baja California). Prey: *Aphonopelma* sp.
Pepsis chrysothemis Lucas, 1894. Berlin. Ent. Ztschr. 39: 731, 739. ♂.
Pepsis cinnabarina Lucas, 1894. Berlin. Ent. Ztschr. 39: 782, 804. ♀.
Pepsis circularis Fox, 1898. Ent. Soc. Wash., Proc. 4: 142, 144. ♂.

Taxonomy: Hurd, 1952. Amer. Mus. Nat. Hist., Bul. 98: 312 (identity of *circularis*).

Biology: Williams, 1956. Ent. Soc. Amer., Ann. 49: 456 (prey, life history).

chrysothemis lucasii Fox. Tex.; Mexico (Tamaulipas).
Pepsis Lucasii Fox, 1898. Ent. Soc. Wash., Proc. 4: 141, 145. ♀.

mexicana Lucas. Tex. w. into south. Calif., s. to Colombia. Prey: *Aphonopelma* sp.
Pepsis mexicana Lucas, 1894. Berlin. Ent. Ztschr. 39: 560, 561, 566. ♂, ♀.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 431-432, fig. 41 (larva).

Biology: Williams, 1956. Ent. Soc. Amer., Ann. 49: 456, 458 (prey, life history).

pallidolimbata pallidolimbata Lucas. Tex. to Kans. w. into south. Calif.; Mexico (Coahuila, Chihuahua, Baja California).
Pepsis pallidolimbata Lucas, 1894. Berlin. Ent. Ztschr. 39: 733, 745. ♀.
Pepsis bequaerti Salman, 1928. Pan-Pacific Ent. 5: 23. ♂.

pallidolimbata smithi Hurd. Calif. (west-central flanks of Sierra Nevada and Mt. Diablo-Mt. Hamilton ranges). Prey: *Aphonopelma* sp.
Pepsis pallidolimbata smithi Hurd, 1948. Calif. Univ., Pubs., Ent. 8: 126, 142. ♂, ♀.

Biology: Williams, 1956. Ent Soc. Amer., Ann. 49: 456 (prey, life history).

thisbe Lucas. Tex. to Nebr. w. into Calif.; Mexico (Coahuila, Chihuahua, Sonora, Baja California). Prey: *Aphonopelma* sp., *Avicularia californica* Bks.
Pepsis thisbe Lucas, 1894. Berlin. Ent. Ztschr. 39: 732, 733, 744. ♂, ♀.
Pepsis sayi Banks, 1926. Canad. Ent. 58: 202. ♂ (♀ misdet.).
Pepsis sherillae Hurd, 1948. Calif. Univ., Pubs., Ent. 8: 124, 146. ♂.

Taxonomy: Williams, 1956. Ent. Soc. Amer., Ann. 49: 457, figs. 10-13 (egg, larva). —Evans, 1959. Ent. Soc. Amer., Ann. 52: 431, figs. 1-7, 40 (larva).

Biology: Cockerell, 1916. Canad. Ent. 48: 55 (prey). —Williams, 1956. Ent. Soc. Amer., Ann. 49: 452-456, figs. 2, 9-14, 19, 21, 23-26 (prey, hunting behavior, life history).

Genus PEPSIS Subgenus STENOPEPSIS Banks

Pepsis subg. *Stenopepsis* Banks, 1945. Bol. Ent. Venezolana 4: 82.
Type-species: *Pepsis hymenaea* Mocsary. Orig. desig.

venusta Smith. South. Ariz. to Brazil.
Pepsis venusta Smith, 1855. Cat. Hym. Brit., Mus., v. 3, p. 196. ♂.

Genus PEPSIS Subgenus DINOPEPSIS Banks

Pepsis subg. *Dinopepsis* Banks, 1945. Bol. Ent. Venezolana 4: 83.
Type-species: *Pepsis grossa* Fabricius. Orig. desig.

formosa formosa (Say). Mo., Tex. to Kans. w. into Ariz. and Nev.; Mexico (Chihuahua). Prey: *Aphonopelma chalcodes* Chamb., *Dugesiella* sp.
Pompilus formosus Say, 1832. West. Quart. Rptr. 2: 76. ♀.
Pepsis nephele Lucas, 1894. Berlin. Ent. Ztschr. 39: 732, 739. ♀.
Pepsis pseudoformosa Cockerell, 1898. Davenport Acad. Nat. Sci., Proc. 7: 146. ♂.

Biology: Buckley, 1862. Ent. Soc. Phila., Proc. 1: 138-139 (prey, misdet. as *Mygale*). —Lincecum, 1867. Amer. Nat. 1: 137-141, 2 figs. (prey, misdet. as *Mygale*). —Cazier and Mortenson, 1964. Ent. Soc. Amer., Ann. 57: 533-541, 8 figs. (prey, nesting behavior).

formosa pattoni Banks. N. Mex., Ariz., Calif.; Mexico (Sonora, Baja California).
Pepsis pattoni Banks, 1941. Mus. Compar. Zool., Bul. 94: 181. ♂, ♀.

Genus PEPSIS Subgenus GIGANTOPEPSIS Lucas

Pepsis subg. *Gigantopepsis* Lucas, 1919. Arch. f Naturgesch., div. A 83: 10, 41.
Type-species: *Pepsis gigantea* Lucas. Orig. desig.

aquila Lucas. South. Ariz. and N. Mex.; Mexico (Durango).
Pepsis aquila Lucas, 1894. Berlin. Ent. Ztschr. 39: 797. ♂.

arizonica Banks. Tex., Ariz., Calif.; Mexico (Chihuahua, Durango).
Pepsis arizonica Banks, 1921. Ent. Soc. Amer., Ann. 14: 21. ♂.
Pepsis hirsuta Salman, 1933. Pan-Pacific Ent. 9: 9. ♀.

marginata Palisot de Beauvois. South. Fla.; West Indies. Prey: *Cyrtopholis portoricensis* Chamb.
Pepsis marginata Palisot de Beauvois, 1809. Ins. Afr., Amer., p. 94, pl. 2, figs. 2, 3. ♂, ♀.
Pepsis heros Dahlbom, 1843. Hym. Europaea, v. 1, p. 122. ♀.

Biology: Petrunkevitch, 1926. Jour. Expt. Zool. 45: 367-394, 2 pls. (prey, hunting behavior, nest, life history). —Petrunkevich, 1952. Sci. Amer. (for Aug.), pp. 20-23 (prey, hunting behavior, nest, life history).

Genus PEPSIS Subgenus UNASSIGNED

angustimarginata Viereck. Tex. to Kans. w. to south. Calif.; Mexico (Sonora, Chihuahua).
Pepsis angustimarginata Viereck, 1908 (1907). Amer. Ent. Soc., Trans. 33: 398. ♀.
Pepsis sayi Banks, 1926. Canad. Ent. 58: 202. ♀ (♂ misdet.).

azteca Cameron. Tex. south to Panama.
Pepsis azteca Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 215. ♀.

cerberus Lucas. Kans., Tex., Ariz.; Mexico (Chihuahua, Baja California).
Pepsis cerberus Lucas, 1894. Berlin. Ent. Ztschr. 39: 780, 790. ♂.
Pepsis inermis Fox, 1898. Ent. Soc. Wash., Proc. 4: 141, 146. ♀.
Pepsis novitia Banks, 1921. Ent. Soc. Amer., Ann. 14: 21. ♂. Apparently a hybrid between *cerberus* and *elegans* Lep. with most characters as in *cerberus*.

Taxonomy: Hurd, 1952. Amer. Mus. Nat. Hist., Bul. 98: 295 (status of *novitia*).

elegans Lepeletier. Pa. to Kans., s. to Fla. and Tex. Ecology: Nests in rodent burrow. Prey: Huge spider.
Pepsis elegans Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 489. ♂.
Pepsis dubitata Cresson, 1867. Amer. Ent. Soc., Trans. 1: 144. ♂, ♀.

Biology: Rau and Rau, 1918. Wasp studies afield, pp. 67-71 (prey transport, nesting site).

Morphology: Salman, 1929. Amer. Ent. Soc., Trans. 55: 119-153, pls. VI-IX.

mildei Stal. Tex. to Kans. w. into Calif.; Mexico (Coahuila, Baja California). Ecology: Nests in prey burrow. Prey: *Bothriocyrtum californicum* (Camb.), *Aphonopelma* sp.
Pepsis mildei Stal, 1857. Ofvers. Kongl. Vetensk. Akad., Forh. 14: 64.
Pepsis hesperiae Patton, 1894. Ent. Soc. Wash., Proc. 3: 46. ♂.
Pepsis Boguei Fox, 1898. Ent. Soc. Wash., Proc. 4: 141, 142, 146. ♂, ♀.

Biology: Passmore, 1933. Natl. Geog. Mag., 64: 203, 205 (prey capture, nest). —Passmore, 1936. Nat. Mag. 27: 155-159 (prey capture, nest; misdet. as *formosa*). —Hurd, 1952. Amer. Mus. Nat. Hist., Bul. 98: 268 (prey). —Williams, 1956. Ent. Soc. Amer., Ann. 49: 458, 460, figs. 4-8, 15-19 (prey capture, nest, life history).

saphirus Palisot de Beauvois. South. Fla.; West Indies.
Pepsis saphirus Palisot de Beauvois, 1805. Ins. Afr., Amer., p. 39, pl. 1, fig. 4. ♀.

Genus HEMIPEPSIS Dahlbom

Hemipepsis Dahlbom, 1844. Hym. Europaea, v. 1, p. 123.
Type-species: *Hemipepsis capensis* Dahlbom. Desig. by Ashmead, 1900.
Pallosoma Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 492.
Type-species: *Pallosoma barbara* Lepeletier. Desig. by Ashmead, 1900.
Tetraodontonyx Ashmead, 1900. Canad. Ent. 32: 187.
Type-species: *Tetraodontonyx rufipes* Ashmead. Orig. desig. (=*Pompilus heros* Guerin).
Cryptocheilus subg. *Tetracryptocheilus* Zavattari, 1907. R. Univ. Torino, Mus. Zool. Compar. Anat., Bol. 22 (555): 4.
Type-species: *Cryptocheilus* (*Tetracryptocheilus*) *ascensi* Zavattari. Orig. desig.
Tetracryptochilus Schulz, 1911. Zool. Ann. 4: 122. Emend.
Trichonyx Haupt, 1929. Rev. Zool. Bot. Africaines 17: 195.
Type-species: *Hemipepsis unguicularis* Kohl. Orig. desig.
Pachynimia Haupt, 1929. Rev. Zool. Bot. Africaines 17: 197, 202.
Type-species: *Priocnemis tinctor* Saussure. Orig. desig.
Hemipepsis subg. *Xenopepsis* Arnold, 1932. Transvaal Mus., Ann. 14: 291, 323, 367.
Type-species: *Hemipepsis* (*Xenopepsis*) *commixta* Arnold. Orig. desig.
Hemipepsis subg. *Moropepsis* Banks, 1934. Amer. Acad. Arts and Sci., Proc. 69: 6, 8.
Type-species: *Hemipepsis* (*Moropepsis*) *croesus* Banks. Monotypic.
Hovagenia Banks, 1941. Acad. Nat. Sci. Phila., Proc. 92: 343.
Type-species: *Hovagenia saussurei* Banks. Orig. desig.

mexicana (Cresson). Tex. (Davis Mts.), s. to Panama.
Mygnimia mexicana Cresson, 1867. Amer. Ent. Soc., Trans. 1: 143. ♀.

toussainti (Banks). Ariz., N. Mex.; Mexico (Durango, Michoacan, Mexico); Haiti.
Mygnimia toussainti Banks, 1928. Studies on Cuban Insects, v. 1, p. 5. ♂.

ustulata ochroptera Stal. Cent. and south. Calif., Ariz., Nev., in U. Austr. and L. Austr. Zones. Prey: *Brachythele longitarsis* Simon, *Aphonopelma* sp.
Hemipepsis ochroptera Stal, 1857. Ofvers. Svenska Vetensk. Akad., Forh. 14: 64.
Mygnimia hesperina Banks, 1917. Mus. Compar. Zool., Bul. 61: 102. ♂, ♀.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 432-433, fig. 42 (larva).

Biology: Williams, 1956. Ent. Soc. Amer., Ann. 49: 460-462, figs. 20, 22 (prey capture, nest, life history).

ustulata ustulata Dahlbom. Tex., Okla., Kans., Colo., N. Mex., Utah, Ariz. in L. Austr. and U. Austr. Zones, less common in Transit. Zone; Mexico (Baja California, Durango, Michoacan, Hidalgo, Mexico).
Hemipepsis ustulata Dahlbom, 1843. Hym. Europaea, v. 1, p. 123. ♀.
Mygnimia cressoni Banks, 1926. Canad. Ent. 58: 203. ♂, ♀.

Genus PRIOCNESSUS Banks

Priocnessus Banks, 1925. Mus. Compar. Zool., Bul. 77: 337.
Type-species: *Salius neotropicalis* Cameron. Desig. by Pate, 1946.

Cressochilus Banks, 1941. Canad. Ent. 73: 119, 120.
Type-species: *Pompilus nuperus* Cresson. Orig. desig.
Amerocnemis Banks, 1945. Bol. Ent. Venezolana 4: 93.
Type-species: *Amerocnemis bequaerti* Banks. Orig. desig.

apache (Banks). Tex., Ariz. in L. Austr. Zone.
Priocnemis (*Priocnessus*) *apache* Banks, 1933. Psyche 40: 11. ♀.

coloradensis (Banks). Colo., Tex.
Cryptocheilus coloradensis Banks, 1910. N. Y. Ent. Soc., Jour. 18: 121. ♀.

dakota (Cresson). Conn. and N. Y. to Ga., W. Va., Kans., "Dakota".
Pompilus (*Agenia*) *Dakota* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 124. ♂.
Pompilus (*Agenia*) *Dakota pallidicornis* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 124. ♂. Preocc.
Priocnemis (*Priocnessus*) *kiowa* Banks, 1933. Psyche 40: 12. ♀.

Taxonomy: Bradley, 1944. Canad. Ent. 76: 151-152 (female, male description, synonymy).

nebulosus (Dahlbom). Ont., U. S. to 100° W. in Transit., U. Austr., and L. Austr. zones.
Ecology: Occurs in open woods. Prey: *Agelenopsis potteri* (Blackw.), *A. emertoni* Chamb. and Ivie, *A. pensylvanica* (Koch), *A. naevia* (Walck.), *A.* sp.
Priocnemis nebulosus Dahlbom, 1843. Hym. Europaea, v. 1, p. 96. ♀.
Pompilus (*Agenia*) *pulchrinus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 126. ♂.
Priocnemis subconicus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 556. ♀.
Priocnemis leibyi Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 203. ♂.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 43 (prey records). —Kurczewski, 1961. Brooklyn Ent. Soc., Bul. 56: 23 (prey record). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 100-101 (ecology, prey records). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 3 (prey records).

nigricans Townes. Ariz.
Priocnessus nigricans Townes, 1957. U. S. Natl. Mus., Bul. 209: 47. ♀.

nuperus (Cresson). N. Y. to Ga., Kans., Tex. in U. and L. Austral zones.
Pompilus (*Priocnemis*) *nuperus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 118. ♀.

Taxonomy: Bradley, 1944. Canad. Ent. 76: 150-151 (male description).

Genus ENTYPUS Dahlbom

Entypus Dahlbom, 1843. Hym. Europaea, v. 1, p. 35.
Type-species: *Entypus ochrocerus* Dahlbom. Monotypic.
Priocnemioides Radoszkowski, 1888. Soc. Imp. Nat. Moscou, Bul. (n. s.) 2: 482.
Type-species: *Pompilus fulvicornis* Cresson. Desig. by Banks, 1944.
Prionocnemoides Dalla Torre, 1897. Cat. Hym., v. 8, p. 211. Emend.
Priocnemoides (!) Ashmead, 1900. Canad. Ent. 32: 187.
Cheilotus Bradley, 1946. Soc. Cubana Hist. Nat., Mem. 18: 124.
Type-species: *Pompilus ignipennis* Cresson. Orig. desig.

Taxonomy: Day, 1974. Ent. News 85: 92-94 (generic synonymy).

angusticeps (Townes), n. comb. Tex.; Mexico (Sinaloa). Prey: *Lycosa antelucana* Mont.
Priocnemioides angusticeps Townes, 1957. U. S. Natl. Mus., Bul. 209: 60, pl. 2, fig. 17. ♂, ♀.

aratus (Townes), n. comb. Idaho, Utah, Ariz., N. Mex., Tex., Kans., in U. and L. Sonoran Faunas; Mexico (Durango). Prey: *Lycosa carolinensis* Walck.
Priocnemioides aratus Townes, 1957. U. S. Natl. Mus., Bul. 209: 51. ♀, ♂.

austrinus austrinus (Banks), n. comb. Tex., Kans., Colo.
Cryptocheilus austrinus Banks, 1917. Mus. Compar. Zool., Bul. 61: 102. ♀.

austrinus fuscatus (Townes), n. comb. Ala., Kans.
Priocnemioides austrinus fuscatus Townes, 1957. U. S. Natl. Mus., Bul. 209: 53. ♀.

fulvicornis (Cresson). Atlantic to 100° W. in U. Austr. and L. Austr. Zones. Prey: *Lycosa avida* Walck.
Pompilus (*Priocnemis*) *fulvicornis* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 112. ♂, ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 59 (prey record).

magnus (Cresson), n. comb. Gulf and Atlantic States, Tex. to N. Y.
Pompilus (*Priocnemis*) *magnus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 111. ♀.

texanus atripennis (Townes), n. comb. La. (Opelousas).
Priocnemioides texanus atripennis Townes, 1957. U. S. Natl. Mus., Bul. 209: 56. ♂.

texanus texanus (Cresson), n. comb. Kans. to Tex., w. to Calif.; Mexico (Coahuila).
Priocnemis texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 204. ♂, ♀.

unifasciatus californicus (Townes), n. comb. Calif.; Mexico (Baja California). Prey: *Lycosa pacifica* Bks.
Priocnemioides unifasciatus californicus Townes, 1957. U. S. Natl. Mus., Bul. 209: 65, pl. 2, fig. 19. ♀, ♂.

Biology: Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 393 (prey).

unifasciatus cressoni (Banks), n. comb. Kans. and Utah s. to Tex. and Ariz., s. to Guatemala. Prey: *Lycosa antelucana* Mont.
Cryptocheilus cressoni Banks, 1929. Psyche 36: 326. ♂, ♀.

Biology: Hurd and Wasbauer, 1956. Kans. Ent. Soc., Jour. 29: 169 (prey record).

unifasciatus unifasciatus (Say), n. comb. Conn., N. Y. to Fla., w. to Wis., Ill., Kans. and Tex. in U. Austral Zone. Ecology: Occurs in open woods and overgrown fields. Prey: *Lycosa rabida* Walck., *L. riparia* Hentz.
Pompilus unifasciatus Say, 1828. American Entomology 3: 92. ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 63 (ecology, prey record). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 100 (prey record).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14: 46-47, pl. 16, figs. H-Q (male genitalia).

Genus CRYPTOCHEILUS Panzer

Salius Fabricius, 1804. Systema Piezatorum, p. 124. Preocc.
Type-species: *Sphex sexpunctata* Fabricius. Desig. by Guerin, 1849.
Cryptocheilus Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 120.
Type-species: *Sphex annulata* Fabricius. Desig. by Westwood, 1840.
Cryptochilus Rafinesque, 1815. Analyse de la Nature., p. 125. Emend.
Adonta Billberg, 1820. Enum. Ins., p. 101. N. name for *Salius*.
Stenoclavelia Arnold, 1932. Transvaal. Mus., Ann. 15: 44.
Type-species: *Stenoclavelia mirablis* Arnold. Orig. desig.
Chilochares Banks, 1941. Canad. Ent. 73: 119, 120.
Type-species: *Cryptocheilus birkmanni* Banks. Orig. desig.
Adirostes Banks, 1946. Mus. Compar. Zool., Bul. 96: 465.
Type-species: *Adirostes tolteca* Banks. Orig. desig.

attenuatum Banks. Tenn., La., Iowa, Kans., Tex., Colo.; Mexico (Morelos and Jalisco). Prey: *Lycosa antelucana* Mont., *L. avida* Walck., *L.* near *helluo* Walck., *L.* sp.; all prey records are of juvenile spiders.
Cryptocheilus attenuatum Banks, 1933. Psyche 40: 8. ♂.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 76 (prey record). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 3 (prey records).

hesperus (Banks). Oreg., Calif., Nev., Utah.
Priocnemis hesperus Banks, 1915. Canad. Ent. 47: 401. ♀.
Cryptocheilus atratus Banks, 1919. Mus. Compar. Zool., Bul. 63: 247. ♂, ♀.

idoneum birkmanni Banks. 100° W. to Rocky Mts. in U. Austr. and L. Austr. Zones; also Ariz., N. Mex., and south. Calif.; Mexico (Baja California). Prey: *Lycosa tigana* Gertsch and Wallace, adult.
Cryptocheilus birkmanni Banks, 1926. Canad. Ent. 58: 202 ♂, ♀.

Biology: Evans, 1959. Kans. Ent. Soc., Jour. 32: 75 (prey record).

idoneum idoneum Banks. Va., N. C., Ga., Fla., Minn. Prey: *Lycosa impavida* Walck., juvenile.
Psammochares tenuicornis Banks, 1910. Psyche 17: 249. ♂. Preocc.

Cryptocheilus idoneus Banks, 1910. Psyche 17: 250. ♀.
Psammochares gracilicornis Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 225. N. name.

Biology: Kurczewski, 1963. Fla. Ent. 46: 209 (prey transport).

pallidipenne (Banks). Oreg., Calif., Ariz., and N. Mex. in L. Sonor. Zone.
Priocnemoides (!) *pallidipennis* Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 236. ♀.

severini Banks. 100°W. to Rocky Mts. in U. Austr. and L. Austr. Zones; also N. Mex., Ariz., and south. Calif.; Mexico (Durango, Chihuahua, Nuevo Leon).
Cryptocheilus severini Banks, 1926. Canad. Ent. 58: 202. ♂.
Cryptocheilus arizonicus Banks, 1933. Psyche 40: 7. ♀ (♂ misdet.).

terminatum subopacum (Cresson). Atlantic to 100° W. in U. Austr. Zone.
Pompilus (*Priocnemis*) *subopacus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 114. ♂, ♀.

terminatum terminatum (Say). 100° W. to Rocky Mts. in U. Austr. Zone; Mexico (Zacatecas and Teotihuacan). Prey: *Lycosa* sp.
Pompilus terminatus Say, 1828. American Entomology v. 3, p. 92.
Cryptocheilus carinatus Banks, 1920. Canad. Ent. 58: 202. ♂.

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 480 (prey, nest).

Genus PRIOCNEMIS Schiodte

So far as known all species are ground-nesting. Many species apparently do not dig a burrow from the ground surface, but construct a cell or cells off the side of a mammal burrow or a pre-existing crevice in the ground.

Genus PRIOCNEMIS Subgenus SPHICTOSTETHUS Kohl

Sphictostethus Kohl, 1885. Zool.-Bot. Gesell. Wien, Verh. 34: 37, 47.
Type-species: *Pompilus gravesii* Haliday. Orig. desig.
Haploneura Kohl, 1885. Zool.-Bot. Gesell. Wien, Verh. 34: 37, 47. Preocc.
Type-species: *Haploneura apogona* Kohl. Orig. desig.
Haploneurion Kohl, 1885. Ent. Nachr. 11: 163. N. name.
Anapriocnemis Haupt, 1959. Nova Acta Leopoldina 21, no. 141: 25-26.
Type-species: *Pompilus flavipes* Guerin. Orig. desig.

pretiosa Banks. Ariz., N. Mex. at 5,000 to 9,100 ft.; Mexico. Prey: *Lycosa* sp., juvenile.
Priocnemis pretiosa Banks, 1933. Psyche 40: 13. ♂.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 83 (prey record).

Genus PRIOCNEMIS Subgenus PRIOCNEMISSUS Haupt

Priocnemissus Haupt, 1949. Beitr. Tax. Zool. 1: 75.
Type-species: *Priocnemis coriaceus* Dahlbom, Orig. desig. Mispelled *coriarius* in orig. descr.

The North American species are all vernal.

minorata Banks. N. S., Que., Ont., U. S. east of 100th Meridian in Alleghanian and Carolinian Faunas, and in Transition Fauna in Pacific Northwest. Ecology: Occurs in woods and appears to dig its own burrow. Prey: *Coras juvenilis* (Keys.), *C.* sp., *Wadotes calcaratus* (Keys.), *W. hybridus* (Em.), *W.* sp.; *Dolomedes tenebrosus* Hentz; *Arctosa rubicunda* (Keys.), *Lycosa gulosa* Walck., *L.* sp., *Trochosa pratensis* (Em.); *Agroeca ornata* Bks., *Clubiona canadensis* Em., *C. obesa* Hentz., *C. spiralis* Em.; *Aysha gracilis* (Hentz); *Amaurobius bennetti* (Blackw.).
Priocnemis minorata Banks, 1912. Canad. Ent. 44: 197. ♀.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 434, figs. 8-13, 44 (larva).

Biology: Yoshimoto, 1954. Brooklyn Ent. Soc., Bul. 49: 130-138, 2 figs. (prey, nesting behavior). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 99 (prey, nest). —Kurczewski, 1963 (1962). Brooklyn Ent. Soc., Bul. 57: 86-87 (prey transport, nest). —Kurczewski and Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 182-184 (prey records).

nigripes (Cresson). N. C., Tenn., Ark., Mo., Nebr., Kans.
Pompilus (*Priocnemis*) *nigripes* Cresson, 1865. Ent. Soc. Phila., Proc. 4: 454. ♀.
Priocnemis gomelza Brimley, 1934. Ent. News 45: 43. ♀.

oregona Banks. B. C., Wash., Oreg., Calif., Idaho, Nev., Utah, Ariz. Prey: *Brachythele* sp.; *Actinoxia versicolor* Sim.; *Atypoides riversi* P.-Camb.
Pompilus comparatus Walker, 1866. *In* Lord, Naturalist in Vancouver Isl. and B. C., v. 2, p. 341. ♀. Preocc.
Priocnemis oregona Banks, 1933. Psyche 40: 11. N. name.

Biology: Hurd and Wasbauer, 1956. Kans. Ent. Soc., Jour. 29: 169 (prey record). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 394 (prey records).

Genus PRIOCNEMIS Subgenus PRIOCNEMIS Schiodte

Priocnemis Schiodte, 1837. Kroyer's Naturhist. Tidsskr. 1: 324.
Type-species: *Sphex exaltata* Fabricius. Desig. by Westwood, 1840.
Prionocnemus Burmeister, 1872. Stettin. Ent. Ztg. 33: 235. Emend.
Prionocnemis Kirby, 1884. Zool. Rec. 20, Ins., p. 131. Emend. Preocc.
Myrmecosalius Ashmead, 1903. Ent. Soc. Wash., Proc. 5: 307.
Type-species: *Myrmecosalius nigriceps* Ashmead. Monotypic.

abbreviata Townes. Tex. (Ft. Davis).
Priocnemis (*Priocnemis*) *abbreviatus* Townes, 1957. U. S. Natl. Mus., Bul. 209: 102. ♀.

aequalis (Banks). Transcont. in Canad. Zone and cooler parts of Transit. Zone.
Ageniella aequalis Banks, 1919. Mus. Compar. Zool., Bul. 63: 243. ♂.

cornica (Say). N. B., Ont., Man., transcontinental in U. S.; Mexico (Puebla, Durango). Ecology: Occurs in open country, usually in sandy soil, but also in heavier soil. Prey: *Drassylus rufulus* Bks.; *Clubiona abbotti* Koch, *C. tibialis* Em., *C.* sp., *Trachelas tranquillus* (Hentz); *Aysha gracilis* (Hentz), *A.* sp.; *Oxyopes salticus* Hentz; *Habronattus decorus* Black., *Evarcha hoyi* (Peckh.), *Zygoballus nervosus* Peckh., *Pellenes viridipes* (Hentz), *P. borealis* (Bks.), *P.* spp., *Salticus scenicus* (Clerck); *Arctosa littoralis* Hentz, *Lycosa avida* Walck., *L. helluo* Walck., *L.* spp., *Pardosa milvina* Hentz, *P. moesta* Bks., *P. saxatilis* (Hentz), *P. groenlandica* (Thor.), *P.* spp., *Pirata arenicola* Em., *P. sedentaria* Montg., *P.* sp., *Trochosa avara* Keys., *Sosippus floridanus* Sim., Lycosidae šp.
Pompilus (*Miscus*) *cornicus* Say, 1836. Boston Jour. Nat. Hist. 1: 305. ♀ (♂ misdet.?).
Pompilus (*Miscus*) *conicus* Leconte, 1859. Writings of Thomas Say on Entomology, v. 2, p. 746. Emend.
Pompilus (*Priocnemis*) *pomilius* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 116. ♀.
Agenia atrata Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 263. ♂, ♀.
Salius pompilus (!) Dalla Torre, 1897. Cat. Hym., v. 8, p. 237.
Priocnemis pompilus (!) Banks, 1919. Mus. Compar. Zool., Bul. 63: 245.
Ageniella eximia Banks, 1919. Canad. Ent. 51: 83. ♂.
Ageniella aludra Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 201. ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 434, fig. 38 (larva). —Townes, 1963. Ent. Soc. Wash., Proc. 65: 115 (synonymy of *atrata*).

Biology: Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 53-55 (prey capture). —Rau and Rau, 1918. Wasp studies afield, pp. 71-77, fig 14 (prey, nest). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 17 (prey). —Townes, 1959. U. S. Natl. Mus., Bul. 209: 200-201 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 96-97 (prey, nesting behavior). —Kurczewski, 1961. Brooklyn Ent. Soc., Bul. 56: 23 (prey). —Kurczewski, 1963. Fla. Ent. 46: 210 (prey transport). —Kurczewski, 1963. Brooklyn Ent. Soc., Bul. 57: 87-88 (prey, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 3-4 (prey records). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 368 (prey records). —Kurczewski and Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 184-185 (prey records).

germana (Cresson). Atlantic to 100° W. in Transit. and U. Austr. Zones, Colo., Ariz. Ecology: Occurs in woods. Prey: *Agelenopsis utahana* (Chamb. and Ivie), *Coras* sp., prob.

juvenilis (Keys.), *Wadotes hybridus* (Em.), *W.* sp.; *Clubiona spiralis* Em.; *Aysha gracilis* (Hentz); *Maevia vittata* (Hentz); *Amaurobius bennetti* (Blackw.), *A.* sp.
Pompilus (*Priocnemis*) *germanus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 116. ♀.
Pompilus (*Agenia*) *iridipennis* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 127. ♂.

Biology: Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 98 (hunting behavior, prey transport, nest ?). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 4 (prey records). —Kurczewski and Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 185-186 (prey records).

hestia (Banks). N. H. to Va., W. Va. Ecology: Occurs in woods. Prey: *Agroeca* sp.
Ageniella hestia Banks, 1915. Canad. Ent. 47: 400. ♂.
Ageniella crassicornis Banks, 1917. Mus. Compar. Zool., Bul. 61: 108. ♂.

Biology: Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 98 (prey hunting, transport, nest ?).

minuscula (Banks). N. C., S. C., Tex., Kans., Ill.
Ageniella minuscula Banks, 1917. Mus. Compar. Zool., Bul. 61: 110. ♂.

nigriceps (Ashmead). Iowa, Kans., Tex.
Myrmecosalius nigriceps Ashmead, 1903. Ent. Soc. Wash., Proc. 5: 308. ♀.

notha alaskensis Townes. Alaska, N. W. T. Prey: *Paraphidippus marginatus* (Walck.).
Priocnemis (*Priocnemis*) *notha alaskensis* Townes, 1957. U. S. Natl. Mus., Bul. 209: 106. ♂, ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 106 (prey).

notha navajo Banks. B. C., Oreg., Calif., Ariz., N. Mex.; Transit. and Canad. Zones; Mexico.
Priocnemis navajo Banks, 1933. Psyche 40: 15. ♀.

notha notha (cresson). P. E. I., N. B., Que., Ont., Man., in U. S. from Atlantic to Rocky Mts. in Canad., Transit., and U. Austr. Zones. Ecology: Occurs in open country. Prey: *Trochosa pratensis* Em., *Schizocosa crassipes* (Walck.), *S.* sp., *Clubiona* sp.
Pompilus (*Priocnemis*) *nothus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 118. ♀.
Cryptocheilus paeneparcus Viereck, 1906. Amer. Ent. Soc., Trans. 32: 202. ♀.

Biology: Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 97-98 (prey transport, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 4-5 (prey transport). —Kurczewski and Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 186 (prey).

notha occidentis Banks. Oreg., Wash., Calif.; in Transit. and Canad. Zones.
Priocnemis occidentis Banks, 1944. Mus. Compar. Zool., Bul. 94: 172. ♀.

scitula relicta Banks. Que., Ont. to N. C., W. Va., Ohio, Wis. Ecology: Occurs in bottomland woods. Prey: *Habrocestum pulex* (Hentz), *Maevia vittata* (Hentz); *Agelenopsis* sp.; *Agroeca* sp., *Clubiona kastoni* Gertsch, *C. spiralis* Em., *C.* spp.; *Xysticus* sp.; *Amaurobius bennetti* (Blackw.).
Priocnemis relicta Banks, 1912. Canad. Ent. 44: 198. ♀.
Ageniella tenella Banks, 1915. Canad. Ent. 47: 400. ♂.

Biology: Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 62 (prey transport). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 98-99 (prey transport, nest). —Kurczewski and Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 186-187 (prey).

scitula scitula (Cresson). Atlantic to 100° W. in U. Austr. Zone. Ecology: Bottomland woods.
Pompilus (*Priocnemis*) *scitulus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 118. ♀.
Agenia perfecta Provancher, 1882. Nat. Canad. 13: 44. ♂.

Taxonomy: Townes, 1963. Ent. Soc. Wash., Proc. 65: 115 (synonymy of *perfecta*).

Genus CALICURGUS Lepeletier,

Calicurgus Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 397.
Type-species: *Pompilus fasciatellus* Spinola. Desig. by Kohl, 1884 (= *Sphex hyalinatus* Fabricius).
Caliadurgus Pate, 1946. Amer. Ent. Soc., Trans. 72: 78.
Type-species: *Sphex hyalinata* Fabricius. Orig. desig.

hyalinatus alienatus (Smith). Atlantic to 100° W. in Transit. and U. Austr. Zones. Ecology: Occurs along stream and river bottoms; nests in sand and heavier soil. Prey: *Araneus marmoreus* Clerck., *A. patagiatus* Clerck., *A.* spp., *Araniella displicata* (Hentz), *Neoscona* spp., *Wixia ectypa* (Walck.), *Eustala anastera* (Walck.), *Acanthepeira stellata* (Walck.), Araneinae sp. *C. hyalinata hyalinata* (Fabricius) occurs in Europe.

Pompilus fascipennis Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, app. p. 332. ♀. Preocc.

Pompilus alienatus Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 159. N. name.

Pompilus (*Agenia*) *calcaratus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 128. ♂.

Salius fasciipennis Dalla Torre, 1897. Cat. Hym., v. 8, p. 223. Emend.

Biology: Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 17 (prey). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 113 (prey). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 21 (prey transport). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 52-53 (prey). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 62 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 101 (prey transport, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 5 (prey and transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 368 (prey and capture). —Kurczewski and Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 187 (prey and transport).

hyalinatus borealis (Banks). Transcont. in Canad. Zone.

Priocnemis alienatus borealis Banks, 1933. Psyche 40: 10. ♀.

hyalinatus excoctus Townes. N. Mex, Ariz.; Mexico (Morelos, Durango, Jalisco).

Calicurgus hyalinatus excoctus Townes, 1957. U. S. Natl. Mus., Bul. 209: 115. ♀, ♂.

hyalinatus rupex (Cresson). Md., N. C., Ga., Kans., Tex., mostly in Austroriparian Fauna; Mexico (Puebla).

Pompilus (*Priocnemis*) *rupex* Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 372. ♀.

Pompilus (*Agenia*) *accolens* Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 374. ♂.

Salius ruspex (!) Dalla Torre, 1897. Cat. Hym., v. 8, p. 239.

Genus DIPOGON Fox

Our species are most commonly found in wooded areas. The North American species for which the nesting habits are known all use pre-existing cavities in wood as a nesting site. The nest consists of a linear series of cells usually separated by complex partitions of debris such as bits of wood or leaf, dead insects, caterpillar frass with an outer layer of compacted soil. Errant spiders are used as prey.

Revision: Evans, 1974. Amer. Ent. Soc., Trans. 100: 29-51, 23 figs. (spp. of southwestern U. S., Mexico, Central America).

Genus DIPOGON Subgenus DEUTERAGENIA Sustera

Agenia Schiodte, 1837. Kroyer's Naturhist. Tidsskr. 1: 321. Preocc.
Type-species: *Sphex variegata* Linnaeus. Desig. by Westwood, 1840.

Pogonius Dahlbom. 1845. Hym. Europaea, v. 1, p. 453. Preocc.
Type-species: *Sphex variegata* Linnaeus. Desig. by Pate, 1946.

Deuteragenia Sustera, 1913. Zool.-Bot. Gesell. Wien, Verh. 16: 191. N. name for *Agenia*.

Dipogon subg. *Adipogon* Banks, 1944. Mus. Compar. Zool., Bul. 94: 181.
Type-species: *Pompilus pulchripennis* Cresson. Orig. desig.

calipterus calipterus (Say). Mass. to N. C., Ind., Ill. Prey: *Amaurobius* sp.

Pompilus calipterus Say, 1836. Boston Jour. Nat. Hist. 1: 302. ♀.

Deuteragenia pilosa Banks, 1933. Psyche 40: 16. ♀.

Dipogon femur-aureus Dreisbach, 1953. Amer. Midland Nat. 49: 832. ♀.

Biology: Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 394 (prey).

calipterus duplicatus Townes. Fla., Ga.

Dipogon (*Deuteragenia*) *calipterus duplicatus* Townes, 1957. U. S. Natl. Mus., Bul. 209: 125. ♀.

calipterus nubifer (Cresson). Calif. s. to Panama. Ecology: Nests in hollow stems. Prey: *Gnaphosa* sp.; *Misumena* sp.; *Trachelas pacificus* Chamb. and Ivie.
Pompilus (Agenia) nubifer Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 374. ♀.
Pseudagenia isthmica Cameron, 1891. Biol. Cent.-Amer., Hym. 2: 165, pl. 10, fig. 11. ♀.
Pseudagenia isthmia(!) Dalla Torre, 1897. Cat. Hym., v. 8, p. 204.

Taxonomy: Wasbauer, 1960. Pan-Pacific Ent. 36: 174, figs. 4-6. ♂. —Evans, 1974. Amer. Ent. Soc., Trans. 100: 36, fig. 19. ♀, ♂.

Biology: Williams, 1966. Amer. Midland Nat. 24: 33-47 (prey, nest, life history). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest).

geronimo Evans. Southeastern Ariz.
Dipogon (Deuteragenia) geronimo Evans, 1974. Amer. Ent. Soc., Trans. 100: 37, figs. 4, 7, 17, 18. ♀, ♂.

hurdi Evans. Southeastern Ariz.; Mexico (Durango). Prey: *Icius* sp.
Dipogon (Deuteragenia) hurdi Evans, 1974. Amer. Ent. Soc., Trans. 100: 41, figs. 5, 21. ♀, ♂.

Biology: Evans, 1974. Amer. Ent. Soc., Trans. 100: 41 (prey).

iracundus Townes. Ariz.; Mexico (Durango). Ecology: Nests in borings in wood.
Dipogon (Deuteragenia) iracundus Townes, 1957. U. S. Natl. Mus., Bul. 209: 127. ♀.

Taxonomy: Evans, 1974. Amer. Ent. Soc., Trans. 100: 40-41. ♀, ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 168-169 (nest, life history).

melanocephalus (Cameron). Tex. (Hidalgo Co.); Mexico (Veracruz, Oaxaca, Morelos).
Pseudagenia melanocephala Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 172, pl. 10, fig. 18. ♀.

Taxonomy: Evans, 1974. Amer. Ent. Soc., Trans. 100: 43-45, figs. 3, 8, 15, 22. ♀, ♂.

papago anomalus Dreisbach. Canad., Transit. and U. Austr. Zone from Atlantic to 100° W. Ecology: Nests in borings in wood. Prey: *Paraphidippus aurantius*. (Luc.), *Phidippus* sp.; *Sergiolus variegatus* (Hentz), *Haplodrassus hiemalis* (Em.), *Poecilochroa capulata* (Walck.); *Clubiona canadensis* Em.
Dipogon anomalus Dreisbach, 1953. Amer. Midland Nat. 49: 834, figs. 4, 8. ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 436 (larva).

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 122 (prey, nest). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 104-105 (prey transport, nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 167-168 (prey, nest, life history). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 368 (prey).

papago floridanus Townes. Fla.
Dipogon (Deuteragenia) papago floridanus Townes, 1957. U. S. Natl. Mus., Bul. 209: 122. ♀, ♂.

papago papago (Banks). B. C., Ariz., Tex.; Mexico (Morelos).
Deuteragenia papago Banks, 1943. Psyche 40: 17. ♀.

pulchripennis (Cresson). Atlantic to 100° W., mostly in Canad. and Transit. Zones; also Ariz. (9,000 ft. in Santa Catalina Mts.); Mexico (Durango). Prey: *Xysticus* sp.; *Amaurobius bennetti* (Blackw.); *Phidippus audax* (Hentz).
Pompilus (Agenia) pulchripennis Cresson, 1867. Amer. Ent. Soc., Trans. 1: 123. ♂, ♀.

Biology: Kurczewski and Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 188 (prey).

sayi nigrior Townes. Transit. Fauna, B. C., Oreg., Calif., Mont., Colo., N. Mex. Prey: *Xysticus* sp.
Dipogon (Deuteragenia) sayi nigrior Townes, 1957. U. S. Natl. Mus., Bul. 209: 130. ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 131 (prey).

sayi sayi Banks. Atlantic to 100° W. in Transit. and U. Austr. Zones. Ecology: Nests in borings in wood. Parasite: *Anthrax irroratus* Say; *Melittobia chalybii* Ashm., *Tetrastichus johnsoni* Ashm.; *Ephuta p. pauxilla* Brad. Prey: *Xysticus bicuspis* Keys.,

X. elegans Keys., *X. ferox* (Hentz), *X. pellax* Camb., *X. triguttatus* Keys., *X. fraternus* Bks., *X. funestus* Keys., *X. canadensis* Gertsch, *X. discursans* Keys., *X. obscurans* Coll., *X. punctatus* (Keys.), *X. lutulentus* Gertsch, *X.* spp., *Misumena vatia* (Clerck), *Misumenoides formosipes* (Walck.), *Tmarus angulatus* (Walck.), *Coriarachne versicolor* Keys., *C. utahensis* Gertsch; *Agelenopsis utahana* (Chamb. and Ivie); *Phidippus whitmanii* Peckh.; *Nodocion melanie* Levi, *Poecilochroa capulata* (Walck.), *P. montana* Em.; *Amaurobius benuetti(Blackw.)*, *A.* sp.

Dipogon sayi Banks, 1941. Canad. Ent. 73: 122. ♂, ♀.

Deuteragenia fascipennis Haupt, 1959. Nova Acta Leopoldina 21, no 141: 32, fig. 16. ♀.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 436, figs. 14-19, 45 (larva). —Evans, 1974. Amer. Ent. Soc., Trans. 100: 30 (synonymy).

Biology: Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 144 (prey, nest; misdet. as *calipterus*). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 130 (nest). —Medler and Koerber, 1957. Ent. Soc. Amer., Ann. 50: 621-625, 6 figs. (nest, prey, life history, parasite). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 52 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 102-104 (nest, prey, life history, parasites). —Fye, 1965. Canad. Ent. 97: 735-736 (nest, prey, life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 161-167, pl. 10, figs. 46 (?), 47 (?), 48 (nest, prey, life history, parasites). —Kurczewski and Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 188 (prey).

sericeus Banks. Oreg., Calif.

Dipogon sericea Banks, 1944. Mus. Compar. Zool., Bul. 94: 180. ♀.

thoracicus Townes. N. Mex., Ariz.; Mexico (Sinaloa, Durango, Morelos). Prey: *Xysticus* spp., juv.

Dipogon (*Deuteragenia*) *thoracicus* Townes, 1957. U. S. Natl. Mus., Bul. 209: 126. ♀.

Biology: Evans, 1974. Amer. Ent. Soc., Trans. 100: 40 (prey).

Genus DIPOGON Subgenus DIPOGON Fox

Dipogon Fox, 1897. Acad. Nat. Sci. Phila., Proc., p. 241.
Type-species: *Dipogon populator* Fox. Orig. desig.

Agriogenia Banks, 1919. Canad. Ent. 51: 83.
Type-species: *Pompilus brevis* Cresson. Orig. desig.

brevis brevis (Cresson). Carol. Fauna, Mass. to N. C. Prey: *Phidippus purpuratus* Keys., *Pellenes hoyi* (Peckh.), *P.* sp.

Pompilus (*Agenia*) *brevis* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 123. ♂.

Biology: Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 105 (prey transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 5 (prey).

brevis ochreus Townes. Md., S. C. Prey: *Phidippus* (?) sp., juv.

Dipogon (*Dipogon*) *brevis ochreus* Townes, 1957. U. S. Natl. Mus., Bul. 209: 137. ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 137 (prey).

brevis recalvus Townes. Alleghan. Fauna, Que. and Ont. to Va. and Wis.

Dipogon (*Dipogon*) *brevis recalvus* Townes, 1957. U. S. Natl. Mus., Bul. 209: 134. ♀, ♂.

diablo Wasbauer. Calif. (Contra Costa Co.).

Dipogon (*Dipogon*) *diablo* Wasbauer, 1960. Pan-Pacific Ent. 36: 172, figs. 1-3. ♀, ♂.

graenicheri atratus Townes. N. J., N. C.

Dipogon (*Dipogon*) *graenicheri atratus* Townes, 1957. U. S. Natl. Mus., Bul. 209: 139, pl. 2, fig. 29. ♀.

graenicheri graenicheri Banks. Fla., La.

Dipogon graenicheri Banks, 1939. Canad. Ent. 71: 230. ♀.

leechi Wasbauer. Calif. (Marin Co.); Mexico (Baja California).

Dipogon (*Dipogon*) *leechi* Wasbauer, 1960. Pan-Pacific Ent. 36: 171. ♀.

paludis Townes. N. J. (Atsion).

Dipogon (*Dipogon*) *paludis* Townes, 1957. U. S. Natl. Mus., Bul. 209: 133. ♀.

parkeri Wasbauer. Nev. (Washoe Co.). Ecology: Nests in borings in *Sambucus* stems.

Dipogon (*Dipogon*) *parkeri* Wasbauer, 1966. Biol. Soc. Wash., Proc. 79: 17. ♀, ♂.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest).

pygmaeus Townes. Ala. (Prattsville).
Dipogon (*Dipogon*) *pygmaeus* Townes, 1957. U. S. Natl. Mus., Bul. 209: 132. ♀.

texanus Texanus Banks. Tex. (Brownsville). Another subspecies occurs in Mexico.
Dipogon texanus Banks, 1944. Mus. Compar. Zool., Bul. 94: 179. ♀.

Genus DIPOGON Subgenus WINNEMANELLA Krombein

Dipogon subg. *Winnemanella* Krombein, 1962. Biol. Soc. Wash., Proc. 75: 7.
Type-species: *Dipogon* (*Winnemanella*) *fulleri* Krombein. Orig. desig.

fulleri Krombein. Md., S. C. Prey: *Icius hartii* Em.
Dipogon (*Winnemanella*) *fulleri* Krombein, 1962. Biol. Soc. Wash., Proc. 75: 8. ♀.

Biology: Krombein, 1962. Biol. Soc. Wash., Proc. 75: 8 (prey).

Tribe AUPLOPODINI

Members of this tribe usually amputate one or more of the spider's legs, presumably to facilitate prey transport, although there are records of some wasps feeding on body fluids exuding from the severed leg stumps. *Phanagenia* and *Auplopus* are mud-daubers, constructing mud cells in sheltered situations. A few species of *Ageniella* have been recorded as nesting in the ground, either in pre-existing crevices or in burrows which they dig themselves. The nesting habits of *Priocnemella* are unknown, but the lack of a pygidial area in the female suggests that it is not a mud-dauber.

Genus PHANAGENIA Banks

Phanagenia Banks, 1933. Psyche 40: 18.
Type-species: *Phanagenia osceola* Banks. Orig. desig. (= *Pompilus bombycinus* Cresson).

Only the type-species occurs in the New World. At least two other species occur in Africa.

bombycina (Cresson). Atlantic to 100° W. in U. Austr. and L. Austr. Zones, also N. Mex.
Ecology: Builds mud cells beneath loose bark and under stones. Parasite: *Ceropales robinsonii* Cr.; *Ephuta scrupea* (Say). Prey: *Lycosa avida* Walck., *L. gulosa* Walck., Lycosidae sp.; *Maevia vittata* (Hentz); *Agelenopsis* sp.
Pompilus (*Agenia*) *bombycinus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 125. ♂, ♀.
Ageniella annecta Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 233. ♀.
Phanagenia osceola Banks, 1933. Psyche 40: 18. ♀.

Biology: Walsh and Riley, 1869. Amer. Ent. 1: 131-132, 136, 163 (nest, parasite). —Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 164-165 (nest, prey, life history). —Peckham and Peckham, 1905. Wasps social and solitary, pp. 244-247 (nest, life history, prey). —Savin, 1924. Nat. Hist. 24: 520-522 (nest, prey). —Schuster, 1951. N. Y. Ent. Soc., Jour. 59: 34 (parasite). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 143 (nest, prey). —Kurczewski, 1961. Brooklyn Ent. Soc., Bul. 56: 23 (prey transport). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 108 (prey transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 5 (prey).

Genus AUPLOPUS Spinola

Auplopus Spinola, 1841. Soc. Ent. France, Ann. 10: 108.
Type-species: *Pompilus femoratus* Fabricius. Monotypic.
Aoplopus Agassiz, 1846. Nomencl. Zool., Index Univ., pp. 27, 41. Emend.
Pilpomus Costa, 1859. Fauna Regno Napoli, Imenotteri Aculeati, Pompilidea, p. 3.
Type-species: *Sphex carbonarius* Scopoli. Desig. by Pate, 1946.
Pseudagenia Kohl, 1885. Zool.-Bot. Gesell. Wien, Verh. 34: 38, 42.
Type-species: *Sphex carbonarius* Scopoli. Orig. desig.
Tumagenia Banks, 1934. Amer. Acad. Arts and Sci., Proc. 69: 39, 67.
Type-species: *Tumagenia iris* Banks. Monotypic.
Calagenia Banks, 1934. Amer. Acad. Arts and Sci., Proc. 69: 40, 72.

Type-species: *Calagenia hermosa* Banks. Orig. desig.
Lophagenia Banks, 1934. Amer. Acad. Arts and Sci., Proc. 69: 40, 74.
Type-species: *Pseudagenia erigone* Bingham. Orig. desig.

The genera *Stenagenia* Saussure, 1892, and *Schizagenia* Cameron, 1910, are questionable synonyms.

Members of this genus make mud cell nests under stones, under logs, and in other protected places.

adjunctus (Banks). Md. to Fla., west to Tex. Ecology: Reared from mud cell; occurs in damp bottomland woods. Prey: *Chiracanthium inclusum* (Hentz); *Phidippus rimator* (Walck.).
Pseudagenia mellipes var. *adjuncta* Banks, 1911. Ent. Soc. Wash., Proc. 13: 238.
Pseudagenia marionae Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 202. ♂.

Taxonomy: Banks, 1912 (1911). N. Y. Ent. Soc. Jour. 19: 233. ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 151 (nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 6 (prey).

architectus architectus (Say). Transit. to Austrorip. Zones from Atlantic to Rocky Mts., and west of Rocky Mts. in Colo., N. Mex. and Ariz.; Mexico (Durango, Zacatecas, Puebla). Ecology: Builds mud cells under loose bark, under stones, and in abandoned burrows of ground-nesting bees. Parasite: *Sphaeropthalma pensylvanica scaeva* (Bl.). Prey: *Trachelas tranquillus* (Hentz), *Clubiona* sp.; *Phidippus princeps* (Peckh.), *P. audax* (Hentz), *P.* sp. near *whitmannii* Peckh., *Icius similis* Bks.; *Misumenops oblongus* (Keys.).
Pompilus architectus Say, 1836. Boston Jour. Nat. Hist. 1: 303. ♀.

Taxonomy: Walsh, 1869. Amer. Ent. 1: 163.

Biology: Say, 1836. Boston Jour. Nat. Hist. 1: 303 (nest). —Walsh and Riley, 1869. Amer. Ent. 1: 132, 163 (nest). —Rau and Rau, 1918. Wasp studies afield, pp. 83-84, fig. 16 (nest). —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 14-15 (prey transport). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 164-165 (nest, prey). —Kurczewski, 1961. Brooklyn Ent. Soc., Bul. 56: 24 (prey transport). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 62-63 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 108-109 (nest, prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 6 (prey transport).

architectus metallicus (Banks). West of Rocky Mts., from B. C. to north Mexico. Parasite: *Sphaeropthalma difficilis* (Bak.). Prey: *Thiodina* sp., *Phidippus formosus* Peckh. and Peckh.; *Trachelas pacificus* Chamb. and Ivie.
Pseudagenia metallica Banks, 1910. N. Y. Ent. Soc., Jour. 18: 125. ♀.

Biology: Hurd and Wasbauer, 1956. Kans. Ent. Soc., Jour. 29: 169 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 109 (prey).

caerulescens caerulescens (Dahlbom). Md. to S. C., Kans., Tex.
Agenia caerulescens Dahlbom, 1843. Hym. Europaea, v. 1, p. 93. ♀.
Pseudagenia coerulescens (!) Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 232. ♂, ♀.

caerulescens floridanus (Banks). Austrorip. Fauna, Fla. to S. C.
Pseudagenia floridana Banks, 1921. Ent. Soc. Amer., Ann. 14: 21. ♀.

caerulescens subcorticalis (Walsh). Atlantic to 100° W. in Transit., U. Austr., and L. Austr. Zones, though replaced in parts of its range by the subspecies *antennalis* and *caerulescens;* Mexico (Guayamas). Ecology: Makes mud cells beneath loose bark and in borings in wood; occurs in woods. Prey: *Trachelas tranquillus* (Hentz), *Clubiona obesa* Hentz, *C.* sp.; *Phidippus audax* (Hentz); *Anyphaena pectorosa* Koch.
Agenia subcorticalis Walsh, 1869. Amer. Ent. 1: 162. ♂, ♀.
Pseudagenia antennalis Banks, 1910. Psyche 17: 251. ♀.
Pseudagenia ariella Banks, 1941. Canad. Ent. 73: 122. ♀.

Biology: Walsh and Riley, 1869. Amer. Ent. 1: 131-132 (nest). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 17 (prey). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 159 (nest). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 109-110 (prey transport). —Medler, 1964. Ent. News 75: 190-191 (nest, prey, life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 170-171, pl. 9, figs. 42-44 (nest, prey, life history).

flavicoxae (Banks). Ariz. (Palmerlee).
Pseudagenia mexicana var. *flavicoxae* Banks, 1911. Ent. Soc. Wash., Proc. 13: 238. ♂, ♀.
Pseudagenia mexicana var. *flavicoxa(!)* Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 233.

inermis Townes. Tex.; Mexico (Morelos). Prey: *Lycosa* sp.
Auplopus inermis Townes, 1957. U. S. Natl. Mus., Bul. 209: 148. ♀.

Biology: Evans, 1964. Kans. Ent. Soc., Jour. 37: 306 (prey transport).

mellipes mellipes (Say). N. J. to Fla., west to Kans. and Tex. Ecology: Builds mud cells in cells of abandoned nests of *Polistes*, *Sceliphron*, and *Trypargilum*, in borings in wood, beneath loose bark, under exposed roots, and in abandoned borings of ground-nesting bees; occurs in woods. Parasite: *Sphaeropthalma pensylvanica scaeva* (Bl.). Prey: *Pisaurina undata* Hentz, *P. mira* (Walck.); *Herpyllus vasifer* (Walck.); *Philodromus* sp.; *Marpissa undata* (DeG.), *Phidippus audax* (Hentz), *P.* sp.
Pompilus mellipes Say, 1836. Boston Jour. Nat. Hist. 1: 304. ♀.
Agenia fulvipes Dahlbom, 1843. Hym. Europaea, v. 1, p. 92. ♀.
Pseudagenia mellipes var. *interior* Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 233. ♀.

Biology: Walsh, 1869. Amer. Ent. 1: 132 (nest). —Rau and Rau, 1916. Jour. Anim. Behavior 6: 42-43 (nest). —Rau and Rau, 1918. Wasp studies afield, pp. 86-89, figs. 18-20 (nest). —Rau, 1926. St. Louis Acad. Sci., Trans. 25: 196-197 (nest, prey). —Rau, 1928. St. Louis Acad. Sci., Trans. 25: 342-358 (nest, prey). —Krombein, 1952. Ent. Soc. Wash., Proc. 54: 176-177 (nesting behavior, prey). —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 15 (prey). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 153 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 171-173, pl. 9, fig. 45 (nest, life history).

mellipes meridianus Townes. Fla. (Paradise Key).
Auplopus mellipes meridianus Townes, 1957. U. S. Natl. Mus., Bul. 209: 154. ♀.

mellipes variitarsatus (Dalla Torre). Atlantic to 100° W. in Canad. and Transit. Zones. Ecology: Makes mud nests in and under decaying logs and stumps, and in borings in wood; occurs in woods.
Pompilus (*Agenia*) *varipes* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 126. ♀. Preocc.
Agenia variitarsata Dalla Torre, 1897. Cat. Hym., v. 8, p. 210. N. name.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 155 (nest). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 110 (nest). —Medler, 1964. Ent. News 75: 191 (nest).

mexicanus (Cresson). South. Ariz.; Mexico (Veracruz).
Pompilus (*Agenia*) *mexicanus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 130. ♀.

mollis Townes. South. Tex.
Auplopus mollis Townes, 1957. U. S. Natl. Mus., Bul. 209: 157. ♀.

nigrellus (Banks). Most of south. Canad. and U. S., but not known from northwest except Oreg., or from southeast; Mexico (Baja California). Ecology: Occurs in or at edge of woods; builds mud cells beneath stones and in boring in stem. Prey: *Clubiona abboti* Koch, *Trachelas tranquillus* (Hentz), *T.* sp.; *Phidippus* spp., *Maevia inclemens* (Walck.); *Anyphaena fraterna* Bks., *Aysha gracilis* (Hentz).
Pseudagenia nigrella Banks, 1912 (1911). N. Y. Ent. Soc. Jour. 19: 232. ♀.
Pseudagenia nanella Banks, 1912. Canad. Ent. 44: 198. ♀.

Biology: Krombein, 1954. Brooklyn Ent. Soc., Bul. 49: 4 (prey). —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 15 (prey). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 167 (nest). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 109 (prey transport). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 6 (prey transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 369 (prey).

variolarum Townes. Tex. (Chisos Mts.).
Auplopus variolarum Townes, 1957. U. S. Natl. Mus., Bul. 209: 149. ♀.

Genus AGENIELLA Banks

Genus AGENIELLA Subgenus LEUCOPHRUS Townes

Ageniella subg. *Leucophrus* Townes, 1951. U. S. Dept. Agr., Monog. 2: 917.

Type-species: *Priocnemis semitincta* Banks. Orig. desig.

fulgifrons (Cresson). U. Austr. and L. Austr. Zones from Atlantic to 100° W. Prey: *Phidippus audax* Hentz, *P.* sp., *Paraphidippus* sp. near *marginatus* (Walck.).
Pompilus (*Priocnemis*) *fulgifrons* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 114. ♀.
Pompilus (*Agenia*) *agilis* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 125. ♂.
Salius fulgidifrons Dalla Torre, 1897. Cat. Hym., v. 8, p. 225. Emend.

Biology: Evans, 1959. Kans. Ent. Soc., Jour. 32: 75 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 6-7 (prey).

incita (Banks). Kans., Tex.
Cryptocheilus incitus Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 234. ♀.

reynoldsi (Banks). Colo., Kans., Tex.
Priocnemis reynoldsi Banks, 1933. Psyche 40: 12. ♀.

semitincta (Banks). Transcont. in U. Austr. and L. Austr. Zones. Prey: *Agelenopsis potteri* Blackw., *A. pennsylvanica* (Koch), *A.* spp.
Priocnemis semitincta Banks, 1912. Canad. Ent. 44: 197. ♀.
Ageniella festina Banks, 1917. Mus. Compar. Zool., Bul. 61: 109. ♂.
Ageniella fraternella Banks, 1917. Mus. Compar. Zool., Bul. 61: 109. ♂.
Priophanes holonis Banks, 1944. Mus. Compar. Zool., Bul. 94: 174. ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 171 (prey). —Kurczewski, 1961. Brooklyn Ent. Soc., Bul. 56: 24 (prey transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 7 (prey).

Genus AGENIELLA Subgenus NEMAGENIA Banks

Ageniella subg. *Nemagenia* Banks, 1944. Mus. Compar. Zool., Bul. 94: 179.
Type-species: *Pompilus* (*Agenia*) *longulus* Cresson. Orig. desig.

longula (Cresson). Calif., "Dakota", Kans., Mo., La., Tex.; British Guiana; Bolivia. Prey: *Pardosa* sp., *Lycosa mccooki* Montgomery, *L.* sp.
Pompilus (*Agenia*) *longulus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 129. ♂.
Agenia longa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 205. "♀" = ♂.
Priocnemis directa Banks, 1912. Canad. Ent. 44: 197. ♀.
Priophanes otiosa Banks, 1946. Mus. Compar. Zool., Bul. 96: 442. ♀.

Biology: Townes, 1951. U. S. Dept. Agr., Monog. 2: 918 (prey). —Evans, 1959. Kans. Ent. Soc., Jour. 32: 75 (prey).

Genus AGENIELLA Subgenus PRIOPHANES Banks

Priophanes Banks, 1944. Psyche 50: 82.
Type-species: *Priocnemis facetus* Cresson. Orig. desig.

agenioides (Fox). Atlantic to 100° W. in U. Austr. and L. Austr. Zones. Prey: *Xysticus* sp.; *Maevia inclemens* (Walck.), *M. vittata* (Hentz), Salticidae sp.
Priocnemis agenioides Fox, 1893. N. Y. Ent. Soc., Jour. 1: 54. ♀.
Pseudagenia virginica Banks, 1910. Psyche 17: 251. ♂.
Ageniella subra Brimley, 1934. Ent. News 45: 42. ♂.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 187 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 8 (prey transport).

arcuata (Banks). Md. to Fla., Alta., Colo., Kans., Tex. to south. Calif.; Mexico (Nayarit, Durango, Zacatecas, Teotihuacan, Veracruz, Jalisco). Prey: *Oxyopes salticus* Hentz; *Misumenops celer* Hentz, *Sassacus papenhoei* Peckh.
Cryptocheilus arcuatus Banks, 1910. N. Y. Ent. Soc., Jour. 18: 120. ♀.
Pseudagenia birkmanni Banks, 1910. N. Y. Ent. Soc., Jour. 18: 124. ♂.

Biology: Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 107 (prey transport). —Evans, 1964. Kans. Ent. Soc., Jour. 37: 306 (prey transport).

arizonica arizonica (Banks). Ariz. (Tempe).
Priocnemis arizonica Banks, 1933. Psyche 40: 14. ♀.

arizonica concolor Townes. Kans. (Manhattan).
Ageniella (*Priophanes*) *arizonica concolor* Townes, 1957. U. S. Natl. Mus., Bul. 209: 179. ♀, ♂.

carolae Wasbauer. Calif. (Riverside Co.). On flowers of *Asclepias erosa*.
Ageniella (*Priophanes*) *carolae* Wasbauer, 1959. Kans. Ent. Soc., Jour. 32: 109, fig. 4. ♀.

faceta faceta (Cresson). Md. to Ga., Tex. Prey: *Pardosa* sp., *Schizocosa* sp.
Priocnemis facetus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 205. ♀.
Cryptocheilus pallescens Banks, 1910. N. Y. Ent. Soc., Jour. 18: 121. ♀.

Biology: Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 8 (prey).

faceta ventralis Townes. Fla.; Mexico (Nuevo Leon).
Ageniella (*Priophanes*) *faceta ventralis* Townes, 1957. U. S. Natl. Mus., Bul. 209: 183. ♀, ♂.

fuscipennis Townes. Calif. Prey: *Oxyopes salticus* Hentz; *Xysticus* sp.
Ageniella (*Priophanes*) *fuscipennis* Townes, 1957. U. S. Natl. Mus., Bul. 209: 189. ♀.

Taxonomy: Wasbauer, 1959. Kans. Ent. Soc., Jour. 32: 109-111, figs. 1-3. ♂.

Biology: Hurd and Wasbauer, 1956. Kans. Ent. Soc., Jour. 29: 169 (prey). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 395 (prey).

placita placita (Banks). Ala., La., Tex.
Cryptocheilus placitus Banks, 1910. N. Y. Ent. Soc., Jour. 18: 122. ♀.
Pseudagenia apicipennis Banks, 1910. N. Y. Ent. Soc., Jour. 18: 123. ♂.

placita sonorensis Townes. Calif.; Mexico (Nogales).
Ageniella (*Priophanes*) *placita sonorensis* Townes, 1957. U. S. Natl. Mus., Bul. 209: 185. ♀.

rufescens (Banks). Kans., N. Mex., Ariz., Wyo.
Priocnemis rufescens Banks, 1939. Canad. Ent. 71: 229. ♀.

Genus AGENIELLA Subgenus AGENIELLA Banks

Ageniella Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 222.
Type-species: *Pompilus* (*Agenia*) *acceptus* Cresson. Orig. desig.

accepta (Cresson). Transcont. in L. Austr. Zone; Mexico (Coahuila). Prey: *Lycosa* sp.
Pompilus (*Agenia*) *acceptus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 130. ♀.
Pseudagenia texana Banks, 1910. N. Y. Ent. Soc., Jour. 18: 125. ♂.
Ageniella adara Brimley, 1934. Ent. News 45: 41. ♂.

Biology: Dow, 1930. Psyche 37: 182 (prey).

blaisdelli (Fox). South. B. C. to south. Calif., Idaho, Utah in Transit. and U. Austr. Zones.
Ecology: Nests in compacted sand along river. Prey: *Pardosa* sp., *Tarentula* sp., prob. *kochi* (Keys.).
Pseudagenia Blaisdelli Fox, 1892. Ent. News 3: 171. ♀.
Ageniella praestans Banks, 1914. N. Y. Ent. Soc., Jour. 22: 305. ♂.

Biology: Wasbauer and Leech, 1973. Pan-Pacific Ent. 49: 182 (prey, nest).

conflicta Banks. Alta., U. S., Transcont., mostly in U. Austr. Zone; Guatemala. Prey: *Trochosa gosiuta* Chamb., *T. avara* (Keys.), *T.* sp., *Arctosa littoralis* Hentz, *Pardosa valens* Barnes, *Lycosa* spp.
Pompilus (*Agenia*) *petiolatus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 127. ♂. Preocc.
Ageniella accepta var. *conflicta* Banks, 1944. Mus. Compar. Zool., Bul. 94: 176. ♀.

Biology: Hurd and Wasbauer, 1956. Kans. Ent. Soc., Jour. 29: 169 (prey). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 211 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 106-107 (prey capture, transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 7 (prey transport).

coronata Banks. South. B. C. to south. Calif., Utah in Transit. and U. Austr. Zones. Prey: *Clubionidae* sp., prob. *Liocranoides* sp.
Ageniella coronata Banks, 1919. Mus. Compar. Zool., Bul. 63: 242. ♀.

Biology: Wasbauer and Leech, 1973. Pan-Pacific Ent. 49: 182 (prey).

cupida (Cresson). N. Y., Pa., Va., W. Va., Ga., Iowa, Kans., Colo.; Guatemala.
Pompilus (*Agenia*) *cupidus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 122. ♀.

euphorbiae (Viereck). Common in Calif., less common in B. C., Oreg., Ariz., N. Mex., Colo., and Tex. Prey: *Agelenopsis* sp.; *Pardosa* sp.
Agenia euphorbiae Viereck, 1903 (1902). Acad. Nat. Sci.Phila., Proc. p. 734. ♂.
Ageniella subaequalis Banks, 1919. Mus. Compar. Zool., Bul. 63: 243. ♂.

Biology: Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 7 (prey).

evansi Townes. Ariz., N. Mex.; Mexico (Teotihuacan). Prey: *Lycosa* sp., *Tarentula kochi* Keys.
Ageniella (*Ageniella*) *evansi* Townes, 1957. U. S. Natl. Mus., Bul. 209: 205. ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 206 (prey). —Evans, 1959. Kans. Ent. Soc., Jour. 32: 76 (prey).

grisea Townes. Idaho (Hollister, Wendell).
Ageniella (*Ageniella*) *grisea* Townes, 1957. U. S. Natl. Mus., Bul. 209: 195. ♀.

mintaka Brimley. Fla., N. C., Va., W. Va.
Ageniella mintaka Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 202. ♂.

neglecta Banks. Colo., N. Mex., Ariz.; Mexico (Puebla, Zacatecas, Teotihuacan).
Ageniella neglecta Banks, 1944. Mus. Compar. Zool., Bul. 94: 176. ♂.

nivalis (Cameron). Ariz.; Mexico (Durango, Guerrero). Host: *Lycosa* sp.
Salius nivalis Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 182, pl. 11, fig. 2. ♀.

Biology: Evans, 1964. Kans. Ent. Soc., Jour. 37: 306-307 (prey transport).

norata Banks. Ont. and Mass. south to N. C., Ind., Kans. Ecology: Occurs in woods.
Ageniella norata Banks, 1914. N. Y. Ent. Soc., Jour. 22: 305. ♂.
Ageniella cupidella Banks, 1915. Canad. Ent. 47: 400. ♀.

pallida Banks. Iowa, Nebr., Kans., Tex.
Ageniella pallida Banks, 1945. Psyche 52: 106. ♀.

partita Banks. Transcont. in U. Austr. and L. Austr. Zones; Mexico (Durango, Puebla, Nayarit, Zacatecas, Hidalgo). Parasite: *Ceropales hatoda* Brim. Prey: *Gnaphosa sericata* (Koch), *Zelotus* sp., *Arctosa littoralis* (Hentz), *A.* sp., *Pardosa falcifera* Camb.
Ageniella partita Banks, 1919. Mus. Compar. Zool., Bul. 63: 244. ♂.
Alasagenia rubineus Dreisbach, 1950. Ent. News. 61: 68. ♀.

Biology: Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 15 (parasite). —Townes, 1957. U. S. Natl. Mus., Bul. 209: 194 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 107 (prey transport). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 395 (prey). —Kurczewski, 1963. Fla. Ent. 46: 209 (prey transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 7-8 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 369 (prey).

seminole Townes. Fla.
Ageniella (*Ageniella*) *seminole* Townes, 1957. U. S. Natl. Mus., Bul. 209: 196. ♀, ♂.

submetallica (Banks). Tex. (Austin).
Pseudagenia submetallica Banks, 1917. Mus. Compar. Zool., Bul. 61: 108. ♀.

utilis delicata Banks. D. C., Va., S. C.
Ageniella delicata Banks, 1944. Mus. Compar. Zool., Bul. 94: 174. ♂.
Ageniella restricta Banks, 1944. Mus. Compar. Zool., Bul. 94: 175. ♂.

utilis utilis (Cameron). Fla., La., Tex.; Mexico (Tabasco), Panama.
Pseudagenia utilis Cameron, 1891. Biol. Cent.-Amer., Hym. v. 2, p. 170. ♀.
Ageniella obscura Banks, 1925. Mus. Compar. Zool., Bul. 67: 331. ♀.

vogeli Townes. Carol. Fauna, Pa. to Ga., Kans. Prey: *Lycosa avara* (Keys.), juv.
Ageniella (*Ageniella*) *vogeli* Townes, 1957. U. S. Natl. Mus., Bul. 209: 202. ♀, ♂.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 203 (prey).

Genus AGENIELLA Subgenus AMERAGENIA Banks

Ameragenia Banks, 1945. Bol. Ent. Venezolana 4: 125.
Type-species: *Ameragenia irene* Banks. Monotypic.

Pseudageniella Haupt, 1959. Nova Acta Leopoldina 21, no. 141: 22-23.
Type-species: *Pompilus rusticus* Fabricius. Orig. desig.
Allageniella Haupt, 1959. Nova Acta Leopoldina 21, no. 141: 23.
Type-species: *Allageniella obsoleta* Haupt. Orig. desig.
Brachyagenia Haupt, 1959. Nova Acta Leopoldina 21, no. 141: 25.
Type-species: *Brachyagenia nigra* Haupt. Orig. desig.
Parageniella Haupt, 1959. Nova Acta Leopoldina 21, no. 141: 26.
Type-species: *Priocnemis rufofemoratus* Taschenberg. Orig. desig.

fasciata Townes. Tex. (Brownsville); Mexico (Cordoba).
Ageniella (*Ameragenia*) *fasciata* Townes, 1957. U. S. Natl. Mus., Bul. 209: 217. ♀.

salti (Banks). Fla.; Cuba. Prey: *Clubiona* spp.
Priocnemella salti Banks, 1928. Studies on Cuban Insects, v. 1, p. 6. ♀.
Priocnemis osceola Banks, 1939. Canad. Ent. 71: 230. ♀.

Biology: Townes, 1957. U. S. Natl. Mus., Bul. 209: 219 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 8 (prey).

striga Townes. Tex. (Brownsville).
Ageniella (*Ameragenia*) *striga* Townes, 1957. U. S. Natl. Mus., Bul. 209: 216. ♀.

Genus PRIOCNEMELLA Banks

Priocnemis subg. *Priocnemella* Banks, 1925. Mus. Compar. Zool., Bul. 67: 337.
Type-species: *Priocnemis* (*Priocnemella*) *fairchildi* Banks. Desig. by Pate, 1946.
Eragenia Banks, 1946. Mus. Compar. Zool., Bul. 96: 421.
Type-species: *Eragenia infelix* Banks. Orig. desig.
Cosmagenia Haupt, 1959. Nova Acta Leopoldina 21, no. 141: 27-28.
Type-species: *Agenia amabilis* Taschenberg. Orig. desig.

tabascoensis (Cameron). South Tex. to Ecuador.
Pseudagenia tabascoensis Cameron, 1891. Biol. Cent.-Amer., Hym., v. 3, p. 172. ♂.
Ageniella rufula Banks, 1945. Bol. Ent. Venezolana 4: 117. ♀.

Subfamily POMPILINAE

Revision: Evans, 1966. Amer. Ent. Soc., Mem. 20: 1-442, 2 text figs., 80 maps, 11 pls. (Mexican and Cent. Amer. spp.; includes records and synonymy of some spp. north of Mexico).

Tribe APORINI

Wasps of this tribe, so far as known, prey upon trapdoor spiders (Ctenizidae); the burrow of the spider is utilized as a nest by the wasp.

Revision: Bradley, 1944. Amer. Ent. Soc., Trans. 70: 32-139 (New World spp.).

Genus EPIPOMPILUS Kohl

Epipompilus Kohl, 1885. K. K. Zool.-Bot. Ges. Wien, Verh. 34: 57.
Type-species: *Epipompilus maximiliani* Kohl. Desig. by Ashmead, 1900.
Aulocostethus Ashmead, 1902. Canad. Ent. 54: 133.
Type-species: *Aulocostethus bifasciatus* Ashmead. Orig. desig.
Epicostethus Banks, 1947. Mus. Compar. Zool., Bul. 99: 445.
Type-species: *Epicostethus williamsi* Banks. Orig. desig.

Revision: Evans, 1961. Psyche 68: 25-37.

pulcherrimus (Evans). Fla. (Royal Palm Hammock in Everglades Natl. Park); Bahamas (Andros Is.).
Aulocostethus pulcherrimus Evans, 1955. Ent. News 66: 150. ♀.

Genus APORUS Spinola

Genus APORUS Subgenus APORUS Spinola

Aporus Spinola, 1808. Insectorum Liguriae, v. 2, p. 5.
Type-species: *Aporus bicolor* Spinola. Desig. by Latreille, 1810.
Actenopoda Ashmead, 1902. Canad. Ent. 34: 88.
Type-species: *Actenopoda rileyi* Ashmead, Orig. desig. (=*Planiceps niger* Cresson).
Melanaporus Ashmead, 1902. Canad. Ent. 34: 132.
Type-species: *Planiceps euferalis* Fox. Orig. desig.
Odontaporus Bradley, 1944. Amer. Ent. Soc., Trans. 70: 110.
Type-species: *Planiceps notabilis* Smith. Orig. desig.

calcaratus (Fox). S. Fla.
Planiceps calcaratus Fox, 1893. Canad. Ent. 25: 115. ♂.

concolor (Smith). Tex. to Calif., s. to Costa Rica.
Planiceps concolor Smith, 1860. Jour. Ent. 1: 80. ♀.
Pompilus monticola Cameron, 1893. Biol. Cent.-Amer., Hym. 2: 190. ♂.

luxus assimilis (Banks). U. Sonor. and Transit. Faunas, Calif. and Utah to B. C. and Idaho.
Planiceps assimilis Banks, 1917. Mus. Compar. Zool., Bul. 61: 100. ♀.

luxus luxus (Banks). L. Sonor. Fauna of Calif., Ariz. Ecology: Occurs in sandy areas.
Planiceps luxus Banks, 1914. N. Y. Ent. Soc., Jour. 22: 304. ♀, ♂.

niger (Cresson). Carol. and Austrorip. Faunas, Tex. and Fla. to Nebr., Ill., south. Ont. and Mass.
Planiceps niger Cresson, 1867. Amer. Ent. Soc., Trans. 1: 136. ♀. Preocc. in *Pompilus*.
Planiceps minor Fox, 1893. N. Y. Ent. Soc., Jour. 1: 55. ♂.
Planiceps dubius Fox, 1893. N. Y. Ent. Soc., Jour. 1: 55. ♂.
Planiceps clericus Dalla Torre. 1897. Cat. Hym., v. 8, p. 281. N. name.
Planiceps compressus Banks, 1917. Mus. Compar. Zool., Bul. 61: 99. ♀.
Aporus (*Aporus*) *hermes* Bradley, 1944. Amer. Ent. Soc., Trans. 70: 94. ♀, ♂.

Taxonomy: Evans, 1956. Ent. News. 67: 6 (Syn. of *hermes*).

notabilis prolongatus Evans. South. Tex.; Mexico (Tamaulipas, Nuevo Leon, Durango, Veracruz). Typical *notabilis* (Sm.) ranges from south. Mexico to Costa Rica.
Aporus (*Aporus*) *notabilis prolongatus* Evans, 1966. Amer. Ent. Soc., Mem. 20: 57. ♀, ♂.

notabilis pulchritarsis (Cameron). South. Ariz. to Oaxaca and Yucatan.
Pompilus (*Planiceps*) *pulchritarsis* Cameron, 1893. Biol. Cent.-Amer., Hym. 2: 185. ♀.
Planiceps bequaerti Banks, 1931. Brooklyn Ent. Soc., Bul. 26: 131. ♀. Intergrade with typical *notabilis* (Sm.).
Planiceps yavapai Banks, 1933. Psyche 40: 1. ♀.

Unplaced Taxa of APORUS Subgenus APORUS Spinola

concolor (Patton). Kans.
Planiceps concolor Patton, 1879. U. S. Geol. Geog. Survey, Bul. 5: 367. ♀.

feralis (Cresson). Tex.
Planiceps feralis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 207. "♀" = ♂.

Nomen Nudum in APORUS Subgenus APORUS Spinola

Actenopoda rileyi Ashmead, 1902. Canad. Ent. 34: 88.

Genus APORUS Subgenus PLECTRAPORUS Bradley

Aporus subg. *Plectraporus* Bradley, 1944. Amer. Ent. Soc., Trans. 70: 97.
Type-species: *Planiceps hirsutus* Banks. Orig. desig.

hirsutus (Banks). Oreg. and Idaho to Calif. and Ariz.; Mexico (Baja California). Ecology: Nests in sand dunes in burrows of trapdoor spider prey. Prey: *Aptostichus* sp., prob. *stanfordianus* Sm.
Planiceps hirsutus Banks, 1917. Mus. Compar. Zool., Bul. 61: 99. ♀.

Biology: Williams, 1928. Hawaii. Sugar Planter's Assoc. Expt. Sta., Ent. Ser., Bul. 19: 135-140, figs. 201, 204 (hunting behavior).

Genus CHELAPORUS Bradley

Chelaporus Bradley, 1944. Amer. Ent. Soc., Trans. 70: 116.
Type-species: *Pedinaspis anomala* Banks. Orig. desig.

anomalus (Banks). Austrorip. Fauna of Tex.; Mexico south to Veracruz.
Pedinaspis anomala Banks, 1917. Mus. Compar. Zool., Bul. 61: 100. ♀.

Genus ALLAPORUS Banks

Allaporus Banks, 1933. Psyche 40: 2.
Type-species: *Planiceps pulchella* Banks. Orig. desig. (=*Aporus rufiventris* Cresson).

aurulentus Evans. Ariz. (Cochise Co.).
Allaporus aurulentus Evans, 1966. Amer. Ent. Soc., Mem. 20: 78. ♀, ♂.

fascipennis Evans. Tex. (Cameron Co.).
Allaporus fascipennis Evans, 1959. Kans. Ent. Soc., Jour. 32: 29. ♀, ♂.

pulchellus (Banks). Transcont. in U. S., Pa. to Oreg. in U. and L. Austr. Zones, south in Mexico to Campeche.
Planiceps pulchella Banks, 1910. N. Y. Ent. Soc., Jour. 18: 123. ♀.
Planiceps hesperus Banks, 1929. Psyche 36: 327. ♀, ♂.
Euplaniceps aquilonaris Dreisbach, 1952. Ent. News 63: 95, 3 figs. ♂.

rufiventris (Cresson). Tex. and southeast. Ariz. south to Morelos and Michoacan.
Aporus rufiventris Cresson, 1872. Amer. Ent. Soc., Trans. 4: 207. ♀. Preocc. in *Pompilus*.
Aporus minimus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 207. ♂.
Pompilus rufiventricosus Dalla Torre, 1897. Cat. Hym., v. 8, p. 318. N. name.
Allaporus mexicanus Evans, 1950. Ent. News 61: 3. ♀.

smithianus (Cameron). South. Tex., Ariz., Calif. south to Morelos and Veracruz.
Pompilus (*Aporus*) *smithianus* Cameron, 1893. Biol. Cent.-Amer., Hym. 2: 191, pl. 11, fig. 9. ♀.
Allaporus amabilis Evans, 1950. Ent. News 61: 2. ♀.

Genus PSORTHASPIS Banks

Pedinaspis subg. *Psorthaspis* Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 231.
Type-species: *Ferreola laevifrons* Cresson. Orig. desig.
Idopedinaspis Haupt, 1930. Berlin Zool. Mus., Mitt. 16: 724, 783.
Type-species: *Ferreola laevifrons* Cresson. Desig. by Haupt, 1937.
Idiopedinaspis (!) Neave, 1939. Nomencl. Zool. 2: 762.
Dicyrtomalis Bradley, 1944. Notulae Nat. 145: 11.
Type-species: *Pompilus connexus* Cresson. Orig. desig.

Taxonomy: Evans, 1954. Amer. Mus. Novitates 1662: 14-17 (keys to males, and all black females).

australis (Banks). Tex.
Pedinaspis australis Banks, 1910. N. Y. Ent. Soc., Jour. 18: 122. ♂.

brimleyi (Malloch). Austrorip. Fauna, Tex., Ark. to N. C.
Pedinaspis brimleyi Malloch, 1928. Ent. Soc. Wash., Proc. 30: 101. ♀.

legata (Cresson). Austrorip. Fauna, Tex., Kans., and Fla. to Tenn. and Md. Ecology: Occurs in woods.
Pompilus (?) *legatus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 109. ♀.

luctuosa (Banks). Tex.
Pedinaspis luctuosa Banks, 1910. N. Y. Ent. Soc., Jour. 18: 123. ♀.

macronotum arizonensis Dreisbach. South. Ariz. Typical *macronotum* (Kohl) is Mexican.
Psorthaspis arizonensis Dreisbach, 1950. Brooklyn Ent. Soc., Bul. 45: 119. ♀.

macronotum cressoni Bradley. Tex. south in Mexico to Veracruz.
Psorthaspis levis Bradley, 1944. Amer. Ent. Soc., Trans. 70: 43. ♂.

Psorthaspis nahuatlensis Bradley, 1944. Amer. Ent. Soc., Trans. 70: 46, pl. 3, figs. 2, 13, 26. ♂.

Psorthaspis cressoni Bradley, 1944. Amer. Ent. Soc., Trans. 70: 59. ♀, ♂.

Taxonomy: Evans, 1954. Amer. Mus. Novitates 1662: 11 (as first reviser placed *levis* as syn. of *cressoni*).

magna (Banks). Tex. (Lee Co.).

Aporus magnus Banks, 1910. N. Y. Ent. Soc., Jour. 18: 126. ♂.

mariae (Cresson). Austrorip. and Carol. Faunas, Fla. and Tenn. to Ill. and N. J. Ecology: Occurs in woods.

Pompilus (?) *mariae* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 108. ♀.

Pedinaspis mariae var. *antennalis* Banks, 1921. Ent. Soc. Amer., Ann. 14: 21. ♀.

Taxonomy: Krombein, 1956. Ent. Soc. Wash., Proc. 58: 155 (sex association).

nigriceps (Banks). N. Mex., Ariz., Utah.

Pedinaspis nigriceps Banks, 1933. Psyche 40: 2. ♀.

planata (Fox). Calif., Utah, Ariz.; Mexico (Baja California). Prey: *Bothriocyrtum californicum* (Camb.).

Planiceps planatus Fox, 1892. Ent. News 3: 171. ♀.

Pompilus aequus Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 99. ♀.

Sophropompilus tumifrons Banks, 1917. Mus. Compar. Zool., Bul. 61: 103. ♂.

Pedinaspis bucephala Malloch, 1928. Ent. Soc. Wash., Proc. 30: 101. ♂.

Pedinaspis albocaudata Malloch, 1928. Ent. Soc. Wash., Proc. 30: 101. ♂.

Psorthaspis morosa Bradley, 1944. Amer. Ent. Soc., Trans. 70: 42. ♀.

Biology: Davidson, 1915. Ent. News 16: 233 (prey). —Jenks, 1938. Natl. Geog. Mag. 74: 807-828.

portiae conocephala Bradley. Tex.; Mexico (Nuevo Leon).

Psorthaspis conocephala Bradley, 1944. Amer. Ent. Soc., Trans. 70: 67. ♂.

portiae portiae (Rohwer). South. Ariz. to Sinaloa and Jalisco, east to Nuevo Leon.

Pedinaspis (*Psorthaspis*) *portiae* Rohwer, 1920. U. S. Natl. Mus., Proc. 57: 228. ♀.

sanguinea (Smith). Austrorip. Fauna, Tex. and Fla. to Kans. and N. C.

Ferreola sanguinea Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 170. ♀.

Parapompilus contiguus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 206. ♀.

texana (Cresson). Austrorip. Fauna of Tex.

Parapompilus texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 206. ♀.

vicina (Cresson). Tex.; Mexico (Tamaulipas).

Parapompilus vicinus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 206. ♀. Preoccupied in *Pompilus*.

Pompilus bombinator Dalla Torre, 1897. Cat. Hym., v. 8, p. 277. N. name.

Tribe POMPILINI

Revision: Evans, 1950-51. Amer. Ent. Soc., Trans. 75: 133-270; 76: 207-361; 77: 203-340.

Taxonomy: Dreisbach, 1949. Ent. Amer. (n. s.) 29: 5-12 (key to N. Amer. and Antillean genera).

Genus TASTIOTENIA Evans

Tastiotenia Evans, 1950. Amer. Ent. Soc., Trans. 75: 150.
Type-species: *Tastiotenia festiva* Evans. Orig. desig.

festiva Evans. South. Calif. to west. Tex.; Mexico (Sonora). Ecology: Occurs on sandy deserts; probably nests on side of pre-existing burrow in sand. Prey: *Latrodectus mactans* F.

Tastiotenia festiva Evans, 1950. Amer. Ent. Soc., Trans. 75: 152. ♀.

Taxonomy: Evans, 1954. Pan-Pacific Ent. 30: 103. ♂.

Biology: Evans, 1961. Southwest. Naturalist 6: 51-52 (prey, probable nest site).

Genus CHALCOCHARES Banks

Psammochares subg. *Chalcochares* Banks, 1917. Mus. Compar. Zool., Bul. 61: 107.
Type-species: *Psammochares hirsutifemur* Banks. Monotypic.
Anotochares Banks, 1939. Canad. Ent. 71: 225, 228.
Type-species: *Anotochares engleharti* Banks. Monotypic.

engleharti (Banks). Tex.; Mexico east of Sierra Madre Occidentale, south to Hidalgo.
Anotochares engleharti Banks, 1939. Canad. Ent. 71: 228. ♀.

hirsutifemur (Banks). L. Sonor. Fauna, west. Tex. to Calif.; south in Mexico to Zacatecas.
Psammochares hirsutifemur Banks, 1914. N. Y. Ent. Soc., Jour. 22: 304. ♀.

Genus EVAGETES Lepeletier

Evagetes Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 390.
Type-species: *Evagetes bicolor* Lepeletier. Monotypic (=*Aporus dubius* Vander Linden).
Sophropompilus Howard, 1901. Insect Book, pl. VII, fig. 13.
Type-species: *Pompilus ingenuus* Cresson. Monotypic.
Nannopompilus Ashmead, 1902. Canad. Ent. 34: 82.
Type-species: *Nannopompilus argenteus* Ashmead. Monotypic (=*Pompilus parvus* Cresson).
Leuchimon Haupt, 1930. Zool. Mus. Berlin, Mitt. 16: 792.
Type-species: *Leuchimon palmatus* Haupt. Orig. desig.
Psammocharoides Moczar, 1946. Hist. Nat. Mus. Natl. Hungarici, Ann. 39: 114.
Type-species: *Pompilus crassicornis* Shuckard. Orig. desig.
Streptosella Dreisbach, 1950. Amer. Midland Nat. 43: 570.
Type-species: *Streptosella steyskali* Dreisbach. Orig. desig.
Evagetes subg. *Contemptevagetes* Wolf, 1970. Beitr. z. Ent. 20: 52.
Type-species: *Pompilus contemptus* Tournier. Orig. desig.
Evagetes subg. *Carinevagetes* Wolf, 1970. Beitr. z. Ent. 20: 52.
Type-species: *Pompilus crassicornis* Shuckard. Orig. desig.

Members of this genus are social parasites of other Pompilini. The females seek the freshly filled nests of their hosts, usually in sandy places, dig into them, destroy the host egg, deposit one of their own, and refill the burrow.

asignus Dreisbach. Mass. south to Fla., west to Mich., Alta., Colo., Tex.; Mexico (Chihuahua, Durango, Zacatecas).
Evagetes asignus Dreisbach, 1956. Ent. News 67: 147, 2 figs. ♂, ♀.

calefactus Evans. Calif., Ariz., Tex., Mont. ?
Evagetes calefactus Evans, 1966. Amer. Ent. Soc., Mem. 20: 136. ♀, ♂.

crassicornis consimilis (Banks). Canad. and Transit. Faunas, Yukon and Man. to higher parts of N. Mex. and Calif.
Pompiloides consimilis Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 228. ♀, ♂.

crassicornis crassicornis (Shuckard). Canad. Zone, N. S. and Yukon to Wash., N. Dak., Mich., and Pa.; Europe.
Pompilus crassicornis Shuckard, 1835. Essay on Indig. Fossor. Hym., p. 63. ♀.
Pompiloides rufibasis Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 226. ♀.
Streptosella michiganensis Dreisbach, 1950. Amer. Midland Nat. 43: 571. Nom. nud., a lapsus for *steyskali*.
Streptosella steyskali Dreisbach, 1950. Amer. Midland Nat. 43: 571, figs. 1, 2. ♂.
Streptosella albertensis Dreisbach, 1950. Amer. Midland Nat. 43: 572, figs. 3, 4. ♂.
Streptosella stricklandi Dreisbach, 1950. Amer. Midland Nat. 43: 574, figs. 5, 6. ♂.

hyacinthinus (Cresson). Transcont., L. Austr. to Transit. Zone. Ecology: Sandy places, especially along streams.
Pompilus hyacinthinus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 90. ♀.
Pompilus brevicornis Cresson, 1867. Amer. Ent. Soc., Trans. 1: 90. ♂.
Pompilus castaneus Provancher, 1882. Nat. Canad. 13: 35, 39. ♂.
Psammochares (*Arachnophila*) *scudderi* Banks, 1917. Mus. Compar. Zool., Bul. 61: 104, 107. ♀.

Sophropompilus bradleyi Banks, 1919. Mus. Compar. Zool., Bul. 63: 237. ♀.
Nannopompilus texanus Banks, 1944. Mus. Compar., Zool., Bul. 94: 170. ♀.

ingenuus (Cresson). Transcont. in U. Austr. and lower part of Transit. Zone; Mexico (Chihuahua, Mexico). Ecology: Occurs in sandy places, and on flowers of *Solidago* and *Daucus carota*.
Pompilus ingenuus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 89. ♀, ♂.
Pompilus brevicornis Taschenberg, 1869. Ztschr. Gesell. Naturw. 34: 50. ♂, ♀. Preocc.
Pompilus Fiorentinii Dalla Torre, 1897. Cat. Hym., v. 8, p. 289. N. name.

macswaini Evans. Calif., Wyo.
Evagetes macswaini Evans, 1957. Pan-Pacific Ent. 33: 181, fig. 1. ♂, ♀.

mohave (Banks). N. Y. to Fla., through southern U. S. to Calif., in western Mexico south to Guerrero and Puebla. Host: *Anoplius apiculatus autumnalis* (Bks.), *A. americanus juxtus* (Cr.).
Sophropompilus quadrispinosus Banks, 1919. Canad. Ent. 51: 82. Preocc. in *Evagetes*.
Sophropompilus mohave Banks, 1933. Psyche 40: 6. ♀.

Taxonomy: Krombein, 1953. Wasmann Jour. Biol. 10: 320-323. ♀, ♂.

Biology: Evans, Lin and Yoshimoto, 1953. N. Y. Ent. Soc., Jour. 61: 72-77 (hosts).

padrinus minusculus (Banks). Austrorip. to Transit. Fauna, Tex. and Fla. to Man., Mich., Ont., and N. H.; Mexico (Tamaulipas, Coahuila). Host: *Episyron q. quinquenotatus* (Say).
Psammochares minusculus Banks, 1910. N. Y. Ent. Soc., Jour. 18: 118. ♀.

Biology: Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 8-9 (host).

padrinus padrinus (Viereck). B. C., N. W. T. and Man. south to Baja California and, at moderate to high elevations, to El Salvador. Ecology: Occurs in sandy areas.
Anoplius (*Pompilinus*) *padrinus* Viereck, 1903 (1902). Acad. Nat. Sci. Phila., Proc. 54: 734. ♂.

parvus (Cresson). Transcont. in Canadian to U. Austral Zones, Yukon, N. W. T. and N. S. to Calif. and Ga., south to Costa Rica. Ecology: Occurs in sandy places.
Pompilus parvus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 453. ♀.
Pompilus subviolaceus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 91. ♀.
Pompilus argenteus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 93. ♂.
Nannopompilus argenteus Ashmead, 1902. Canad. Ent. 34: 82.
Pompiloides minora Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 227. ♀.

subangulatus (Banks). Transcont., Huds. to Transit. Zone. Ecology: Occurs in sandy places, and on flowers of *Solidago* and *Spiraea*.
Sophropompilus subangulatus Banks, 1919. Mus. Compar. Zool., Bul. 63: 237. ♀, ♂.
Psammochares (*Sophropompilus*) *tebemi* Brimley, 1936. Elisha Mitchell Sci. Soc., Jour. 52: 127. ♀.

Genus AGENIOIDEUS Ashmead

Genus AGENIOIDEUS Subgenus RIDESTUS Banks

Ridestus Banks, 1912 (1911). N. Y. Ent. Soc. Jour. 19: 223.
Type-species: *Psammochares transversalis* Banks. Orig. desig. (=*Psammochares biedermani* Banks).

biedermani (Banks). L. Sonor. Fauna, entering U. Sonor., Kans., Utah, Oreg., Mont. ?, south into Mexico (Baja California, Chihuahua, Nuevo Leon, Hidalgo). Prey: *Loxosceles devius* Gertsch and Mulaik.
Pompilus mexicanus Taschenberg, 1869. Ztschr. Ges. Naturw. 34: 52. ♀. Preocc.
Psammochares biedermani Banks, 1910 (June). N. Y. Ent. Soc., Jour. 18: 116. ♂.
Psammochares striatulus Banks, 1910 (June). N. Y. Ent. Soc., Jour. 18: 119. ♀.
Psammochares transversalis Banks, 1910 (Dec.). Psyche 17: 248. ♀.
Arachnophroctonus anahuacensis Bradley, 1944. Notulae Nat. 145: 10. N. name.

Biology: Evans, 1959. Kans. Ent. Soc., Jour. 32: 76 (prey transport).

Genus AGENIOIDEUS Subgenus AGENIOIDEUS Ashmead

Agenioideus Ashmead, 1902. Canad. Ent. 34: 85.
Type-species: *Pompilus humilis* Cresson. Orig. desig.
Aporoideus Ashmead, 1902. Canad. Ent. 34: 86.
Type-species: *Pompilus sericeus* Vander Linden. Orig. desig.

humilis (Cresson). Transit. to L. Austr. Zones, N. B. and B. C. to Fla. and Calif., south to Panama. Ecology: Nests in sandy places, and around cliffs, walls, and buildings in pre-existing crevices. Parasite: Bombyliidae sp.; Mutillidae sp. Prey: *Acacesia hamata* (Hentz), *Araneus cornutus* McC., *A.* sp., *Neosconella pegnia* (Walck.), *Conepeira excelsa* (Bks.).
Pompilus humilis Cresson, 1867. Amer. Ent. Soc., Trans. 1: 91. ♀.

Taxonomy: Hurd, 1947. Pan-Pacific Ent. 23: 133. ♂.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 15 (prey). —Hurd, 1947. Pan-Pacific Ent. 23: 132 (nest, parasites). —Krombein, 1953. Brooklyn Ent. Soc., Bul. 48: 113-115 (prey, nest). —Eberhard, 1971 (1970). Psyche 77: 243-247 (prey hunting).

Genus AGENIOIDEUS Subgenus GYMNOCHARES Banks

Gymnochares Banks, 1917. Mus. Compar. Zool., Bul. 61: 107, 108.
Type-species: *Psammochares birkmanni* Banks. Desig. by Pate, 1946.

birkmanni (Banks). Transcont. in L. Austr. Zone, entering U. Austr. in West. N. J., Kans., Wyo., and Oreg. southward in Mexico to Oaxaca. Prey: *Herpyllus vasifer* (Walck.).
Psammochares birkmanni Banks, 1910. N. Y. Ent. Soc., Jour. 18: 116. ♂.
Gymnochares texana Banks, 1944. Mus. Compar. Zool., Bul. 94: 170. ♀.

Biology: Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 369 (prey).

Genus SERICOPOMPILUS Howard

Sericopompilus Howard, 1901. Insect Book, pl. XI, fig. 17.
Type-species: *Pompilus cinctipes* Cresson. Monotypic (=*Ceropales apicalis* Say).

angustatus (Cresson). L. and U. Austr. Zones of the Great Plains area; Tex. and N. Mex. to Wyo., S. Dak., and Mich.; in Mexico south to Jalisco and Guanajuato in Central Plateau.
Pompilus angustatus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 452. ♀.
Psammochares fulvoapicalis Banks, 1910. N. Y. Ent. Soc., Jour. 18: 117. ♀.
Sericopompilus fumosus Banks, 1933. Psyche 40: 5. ♂.

apicalis (Say). Austrorip. and Carol. Faunas, Tex. and Fla. to Nebr., Mich., and Conn. Ecology: Nests in sand and soft earth. Parasite: Miltogrammini sp. Prey: *Phidippus audax* Hentz, *P. audax* var. *bryantae* Kast., *P. whitmanii* Peckh., *P. putnami* Peckh., *P.* sp., *Paraphidippus chrysis* Walck., *Thiodina sylvana* (Hentz); *Thomisus* sp., *Xysticus ferox* (Hentz), *X. funestus* Keys., *Philodromus washita* Bks.; *Aysha gracilis* (Hentz); Lycosidae sp.; *Oxyopes scalaris* Hentz; *Eriophora ravilla* (Koch), *Acanthepeira stellata* (Walck.), *Eustala anastera* (Walck.), *Neoscona arabesca* (Walck.), *N.* sp.
Ceropales apicalis Say, 1835. Boston Jour. Nat. Hist. 1: 366. ♂.
Pompilus fuscipennis Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 434. ♀. Preocc.
Pompilus sordidus Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 160. ♀. N. name.
Pompilus cinctipes Cresson, 1867. Amer. Ent. Soc., Trans. 1: 102. ♂. N. name.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 140-144 (prey, nest). —Krombein, 1953. Ent. Soc. Wash. Proc. 55: 116-117 (prey, parasite). —Krombein, 1955. Ent. Soc. Wash., Proc. 57: 149 (prey). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28:17-18 (prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 101 (prey). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 193 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 89-91 (prey, nest, parasite, life history). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 66 (prey).

neotropicalis (Cameron). L. Austr. Zone, Calif., Ariz., Kans., Ark., Tex., Ala., Ga., Fla., and N. C., south to Costa Rica.
Pompilus neotropicalis Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 203. ♀.

Pompilus guatemalensis Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 206. ♂.
Psammochares posticatus Banks, 1910. N. Y. Ent. Soc., Jour. 18: 119. ♂.
Psammochares fuscipennis var. *georgiana* Banks, 1911. Ent. Soc., Wash., Proc. 13: 238. ♀.

Genus EPISYRON Schiodte

Episyron Schiodte, 1837. Kroyer's Naturhist. Tidsskr. 1: 341.
Type-species: *Sphex rufipes* Linnaeus. Monotypic.
Spilopompilus Ashmead, 1902. Canad. Ent. 34: 81.
Type-species: *Pompilus biguttulatus* (!) Fabricius. Orig. desig.
Epizuron (!) Ashmead, 1902. Canad. Ent. 34: 82.

These are extremely active wasps, two of which have been dubbed the "Tornado Wasp" and the "Hurricane Wasp" by the Peckhams. They nest in short burrows in sand, which they provision invariably with orb-weavers (Araneidae). They visit flowers of many kinds.

biguttatus biguttatus (Fabricius). Temperate N. Amer. east of the Rockies, Tex. and Fla. to Labr. and N. W. T. Ecology: Nests in sand. Parasite: Miltogrammini sp. Prey: *Araneus diadematus* Clerck, *A.* spp., *Eustala anastera* (Walck.), *Metepeira labyrintha* (Hentz), *Neoscona benjamina* (Walck.), *N.* sp., near *sacra* (Walck.), *N.* sp.
Pompilus biguttatus Fabricius, 1798. Sup. Ent. System., p. 249. ♀.
Episyron atrytone Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 229. ♀.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 138-140 (prey transport). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 9-10 (prey, nest, parasite). —Krombein, 1953. Wasmann Jour. Biol. 264-266 (nest, prey, parasite). —Krombein, 1953. Ent. Soc. Wash., Proc. 55: 115-116 (nest, prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 93 (prey). —Kurczewski, 1963 (1962). Brooklyn Ent. Soc., Bul. 57: 88 (prey, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 9 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 369 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 66 (prey).

biguttatus californicus (Banks). U. Sonor. to Canad. Fauna, Calif. to B. C., Alta., and S. Dak. Prey: *Neoscona naiba* Chamb. and Gertsch.
Psammochares californica Banks, 1910. N. Y. Ent. Soc., Jour. 18: 117. ♂.

Biology: Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 396 (prey).

biguttatus montezuma (Cameron). Ariz., N. Mex., west. Tex. south in Mexico to Morelos, Guerrero and Veracruz. Prey: *Neoscona naiba* Chamb. and Gertsch.
Pompilus montezuma Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 193, pl. 11, fig. 10. ♀.
Episyron arizonica Banks, 1933. Psyche 40: 5. ♀.

Biology: Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 396 (prey).

conterminus posterus (Fox). N. Y. to Fla., west to south. Calif., Ill., south to Costa Rica. Ecology: Nests in sand. Parasite: *Senotainia* sp., Miltogrammini sp.; *Evagetes* sp. Prey: *Eustala anastera* (Walck.), *E. cepina* (Walck.), *E.* sp., *Araneus ozarkensis* (Arch.), *A.* sp., *Larinia* sp., *Neoscona arabesca* (Walck.), *N. vertebrata* McCook, *N.* sp., *Neosconella pegnia* (Walck.), *Argiope aurantia* Luc., *Drexelia directa* (Hentz), *Gea heptagon* (Hentz). Typical *conterminus* (Sm.) occurs in South America.
Pompilus posterus Fox, 1893 (May). Canad. Ent. 25: 115. ♀, ♂.
Pompilus exactus Cameron, 1893 (Sept.). Biol. Cent.-Amer., Hym., v. 2, p. 202. ♀, ♂.
Pompilus porus Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 98. ♀, ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 439 (larva).

Biology: Evans, 1950. Amer. Ent. Soc., Trans. 75: 225 (prey). —Krombein, 1953. Wasmann Jour. Biol. 10: 266-268 (prey, nest, parasite). —Krombein, 1955. Ent. Soc. Wash., Proc. 57: 149-150 (prey, nest). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 102 (prey, nest, parasite). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 194 (prey, nest). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 396 (prey). —Kurczewski, 1963. Fla. Ent. 46: 210-212 (prey, nest). —Krombein, 1964. Amer. Mus. Novitates 2201: 10-11 (prey, nest).

—Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 9 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 369 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 66-67 (prey, nest, parasite).

oregon Evans. Transit. and Canad. Fauna, Yukon and Alta. to Wyo., Colo. and Calif. Prey: *Araneus trifolium* (Hentz).

Episyron oregon Evans, 1950. Amer. Ent. Soc., Trans. 75: 231. ♀, ♂.

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 481 (prey, transport).

quinquenotatus hurdi Evans. Transit. and U. Sonor. Fauna, B. C. and Alta. to Utah and Calif.; Mexico (Baja California). Prey: *Epeira* sp.

Episyron quinquenotatus hurdi Evans, 1950. Amer. Ent. Soc., Trans. 75: 221. ♀, ♂.

quinquenotatus quinquenotatus (Say). Canad. in U. Austr. Zone, N. S., Sask., and B. C. to Mont., Colo., Tex., and Ala. Ecology: Nests in sand. Parasite: *Senotainia trilineata* (Wulp). Prey: *Metazygia wittfeldae* (McC.), *Araneus cornutus* Clerck, *A. patagiatus* Clerck, *A. diadematus* Clerck, *A.* sp. near *diadematus* Clerck, *A. thaddeus* (Hentz), *A. marmoreus* Clerck, *A. ozarkensis* (Arch.), *A.* sp., *Epeira displicata* Hentz, *E. foliata* Fourcr., *Singa eugeni* Levi, *Neoscona arabesca* (Walck.), *N. minima* (Camb.), *N.* sp., *Eustala anastera* (Walck.), *E. triflex* (Walck.), *E. cepina* (Walck.), *Allepeira stellata* (Walck.).

Pompilus 5-notatus Say, 1835. Boston Jour. Nat. Hist. 1: 304. ♀.

Pompilus griseus Provancher, 1882. Nat. Canad. 13: 35, 36. ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 439, fig. 46 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 126-138 (prey, nest). —Evans, 1950. Amer. Ent. Soc., Trans. 75: 220 (prey). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 102 (prey). —Kurczewski, 1961. Brooklyn Ent. Soc., Bul. 56: 24 (prey transport). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 63 (prey, nest). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 91-92 (prey, nest, parasite). —Evans, 1963. Ent. News 74: 238-239, fig. 2 (prey, nest). —Krombein, 1964. Brooklyn Ent. Soc., Bul. 58: 118 (prey, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 9-12 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 370 (prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 482 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 67 (prey).

snowi (Viereck). Transcont. in L. and U. Austr. Zones, n. to N. J., Ill., S. Dak., Mont., and Oreg.; Mexico (Baja California, Chihuahua, Durango). Parasite: Miltogrammini sp. Prey: *Neoscona benjamina* (Walck.), *Cyclosa conica* (Pall.).

Anoplius (*Pompilinus*) *snowi* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 202. ♂.

Psammochares maneei Banks, 1910. N. Y. Ent. Soc., Jour. 18: 117. ♀.

Episyron laevis Banks, 1933. Psyche 40: 4. ♀.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 10 (prey transport). —Krombein, 1953. Wasmann Jour. Biol. 10: 268-269 (prey, nest, parasite). —Krombein, 1953. Ent. Soc. Wash., Proc. 55: 116 (prey, nest).

Genus POECILOPOMPILUS Howard

Poecilopompilus Howard, 1901. Insect Book, pl. V. fig. 1, and pl. XI, fig. 18.
Type-species: *Pompilus navus* Cresson. Desig. by Ashmead, 1902 (= *Ceropales interrupta* Say).

Batozonus Howard, 1901. Insect Book, pl. XI, fig. 24.
Type-species: *Pompilus algidus* Smith. Monotypic.

Batazonus (!) Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 221, 224.

Eubatozonus Haupt, 1950. Explor. Parc Nat. Albert, Mission de Witte, fasc. 69, p. 52.
Type-species: *Eubatozonus pulcher* Haupt. Orig. desig.

Wasps of this genus, as in the closely related *Episyron*, prey exclusively upon Araneidae, and nest in sandy places; they are also frequent visitors on flowers.

algidus algidus (Smith). Austrorip. and Carol. Fauna, Tex. and Fla. to Mass., Mich., and N. Dak.

Pompilus algidus Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 158. ♀.

algidus coquilletti (Provancher). U. Sonor. Fauna, south. Calif. and N. Mex. to Utah and north. Calif.

Pompilus coquilletti Provancher, 1887. Addit. Corr. Fauna Ent. Canad., Hym., p. 261. ♂.
Batazonus (!) *flavipennis* Banks, 1921. Ent. Soc. Amer., Ann. 14: 20. ♀.

algidus marcidus (Smith). South. Tex. s. to Nicaragua.

Pompilus marcidus Smith, 1862. Jour. Ent. 1: 395. ♀.
Pompilus pygidialis Kohl, 1886. Zool.-Bot. Ges. Wien, Verhandl. 36: 314, 334. ♀.

algidus willistoni (Patton). S. Dak. and Colo. to N. Mex. and Ariz., s. in Mexico to Durango and Baja California.

Pompilus willistoni Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 352. ♀.

flavopictus flavopictus (Smith). South. Tex to Surinam and Colombia. Other subspp. occur in the Antilles and Brazil.

Pompilus flavopictus Smith, 1862. Jour. Ent. 1: 396. ♀.

interruptus cressoni (Banks). North. Va. and east. Ohio to Mass. Ecology: Nests in sand. Prey: *Epeira trifolium* Hentz, *Argiope trifasciata* (Forsk.).

Batazonus (!) *interruptus* var. *cressoni* Banks, 1944. Mus. Compar. Zool., Bul. 94: 167. ♀, ♂.

Biology: Evans, 1950. Amer. Ent. Soc., Trans. 75: 253 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 12-13 (prey, nest).

interruptus interruptus (Say). Transcont. in L. and U. Austr. Zones, north to N. J., Ohio, Mich., S. Dak., Utah, and south. Calif. Ecology: Nests in sand. Parasite: Miltogrammini sp. Prey: *Neoscona benjamina* (Walck), *N. vertebrata* McCook, *N.* sp., *Araneus cornutus* Cl., *A. trifolium* (Hentz), *Argiope aurantia* Luc., *A. trifasciata* (Forsk.), *Epeira foliata* (Fourcr.), *Acanthepeira stellata* Walck.; Lycosidae sp.

Ceropales interrupta Say, 1835. Boston Jour. Nat. Hist. 1: 365. ♂.
Pompilus navus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 105. ♀, ♂.
Pompilus ichneumoniformis Patton, 1879. U. S. Geol. Survey, Bul. 5: 351. ♀. Preocc.
Pompilus ichneumonoides Dalla Torre, 1897. Cat. Hym., v. 8, p. 295. N. name.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 438, figs. 26-30 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 152-153 (prey, nest). —Krombein, 1953. Wasmann Jour. Biol. 10: 269-272 (nest, prey, parasite). —Strandtmann, 1953. Kans. Ent. Soc., Jour. 26: 45-46 (prey). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (prey, nest). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 93-94 (nest, prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 13 (prey).

interruptus semiflavus Evans. Calif. (Central Valley).

Poecilopompilus interruptus semiflavus Evans, 1966. Amer. Ent. Soc., Mem. 20: 224. ♀, ♂.

Genus TACHYPOMPILUS Ashmead

Tachypompilus Ashmead, 1902. Canad. Ent. 34: 83
Type-species: *Tachypompilus abbotti* Ashmead. Orig. desig. (=*Sphex analis* Fabricius).
Arachnophroctonus Ashmead, 1902. Canad. Ent. 34: 83. Preocc.
Type-species: *Ceropales ferruginea* Say. Orig. desig.
Balanoderes Haupt, 1929. Berlin Zool. Mus., Mitt. 15: 119, 155.
Type-species: *Sphex analis* Fabricius. Desig. by Haupt, 1929.
Afropompilus Arnold, 1936. Transvaal Mus., Ann. 18: 107.
Type-species: *Pompilus ignitus* Smith. Orig. desig.
Zarachnophroctonus Pate, 1946. Amer. Ent. Soc., Trans. 72: 130. N. name.

Wasps of this genus occur around walls, stone piles, and buildings, where they nest in crevices, supplying the nest with Lycosid and Pisaurid spiders; they also visit flowers.

ferrugineus annexus (Banks). Tex.; northeast. Mexico ? Ecology: Nests in loose dry soil beneath house. Prey: *Lycosa rabida* (Walck.), *L. antelucana* Mont.
Arachnophroctonus ferrugineus var. *annexus* Banks, 1944. Mus. Compar. Zool., Bul. 94: 168. ♀.

Biology: Strandtmann, 1953. Kans. Ent. Soc., Jour. 26: 46-48, fig. 1 (nest, prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 87 (prey).

ferrugineus ferrugineus (Say). L. and U. Austr. Zones, east. Tex. and Fla. to N. J., Ohio, Minn., and Colo. Ecology: Nests in crevices in walls. Prey: *Lycosa helluo* Walck., *L. osceola* Wall., *L. rabida* Walck., *L.* spp.; *Dolomedes tenebrosus* Hentz, *D.* sp.
Ceropales ferruginea Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 334. ♂.

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 78-83 (prey, nest). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 12 (prey). —Evans, 1950. Amer. Ent. Soc., Trans. 75: 260 (prey). —Evans and Yoshimoto, 1962. Ent. Soc Amer., Misc. Pub. 3: 87 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 13 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 67 (prey).

ferrugineus nigrescens (Banks). North. Va. and west. N. Y. to N. H.
Arachnophroctonus ferrugineus var. *nigrescens* Banks, 1944. Mus. Compar. Zool., Bul. 94: 169. ♀, ♂.

ferrugineus torridus (Smith). South. parts of Tex., N. Mex., Ariz., and Calif.; Mexico s. to Chiapas.
Pompilus torridus Smith, 1862. Jour. Ent. 1: 396. ♀.
Arachnophroctonus ferrugineus var. *unicolor* Banks, 1944. Mus. Compar. Zool., Bul. 94: 168. ♀. Preocc.
Tachypompilus ferrugineus Yavapai Evans, 1950. Amer. Ent. Soc., Trans. 75: 263. N. name.

unicolor cerinus Evans. South. Calif., Utah, N. Mex. and Tex. s. to Costa Rica.
Tachypompilus unicolor cerinus Evans, 1966. Amer. Ent. Soc., Mem. 20: 235, map 41. ♀, ♂.

unicolor unicolor (Banks). L. and U. Sonor. Faunas, Calif. and Utah, Wyo., Idaho, and B. C.
Arachnophroctonus unicolor Banks, 1919. Mus. Compar. Zool., Bul. 63: 239, 240. ♀.
Arachnophroctonus latifrons Banks, 1939. Canad. Ent. 71: 229. ♀, ♂.

Genus ANOPLIUS Dufour

Genus ANOPLIUS Subgenus LOPHOPOMPILUS Radoszkowski

Lophopompilus Radoszkowski, 1887. Soc. Ent. Rossica, Horae 21: 42.
Type-species: *Pompilus grandis* Eversmann. Desig. by Ashmead, 1902 (=*Sphex samariensis* Pallas).
Pompilogaster Howard, 1901. Insect Book, pl. V, fig. 19.
Type-species: *Pompilus aethiops* Cresson. Monotypic.
Pompilogastra Ashmead, 1902. Canad. Ent. 34: 81.
Type-species: *Pompilus aethiops* Cresson. Orig. desig.

Wide-ranging, strong-flying species which prey chiefly on Lycosidae and nest in tunnels in sand or soft earth. They are frequent visitors to flowers and occasionally come to light at night.

Revision: Regan, 1923. Ent. Soc. Amer., Ann. 16: 177-194.

aethiops (Cresson). N. S. to B. C. s. to Ga., Tex., Calif. in Transition to L. Austral Zones; Mexico (higher altitudes), Guatemala. Ecology: Occurs in fields, meadows, and prairies; commonly visits flowers; nests in pre-existing crevices in soft soil. Prey: *Lycosa frondicola* Em., *L. helluo* Walck., *L. gulosa* Walck., *L. carolinensis* Walck., *L. santrita* Chamb. and Ivie, *Schizocosa ocreata* (Hentz).
Pompilus aethiops Cresson, 1865. N. Y. Ent. Soc., Jour. 4: 451. ♂ (♀ misdet.).
Psammochares ilione Banks, 1910. Psyche 17: 249. ♀.
Lophopompilus azotus Banks, 1929. Psyche 36: 326. ♀.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 76: 217 (ecology, prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 70 (prey transport, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 13 (prey transport, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 46: 370 (prey transport). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 68 (prey).

atrox (Dahlbom). L. and U. Austr. Zones, N. Mex. and Fla. to S. Dak., Ont., and Mass. Ecology: Occurs in fields, meadows and open woods; nests in sand or soft soil. Prey: *Lycosa rabida* Walck., *Dolomedes tenebrosus* Hentz, *D. urinator* Hentz.

Pompilus atrox Dahlbom, 1843. Hym. Europaea, v. 1, p. 63. ♀.

Biology: Peckham and Peckham, 1900. Wis. Nat. Hist. Soc., Bul. 1: 87 (prey). —Evans, 1951. Amer. Ent. Soc., Trans. 76: 224 (ecology, prey). —Krombein, 1955. Ent. Soc. Wash., Proc. 57: 150 (prey). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 194 (prey).

bengtssoni (Regan). Austrorip. and Carol. Faunas, Tex. and Fla. to S. Dak., Mich., and Mass.

Lophopompilus bengtssoni Regan, 1923. Ent. Soc. Amer., Ann. 16: 185, 186. ♀, ♂.

carolina (Banks). Alleghanian Fauna, south. Que. to north. Ga. Ecology: Occurs in open woodlands, and on flowers of *Daucus carota;* nests in mammal burrows or in bare soil. Prey: *Wadotes hybridus* (Em.), *W.* sp.; *Amaurobius bennetti* (Blackw.).

Lophopompilus carolina Banks, 1921. Ent. Soc. Amer., Ann. 14: 20. ♀.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 442, fig. 50 (larva).

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 76: 222 (ecology, prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 53 (prey transport). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 63 (prey transport). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 70-71 (prey transport, nest). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 68 (prey).

cleora (Banks). P. E. I. to B. C., south to N. C., Ind., Tex., Ariz., mostly in U. and L. Austral Zones; Mexico (Baja California, Sonora, Jalisco, Puebla). Ecology: Nests in sand; rarely visits flowers. Parasite: *Senotainia litoralis* Allen. Prey: *Arctosa littoralis* (Hentz), *Lycosa helluo* Walck., *Trochosa avara* Keys., *T.* sp.

Psammochares cleora Banks, 1917. Mus. Compar. Zool., Bul. 61: 105. ♀.

Biology: Krombein, 1952. Amer. Ent. Soc., Trans. 78: 93 (prey). —Krombein, 1953. Ent. Soc. Wash., Proc. 55: 116 (prey). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (prey, nest). —Krombein, 1958. Ent. Soc. Wash., Proc. 55: 116 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 69-70 (prey transport, nest, parasite). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 13-14 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 371 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 68 (prey).

Genus ANOPLIUS Subgenus NOTIOCHARES Banks

Notiochares Banks, 1917. Mus. Compar. Zool., Bul. 61: 107, 108.
Type-species: *Pompilus philadelphicus* Lepeletier. Monotypic (=*Sphex amethystina* Fabricius).

amethystinus amthystinus (Fabricius). Southern Fla., Ariz., Calif. south to Panama. Prey: *Lycosa* sp. Another subsp. occurs in South America.

Sphex amethystina Fabricius, 1793. Ent. System., Emend. et Aucta, v. 2, p. 210. ♀.
Pompilus anceps Cresson, 1865. Ent. Soc. Phila., Proc. 4: 130. ♂. Preocc.
Pompilus cubensis Cresson, 1867. Amer. Ent. Soc., Trans. 1: 93. N. name.
Pompilus propinquus Fox, 1891. Amer. Ent. Soc., Trans. 18: 339. ♀. Preocc.
Pompilus dux Dalla Torre, 1897. Cat. Hym., v. 8, p. 286. N. name.
Pompilus amethystinoides Strand, 1911. Arch. f. Naturges., v. 77, bd. 1, sup. 2, p. 147. N. name for *amethystinus* Tasch., believed to differ from *amethystinus* F.
Psammochares philadelphicus var. *floridensis* Banks, 1917. Mus. Compar. Zool., Bul. 61: 106. ♀.

lepidus atramentarius (Dahlbom). Southern New England, Ohio and Nebr. to Fla. and Tex. in Austroriparian and Carolinian Faunas; Mexico (Coahuila, Durango). Ecology: Nests in sand and firm soil; visits many flowers. Prey: *Lycosa rabida* (Walck.), *L. avida* Walck.,

L. antelucana Mont., *L.* sp., *Arctosa littoralis* (Hentz). Typical *lepidus* (Say) occurs from Mexico to British Guiana and Ecuador.
Pompilus atramentarius Dahlbom, 1843. Hym. Europaea, v. 1, p. 48.
Pompilus philadelphicus Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 423. ♀.
Pompilus philadelphicus var. *sericatus* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 202. ♀.
Sericopompilus plutonis Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 228. ♂.
Notiochares angusticeps Banks, 1939. Canad. Ent. 71: 227. ♀.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 13-15 (prey, nest). —Evans, 1951. Amer. Ent. Soc., Trans. 76: 233-234 (prey). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 71-72 (prey transport, nest).

Genus ANOPLIUS Subgenus ANOPLIODES Banks

Anopliodes Banks, 1939. Canad. Ent. 71: 225, 226.
Type-species: *Anopliodes modestus* Banks. Monotypic (=*Anoplius bolli* Banks).

bolli Banks. Tex. to Kans., Mo., and N. J.; Mexico (Tamaulipas).
Anoplius bolli Banks, 1917. Mus. Compar. Zool., Bul. 61: 104. ♂.
Anopliodes modestus Banks, 1939. Canad. Ent. 71: 226. ♀.

parsonsi (Banks). South. Fla.; Cuba, Mexico south to Costa Rica.
Psammochares parsonsi Banks, 1944. Mus. Compar. Zool., Bul. 94: 183. ♀.

Genus ANOPLIUS Subgenus ARACHNOPHROCTONUS Howard

Arachnophroctonus Howard, 1901. Insect Book, pl. VII, figs. 11, 14.
Type-species: *Sphex tropica* Fabricius. Desig. by Pate, 1946.
Arachnophila Ashmead, 1902. Canad. Ent. 34: 86. Preocc.
Type-species: *Pompilus divisus* Cresson. Orig. desig.
Anoplinellus Banks, 1934. Amer. Acad. Arts and Sci., Proc. 69: 84.
Type-species: *Pompilus clotho* Smith. Monotypic.
Arachnodaicter Pate, 1946. Amer. Ent. Soc., Trans. 72: 74. N. name.

Day (1974) synonymized the subgenus *Pompilinus* Ashm. under the subgenus *Arachnophroctonus* How. This action was taken too late to be used in this edition of the catalog.

The wasps of this group inhabit sandy places, where they nest in short burrows in the earth, stocking their burrows with errant spiders of several families. They visit flowers of many kinds.

Taxonomy: Day, 1974. Brit. Mus. (Nat. Hist.), Ent., Bul. 30: 379-380 (subgeneric syn.). —Day, 1974. Brit. Mus. (Nat. Hist.), Ent. Bul. 31: 49-51 (identity of *Anoplinellus* Bks.).

acapulcoensis (Cameron). L. Austr. Zone, Ariz. to Fla. and south. N. J., south to Guatemala.
Ecology: Visits flowers of many kinds.
Pompilus acapulcoensis Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 198. ♂.
Psammochares bellicosus Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 224. ♂.
Lophopompilus autilone Banks, 1919. Canad. Ent. 51: 82. ♂.

americanus ambiguus (Dahlbom). Tropical and L. Austr. Zones, Greater Antilles and Panama to Calif., Utah, Kans., and Ala. Ecology: Nests in sand-clay soil. Parasite: *Evagetes mohave* (Bks.). Prey: *Arctosa littoralis* (Hentz), *Lycosa* spp., *Schizocosa crassipes* Walck.; *Peucetia viridans* Hentz.
Pompilus ambiguus Dahlbom, 1845. Hym. Europaea, sup. 1, p. 452. ♀.
Pompilus coruscus Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 156. ♀.
Pompilus juxtus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 128. ♀.
Pompilus subargenteus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 129. ♂.
Anoplius puella Banks, 1941. Canad. Ent. 73: 121. ♂.
Pompilinus orthodes Banks, 1944. Zool. 29: 112. ♀.
Anoplius varunus Banks, 1947. Mus. Compar. Zool., Bul. 99: 419. ♂.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 76: 270 (prey transport, nest, parasite). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (prey, nest). —Hurd and Wasbauer, 1956. Kans. Ent. Soc., Jour. 29: 169 (prey). —Evans and Yoshimoto, 1962. Ent.

Soc. Amer., Misc. Pub. 3: 76-77 (prey transport, nest). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 397 (prey).

americanus americanus (Palisot de Beauvois). Cent. Tex. and north. Ga. to S. Dak., Minn., south Ont., and southeast. N. Y. Ecology: Nests in clay. Prey: *Pardosa milvina* (Hentz), *P.* sp.; *Philodromus* sp.
Pompilus americanus Palisot de Beauvois, 1811. Ins. Afr. Amer., p. 117. ♀.
Pompilus plebejus Dahlbom, 1845. Hym. Europaea, v. 1, p. 60. ♀.
Psammochares albomarginatus Banks, 1910. N. Y. Ent. Soc., Jour. 18: 114. ♂.
Pompiloides agnema Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 204. ♂.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 10-11 (prey transport, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 15 (prey).

americanus trifasciatus (Palisot de Beauvois). Austrorip. Fauna, N. C., Ga. and Fla. Prey: *Geolycosa hubbelli* Wall.
Pompilus trifasciatus Palisot de Beauvois, 1811. Ins. Afr. Amer., p. 118. ♀.
Psammochares eurydice Banks, 1921. Ent. Soc. Amer., Ann. 14: 19. ♀.

Biology: Kurczewski, 1963. Fla. Ent. 46: 212 (prey).

apiculatus apiculatus (Smith). Tropical and L. Sonor. Zones, south Calif., Ariz., and cent. Tex. to Panama. Ecology: Occurs along sandy streambanks and seashores.
Pompilus apiculatus Smith, 1855. Cat. Hym. Brit., Mus., v. 3, p. 157. ♀.
Pompilus coruscus Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 155. ♀. Preocc.
Arachnophroctonus apiculatus hondurensis Dreisbach, 1954. Amer. Midland Nat. 52: 439. ♂.

apiculatus autumnalis (Banks). Austrorip. and Carol. Faunas, Tex. and Fla. to Ga., west. N. Y., south. Ont., Minn., and Kans. Ecology: Nests in sand. Parasite: *Evagetes mohave* (Bks.). Prey: *Arctosa littoralis* (Hentz).
Pompiloides autumnalis Banks, 1914. N. Y. Ent. Soc., Jour. 22: 301. ♀.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 442, fig. 49 (larva).

Biology: Evans, Lin and Yoshimoto, 1953. N. Y. Ent. Soc., Jour. 61: 61-78 (prey transport, nest, parasite, life history). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 74-75 (prey transport, nest, parasite). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 15 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 371 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 68 (prey, nest).

apiculatus pretiosus (Banks). Coastal plain, Fla. to Maine. Ecology: Nests in sand, especially along bodies of water. Parasite: *Senotainia litoralis* Allen. Prey: *Arctosa littoralis* (Hentz), *Lycosa helluo* (Walck.).
Psammochares pretiosa Banks, 1910. N. Y. Ent. Soc., Jour. 18: 119. ♂.
Pompiloides autumnalis var. *atlanticus* Banks, 1914. N. Y. Ent. Soc., Jour. 22: 301. ♀.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 442 (larva).

Biology: Krombein, 1953. Wasmann Jour. Biol. 10: 272-275 (prey, nest, life history, parasite). —Krombein and Evans, 1954. Ent. Soc. Wash., Proc. 56: 230 (prey). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 194 (prey). —Krombein, 1964. Amer. Mus. Novitates 2201: 11 (nest, prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 15-16, fig. 3 (prey, nest).

marginalis (Banks). Ariz., Tex., and Fla. to Utah, Man., south. Ont., and Mass. Ecology: Nests in sand. Parasite: *Evagetes mohave* (Bks.). Prey: *Geolycosa pikei* (Marx), *G. wrighti* Em., *G. missouriensis* Bks., *G.* spp., *Lycosa baltimoriana* Keys., *L. carolinensis* Walck., *L. frondicola* Em., *L. avida* Walck., *L.* sp. near *lenta* Hentz, *L.* sp. near *ceratiola* Gertsch and Wall., *L.* spp., *Arctosa littoralis* Hentz; *Pellenes coronatus* (Hentz).
Sphex tropica Fabricius, 1775. Systema Ent., p. 350. ♀. Preocc.
Psammochares marginalis Banks, 1910 (June). N. Y. Ent. Soc., Jour. 18: 118. ♀, ♂.
Psammochares castella Banks, 1910 (Dec.). Psyche 17: 248. ♂.
Psammochares fabricii Banks, 1933. Psyche 40: 6. N. name.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 441, figs. 31-34, 48 (larva).

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 45-58 (prey, nest). —Krombein, 1953. Wasmann Jour. Biol. 10: 275-276 (prey, nest, life history). —Krombein, 1953. Ent. Soc. Wash., Proc. 55: 116-117 (prey, nest). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (prey, nest). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 102-103 (prey, nest). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 73-74 (nest, prey, parasite). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 397 (prey). —Kurczewski, 1963 (1962). Brooklyn Ent. Soc., Bul. 57: 88-89 (prey). —Krombein, 1964. Amer. Mus. Novitates 2201: 11-13 (prey, nest). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 68 (prey, nest, parasite).

moestus (Banks). L. Sonor. Fauna, east. Tex. to southeast. Ariz.; Mexico.

Pompiloides moestus Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 226. ♀.

Anoplius comanche Banks, 1941. Canad. Ent. 73: 121. ♂.

occidentalis (Dreisbach). Calif. (Redwood City).

Arachnophroctonus occidentalis Dreisbach, 1954. Amer. Midland Nat. 52: 437, figs. 13, 17. ♂.

relativus (Fox). Mass., Ont. and B. C. to Fla., Tex. and Calif., mostly in U. and L. Austral Zones, south in Mexico at higher altitudes to Oaxaca and Guerrero. Ecology: Occurs in fields and prairies; nests in sand and heavier soil. Prey: *Lycosa rabida* Walck., *L. antelucana* Mont., *Arctosa littoralis* (Hentz), *Geolycosa missouriensis* (Bks.), *G.* sp.; *Agelenopsis naevia* (Walck.), *A. pennsylvanica* (Koch).

Pompilus relativus Fox, 1893. Canad. Ent. 25: 114. ♀.

Psammochares (*Allocyphonyx*) *hesione* Banks, 1910. Psyche 17: 250. ♂.

Psammochares difficilis Banks, 1917. Mus. Compar. Zool., Bul. 61: 105. ♀.

Anoplius confraternus Banks, 1926. Canad. Ent. 58: 201. ♀.

Psammochares henshawi Banks, 1939. Canad. Ent. 71: 226. ♀.

Arachnoproctonus (!) *variegatus* Dreisbach, 1957. Ent. News 68: 72, 2 figs. ♂.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 76: 251-252 (nest, prey). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (nest, prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 72-73 (prey, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 14-15 (prey, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 371-372 (prey hunting). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 68-69 (prey, nest).

semirufus (Cresson). Tex. and Fla. to Mont., Man., and N. B. Ecology: Nests in sand. Prey: *Lycosa gulosa* Walck., *L. rabida* Walck., *L. punctulata* Hentz, *L. avida* Walck., *L.* spp., *Schizocosa crassipalpis* (Em.), *S. crassipes* (Walck.), *S. saltatrix* (Hentz), *S. bilineata* (Em.), *S. ocreata* (Hentz), *S.* spp., *Pardosa milvina* Hentz, *P. falcifera* Camb., *P.* sp. near *modica* (Blackw.), *P. distincta* (Blackw.), *P.* sp. near *floridana* Bks., *P.* spp., *Trochosa pratensis* (Em.), *T. avara* Keys.; *Agelenopsis pennsylvanica* (Koch), *A.* sp.; *Amaurobius* sp.

Pompilus semirufus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 100. ♀.

Pompilus divisus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 100. ♀.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 442 (larva).

Biology: Krombein, 1953. Wasmann Jour. Biol. 10: 277-280 (prey, nest, life history). —Evans, 1953. Syst. Zool. 2: 168-169 (nest, prey). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 18 (prey, nest). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 103 (prey, nest). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 194 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 75-76 (prey, nest, life history). —Kurczewski, 1963. Brooklyn Ent. Soc., Bul. 57: 89 (prey transport). —Evans, 1964. Kans. Ent. Soc., Jour. 37: 306 (prey transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 16-18 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 372 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 69 (nest, prey).

xerophilus Evans. L. Sonor. Fauna, Tex., N. Mex., to cent. Calif. and Utah; Mexico (Baja California).

Anoplius xerophilus Evans, 1947. Ent. News 58: 10. ♀, ♂.

Arachnophroctonus gaigei Dreisbach, 1954. Amer. Midland Nat. 52: 438, figs. 4, 11. ♂.

Genus ANOPLIUS Subgenus POMPILINUS Ashmead

Psammochares Latreille, 1796. Precis Caract. Gen. Ins., p. 115. Suppressed by Internatl. Comn. Zool. Nomencl., Op. 166, 1945.
Pompilinus Ashmead, 1902. Canad. Ent. 34: 85.
Type-species: *Pompilus cylindricus* Cresson. Orig. desig.
Anopliella Banks, 1939. Canad. Ent. 71: 225, 227.
Type-species: *Pompilus tenebrosus* Cresson. Orig. desig.

Day (1974) synonymized the subgenus *Pompilinus* Ashm. under the subgenus *Arachnophroctonus* How. This action was published too late to be used in this edition of the catalog.

Wasps of this group inhabit gardens, waste places, clay banks, and sandy areas; they prey upon a wide variety of spiders and nest in short galleries in the earth.

Revision: Dreisbach, 1949. Ent. Amer. (n. s.) 29: 12-58.

Taxonomy: Day, 1974. Brit. Mus. (Nat. Hist.), Ent., Bul. 30: 379-380 (subgeneric syn.).

californiae (Evans. L. Sonor. Fauna, N. Mex. to Calif.; Mexico (Sonora, Baja California).
Ecology: Has been taken on *Helianthus* and *Tamarix*.
Anoplius (*Pompilinus*) *californiae* Evans, 1948. Pan-Pacific Ent. 24: 128. ♀, ♂.

clystera (Banks). L. and U. Sonor. Fauna, Tex. and south. Calif. to Colo. and cent. Calif.; Mexico (Chihuahua, Baja California). Prey: *Lycosa* sp.
Pompiloides clystera Banks, 1914. N. Y. Ent. Soc., Jour. 22: 302. ♂.
Pompilinus submarginatus Dreisbach, 1952. Amer. Midland Nat. 48: 146, figs. 14, 17. ♂.

Taxonomy: Evans, 1968. Ent. News 79: 254-255, fig. 4 (redescription female).

Biology: Wasbauer and Powell, 1962. Pan-Pacific Ent. 35: 398 (prey).

cylindricus (Cresson). Conn., south. Ont., N. W. T., cent. Oreg. s. to Fla.,Tex. and Calif.; Mexico (Chihuahua). Ecology: Nests in sandy places. Prey: *Geolycosa wrightii* (Em.), *G.* sp.
Pompilus cylindricus Cresson, 1867. Amer. Ent. Soc., Trans. 1: 92. ♂.
Arachnophila brevihirta Banks, 1945. Psyche 52: 105. ♀.
Pompilinus truncatus Dreisbach, 1949. Ent. Amer. (n. s.) 29: 15. ♂.
Pompilinus subtruncatus Dreisbach, 1949. Ent. Amer. (n. s.) 29: 17. ♂.
Pompilinus hispidus Dreisbach, 1949. Ent. Amer. (n. s.) 29: 23. ♂.
Pompilinus clavipes Dreisbach, 1958. Ent. News 69: 61, figs. ♂.

Biology: Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 19 (prey).
—Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 69 (prey).

estellina (Banks). U. Sonor. and Transit. Faunas, Calif. and N. Mex. to Alta., s. to Guatemala. Ecology: Nests in pre-existing crevices or burrows in soil. Prey: Lycosidae sp. ?
Pompiloides estellina Banks, 1914. N. Y. Ent. Soc., Jour. 22: 303. ♂, (♀ misdet.).
Pompilinus utahensis Dreisbach, 1952. Amer. Midland Nat. 48: 145, figs. 15, 16. ♂.
Pompilinus minutus Dreisbach, 1952. Amer. Midland Nat. 48: 147, figs. 7, 8. ♂.

Biology: Evans, 1964. Kans. Ent. Soc., Jour. 37: 305-306 (prey, nest).

fraternus (Banks). L. and U. Austr. Zones, N. Mex. and Fla. to Colo., Nebr., and southeast. N. Y.; Mexico (Tamaulipas, Sonora). Ecology: Nests on protected beaches and on elevated salt flats inland in pre-existing crevices or burrows. Parasite: *Ephuta s. sabaliana* Schus. Prey: *Lycosa watsoni* Gertsch, *L. carrana* Bryant, *Sosippus floridanus* Sim., *Pardosa longispinnata* Tull.; *Habronattus* sp., *Pellenes* sp.
Lophopompilus fraternus Banks, 1941. Canad. Ent. 73: 120. ♀.
Pompilinus dowi Dreisbach, 1949. Ent. Amer. (n. s.) 29: 12. ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 440, figs. 35-37 (larva).

Biology: Krombein and Evans, 1954. Ent. Soc. Wash., Proc. 56: 231 (prey transport, nest).
—Evans, Krombein, and Yoshimoto, 1955. Brooklyn Ent. Soc., Bul. 50: 77-84, 3 figs. (hunting behavior, prey, nest, life history).

insolens (Banks). Transcont. in Transit. and U. Austr. Zones, Maine, Ont. and B. C. s. to Ga., Tex. and Calif., s. in Mexican central plateau to Veracruz and Morelos. Prey: *Maevia vittata* (Hentz).
Pompiloides insolens Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 226. ♂.

krombeini Evans. Austrorip. Fauna, Fla. to N. J. Ecology: Nests in sand. Prey: *Pardosa floridana* Bks., *Schizocosa* sp.
Anoplius (*Pompilinus*) *krombeini* Evans, 1950. Kans. Ent. Soc., Jour. 23: 88. ♀, ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 440-441 (larva).

Biology: Krombein, 1953. Ent. Soc. Wash., Proc. 55: 117-118 (prey, nest). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 80 (prey transport, nest, life history). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 69 (prey).

leona (Cameron). West. Tex. to Ariz., south to El Salvador.
Pompilus leona Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 198, pl. 11, fig. 20. "♂" = ♀.
Anoplius (*Pompilinus*) *grandiflexionis* Evans, 1950. Kans. Ent. Soc., Jour. 23: 84. ♀, ♂.

marginatus (Say). L. Austr. to Canad. Zone, Ariz., Colo., and Alta. east to the Atlantic. Ecology: Nests in sand, gravel and other light soils. Parasite: *Evagetes parvus* (Cr.) ? Prey: *Odiellus pictus* (Wood); *Argiope aurantia* Luc.; *Agelenopsis naevia* (Walck.), *A. pennsylvanica* (Koch), *Pellenes borealis* (Bks.), *P. viridipes* (Hentz), *P.* sp., *Arctosa emertoni* Gertsch, *Geolycosa fatifera* Comst., *Lycosa avida* Walck., *L. domifex* Hancock; *Pardosa saxatilis* (Hentz), *P.* sp., *Pirata insularis* Em., *Schizocosa crassipes* Walck., *S.* sp., *Trochosa avara* (Keys.), *T. pratensis* (Em.), *T.* sp.; *Callilepis imbecillus* (Keys.), *Drassodes neglectus* (Keys.), *Drassylus niger* (Bks.), *Gnaphosa muscorum* (Koch), *G.* sp., *Haplodrassus signifer* (Koch), *Herpyllus vasifer* (Walck.); *Castianeira longipalpus* (Hentz), *Clubiona kastoni* Gertsch, *C. mixta* Em., *C.* sp.; *Anyphaena* sp.; *Philodromus infuscatus* Keys., *P. washita* Bks., *Thanatus formicinus* (Oliv.), *Tibellus duttoni* (Hentz), *Xysticus bicuspis* Keys., *X. elegans* Keys., *X. ferox* (Hentz), *X. funestus* Keys.; *Evarcha hoyi* (Peckh.), *Habrocestum decorus* (Blackw.), *Maevia vittata* (Hentz), *Phidippus audax* (Hentz), *P. clarus* Keys., *P. purpuratus* Keys.; *Amaurobius bennetti* (Blackw.). Females of *bequaerti* (Dreis.), *rectangularis* (Dreis.) and *townesi* Evans are unknown and are probably confused with females of *marginatus;* accordingly, some of the prey records and biological references may refer to one of the former three taxa.
Pompilus marginatus Say, 1824. *In* Keating's, Narr. Long's 2nd Exped., v. 2, p. 333. ♀.
Pompilus (*Miscus*) *petiolatus* Say, 1835. Boston Jour. Nat. Hist. 1: 305. ♀.
Pompiloides reducta Banks, 1914. N. Y. Ent. Soc., Jour. 22: 302. ♀.
Pompiloides hageni Banks, 1919. Mus. Compar. Zool., Bul. 63: 235. ♀.
Pompilinus basirufus Dreisbach, 1952. Amer. Midland Nat. 48: 149, figs. 9, 10. ♂ (♀ misdet.).
Pompilinus basirufous (!) Dreisbach, 1952. Amer. Midland Nat. 48: 158.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 440, fig. 39 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 144-152 (prey transport, nest). —Hartman, 1905. Tex. Univ., Bul. 65: 52-54 (prey, nest). —Rau and Rau, 1918. Wasp Studies Afield, pp. 58-63 (prey hunting, transport). —Evans, 1948. Ent. News 59: 183-184 (prey, nest). —Evans, 1950. Amer. Ent. Soc., Trans. 75: 164 (parasite). —Krombein, 1953. Wasmann Jour. Biol. 10: 280-281 (prey, nest). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 19 (prey). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 194 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 78-80 (prey transport, nest, life history). —Kurczewski, 1963 (1962). Brooklyn Ent. Soc., Bul. 57: 89 (prey transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 19-20 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 373-374 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 69-70, fig. 1 (prey, nest).

percitus Evans. Austrorip. and Carol. Faunas, Tex. to Mass. Prey: *Trochosa* sp. probably *gosiuta* Chamb., immature.
Anoplius (*Pompilinus*) *percitus* Evans, 1950. Kans. Ent. Soc., Jour. 23: 85. ♀, ♂.

rectangularis gillaspyi Evans. Tex., N. C., N. J. in Austrorip. Fauna.
Anoplius (*Pompilinus*) *rectangularis gillaspyi* Evans, 1951. Amer. Ent. Soc., Trans. 76: 310, fig. 101. ♂.

rectangularis rectangularis (Dreisbach). Transit. and U. Austr. Zones, Mass. to Minn., s. to Colo., Kans., Ohio and N. C. Prey: *Lycosa avida* Walck., *Schizocosa* sp., *Pardosa*

distincta (Blackw.); *Xysticus elegans* Keys., *X. ferox* (Hentz); *Phidippus whitmanii* Peckh.

Pompilinus rectangularis Dreisbach, 1949. Ent. Amer. (n. s.) 29: 18. ♂.

Biology: Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 20-21 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 374 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 70 (prey).

splendens (Dreisbach). L. and U. Austr. Zones, Fla., Tex., and Ariz. to Alta., Man., Ont., and Maine; Mexico (Chihuahua, Durango). Ecology: Nests in sandy areas. Prey: *Agelenopsis pennsylvanica* (Koch), *A.* spp.; *Araneus patagiatus* Clerck; *Pisaurina mira* (Walck.); *Amaurobius bennetti* (Blackw.); *Pardosa distincta* (Blackw.), *P. milvina* (Hentz), *P.* sp. near *floridana* Bks., *Schizocosa crassipes* (Walck.), *S. saltatrix* (Hentz), *S.* sp., *Trochosa avara* Keys., *Arctosa littoralis* (Hentz), *Geolycosa wrightii* Em., *Lycosa avida* Walck., *L. frondicola* Em., *L.* sp.; *Xysticus pellax* Camb., *X. ferox* (Hentz), *X. funestus* Keys., *X. elegans* Keys., *X.* sp.; *Thanatus formicinus* (Clerck); *Marpissa pikei* (Peckh. and Peckh.), *Pellenes coronatus* (Hentz), *P. agilis* Bks., *P.* sp., *Phidippus audax* (Hentz), *P. clarus* Keys., *Habronattus viridipes* (Hentz); *Castianeira longipalpus* (Hentz), *C.* sp.

Pompilinus splendens Dreisbach, 1949. Ent. Amer. (n. s.) 29: 20. ♂.

Pompilinus pseudoreductus Dreisbach, 1949. Ent. Amer. (n. s.) 29: 21. ♂.

Pompilinus ohioensis Dreisbach, 1949. Ent. Amer. (n. s.) 29: 24. ♂.

Pompilinus shappirioi Dreisbach, 1952. Amer. Midland Nat. 48: 148, figs. 5, 6. ♂. N. syn. (H. E. Evans).

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 76: 320 (prey). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 194 (prey). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 398 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 21-22 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 374-375 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 70 (prey).

stenotus bequaerti (Dreisbach). Tex. and Fla. to Alta., Minn., Mich., and N. C. Ecology: Nests in sand. Prey: *Lycosa* sp.

Pompilinus bequaerti Dreisbach, 1949. Ent. Amer. (n. s.). 29: 16. ♂.

Biology: Krombein, 1964. Amer. Mus. Novitates 2201: 13 (prey transport).

stenotus stenotus (Banks). South. Fla. and Ala. Ecology: Nests in sand. Prey: *Lycosa* sp., *Trochosa* sp.

Pompiloides stenotus Banks, 1914. N. Y. Ent. Soc., Jour. 22: 302. ♂.

Biology: Krombein and Evans, 1955. Ent. Soc. Wash., Proc. 57: 230 (prey, nest). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 70 (prey).

subcylindricus (Banks). L. Austr. to Transit. Zones, Fla., Tex., and Ariz. to Utah, Minn., Que., and Vt.; Mexico to Morelos and Guerrero. Ecology: Nests in sand and gravelly soil. Parasite: *Evagetes parvus* (Cr.). Prey: *Xysticus gulosus* Keys., *X. banksi* Bry., *X. ferox* (Hentz), *X. triguttatus* Keys., *X. funestus* Keys.; *Micaria* sp.

Pompiloides subcylindricus Banks, 1917. Mus. Compar. Zool., Bul. 61: 103. ♀, ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 440 (larva).

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 76: 288 (prey). —Evans, 1951. Amer. Ent. Soc., Trans. 77: 315 (prey). —Krombein, 1953. Wasmann Jour. Biol. 10: 281 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 77-78 (prey transport, nest, life history, parasite). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 18-19 (prey).

tenebrosus (Cresson). Transcont. in Canad. and Transit. Zones, entering U. Austr. Ecology: Nests in sand. Prey: *Schizocosa saltatrix* Hentz, *Trochosa avara* Keys., *Tarentula kochi* Keys., *Lycosa frondicola* Em., *L. avida* Walck., *L. baltimoriana* Keys.; *Xysticus gulosus* Keys., *X. ferox* Hentz, *Thanatus formicinus* (Oliv.).

Pompilus tenebrosus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 453. ♀.

Pompilus compactus Provancher, 1895. Nat. Canad. 22: 111. ♀.

Pompiloides canadensis Banks, 1919. Canad. Ent. 51: 82. ♂.

Pompilinus drakei Dreisbach, 1958. Ent. News 69: 62, 2 figs. ♂. N. syn (H. E. Evans). The unique holotype is a teratological specimen.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 76: 303 (prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 81 (prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 482 (prey). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 399 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 70-72 (prey transport, nest).

texanus (Dreisbach). La. and Tex. s. in Mexico to Morelos and Yucatan.
Pompilinus texanus Dreisbach, 1949. Ent. Amer. (n. s.) 29: 14. ♂.

townesi Evans. Alleghan. Fauna, N. H. w. to Man., Conn. to Fla.
Anoplius (*Pompilinus*) *townesi* Evans, 1951. Amer. Ent. Soc., Trans. 76: 313, fig. 102. ♂.

Genus ANOPLIUS Subgenus ANOPLIUS Dufour

Anoplius Dufour, 1834. Soc. Ent. France, Ann. 2: 483.
Type-species: *Sphex nigerrimus* Scopoli. Desig. by Internatl. Comn. Zool. Nomencl., Op. 997, 1973.
Pompilioides Radoszkowski, 1887. Soc. Ent. Rossica, Horae 21: 94.
Type-species: *Pompilioides unicolor* Radoszkowski. Desig. by Ashmead, 1902.
Aphiloctenus Ashmead, 1902. Canad. Ent. 34: 87.
Type-species: *Pompilus virginiensis* Cresson. Orig. desig.

Wasps of this subgenus nest in ready-made cavities of various kinds, and occupy a variety of habitats.

depressipes Banks. Carol. and Alleghanian Faunas, Tex., Ala. and Fla. to Wis. and Maine. Ecology: Nests in pre-existing cavities in wood and soil; occasionally stores more than one cell per cavity, each cell separated by a partition of the substrate. Prey: *Dolomedes triton sexpunctatus* Hentz, *D. scriptus* Hentz, *D. striatus* Giebel, *D. tenebrosus* Hentz.
Anoplius depressipes Banks, 1919. Canad. Ent. 51: 81. ♀.

Biology: Evans, 1949. Ent. Soc. Wash., Proc. 51: 206 (prey transport). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 83-84 (prey transport, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 22 (prey).

dreisbachi Evans. Ariz. and south. Calif. to Colo., Wyo. and B. C., chiefly in Transit. Zone.
Anoplius (*Anoplius*) *dreisbachi* Evans, 1966. Amer. Ent. Soc., Mem. 20: 353, fig. 49. ♂, ♀.

elongatus Dreisbach. Mich., Minn.
Anoplius elongatus Dreisbach, 1950. Amer. Midland Nat. 43: 576, figs. 11, 12. ♂.

fulgidus (Cresson). Extreme southern U. S., Fla., Tex., Ariz., Utah, Calif.; Antilles, Mexico, Central and South America to Peru and Brazil. Ecology: Nests in heavy loam along stream. Prey: *Pirata sedentarius* Montg., *Arctosa* sp. near *littoralis* (Hentz).
Pompilus fulgidus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 131. ♀.
Pompilus aeneopurpureus Fox, 1891. Amer. Ent. Soc., Trans. 18: 339. ♀, ♂.
Pompilus championi Cameron, 1893. Biol. Cent.-Amer. Hym., v. 2, p. 196. ♀.
Pompilus mundulus Fox, 1897. Acad. Nat. Sci. Phila., Proc. 49: 243. ♀.
Anoplius amarus Banks, 1947. Mus. Compar. Zool., Bul. 99: 416. ♀.

Biology: Wasbauer, 1955. Pan-Pacific Ent. 31: 63-66 (prey transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 22 (prey).

hispidulus Dreisbach. Ill., Mich., N. Y., Conn., Md.
Anoplius hispidulus Dreisbach, 1950. Amer. Midland Nat. 43: 577, figs. 25, 26. ♂.

illinoensis (Robertson). U. Austr. and Transit. Zones, Ga., Tex., Utah, and Colo. to Mont., Mich., and Que. Ecology: Nests in firm soil. Prey: *Lycosa avida* Walck., *L. helluo* Walck., *L.* sp.
Pompilus illinoensis Robertson, 1901. Amer. Ent. Soc., Trans. 27: 202. ♀, ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 439, figs. 20-25, 47 (larva).

Biology: Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 82-83 (prey transport, nest). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 72 (prey).

imbellis Banks. Transcont. in U. Austr. and Transit. Zones south at higher altitudes to Costa Rica. Ecology: Nests in soil near still water. Prey: *Pardosa ramulosa* McCook, *P. milvina* (Hentz), *P. distincta* group, *P.* sp., *Trochosa avara* Keys., *Arctosa* sp.
Anoplius imbellis Banks, 1944. Mus. Compar. Zool., Bul. 94: 169. ♀, ♂.

Anoplius imbellis var. *major* Dreisbach, 1950. Amer. Midland Nat. 43: 581, figs. 20, 24. ♂.
Anoplius subimbellis Dreisbach, 1952. Amer. Midland Nat. 48: 155, figs. 23, 25. ♂.

Biology: Wasbauer, 1957. Wasmann Jour. Biol. 15: 81-97, 7 figs. (prey, nests). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 399 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 22 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 72 (prey).

ithaca (Banks). Transcont. in Transit. and U. Austr. Zones; Mexico (Nuevo Leon). Ecology: Occurs along rocky stream-beds and nests under stones. Prey: *Pardosa lapidicina* Em., *P. milvina* (Hentz), *P. groenlandica* Th., *P. steva* Lowrie and Gertsch, *P.* sp., *Arctosa littoralis* (Hentz), *Lycosa* sp.
Psammochares ithaca Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 224. ♀.
Anoplius selkirkensis Banks, 1919. Mus. Compar. Zool., Bul. 63: 234. ♀, ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 440 (larva).

Biology: Evans, 1948. Ent. News 59: 180-183 (prey transport, nest). —Evans and Yoshimoto, 1955. Kans. Ent. Soc., Jour. 28: 19 (prey). —Krombein, 1956. Brooklyn Ent. Soc., Bul. 51: 42 (prey transport). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 83 (prey transport, nest). —Kurczewski, 1963 (1962). Brooklyn Ent. Soc., Bul. 57: 89 (prey hunting and transport). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 22 (prey). —Ricards, 1969. Ent. News 80: 149-157, 2 figs. (prey transport, nesting behavior). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 72 (prey).

nigerrimus (Scopoli). Transcont. in Hudsonian and Canadian Zones, entering Transition Zone rarely; Holarctic. Ecology: Not known for North America; in Europe it nests in pre-existing cavities in twigs or soil, or under stones. Prey: Not known for North America; in Europe it preys chiefly on Lycosidae, occasionally on Pisauridae and Gnaphosidae.
Sphex nigerrima Scopoli, 1763. Ent. Carniolica, p. 295. ♀ ?
Pompilus incisus Tischbein, 1850. Stettin. Ent. Ztg. 11: 8. ♂.
Pompilus excerptus Tournier, 1889. Ent. Genevois 1: 159. ♀.
Pompilus nigerrimus var. *Kohli* Verhoeff, 1892. Ent. Nachr. 18: 71. ♂.
Anoplius wheeleri Banks, 1939. Canad. Ent. 71: 228. ♀, ♂.
Anoplius banksi Dreisbach, 1950. Amer. Midland Nat. 43: 579, figs. 13, 14. ♂.

Taxonomy: van der Vecht and Menke, 1968. Bul. Zool. Nomencl. 25: 120-124 (request for designation of *nigerrimus* as type-species of *Anoplius*, and of a neotype for *nigerrimus;* request approved in Op. 997, Internatl. Comn. Zool. Nomencl., 1973).

Biology: Richards and Hamm, 1939. Soc. Brit. Ent., Trans. 6: 98-100 (summarizes European literature on prey, nests).

papago Banks. D. C. to Kans., s. to Fla. and Ariz. and Costa Rica. Ecology: Nests in loamy soil. Prey: *Lycosa* sp.
Anoplius papago Banks, 1941. Canad. Ent. 73: 120. ♂.
Anoplius subtarsatus Dreisbach, 1950. Amer. Midland Nat. 43: 578, figs. 18, 22. ♂.
Anoplius guatemalensis Dreisbach, 1952. Amer. Midland Nat. 48: 154. ♂.

Biology: Evans, 1964. Kans. Ent. Soc., Jour. 37: 304 (prey, nest).

tenuicornis (Tournier). Transcont. in Canad. Zone, s. to N. B., Vt., Man. and in mts. to N. Mex. and Calif.; Holarctic.
Pompilus tenuicornis Tournier, 1889. Ent. Genevois 1: 159. ♀.
Pompilus piliventris Morawitz, 1889 Soc. Ent. Rossica, Horae. 23: 122. ♂.
Anoplius basalis Dreisbach, 1950. Amer. Midland Nat. 43: 578, figs. 9, 10. ♂.

toluca (Cameron). Calif. to west. Tex., s. to Costa Rica; adventive in Hawaii. Ecology: Nests in soil. Prey: *Alopecosa gertschii* Schenkel, *Lycosa* sp., *Schizocosa* sp. in *avida* group, *Tarentula kochii* Keys., *Trochosa gosiuta* Chamb., *T. pratensis* (Em.); adults.
Pompilus toluca Cameron, 1893. Biol. Cent.-Amer., Hym. 2: 195. ♀.
Anoplius tarsatus Banks, 1919. Mus. Compar. Zool., Bul. 63: 233. ♀.

Biology: Evans, 1964. Kans. Ent. Soc., Jour. 37: 305 (prey).

ventralis (Banks). Austrorip. to Alleghanian Fauna, Tex. and Fla. to Man., Ont., and N. S. Ecology: Nests in sand and in hard-packed soil Prey: *Agelenopsis naevia* (Walck.); *Lycosa helluo* Walck., *Schizocosa saltatrix* (Hentz), *Trochosa frondicola* (Em.).
Psammochares ventralis Banks, 1910. N. Y. Ent. Soc., Jour. 18: 120. ♂.

Biology: Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 399 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 23 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 375-376 (prey transport, nest).

virginiensis (Cresson). N. S., Sask., and B. C., s. to Wash., Colo., Mo., and Ga. Ecology: Occurs in open woods; nests in pre-existing cavities in dead wood. Prey: *Agelenopsis pennsylvanica* (Koch), *A. utahana* (Chamb. and Ivie), *Wadotes calcaratus* (Keys.); *W. hybridus* (Em.), *Coras juvenilis* (Keys.); *Amaurobius bennetti* (Blackw.); *Pardosa lapidicina* Em.
Pompilus virginiensis Cresson, 1867. Amer. Ent. Soc., Trans. 1: 92. ♂.

Taxonomy: Evans, 1959. Ent. Soc. Amer., Ann. 52: 440 (larva).

Biology: Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 81-82 (prey hunting and transport, nest, life history). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 22 (prey transport). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 72 (prey).

Genus POMPILUS Fabricius

The species of this genus prey upon errant spiders, principally of the families Lycosidae, Salticidae, and Pisauridae; they nest in sand or soft earth so far as is known.

Genus POMPILUS Subgenus POMPILUS Fabricius

Pompilus Fabricius, 1798. Sup. Ent. System., p. 212.
Type-species: *Pompilus pulcher* Fabricius. Desig. by Internatl. Comn. Zool. Nomencl., Op. 166, 1945.

Members of the typical subgenus occur only in the Old World.

Genus POMPILUS Subgenus HESPEROPOMPILUS Evans

Pompilus subg. *Hesperopompilus* Evans, 1948. Ent. Soc. Wash., Proc. 50: 141.
Type-species: *Pompilus orophilus* Evans. Orig. desig.

The seven known species of this subgenus occur in western North America south into Baja California and Sonora.

Revision: Evans, 1966. Amer. Ent. Soc., Mem. 20: 358-370.

hilli Evans. Calif. (Pomona Mts.).
Pompilus (*Hesperopompilus*) *hilli* Evans, 1957. Pan-Pacific Ent. 33: 183. ♂.

idahoensis Evans. Idaho (Gooding).
Pompilus (*Hesperopompilus*) *idahoensis* Evans, 1966. Amer. Ent. Soc., Mem. 20: 367. ♀.

jacintoensis Evans. South. Calif. and Ariz.; Mexico (Baja California, Sonora).
Pompilus (*Hesperopompilus*) *jacintoensis* Evans, 1948. Ent. Soc. Wash., Proc. 50: 146. ♀ (♂ misdet.).
Pompilus (*Hesperopompilus*) *evagetoides* Evans, 1951. Amer. Ent. Soc., Trans. 77: 217. ♂.

orophilus Evans. Transit. Fauna, Alta. and Nebr. to N. Mex. and Calif.; Mexico (Sonora).
Pompilus orophilus Evans, 1947. Ent. News 58: 14. ♀.

rufopictus Evans. South. Calif. and Ariz. in deserts.
Pompilus (*Hesperopompilus*) *rufopictus* Evans, 1948. Ent. Soc. Wash., Proc. 50: 144. ♀.
Pompilus (*Hesperopompilus*) *boharti* Evans. 1951. Amer. Ent. Soc., Trans. 77: 216, figs. 176, 204. ♂.

serrano Evans. South. Calif.; Mexico (Baja California).
Pompilus (*Hesperopompilus*) *serrano* Evans, 1966. Amer Ent. Soc., Mem. 20: 369, figs. 58, 83. ♀, ♂.

Genus POMPILUS Subgenus XENOPOMPILUS Evans

Pompilus subg. *Xenopompilus* Evans, 1953. Ent. Soc. Amer., Ann. 46: 531.
Type-species: *Pompilus* (*Xenopompilus*) *tlahuicanus* Evans. Orig. desig.

tlahuicanus Evans. Ariz. (Portal): Mexico (Puebla, Morelos, Jalisco, Durango, Chihuahua).
Pompilus (*Xenopompilus*) *tlahuicanus* Evans, 1953. Ent. Soc. Amer., Ann. 46: 534, fig. 1. ♀, ♂.
Pompilus (*Xenopompilus*) *tarahumarae* Evans, 1953. Ent. Soc. Amer., Ann. 46: 535. ♀.

Genus POMPILUS Subgenus PERISSOPOMPILUS Evans

Pompilus subg. *Perissopompilus* Evans, 1951. Amer. Ent. Soc., Trans. 77: 222.
Type-species: *Pompilus* (*Ammosphex*) *phoenix* Evans. Orig. desig.

perfasciatus Evans. South. Calif. and Ariz. in deserts; Mexico (Zacatecas).
Pompilus (*Perissopompilus*) *perfasciatus* Evans, 1951. Amer. Ent. Soc., Trans. 77: 225. ♀.

Taxonomy: Evans, 1958. Ent. News 69: 147, figs. 1-2. ♂.

phoenix Evans. Calif., Nev., Utah, west. Tex.; Mexico (Baja California and Sonora s. to Puebla and Guerrero). Ecology: Occurs in open, semiarid areas. Prey: *Filistata* sp.
Pompilus (*Ammosphex*) *phoenix* Evans, 1948. Pan-Pacific Ent. 24: 123. ♂, ♀.

Biology: Evans, 1966. Ent. Soc. Wash., Proc. 68: 339 (prey).

Genus POMPILUS Subgenus XEROCHARES Evans

Pompilus subg. *Xerochares* Evans, 1951. Amer. Ent. Soc., Trans. 77: 218.
Type-species: *Pompilus connexus* Fox. Orig. desig.

expulsus Schulz. South. Ariz.; Mexico to Nicaragua.
Pompilus connexus Fox, 1893. Calif. Acad. Sci., Proc. (2) 4: 23. ♀. Preocc.
Pompilus expulsus Schulz, 1906. Spolia Hym., p. 170. N. name.
Psammochares arizonica Banks, 1910. N. Y. Ent. Soc., Jour. 18: 115. ♀.
Pompilus rubriventris Bradley, 1944. Notulae Nat. 145, p. 9. N. name.

Genus POMPILUS Subgenus AMMOSPHEX Wilcke

Ammosphex Wilcke, 1942. Ent. Ber. 11: 25.
Type-species: *Pompilus unguicularis* Thomson. Orig. desig.
Anopompilinus Dreisbach, 1949. Ent. Amer. (n. s.) 29: 7, 10, 11.
Type-species: *Anopompilinus michiganensis* Dreisbach. Monotypic.
Pompilus subg. *Holarctopompilus* Wolf, 1965. Schweiz. Ent. Gesell., Mitt. 38: 101. N. syn. (H. E. Evans).
Type-species: *Psammochares gibbomimus* Haupt. Orig. desig.
Pompilus subg. *Boreopompilus* Wolf, 1965. Schweiz. Ent. Gesell., Mitt. 38: 101. N. syn. (H. E. Evans).
Type-species: *Pompilus trivialis* Dahlbom. Orig. desig.

angularis angularis (Banks). Transcont. in Transit. and U. Austr. Zones; Mexico (Baja California). Ecology: Occurs in sandy areas, and also nests in hard-packed soil. Prey: *Callilepis altitudonis* Chamb., *C. imbecilla* (Keys.); *Xysticus* spp.; *Pellenes* spp., *Habronattus* ? sp., Thomisidae sp. Another subsp. occurs in Mexico.
Psammochares angularis Banks, 1910. N. Y. Ent. Soc., Jour. 18: 115. ♂.

Biology: Evans, 1959. Kans. Ent. Soc., Jour. 32: 76 (prey transport). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 399-400 (prey). —Evans, 1963. Ent. News 74: 239 (prey transport). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 482 (prey transport). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 72-73 (prey transport). —Alcock, 1973. Wasmann Jour. Biol. 31: 323-324, fig. 1 (nest, prey).

anomalus anomalus (Dreisbach). U. Sonor. and Transit. Faunas, Alta. to Ariz., Calif.; Mexico (Baja California). Prey: *Xysticus conctator* Thor. Another subsp. occurs in Mexico.
Anopompilinus anomalus Dreisbach, 1950. Amer. Midland Nat. 42: 725, 737. ♂.
Anopompilinus arnaudi Dreisbach, 1952. Amer. Midland Nat. 48: 153, figs. 1, 2. ♂.

Biology: Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 400 (prey).

dakota dakota (Dreisbach). Transit. Zone, Alaska, Mont. and N. Dak. s. to Ariz. and N. Mex. Prey: *Thanatus formicinus* (Oliv.). Another subsp. occurs in Europe.
Anopompilinus dakota Dreisbach, 1950. Amer. Midland Nat. 42: 728, figs. 9, 10. ♂.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 77: 246 (prey).

imbecillus imbecillus (Banks). Transcont. in Transit. Zone except Pacific States. Ecology: Occurs in open woods.
Anopliella imbecilla Banks, 1939. Canad. Ent. 71: 227. ♀.
Anopompilinus coloradensis Dreisbach, 1950. Amer. Midland Nat. 42: 724, 737. ♂.
Anopompilinus banksi Dreisbach, 1950. Amer. Midland Nat. 42: 728, 737. ♂.

imbecillus ojibwae Evans. Canad. and Hudson. Zones, N. B. and B. C., n. to N. W. T.
Pompilus (*Ammosphex*) *imbecillus ojibwae* Evans, 1951. Amer. Ent. Soc., Trans. 77: 249. ♀, ♂.

luctuosus luctuosus Cresson. Transcont. in Canad. Zone, entering Transit. Zone in West. Ecology: Occurs in open woods. Other subspp. occur in Palaearctic Region.
Pompilus luctuosus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 452. ♀.
Anopompilinus hirsutus Dreisbach, 1950. Amer. Midland Nat. 42: 733, 737. ♂.
Anopompilinus mainensis Dreisbach, 1950. Amer. Midland Nat. 42: 733, 737. ♂.

michiganensis michiganensis (Dreisbach). Hudson., Canad., and Transit. Zones from N. B., N. W. T., Yukon, s. to Alta., Minn., N. Y., and in mts. to Colo. and Ga. Ecology: Occurs in open woods and fields; nests in sand and sandy loam. Prey: *Xysticus conctator* Thor., *X. transversatus* (Walck.), *X. ferox* (Hentz), *X. funestus* (Keys.), *X.* sp. Another subsp. occurs in the Palaearctic Region.
Anopompilinus michiganensis Dreisbach, 1949. Ent. Amer. (n. s.) 29: pl. 1, fig. 3. ♂.
Anopompilinus aspinosus Dreisbach, 1950. Amer. Midland Nat. 42: 730, 738. ♂, ♀.

Biology: Kurczewski and Snyder, 1964. Biol. Soc. Wash., Proc. 77:215-222, 6 figs. (prey transport, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 23 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 376 (prey, nest). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 73 (prey).

occidentalis (Dreisbach). Transit. Fauna, B. C. and Alta. to Colo. and Calif., s. in Mexico to Morelos and Puebla. Ecology: Nests in gravel bank. Prey: *Pardosa uintana* Gertsch, *P.* sp.
Anopompilinus occidentalis Dreisbach, 1950. Amer. Midland Nat. 42: 726, 736, 738. ♂, ♀.

Biology: Powell, 1957. Pan-Pacific Ent. 33: 39-40 (prey). —Evans, 1963. Ent. News 74: 239 (prey transport).

parvulus (Banks). U. Sonor. and Transit. Faunas, N. Mex. and Alta., w. to the Pacific, s. in Mexico to Baja California and Zacatecas.
Pompiloides parvulus Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 227. ♀, ♂.
Pompilus (*Ammosphex*) *parvulus tepahuanus* Evans, 1953. Ent. Soc. Amer., Ann. 46: 542. ♂.

silvivagus Evans. Transit. Zone forests, Tex., N. Mex., Colo., Ariz., Calif.
Pompilus (*Ammosphex*) *solonus silvivagus* Evans, 1951. Amer. Ent. Soc., Trans. 77: 241, figs. 184, 218. ♂, ♀.

solonus solonus (Banks). L. and U. Sonor. Faunas, Calif., Colo., and cent. Tex.; Mexico (Baja California). Prey: *Lycosa* sp. Another subsp. occurs in Mexico.
Pompiloides solonus Banks, 1914. N. Y. Ent. Soc., Jour. 22: 303. ♀.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 77: 241 (prey).

wasbaueri Evans. Calif. (Contra Costa and Tuolumne Co's.).
Pompilus (*Ammosphex*) *wasbaueri* Evans, 1966. Amer. Ent. Soc., Mem. 20: 396. ♂.

Genus POMPILUS Subgenus ARACHNOSPILA Kincaid

Arachnospila Kincaid, 1900. Wash. Acad. Sci., Proc. 2: 509.
Type-species: *Arachnospila septentrionalis* Kincaid. Monotypic.
Pycnopompilus Ashmead, 1902. Canad. Ent. 34: 83.
Type-species: *Pompilus scelestus* Cresson. Orig. desig.

arctus Cresson. Transcont. in Canad. and Transit. Zones; Mexico (Hidalgo, Mexico). Ecology: Occurs in open woods; nests in gravelly soil. Prey: *Arctosa* sp., *Schizocosa saltatrix* (Hentz), *Trochosa avara* Keys.; *Amaurobius bennetti* (Blackw.), *A. ferox* Walck.; *Clubiona* sp.; *Orodrassus coloradensis* Em.

Pompilus arctus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 453. "♀" = ♂.
Psammochares anoplinus Banks, 1919. Mus. Compar. Zool., Bul. 63: 231, 232. ♀.
Pycnopompilus siouxensis Dreisbach, 1950. Amer. Midland Nat. 43: 592, figs. 46, 47. ♂.
Pycnopompilus sculleni Dreisbach, 1950. Amer. Midland Nat. 43: 594, figs. 33, 37. ♂.
Pycnopompilus parvus Dreisbach, 1952. Amer. Midland Nat. 48: 152, figs. 3, 4. ♂.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 77: 260-261 (nest, prey). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 86 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 376 (prey).

fumipennis eureka (Banks). Canad. and Transit. Zones, B. C. and Mont. to Calif. and N. Mex.; Mexico (Baja California). Ecology: Nests off side of mammal burrow. Prey: *Tarentula kochi* Keys., *Trochosa pratensis* Em., *Lycosa* sp.

Psammochares eureka Banks, 1919. Mus. Compar. Zool., Bul. 63: 231. ♀ (♂ misdet.).
Psammochares catalinae Banks, 1933. Psyche 40: 7. ♀, ♂.

Biology: Evans, 1951. Amer. Ent. oc., Trans. 77: 268 (prey, nest). —Evans, 1959. Kans. Ent. Soc., Jour. 32: 75 (prey). —Wasbauer and Powell, 1962. Kans. Ent. Soc., Jour. 35: 400 (prey).

fumipennis fumipennis Zetterstedt. Transcont. in Canad. Zone, Alaska, N. W. T., and Labrador to Wash., Alta., N. Dak., and N. Y.; north. Europe.

Pompilus fumipennis Zetterstedt, 1838. Ins. Lapponica, v. 1, p. 438. ♀.
Arachnospila septentrionalis Kincaid, 1900. Wash. Acad. Sci., Proc. 2: 509. ♀.
Psammochares lasiope Banks, 1919. Canad. Ent. 51: 81. ♀.

scelestus Cresson. Transcont. in Transit. and U. Austral Zones, southern Canada to Calif. and Ga., s. in Mexico at higher altitudes to Guerrero and Oaxaca. Ecology: Occurs in open woods and on sand dunes; nests in light soil or sand. Parasite: *Evagetes parvus* (Cr.), *Ceropales* sp. Prey: *Lycosa gulosa* Walck., *L. frondicola* Em., *L.* sp., *Trochosa avara* Keys., Lycosidae sp.; *Dolomedes* sp.; *Phidippus* sp.

Pompilus scelestus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 451. ♀, ♂.
Pompilus pulchrinellus Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 194, pl. 11, figs. 12, 12a. ♀.
Pompilus Omiltemensis Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 197, pl. 11, figs. 18, 18a. ♂.
Psammochares astur Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 225. ♀.
Psammochares sublaevis Banks, 1921. Ent. Soc. Amer., Ann. 14: 20. ♀.
Pycnopompilus subscelestus Dreisbach, 1950. Amer. Midland Nat. 43: 591, figs. 39, 40. ♂.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 153-163 (prey, nest, parasite). —Peckham and Peckham, 1905. Wasps, social and solitary, pp. 230-242 (prey, nest, parasite). —Rau and Rau, 1918. Wasp Studies Afield, pp. 64-67 (prey, nest). —Evans, 1951. Amer. Ent. Soc., Trans. 77: 264 (prey, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 23 (prey). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 377 (prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 483 (prey transport, nest). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 73-74, fig. 2 (prey, nest).

Genus POMPILUS Subgenus ANOPLOCHARES Banks

Anoplochares Banks, 1939. Canad. Ent. 71: 225, 229.
Type-species: *Pompiloides rectus* Banks. Orig. desig.

The North American species are found in open woods. The lack of a tarsal pecten suggests that the females nest in pre-existing cavities, such as those of the prey as in the European *spissus* Schiodte.

apicatus Provancher. Newfoundland, Sask., and B. C. s. to Fla., Tex., and Calif.

Pompilus apicatus Provancher, 1882. Nat. Canad. 13: 35, 38.

Pompiloides rectus Banks, 1914. N. Y. Ent. Soc., Jour. 22: 303. ♀, ♂.
Pompiloides elsinore Banks, 1919. Mus. Compar. Zool., Bul. 63: 235, 236. ♀.

similaris (Banks). Alleghanian and Carol. Faunas, Ont. and New England s. to Fla. and w. to Ill.
Anoplius similaris Banks, 1919. Canad. Ent. 51: 82. ♀.

Genus APORINELLUS Banks

Aporinellus Banks, 1912 (1911). Ent. Soc. Wash., Proc. 13: 238.
Type-species: *Aporus fasciatus* Smith. Desig. by Banks, 1912.
Ferreoloides Haupt, 1929. Zool. Mus. Berlin, Mitt. 15: 150.
Type-species: *Pompilus moestus* Klug. Desig. by Bradley, 1944.
Eupompiloides Gussakovsky, 1935. Konowia 14: 141.
Type-species: *Pompilus moestus* Klug. Monotypic.
Ceratopompilus Bradley, 1944. Eos 20: 95, 97.
Type-species: *Pompilus sexmaculatus* Spinola. Orig. desig.

Occur chiefly in sandy places, and visit honeydew and occasionally flowers; prey usually upon spiders of the family Salticidae.

Revision: Bequaert, 1919. Psyche 26: 115-123. —Evans, 1966. Amer. Ent. Soc., Mem. 20: 402-423.

Taxonomy: Evans, 1957. Pan-Pacific Ent. 33: 185-186 (revised key).

basalis Banks. Kans., Tex. and Oreg. s. to Costa Rica. Ecology: Nests in sand. Prey: *Oxyopes helius* Chamb.
Aporinellus basalis Banks, 1933. Psyche 40: 3. ♀.
Aporinellus bridwelli Evans, 1951. Amer. Ent. Soc., Trans. 77: 291, figs. 197, 265. ♂.

Biology: Evans, 1959. Kans. Ent. Soc., Jour. 32: 76 (prey transport).

borregoensis Evans. South. Calif., Ariz. and Nev.
Aporinellus borregoensis Evans, 1957. Pan-Pacific Ent. 33: 184, fig. 2. ♂, ♀.

completus Banks. Transcont. in south. Canada and U. S., s. in Mexico to Chiapas at higher altitudes. Ecology: Nests in soil. Prey: *Phidippus clarus* Keys., *Habronattus* sp., *Pellenes oregonensis* Peckh., *P. viridipes* (Hentz), *P. borealis* (Bks.), *P.* sp., *Evarcha hoyi* (Peckh.), *Habrocestum pulex* (Hentz), *Maevia vittata* (Hentz), *Sitticus palustris* (Peckh.).
Aporinellus completus Banks, 1917. Mus. Compar. Zool., Bul. 61: 97. ♀.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 77: 294 (prey). —Evans, 1962. Kans. Ent. Soc., Trans. 32: 76 (prey). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 63 (prey, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 377 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 74 (prey).

fasciatus (Smith). N. C., Ill., Alta. and B. C., s. to Fla., Tex. and Calif., s. in Mexico at higher altitudes to Puebla and Morelos.
Aporus fasciatus Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 175. ♂. Preocc. in *Pompilus*.
Pompilus unionis Dalla Torre, 1897. Cat. Hym., v. 8, p. 330. N. name.
Aporus apicatus Banks, 1910. N. Y. Ent. Soc., Jour. 18: 126. ♂.

medianus Banks. Calif., Wyo., Mich. and N. Y. s. to Costa Rica. Ecology: Nests in sand. Prey: *Oxyopes salticus* Hentz, *Maevia vittata* Hentz, *Phidippus whitmanii* Peckh. ?, *P.* sp., *Salticus* sp.; *Tibellus duttoni* (Hentz), *Xysticus* sp. near *gulosus* Keys. This sp. was consistently misdet. as *fasciatus* Sm. until 1966.
Aporinellus medianus Banks, 1917. Mus. Compar. Zool., Bul. 61: 97. ♀.
Aporinellus intermedius Banks, 1919. Mus. Compar. Zool., Bul. 63: 240. ♀.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 55-57 (prey, nest). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 194-195 (prey, nest). —Kurczewski and Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 23-24 (prey hunting and transport, nest).

taeniatus baboquivari Evans. Ariz. (Baboquivari Mts.).
Aporinellus taeniatus baboquivari Evans, 1951. Amer. Ent. Soc., Trans. 77: 286. ♀.

taeniatus rufus Banks. Colo., Minn., Nebr.
Aporinellus rufus Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 230. ♀.

taeniatus taeniatus (Kohl). B. C., Minn. and Mass. s. to Calif., La. and Fla., and to Guatemala from sea level to at least 7500 ft. Ecology: Nests in sand. Prey: *Habronattus calcaratus* (Bks.), *Pellenes agilis* (Bks.), *P. borealis* (Bks.), *P. viridipes* (Hentz), *P.* sp.
Pompilus taeniatus Kohl, 1886. Zool.-Bot. Gesell. Wien, Verh. 36: 315. ♀.
Pompilus taeniolatus Dalla Torre, 1897. Cat. Hym., v. 8, p. 326. N. name.
Aporus ferrugineipes Viereck, 1906. Amer. Ent. Soc., Trans. 32: 203. ♀.
Aporinellus californicus Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 240. ♀.
Aporinellus banksi Bequaert, 1919. Psyche 26: 118. ♀.
Aporinellus semirufus Banks, 1929. Psyche 36: 326. ♀.
Aporinellus bequaerti Banks, 1933. Psyche 40: 3. ♀.

Biology: Evans, 1951. Amer. Ent. Soc., Trans. 77: 284 (prey). —Krombein, 1964. Amer. Mus. Novitates 2201: 13 (prey). —Kurczewski and Kurczewski, 1973. Kans. Ent. Soc., Jour. 46: 74 (prey, nest).

taeniatus wheeleri Bequaert. Alleghanian Fauna, Mass. to N. C.
Aporinellus wheeleri Bequaert, 1919. Psyche 26: 118. ♀.

yucatanensis (Cameron). N. J., Iowa, Mont. and Oreg. s. to Costa Rica except at high altitudes. Ecology: Nests in sand. Prey: *Xysticus* sp.
Pompilus (*Aporus*) *yucatanensis* Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 189. ♀.
Aporinellus laticeps Banks, 1912 (1911). N. Y. Ent. Soc., Jour. 19: 230. ♀.
Aporinellus sinuatus Evans, 1951. Amer. Ent. Soc., Trans. 77: 298, figs. 199, 246, 250, 253, 256. ♂, ♀.

Biology: Krombein, 1959. Ent. Soc. Wash., Proc. 61: 194 (prey, nest; misdet. as *apicatus*).

Genus ALLOCHARES Banks

Allochares Banks, 1917. Mus. Compar. Zool., Bul. 61: 98.
Type-species: *Allochares bruesi* Banks. Monotypic.

Revision: Bradley, 1944. Amer. Ent. Soc., Trans. 70: 148.

azureus (Cresson). Fla. to south. Calif., s. in Mexico to Puebla and Veracruz.
Pompilus (*Agenia*) *azureus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 131. ♀.
Pompilus sinaloae Cameron, 1893. Biol. Cent.-Amer., Hym., v. 2, p. 192. ♀.
Allochares bruesi Banks, 1917. Mus. Compar. Zool., Bul. 61: 98. ♀.

Genus PARACYPHONONYX Gribodo

Paracyphononyx Gribodo, 1884. Mus. Civ. Stor. Nat. Genova, Ann. (2) 1: 306.
Type-species: *Paracyphononyx melanicrus* Gribodo. Monotypic.
Schistosalius Saussure, 1892. *In* Grandidier, Hist. Nat. Madagascar, v. 20, Hym., v. 1, p. 313.
Type-species: *Salius ellioti* Saussure. Desig. by Ashmead, 1902.
Paracyphonyx Ashmead, 1902. Canad. Ent. 34: 81.
Type-species: *Paracyphonyx metemmensis* Magretti. Orig. desig.
Allocyphonyx Ashmead, 1902. Canad. Ent. 34: 136.
Type-species: *Pompilus maurus* Cresson. Orig. desig.
Pompiloides Sustera, 1913. Zool.-bot. Gesell. Wien, Verhandl. 62: 180.
Type-species: *Pompilus ruficrus* Klug. Monotypic.
Dicyrtomus Haupt, 1927. Deut. Ent. Ztschr., Beih., pp. 150, 256.
Type-species: *Pompilus ruficrus* Klug. Orig. desig.
Atopopompilus Arnold, 1937. Transvaal Mus., Ann. 19: 22.
Type-species: *Pompilus venans* Kohl. Orig. desig.
Anacyphononyx Haupt, 1950. Explor. Parc. Nat. Albert, Miss. de Witte, fasc. 69, p. 59.
Type-species: *Pompilus semiplumbeus* Taschenberg. Orig. desig.

funereus (Lepeletier). Mass., Mich., S. Dak. and Utah s. to Fla., Tex. and Ariz., s. in Mexico to Yucatan. Prey: *Lycosa lenta* (Hentz).
Anoplius funereus Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 449. ♂.

Pompilus maurus Cresson, 1867 Amer. Ent. Soc., Trans. 1: 88. ♀, ♂.
Psammochares (*Allocyphonyx*) *harpalyce* Banks, 1910. Psyche 17: 250. ♂.

Biology: Hurd and Wasbauer, 1956. Kans. Ent. Soc., Jour. 29: 169 (prey).

Subfamily CEROPALINAE

This group is considered a family by some workers.

Revision: Townes, 1957. U. S. Natl. Mus., Bul. 209: 221-272, 32 figs.

Tribe MINAGENIINI

Genus MINAGENIA Banks

Pseudagenia subg. *Minagenia* Banks, 1934. Amer. Acad. Arts and Sci., Proc. 69: 40, 64.
Type-species: *Pseudagenia* (*Minagenia*) *brevicornis* Banks. Orig. desig.
Nannochilus Banks, 1934. Mus. Compar. Zool., Bul. 94: 171.
Type-species: *Pseudagenia externa* Banks. Orig. desig.
Compsagenia Haupt, 1959. Nova Acta Leopoldina 21, no. 141: 29.
Type-species: *Compsagenia laevipes* Haupt. Orig. desig.

Biological notes have been reported on *osoria* (Bks.) only. The larva lives as an external parasite of an active lycosid spider. The wasp cocoon is spun under bark.

clypeata (Banks). Md. to N. C., Mich.
Ageniella clypeata Banks, 1914. N. Y. Ent. Soc., Jour. 22: 306. ♂.
Minagenia shappirioi Dreisbach, 1953. Amer. Midland Nat. 49: 839, figs. 1, 5. ♂.

congrua (Cresson). Alleghan. Fauna, Que. to Va., W. Va., Mich. *M. michiganensis* Dreisb. is possibly a syn.
Pompilus (*Agenia*) *congruus* Cresson, 1867. Amer. Ent. Soc., Trans. 1: 129. ♀.
Agenia rufigastra Provancher, 1889. Addit. Corr. Faune Ent. Canada, Hym., p. 264. ♀.
Minagenia semirufa Dreisbach, 1953. Amer. Midland Nat. 49: 841, figs. 10, 14. ♂.

externa (Banks). Tex. (Lee Co.).
Pseudagenia externa Banks, 1910. N. Y. Ent. Soc., Jour. 18: 124. ♀.

julia (Brimley). Atlantic and Gulf Coast States, Md. to Tex.
Ageniella julia Brimley, 1934. Ent. News 45: 42. ♂.

lata Townes. S. C. (McClellanville, Columbia).
Minagenia lata Townes, 1957. U. S. Natl. Mus., Bul. 209: 230, pl. 3, fig. 36, pl. 4, fig. 44. ♂.

lutea Dreisbach. Okla. (Vinita).
Minagenia lutea Dreisbach, 1955. Ent. News 66: 106. ♀.

major Townes. D. C., Ga.
Minagenia major Townes, 1957. U. S. Natl. Mus., Bul. 209: 229. ♂, ♀.

michiganensis Dreisbach. Mich. (Roscommon Co.). Possibly a syn. of *congrua* (Cr.).
Minagenia michiganensis Dreisbach, 1953. Amer. Midland Nat. 49: 842, figs. 9, 12. ♂.

montisdorsa Dreisbach. Ohio, Ga., La., Tex.; Mexico (Baja California, Zacatecas).
Minagenia montisdorsa Dreisbach, 1953. Amer. Midland Nat. 49: 840, figs. 3, 7. ♂.

osoria (Banks). Md., Va., W. Va., Ga., Tex. Host: Lycosidae spp.
Nannochilus osoria Banks, 1944. Mus. Compar. Zool., Bul. 94: 172. ♂, ♀.

Biology: Kaston, 1959. Brooklyn Ent. Soc., Bul. 54: 103-106, fig. 9 (host, life history).

Tribe NOTOCYPHINI

Genus NOTOCYPHUS Smith

Notocyphus Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 172.
Type-species: *Notocyphus saevissimus* Smith. Desig. by Smith, 1873.

dorsalis arizonicus Townes. L. Sonoran Fauna of Ariz. and Calif.
Notocyphus dorsalis arizonicus Townes, 1957. U. . Natl. Mus., Bul. 209: 223. ♂, ♀.

dorsalis dorsalis Cresson. Tex.; Mexico (Chihùahua, Durango).
Notocyphus dorsalis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 207. ♀.
Notocyphus texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 207. ♂.

Tribe CEROPALINI

Genus CEROPALES Latreille

Ceropales Latreille, 1796. Precis Caract. Gen. Ins., p. 123.
Type-species: *Evania maculata* Fabricius. Desig. by Curtis, 1839.
Ceratopales (!) Howard, 1901. Insect Book. pl. 5, fig. 10.
Ceratopales Schulz, 1906. Spolia Hym., p. 174. Emend.
Agenioxenus Ashmead, 1902. Canad. Ent. 34: 137.
Type-species: *Ceropales rufiventris* Walsh. Orig. desig. (=*Ceropales robinsonii* Cresson).
Hypsiceraeus Morice and Durrant, 1915. Ent. Soc. London, Trans. pp. 403, 405.
Type-species: *Evania maculata* Fabricius. Orig. desig.

Members of this genus are social parasites of other spider wasps. The female *Ceropales* lays her egg in the book lung of the spider prey of the host either during transport of the prey or while the prey is lying unguarded. The *Ceropales* larva hatches first, devours the host egg, and then feeds on the host prey.

Revision: Fox, 1892. Amer. Ent. Soc., Trans. 19: 49-63.

Taxonomy: Dreisbach, 1948 (1946). Mich. Acad. Sci., Arts, and Letters, Papers 32: 249 (key to Mich. spp.). —Dreisbach, 1948. N. Y. Ent. Soc., Jour. 56: 233-268 (key to U. S. spp.).

bipunctata bipunctata Say. Atlantic to 100° W. in Transit. and U. Austr. Zones.
Ceropales bipunctata Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, app., p. 334. ♂, ♀.

bipunctata tibialis Banks. N. C. to Fla.
Ceropales bipunctata var. *tibialis* Banks, 1910. N. Y. Ent. Soc., Jour. 18: 126. ♂, ♀.
Ceropales floridensis Dreisbach, 1948. N. Y. Ent. Soc., Jour. 56: 233. ♀.

brevicornis Patton. La., Tex., N. Mex. n. to Pa. and Alta., Wash.
Ceropales brevicornis Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 368. ♂.

cubensis albopicta Cresson. South. Tex. to Panama, Baja California. Typical *cubensis* Cresson occurs in the West Indies.
Ceropales albopicta Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 378. ♂.

elegans aquilonia Townes. Alta., Minn.
Ceropales elegans aquilonia Townes, 1957. U. S. Natl. Mus., Bul. 209: 256. ♂.

elegans elegans Cresson. Pacific to 100° W. in U. Austr. and L. Austr. Zones.
Ceropales elegans Cresson, 1872. Amer. Ent. Soc., Trans. 4: 208. ♀.
Ceropales Cressoni Fox, 1892. Amer. Ent. Soc., Trans. 19: 58. ♂, ♀.

elegans quaintancei Viereck, Md. to Fla., Ill., Kans.
Ceropales quaintancei Viereck, 1902. Ent. News 13: 275. "♂" = ♀.

femoralis Cresson. Va. to Kans., s. to Panama.
Ceropales femoralis Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 378. ♀.
Ceropales foxii Rohwer, 1916. Canad. Ent. 48: 369. ♂.

fulvipes Cresson. Tex.
Ceropales fulvipes Cresson, 1872. Amer. Ent. Soc., Trans. 4: 208. ♀.

hatoda Brimley N. Y. to N. C., Minn. Host: *Ageniella partita* Bks.
Ceropales hatoda Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 201. ♂.

Biology: Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 15 (host).

longipes Smith. N. J. to Ga., Mo.
Ceropales fasciata Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, app., p. 333; Leconte Ed. v. 1, p. 224 Preocc.
Ceropales longipes Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 179. ♀.
Ceropales frigida Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 180. N. name.

maculata caenosa Townes. Calif. (Sierra Nevada Mts.).
Ceropales maculata caenosa Townes, 1957. U. S. Natl. Mus., Bul. 209: 242. ♀, ♂.

maculata fraterna Smith. Transcont., chiefly in Canad. and Transit. Zones, but replaced in far West by *maculata stretchii* Fox and *maculata caenosa* Townes, and in the Alberta-Dakotas area by *maculata rhodomerus* Townes. Host: *Pompilus scelestus* Cr., *Priocnemis* sp., prob. *germana* Cr. Typical *maculata* (Fabricius) is European.
Ceropales fraterna Smith, 1855. Cat. Hym. Brit. Mus., v. 3, p. 180. ♀.
Ceropales minima Provancher, 1887. Addit. Corr. Faune Ent. Canada, Hym., p. 265. ♂.
Ceropales fraternus occidentalis Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 455. ♂.

Taxonomy: Rohwer, 1916. Canad. Ent. 48: 369 (notes on type of *minima*).

Biology: Peckham and Peckham, 1898. Wis. Nat. Hist. Survey, Bul. 2: 154-155, 239 (host). —Evans and Yoshimoto, 1962. Ent. Soc. Amer., Misc. Pub. 3: 112 (host).

maculata rhodomerus Townes. South. Alta. and Mont. to N. and S. Dak., and occasional individuals from Minn., Mich., N. Y., Mass. in range of *maculata fraterna* Smith.
Ceropales maculata rhodomerus Townes, 1957. U. S. Natl. Mus., Bul. 209: 243. ♀, ♂.

maculata stretchii Fox. Calif. east of Sierra Nevada Mts., n. to B. C. and e. to Idaho, north. Nev., and Utah.
Ceropales Stretchii Fox, 1892. Amer. Ent. Soc., Trans. 19: 52. ♀.

neomexicana Rohwer. N. Mex., Calif.; Mexico (Zacatecas, Durango).
Ceropales neomexicana Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 236. ♂.

nigripes Cresson. Pacific to 100° W. in Transit. and U. Austr. Zones; Mexico (Durango, Zacatecas).
Ceropales nigripes Cresson, 1867. Amer. Ent. Soc., Trans. 1: 139. ♀.
Ceropales texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 208. ♂.

pacifica Townes. Oreg., Calif.
Ceropales pacifica Townes, 1957. U. S. Natl. Mus., Bul. 209: 264. ♂, ♀.

robinsonii robinsonii Cresson. Que. to Fla., Ont., Ohio, Ill. Host: *Phanagenia bombycina* (Cr.).
Ceropales Robinsonii Cresson, 1867. Amer. Ent. Soc., Trans. 1: 140. ♂.
Ceropales rufiventris Walsh and Riley, 1869. Amer. Ent. 1: 136, 163. ♂, ♀.
Ceropales superba Provancher, 1883. Nat. Canad. 14: 36. ♀.

Biology: Walsh and Riley, 1869. Amer. Ent. 1: 136, 163 (host).

robinsonii stigmatica Banks. Kans., Tex.
Ceropales robinsonii var. *stigmatica* Banks, 1910. N. Y. Ent. Soc., Jour. 18: 126. ♀.

rugata Townes. Oreg., Calif., Wyo., Utah, Gulf and South Atlantic States; Mexico (Zacatecas, Teotihuacan).
Ceropales rugata Townes, 1957. U. S. Natl. Mus., Bul. 209: 264. ♂, ♀.

Unplaced Taxa of Pompilidae

Pompilus bipartitus Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 439. ♀. Philadelphia. Preocc.; replaced by *Pompilus semipartitus* Dalla Torre.
Pompilus semipartitus Dalla Torre, 1897. Cat. Hym., v. 8, p. 321. N. name for *Pompilus bipartitus* Lepeletier.

Family RHOPALOSOMATIDAE

During their larval stages the two North American rhopalosomatids are external parasites of nymphal crickets. Gurney (1953) undoubtedly had material of both species before him in his study of the biology and larval stages of what he supposed to be *Rhopalosoma* only. He recorded as hosts *Hapithis a. agitator* Uhler, *H. agitator quadratus* Scudd., *H. brevipennis* Sauss., *H.* sp., and *Orocharis* sp.

Taxonomy: Gurney, 1953. U. S. Natl. Mus., Proc. 103: 25-31, figs. 8, 9 (larva).

Biology: Gurney, 1953. U. S. Natl. Mus., Proc. 103: 19-25, pl. 1.

Genus RHOPALOSOMA Cresson

The adults are fully winged, have enlarged ocelli and are nocturnal.

Rhopalosoma Cresson, 1865. Ent. Soc. Phila., Proc. 4: 58.
Type-species: *Rhopalosoma Poeyi* Cresson. Monotypic.
Sibyllina Westwood, 1868. Ent. Soc. London, Trans. p. 329.
Type-species: *Sibyllina aenigmatica* Westwood. Monotypic (=*Rhopalosoma poeyi* Cr.).

Revision: Brues, 1943. Ent. Soc. Amer., Ann. 36: 310-318, 1 pl.

nearcticum Brues. Md. south to Fla., Ky., Mo. Host: *Orocharis saltator* Uhler.
Rhopalosoma nearcticum Brues, 1943. Ent. Soc. Amer., Ann. 36: 316. ♀, ♂.

Biology: Hood, 1914 (1913). Ent. Soc. Wash., Proc. 15: 145-147, 1 fig. (Misdet. as *R. poeyi* Cresson.)

Genus OLIXON Cameron

Olixon Cameron, 1887. Biol. Cent.-Amer. Hym., v. 1, p. 412.
Type-species: *Olixon testaceum* Cameron. Monotypic.
Saphobethylus Kieffer, 1911. Soc. Sci. Bruxelles, Ann. (2) 35: 216.
Type-species: *Saphobethylus pallidus* Kieffer. Monotypic.
Nealgoa Brues, 1922. Psyche 29: 105.
Type-species: *Nealgoa banksii* Brues. Monotypic.

This genus is unusual in that extreme brachyptery is equally developed in both sexes. The species are much smaller than *Rhopalosoma*, have tiny ocelli and are diurnal.

Taxonomy: Reid, 1939. Roy. Ent. Soc. London, Proc. 8: 101.

banksii (Brues). N. Y., D. C., N. C., Ga., Fla., Ohio, Minn., Kans. Host: *Nemobius* sp.; *Hapithis agitator* Uhler.
Nealgoa banksii Brues, 1922. Psyche 29: 106. ♀.

Biology: Krombein, 1950 (1949). Elisha Mitchell Sci. Soc., Jour. 65: 264-265 (male).

Superfamily SPHECOIDEA

By Karl V. Krombein

For nearly a century most specialists in this group, influenced by Kohl's ultra-conservative views, considered that the superfamily contained a single family, the Sphecidae. The monumental generic reclassification by Bohart and Menke (1976) embraces this opinion. However, Brothers (1975) demonstrates convincingly that each of the aculeate superfamilies should comprise several families if the family-level groups are to represent categories of equal phylogenetic value. The classification used elsewhere in this catalog supports the latter conviction. Accordingly the major subfamilies recognized by Bohart and Menke are restored to family rank, a position accorded them by most specialists of the previous century.

Some authors believe that the sphecoid wasps and the bees belong to a single superfamily, the Sphecoidea. For example, Brothers divides the Sphecoidea into two informal groups, the Spheciformes and Apiformes, with eight and nine families respectively. However, on the basis of the presence or absence of a hind tibial strigil, Boerner (1919) divides the Aculeata into two subsections, the sphecoids, pompiloids and vespoids, and the formicoids, scolioids and apoids. The phylogeny of the sphecoid wasps and bees requires more intensive investigation than they have had hitherto, for the possibility exists that the bees may not be so closely related to the sphecoid wasps as supposed by some workers. At this time the Sphecoidea and Apoidea are maintained as separate superfamilies.

The behavior and life history of this diverse assemblage of wasps has attracted a host of observers both in the United States and abroad. Many species are ground nesters and are known popularly as digger wasps; most of them dig their own nests but some species appropriate pre-existing burrows of other arthropods and modify them as needed. Numerous species nest above ground in pre-existing cavities such as abandoned borings of beetle larvae in wood, old insect galls and old mud-dauber nests; many of these species can be induced to nest in borings in wood called trap-nests. Some of our species excavate their own nests in soft pith of shrubs such as sumac and elderberry, or in rotten wood. Relatively few North American species are mason wasps, building various kinds of mud cells. Several genera are cleptoparasites of other ground-nesting sphecoids. So far as known the North American species are all solitary wasps, but apparent eusociality has been discovered in the Neotropical genus *Microstigmus* Ducke.

Members of the Sphecoidea prey upon a great variety of terrestrial insect orders as well as upon spiders. Varying degrees of host specificity are found among the several families and lesser categories. In general the more primitive sphecoids prey upon the more primitive and ancient groups of Hemimetabola while the more advanced groups prey upon the higher groups of Holometabola.

The pre-1920 references listed below under the side-head Taxonomy are not reliable for generic or specific discrimination.

Revision: Bohart and Menke, 1976. Sphecid wasps of world, 695 pp., 190 figs. (reclassification of world genera, lists of species-level taxa).

Taxonomy: Ashmead, 1899. Canad. Ent. 31: 145-155, 161-174, 212-225, 238-251, 291-300, 322-330, 345-357 (keys to families and genera, and lists of No. Amer. spp.). —Smith, 1908. Nebr. Univ., Studies 8: 323-410, 1 pl. (keys to Nebr. spp.). —Mickel, 1918 (1917). Nebr. Univ., Studies 17: 342-456, 2 figs. (keys to Nebr. spp.). —Pate, 1937. Amer. Ent. Soc., Mem. 9: 1-103 (generic names and type-species). —Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 131-166, 13 pls. (larvae of Sphecinae). —Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 35-66, 13 pls. (larvae of Nyssoninae). —Evans, 1957. Amer. Ent. Soc., Trans. 83: 79-117, 12 pls. (larvae of Philanthinae, Trypoxyloninae and Crabroninae). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 137-191, 7 pls. (addendum to larvae, keys to subfamilies and genera based on larval characters, and remarks on evolution and classification based on larval characters). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 235-299, 12 pls. (larvae, supplement). —Evans, 1964. Ent. News 75: 225-237, 3 figs. (classification and evolution of digger wasps based on larvae). —Brothers, 1975. Kans. Univ. Sci. Bul. 50: 586-587, 640-641 (phylogeny).

Biology: Evans, 1963. Sci. Amer. 208 (4): 145-154 (evolution as evidenced by predatory behavior). —Evans, 1966. Science 152: 465-471, 6 figs. (accessory burrows of digger wasps). —Kurczewski and Snyder, 1968. Conservationist 23 (2): 28-31, 11 figs. (evolution of cliff-nesting in digger wasps). —Miller and Kurczewski, 1973. *In* Dindal, Proc. First Soil Microcommunities Conf., USAEC, CONF-711076; Natl. Tech. Inform. Serv., USDC, pp. 204-217 (ecology of digger wasps). —Evans, 1975 (1974). N. Y. Ent. Soc., Jour. 82: 259-267, 4 figs. (digger wasps as colonizers of new habitats). —Alcock, 1975. Anim. Behaviour 23: 893-894 (male behavior and territoriality).

Family AMPULICIDAE

These primitive sphecoid wasps occur principally in the tropics of the Old and New Worlds. Appropriately, they prey upon cockroaches, one of the most primitive of insect orders. The biology of only a few species has been observed. The nests are constructed in pre-existing cavities or crevices, such as in twigs, beneath bark of trees or in the soil. Unlike other sphecoids, the prey is carried backwards on foot as in most pompilid wasps.

Taxonomy: Kohl, 1893. K. K. Naturhist. Hofmus., Ann. 8: 455-516, 3 pls. (generic diagnoses, key to and descriptions of *Ampulex* spp.). —Evans, 1959. Ent. News 70: 57-61, 6 figs. (larvae).

Subfamily DOLICHURINAE

Genus DOLICHURUS Latreille

Dolichurus Latreille, 1809. Gen. Crust. Ins., v. 4, p. 387.
Type-species: *Pompilus corniculus* Spinola. Monotypic.
Thyreosphex Ashmead, 1904. Canad. Ent. 36: 282.
Type-species: *Thyreosphex Stantoni* Ashmead. Monotypic.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 21, figs. F, G (male genitalia).

greenei Rohwer. Ont. to Fla., Mo. Ecology: Nests under leaf litter in woods. Prey: *Parcoblatta* sp., nymph.
Dolichurus greenei Rohwer, 1916. Ent. Soc. Wash., Proc. 18: 212. ♀.

Taxonomy: Bradley, 1934. Ent. News 45: 33-34, ♂.

Biology: Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 15 (prey, nest site).

Genus PARADOLICHURUS Williams

Dolichurus subg. *Paradolichurus* Williams, 1960. Wasmann Jour. Biol. 17: 299.
Type-species: *Dolichurus* (*Paradolichurus*) *californicus* Williams. Orig. desig.

californicus (Williams). Calif. (San Diego Co.).
Dolichurus (*Paradolichurus*) *californicus* Williams, 1960. Wasmann Jour. Biol. 17: 300, figs. 1, 2, 4. ♀.

Subfamily AMPULICINAE

Genus AMPULEX Jurine

Ampulex Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 132.
Type-species: *Sphex compressus* Fabricius. Desig. by Audouin, 1822.
Pronoeus Latreille, 1809. Gen. Crust. Ins., v. 4, p. 56.
Type-species: *Dryinus aeneus* Fabricius. Monotypic.
Lorrheum Leach, 1837. *In* Shuckard, Essay on Indig. Fossor. Hym., p. 18. A manuscript name of Leach, validated by Shuckard.
Type-species: *Sphex compressus* Fabricius. Desig. by Shuckard, 1837.
Rhinopsis Westwood, 1844. Arcana Ent., v. 2, p. 68.
Type-species: *Rhinopsis Abbottii* Westwood. Monotypic.
Waagenia Kriechbaumer, 1874. Stettin Ent. Ztg. 35: 55.
Type-species: *Waagenia sikkimensis* Kriechbaumer. Monotypic.
Chlorampulex Saussure, 1892. *In* Grandidier, Hist. Nat. Madagascar, v. 20, p. 441.
Type-species: *Sphex compressus* Fabricius. Desig. by Pate, 1937.

canaliculata Say. Mass. to Ga., Ohio, Wis., Mo., Kans. Ecology: Nests in cavities in twigs and in borings in wood. Prey: *Parcoblatta virginica* (Brunner), *P.* sp., *Ischnoptera* sp.
Ampulex canaliculatus Say, 1823. West. Quart. Rptr. 2: 76.
Rhinopsis Abbottii Westwood, 1844. Arcana Ent., v. 2, p. 68, pl. 65, fig. 5. ♀.
Ampulex pensylvanica Haldeman, 1849. Acad. Nat. Sci. Phila., Proc. 4: 203.
Rhinopsis melanognathus Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 464. "♀" = ♂.

Taxonomy: Schulz, 1911. Zool. Ann. 4: 149-152. —Bradley, 1934. Ent. News 45: 32-33. —Evans, 1959. Ent. News 70: 57-58, 6 figs. (larva).

Biology: Williams, 1929. Hawaii. Ent. Soc., Proc. 7: 318-329, 10 figs. (nest, prey, life history). —Krombein, 1967. Trap-nesting wasps and bees, pp. 173-175, figs. 49-51 (nest, prey, life history).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): 50, pl. 22, figs. A-D (male genitalia).

ferruginea Bradley. Fla., Tex.
Ampulex (*Rhinopsis*) *ferruginea* Bradley, 1934. Ent. News 45: 274. ♂.

Taxonomy: Strandtmann, 1943. Ent. Soc. Amer., Ann. 36: 46-48. ♀.

Family SPHECIDAE

Collectively, the members of this family are known as thread-waisted wasps because of the slender, elongate abdominal petiole. Most North American species are moderately large wasps, many of them with conspicuous coloration. The nesting habits are quite varied: The majority of species are digger or sand wasps, excavating their nests in soil; others utilize pre-existing cavities or borings in wood, or abandoned mud-dauber cells; a few are mud-daubers. The prey is also quite varied and includes spiders, cockroaches, crickets, grasshoppers, katydids and larvae of Lepidoptera and Hymenoptera. Normally, the species of a genus or higher category prey upon species of only one of the foregoing groups.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 131-153, 73 figs. (larvae). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 147-149, figs. 31-35 (larvae). —Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 91-182, 115 figs. (reclassification). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 237-245, pls. 8-9 (larvae). —Menke, 1965. Tijdschr. v. Ent. 108: 205-217, 8 figs. (syn. of some New World spp.).

Subfamily SCELIPHRONINAE

Revision: Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 99-117 (Nearctic spp.).

Genus CHLORION Latreille

Chlorion Latreille, 1802. Hist. Nat. Crust. Ins., v. 3, p. 333.
Type-species: *Sphex lobata* Fabricius. Monotypic.

Chlorium Schulz, 1906. Spolia Hym., p. 193. Emend.

Revision: Menke, 1961. Ent. Soc. Amer., Ann. 54: 667-669, 9 figs. (N. Amer. spp.).

aerarium Patton. Entire U. S. Ecology: Nests in sand, probably constructing several cells per nest. Prey: *Gryllus rubens* Scud., *G. pennsylvanicus* (Burm.), *G.* sp., *Anurogryllus muticus* (De Geer).
Chlorion aerarium Patton, 1879. Canad. Ent. 11: 133. ♀.
Sphex (*Chlorion*) *nearcticus* Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 186. ♀, ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 242-244, figs. 9-12 (larva).

Biology: Peckham and Peckham, 1900. Wis. Nat. Hist. Soc., Bul. 1: 85-87 (nest, prey, parasite). —Peckham and Peckham, 1905. Wasps, Social and Solitary, pp. 256-261 (nest, prey, parasite). —Krombein, 1953 (1952). Wasmann Jour. Biol. 10: 283 (prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 104 (nest). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 195 (prey).

cyaneum Dahlbom. Tex., N. Mex., Ariz.; Mexico.
Chlorion cyaneum Dahlbom, 1843. Hym. Europaea, v. 1, p. 24.
Sphex (*Chlorion*) *occultus* Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 187. ♀, ♂.

Genus PODIUM Fabricius

Podium Fabricius, 1804. Systema Piezatorum, pp. x, 183.
Type-species: *Podium rufipes* Fabricius. Desig. by Latreille, 1810.
Talthybius Rafinesque, 1815. Analyse Nature ou Tabl. Univers, Palermo, p. 124. N. name.
Ammophilus Perty, 1833. Delect. Anim. Artic. Brasil, p. 141.
Type-species: *Ammophilus fumigatus* Perty. Desig. by Pate, 1937.
Parapodium Taschenberg, 1869. Ztschr. Gesam. Naturw. Halle 34: 423.
Type-species: *Parapodium biguttatum* Taschenberg. Monotypic.

Most of the species are Neotropical. Biological information has been published on only a few species, all of which prey upon cockroaches and nest in pre-existing cavities in wood, termite mounds or mud-dauber nests.

Revision: Kohl, 1902. Zool.-Bot. Gesell. Wien, Abh. 1 (4): 1-101.

krombeini Bohart and Menke. Tex., southern Calif.; Mexico (Morelos, Puebla, Oaxaca).
Podium krombeini Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 106, figs. 4, 49, 60. ♂, ♀.

luctuosum Smith. N. Y. to Tex., Mo., Kans. Ecology: Nests in borings in wood or in dead tree trunks; closing plug of rotten wood particles at inner end, the outer end plastered with mud. Parasite: *Melittobia chalybii* Ashm.; *Neochrysis panamensis* (Cam.)? Prey: *Parcoblatta uhleriana* (Sauss.), adults.
Podium luctuosum Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 235. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 244-245, figs. 14, 15 (larva).

Biology: Krombein, 1964. Brooklyn Ent. Soc., Bul. 58: 118-119 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 255-257, figs. 64, 65 (nest, prey, life history, parasites).

rufipes Fabricius. N. Y. to Fla., Iowa, Kans., Tex.; Mexico, Central and South America. Ecology: Nests in borings in wood and in abandoned mud-dauber nests; closing plug of a variety of compacted debris or earth with an outer coating of resin. Parasite: *Histiostoma myrmicarum* Scheuch.; *Lepidophora appendiculata* (Macq.); *Megaselia* sp.; *Melittobia chalybii* Ashm.; *Neochrysis panamensis* (Cam.). Prey: *Parcoblatta pennsylvanica* (DeG.), *P.* sp., *Chorisoneura texensis* Sauss. and Zehnt., *Cariblatta lutea* (Sauss. and Zehnt.), *C. minima* Heb., *Latiblatella rehni* Heb., *Eurycotis floridana* (Wlkr.), adults and nymphs. Predator: *Cymatodera undulata* Say.
Podium rufipes Fabricius, 1805. Systema Piezatorum, p. 183.
Parapodium biguttatum Taschenberg, 1869. Ztschr. Gesam. Naturw. Halle 34: 423. ♂, ♀.
Podium carolina Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 556. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 150, figs. 69-73 (larva).

Biology: Rau, 1937. Ent. News 48: 91-93 (nest, prey, life history). —Krombein, 1958. Amer. Ent. Soc., Trans. 84: 147-149 (nest, prey, life history, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 251-255, figs. 62, 63 (nest, prey, life history, parasites, predator). —Krombein, 1970. Smithsn. Contrib. Zool. 46: 12-22, figs. 40-61 (nest behavior, prey, life history).

Genus CHALYBION Dahlbom

Chalybion Dahlbom, 1843. Hym. Europaea, v. 1, p. 21.
Type-species: *Sphex cyanea* Fabricius. Desig. by Patton, 1880.
Chalybium Agassiz, 1847. Nomencl. Zool., p. 77. Emend.
Chalybium Schulz, 1906. Spolia Hym., p. 192. Emend.

Only the typical subgenus occurs in North America. These wasps nest in pre-existing cavities, most commonly in abandoned nests of mud-daubers, but also in holes in wood, bamboo and plant stems, and crevices in walls. There is one atypical record of *californicum* opening a sealed nest of *Sceliphron caementarium* (Dru.), the black and yellow mud-dauber, extracting the enclosed spiders, and restocking the nest with its own spiders.

Revision: Kohl, 1918. K. K. Naturhist. Hofmus. Ann. 32: 1-171 (World spp.). —Hutson, 1919. Amer. Ent. Soc., Trans. 45: 203-227 (N. Amer. spp.).

californicum (Saussure). Transcontinental in U. S., B. C., northern Mexico; adventive in Hawaii and Bermuda. Ecology: Nests in abandoned mud nests of *Sceliphron caementarium* (Dru.). Parasite: *Anthrax limatulus artemisia* Marst., *Sphaeropthalma* (*S.*) *a. auripilis* (Bl.). Prey: *Latrodectus mactans* (F.) most commonly, *Asagena americana* Em., *Enoplognatha puritana* Chamb. and Ivie, *Theridion tepidariorum* (Koch), *T. frondeum* Hentz, *T. australe* Bks., *Steatoda borealis* (Hentz); *Neoscona* sp., *Epeira foliata* (Fourcr.), *Araneus* sp., *Gea heptagon* (Hentz); Misumeninae sp., Thomisidae spp.; *Oxyopes scalaris* Hentz, Oxyopidae sp.; *Paraphidippus marginatus* (Walck.), Salticidae sp.
Sphex caerulea Linnaeus, 1763. Centuria Ins. Rar., p. 30. Preocc.
Sphex cyanea Fabricius, 1775. Systema Ent., No. 5, p. 346. Preocc.
Pelopoeus (*Chalybion*) *californicus* Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 26.

Taxonomy: Rau, 1915. Psyche 22: 62-63 (cocoon). —Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 149, figs. 67, 68 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2 (Sci. Ser. 1): 176-199 (nest, prey). —Peckham and Peckham, 1905. Wasps Social and Solitary, pp. 265-274 (nest, prey). —Rau, 1915. Ent. News 26: 469-471 (number of generations per year). —Rau, 1928. Ent. Soc. Amer., Ann. 21: 25-35 (nesting habits). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 443-448 (nesting habits). —Rau, 1935. Ent. News 46: 259-260 (prey). —Irving and Hinman, 1935. Science 82: 395-396 (prey). —Muma and Jeffers, 1945. Ent. Soc. Amer., Ann. 38: 245-255 (prey). —Ward, 1972. Ind. Acad. Sci., Proc. 81: 177-181 (sleeping aggregations).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14: 50, pl. 23, figs. H, J, L (male genitalia).

zimmermanni aztecum (Saussure). Western Tex. to Ariz., Utah; Mexico to Costa Rica, Clarion Is. Ecology: Nests in old mud nests of *Sceliphron assimile* (Dahlb.). Parasite: *Anthrax pluricellus* Will.
Pelopeus (!) *aztecus* Saussure, 1867. Reise der Ost. Freg. Novara, Zool. 2: 26. ♂.
Sceliphron (*Chalybion*) *monstrosum* Kohl, 1918. K. K. Naturhist. Hofmus., Ann. 32: 61. ♂.

Biology: Rau, 1940. Ent. Soc. Amer., Ann. 33: 591 (nests, parasite). —Rau, 1942. Canad. Ent. 74: 196 (sleeping aggregation).

zimmermanni zimmermanni Dahlbom. Tenn., N. C., Fla. to eastern Tex., Ind.; Hispaniola. Ecology: Nests in borings in wood and in old mud nests of *Sceliphron caementarium* (Dru.). Parasite: *Melittobia chalybii* Ashm. Prey: *Araneus* spp., *Argiope aurantia* Luc.,

A. trifasciata (Forsk.), *Cyclosa conica* (Pall.); *Theridion frondeum* Hentz, *Asagena americana* Em.
Chalybion zimmermanni Dahlbom, 1843. Hym. Europaea, v. 1, p. 22. ♀, ♂.
Pelopoeus texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 210. ♀, ♂.

Biology: Ward, 1970. Ind. Acad. Sci., Proc. 79: 231-233 (nest, prey). —Ward, 1971. Ind. Acad. Sci., Proc. 80: 264-266, 1 fig. (nests). —Ward, 1973. Ind. Acad. Sci., Proc. 82: 231-233 (growth in captivity). —Ward, 1973. Ind. Acad. Sci., Proc. 82: 233-234 (parasite).

Genus SCELIPHRON Klug

Genus SCELIPHRON Subgenus SCELIPHRON Klug

Sceliphron Klug, 1801. Neue Schr. Gesell. Naturf. Freunde Berlin 3: 561.
Type-species: *Sphex spirifex* Linnaeus. Desig. by Bingham, 1897.
Pelopoeus Latreille, 1803 (1802). Hist. Nat. Crust. Ins., v. 3, p. 334.
Type-species: *Sphex spirifex* Linnaeus. Desig. by Latreille, 1810.
Pelopaeus Latreille, 1804. Nouv. Dict. Hist. Nat., v. 24, p. 180. Emend. or error.
Sceliphrum Schulz, 1906. Spolia Hym., p. 192. Emend.

Only the typical subgenus occurs in North America. Most species are tropical.
These are the common black and yellow mud-daubers which build mud cells in sheltered situations. Each cell is stored with a number of small, paralyzed spiders.

Revision: Kohl, 1918. K. K. Naturhist. Hofmus., Ann. 32: 1-171 (world spp.). —Porter, 1926. U. S. Natl. Mus., Proc. 70 (1): 1-22 (N. Amer. spp.). —van der Vecht and van Breugel, 1968. Tijdschr. Ent. 111: 185-255 (world spp.).

assimile (Dahlbom). Tex.; Mexico south to Panama, Cuba. Parasite: *Acroricnus cubensis* (Cr.). Prey: *Epeira oaxacensis* Keys., *E. fuscovittata* Keys.; *Misumena* sp.; *Scytodes* sp.; *Phidippus* sp.
Pelopoeus assimilis Dahlbom, 1843. Hym. Europaea, v. 1, p. 23. ♀, ♂.
Sceliphron caementarium var. *nicaraguanum* Kohl, 1918. K. K. Naturhist. Hofmus., Ann. 32: 118. ♀.

Biology: Dow, 1932. Psyche 39: 10-12 (nest, prey, parasite).

caementarium (Drury). South. Canada and entire U. S. south to Central America, West Indies; adventive in Bermuda, Peru, Japan, Mariana Is., Marshall Is., Hawaii, Australia, New Caledonia, Fiji, Samoa, Society Is., Marquesas Is., Gambier Is., France, Germany, Madeira Is. Parasite: *Anthrax limatulus fur* (O. S.), *A. l. artemisia* Marst.; *Amobia floridensis* (Tns.); *Acroricnus s. stylator* (Thunb.), *A. s. edwardsii* (Cr.), *A. s. junceus* (Cr.); *Chrysis fuscipennis* Br.; *Sphaeropthalma* (*Photopsioides*) sp., *S.* (*S.*) *a. auripilis* (Bl.), *S.* (*S.*) *p. pensylvanica* (Lep.), *S.* (*S.*) *p. scaeva* (Bl.). Prey: *Neoscona arabesca* (Walck.), *N. benjamina* (Walck.), *N.* sp., *Acanthepeira stellata* (Walck.), *Argiope trifasciata* (Forsk.), *A. aurantia* Luc., *Epeira foliata* (Fourcr.), *E. displicata* Hentz, *E.* sp., *Aranea nivea* Hentz, *A. miniata* (Walck.), *A. cornuta* Cl., *A.* sp., *Metepeira labyrinthea* (Hentz), *Eustala anastera* (Walck.), *Mangora gibberosa* (Hentz.); *Philodromus pernix* Blackw., *Misumenops asperatus* (Hentz), *Misumena calycina* (L.), *M.* sp., *Misumenoides aleatorius* (Hentz), Misumeninae sp., Thomisidae sp.; *Phidippus mystaceus* Hentz, *P. clarus* Keys., *P.* sp., *Xysticus ferox* (Hentz), *Marpissa undata* (DeG.), Salticidae sp.; *Schizocosa crassipes* (Walck.), Lycosidae sp.; *Dolomedes* sp.; Anyphaenidae sp.; *Oxyopes scalaris* Hentz, *O. salticus* Hentz, Oxyopidae sp.; Clubionidae sp. Predator: *Lecontella cancellata* (LeC.).
Sphex caementaria Drury, 1773. Illus. Nat. Hist., v. 2, index.
Sphex flavomaculata DeGeer, 1773. Mem. Hist. Ins., v. 3, p. 588.
Sphex lunata Fabricius, 1775. Systema Ent. p. 347.
Sphex flavipes Fabricius, 1781. Species Ins., p. 444.
Sphex flavipunctata Christ, 1791. Naturgesch. Class. Nomencl., p. 301.
Sphex affinis Fabricius, 1793. Ent. System., v. 2, p. 203.
Pelopoeus architectus Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 313. ♀.
Pelopoeus servillei Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 313. ♀.
Pelopoeus solieri Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 318. ♀.

Pelopoeus canadensis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 233. ♂.
Pelopoeus nigriventris Costa, 1864. Mus. Zool. Napoli, Ann. 2: 60.
Pelopoeus tahitensis Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 27, pl. 2, fig. 17. ♀, ♂.
Sphex economica Curtiss, 1938. Short Zoology of Tahiti, p. 155.

Taxonomy: Rau, 1915. Psyche 22: 62-63 (cocoon). —Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 147, figs. 50-56 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. and Nat. Hist. Survey, Bul. 2 (Sci. Ser. 1): 176-199 (nest, prey). —Peckham and Peckham, 1905. Wasps, Social and Solitary, pp. 265-274 (nest, prey). —Rau and Rau, 1913. Ent. News 24: 392-401 (nest, prey). —Rau, 1915. Jour. Anim. Behavior 5: 240-249 (experiments on prey recognition). —Rau, 1915. Ent. News 26: 469-471 (number of generations per year). —Rau and Rau, 1918. Wasp Studies Afield, pp. 118-124 (nest). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 443-466 (nest, prey, experiments with substitute prey). —Rau, 1935. Ent. News 46: 267-270 (prey). —Muma and Jeffers, 1945. Ent. Soc. Amer., Ann. 38: 246-255 (prey). —Rau, 1946. Brooklyn Ent. Soc., Bul. 41: 10-11 (parasites, mating). —Shafer, 1949. Ways of a mud dauber, 78 pp., 10 pls., 9 figs. (nest, life history, physiology). —Eberhard, 1971 (1970). Psyche 77: 247-251 (predatory behavior).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99: no. 14: 50, pl. 23, figs. A-F (male genitalia).

Subfamily SPHECINAE

All of our species are ground-nesting except for those belonging to *Isodontia* which nest in pre-existing cavities in wood, stems or in the ground.

Revision: Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 77-194, 317-462 (world spp.). —Fernald, 1906. U. S. Natl. Mus., Proc. 31: 291-423 (New World spp.). —Bohart and Menke, 1963. Univ. Calif. Pubs., Ent. 30: 117-160 (Nearctic spp.).

Tribe SPHECINI

Genus SPHEX Linnaeus

Genus SPHEX Subgenus SPHEX Linnaeus

Sphex Linnaeus, 1758. Syst. Nat., ed. 10, v. 1, p. 569.
Type-species: *Sphex flavipennis* Fabricius. Desig. by Internatl. Comn. Zool. Nomencl., Op. 180, 1946.
Sphaex Scopoli, 1772. Observ. Zool., Hist.-Nat., v. 5, p. 122. Emend. or error.
Ammobia Billberg, 1820. Enum. Ins., p. 105.
Type-species: *Pepsis argentata* Fabricius. Desig. by Rohwer, 1911.
Proterosphex Fernald, 1905. Ent. News 16: 165.
Type-species: *Sphex maxillosus* Fabricius. Orig. desig.

Members of this subgenus are all fossorial, and many of them nest gregariously in the same site year after year. So far as known the Nearctic species construct multicelled nests, each cell at the end of a lateral from the vertical or oblique burrow. Preferred prey are nymphs or adults of Tettigoniidae, but occasionally Gryllacrididae are also stored. Our species practice mass provisioning, but one Oriental species practices progressive provisioning and is also unusual in constructing 1-celled nests.

ashmeadi (Fernald). Calif., Nev., Utah, Colo., Ariz., N. Mex., Tex.; Mexico (Tamaulipas, Nuevo Leon).
Chlorion (*Proterosphex*) *ashmeadi* Fernald, 1906. U. S. Natl. Mus., Proc. 31: 389. ♀, ♂.

dorsalis Lepeletier. Southern U. S., Fla. and Ga. to Calif.; Central and South America.
Ecology: Nests in firm soil, the burrow vertical or nearly so, terminating in one or more cells, each cell stored with 1-3 prey specimens. Prey: *Conocephalus fasciatus* (DeG.), *C.* sp.
Sphex dorsalis Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 347. ♂.

Sphex singularis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 261. ♂.
Sphex chlorargyrica Costa, 1862. Mus. Zool. Napoli, Ann. 1: 66.
Sphex micans Taschenberg, 1869. Ztschr. Gesam. Naturw. Halle 34: 419. ♀. Preocc.
Sphex dubitata Cresson, 1872. Amer. Ent. Soc., Trans. 4: 213. ♀.
Sphex spiniger Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 428. ♂.

Biology: Dow, 1932. Psyche 39: 8-9 (nest, prey). —Krombein and Evans, 1954. Ent. Soc. Wash., Proc. 56: 233-234 (nest, prey, life cycle).

flavovestitus flavovestitus Smith. Va. to Fla., west to Tex.; Mexico (Durango). Parasite: *Pseudoxenos smithii* (Heyd.). Another subspecies occurs in Mexico.
Sphex flavovestita Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 253. ♂.
Sphex flavipes Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 263. ♀. Preocc.
Chlorion (Proterosphex) flavitarsis Fernald, 1906. U. S. Natl. Mus., Proc. 31: 379. ♀, ♂. N. name.

habenus Say. Md. to Fla., west to Ark. and Tex.; Mexico (Sinaloa). Parasite: *Pseudoxenos smithii* (Heyd.). Prey: Tettigoniidae sp., nymph.
Sphex habena Say, 1832. New Sp. N. Amer. Ins. chiefly of Louisiana, p. 14. ♀.
Sphex lauta Cresson, 1872. Amer. Ent. Soc., Trans. 4: 212. ♀.
Sphex lauta var. *illustris* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 210. ♀.
Sphex princeps Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 398. ♀.
Sphex chrysophorus Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 300. ♀.
Sphex lanciger Kohl, 1895. K. K. Naturhist. Hofmus., Ann. 10: 55. ♂.

Biology: Strandtmann, 1953. Kans. Ent. Soc., Jour. 26: 51-52 (nest, prey).

ichneumoneus (Linnaeus). Southern Canada, U. S., south to Brazil and Peru. Ecology: Nests in hard-packed soil or sand, the burrow vertical or nearly so, each nest with 2-7 cells, each cell provisioned with several prey specimens. Parasite: *Pseudoxenos smithii* (Heyd.); *Metopia argyrocephala* (Meig.), *M. campestris* (Fall.), *Senotainia trilineata* (Wulp); *Nysson plagiatus* Cr. Prey: *Neoconocephalus ensiger* (Harr.), *N.* sp., *Acanthodis* SP)(*Atlanticus dorsalis* (Burm.), *Conocephalus attenuatus* (Scud.), *C. fasciatus* (DeG.), *C. brevipennis* (Scud.), *C. triops* (L.), *C.* sp., *Neduba* sp., *Scudderia texensis* (Sauss.), *S. pistillata* (Brunn.), *Orchelimum vulgare* Harr., *O. calcaratum* R. and H., *O. delicatum* Brun., *Amblycorypha oblongifolia* (DeG.); *Oecanthus n. nigricornis* (Wlkr.); *Brachybaenus* sp., *Gryllacris* sp. This handsome wasp is commonly called "The Great Golden Digger".
Apis ichneumonea Linnaeus, 1758. Syst. Nat., ed. 10, p. 578.
Nomada surinamensis Retzius, 1783. Genera et Species Insectorum, p. 62. N. name.
Sphex auriflua Perty, 1834. Delect. Anim. Articul. Brasil., p. 142. A questionable synonym.
Sphex aurocapillus Templeton, 1841. Ent. Soc. London, Trans. 3: 51. A questionable synonym.
Sphex Croesus Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 351. ♀.
Sphex dimidiatus Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 352. ♂. Preocc.
Sphex sumptuosa Costa, 1862. Mus. Zool. Napoli, Ann. 1: 66. ♂. A questionable synonym.
Sphex ichneumoneus var. *ignotus* Strand, 1916. Arch. f. Naturgesch. 81: 99. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 139, figs. 1-8 (larva).

Biology: Packard, 1869. Guide Study Ins., pp. 167-168 (nest, prey). —Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2, Sci. Ser. 1: 33-41, pl. 2, fig. 4, pl. 11, fig. 1, pl. 12, figs. 1-2 (nest, prey). —Rau and Rau, 1918. Wasp studies afield, pp. 193-198, fig. 43 (nest, prey). —Reinhard, 1929. Witchery of wasps, pp. 141-164, 2 pls. (prey). —Abbott, 1931. Iowa Acad. Sci., Proc. 38: 255-258 (nesting behavior). —Frisch, 1937. Amer. Midland Nat. 18: 1043-1062 (nesting aggregation, prey, life cycle, parasite). —Fernald, 1945. Ent. Soc. Amer., Ann. 38: 458-460 (nesting aggregation, prey). —Ristich, 1953. Canad. Ent. 85: 374-386, 1 pl., 4 text figs. (nest, prey, parasites).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14: 50, pl. 22, figs. K-N, Q, R (male genitalia).

jamaicensis (Drury). Fla.; West Indies.
Vespa Jamaicensis Drury, 1770. Illus. Nat. Hist., v. 1, p. 104.
Sphex Jamaica Christ, 1791. Naturgesch. Class. Nomencl. Ins., p. 292. Emend.

Sphex aurulenta Guerin, 1835. Iconogr. Regne Anim., Planches Anim. Invert., pl. 70, fig. 2. Lapsus for *lanierii* Guer., 1844.
Sphex Lanierii Guerin, 1844. Iconogr. Regne Anim., Ins., v. 3: 433. ♂.
Sphex ornata Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 344. ♀, ♂.
Sphex ichneumoneus var. *fulviventris* Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 431.

nudus Fernald. Md. to Ill., south to Fla. and La. Prey: *Camptonotus carolinensis* Gerst.
Sphex nudus Fernald, 1903. Psyche 10: 201. ♂.
Sphex bridwelli Fernald, 1903. Psyche 10: 202. ♀.

Biology: Rau and Rau, 1918. Wasp studies afield, p. 206 (prey).

pensylvanicus Linnaeus. Transcont. in U. S. except northwestern states; northern Mexico. Ecology: Nests in soft earth in sheltered areas, the burrow oblique; several cells provisioned with 2-6 prey specimens. Parasite: *Pseudoxenos smithii* (Heyd.); *Senotainia trilineata* (Wulp). Prey: *Microcentrum retinerve* (Burm.), *M. rhombifolium* (Sauss.), *Scudderia furcata* Brunn. This wasp is commonly called "The Great Black Wasp."
Sphex pensylvanica Linnaeus, 1763. Centuria Ins. Rar., p. 30.
Sphex pensylvanicus var. *robustisoma* Strand, 1916. Arch. f. Naturgesch. 81: 101. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 140, figs. 9-11 (larva).

Biology: Reinhard, 1929. Witchery of wasps, pp. 165-191, 1 pl., 1 text fig. (nest, prey). —Frisch, 1938. Amer. Midland Nat. 19: 673-677 (nest, prey, life cycle, parasites). —Rau, 1944. Ent. Soc. Amer., Ann. 37: 439-440 (nest, prey). —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 16-17 (nesting aggregation, prey).

servillei Lepeletier. Southern Tex. to Argentina.
Sphex fuliginosa Dahlbom, 1843. Hym. Europaea, v. 1, p. 425. Preocc.
Sphex Servillei Lepeletier, 1845. Hist. Nat. Ins. Hym. 3: 336. ♂.
Sphex Chichimecus Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 40. ♂.
Sphex congener Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 418. ♀.
Sphex Joergenseni Brethes, 1913. Buenos Aires Mus. Nac. de Hist. Nat., An. 24: 120. ♂.

tepanecus Saussure. Tex. to Ariz.; Mexico (Chihuahua). Ecology: Nests gregariously in fine sandy loam soil. Prey: Tettigoniidae sp., nymph.
Sphex tepanecus Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 41. ♂.
Sphex mexicana Taschenberg, 1869. Ztschr. Gesam. Naturw. Halle 34: 416. ♂. Preocc.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 237-238, figs. 1-4 (larva).

Biology: Gillaspy, 1962. Brooklyn Ent. Soc., Bul. 57: 15-17 (nest, prey, mating, cocoon).

texanus Cresson. Kans. to Tex., Ariz.
Sphex Texana Cresson, 1872. Amer. Ent. Soc. Trans. 4: 212. ♀, ♂.

Genus SPHEX Subgenus FERNALDINA Bohart and Menke

Fernaldina Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 130.
Type-species: *Sphex lucae* Saussure. Monotypic.

Our single species builds a 1-celled nest in the soil which it provisions with nymphal and adult Tettigoniidae.

lucae Saussure. Southeastern and western U. S., B. C.; northern Mexico. Ecology: Nests in compacted sandy soil or rocky ground. Parasite: ? *Senotainia* sp. in *trilineata* (Wulp) complex. Prey: *Insara* sp., probably *elegans* Scud., nymphs and adults.
Sphex lucae Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 41. ♀.
Sphex belfragei Cresson, 1872. Amer. Ent. Soc., Trans. 4: 212. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 156-157, fig. 4 (sleeping aggregation). —Cazier and Mortenson, 1965. Pan-Pacific Ent. 41: 34-43, 6 figs. (nesting behavior, prey, parasite).

Genus ISODONTIA Patton

This is the only non-fossorial genus among our native Sphecinae.

Genus ISODONTIA Subgenus ISODONTIA Patton

Isodontia Patton, 1881. Boston Soc. Nat. Hist. Proc. 20: 380.
Type-species: *Sphex philadelphica* Lepeletier. Orig. desig.
Leontosphex Arnold, 1945. Sphecidae of Madagascar, p. 90.
Type-species: *Sphex leoninus* Saussure. Monotypic.

apicalis (Smith). N. J. to Fla., west to Tex., Tenn., Nebr., Ariz.
Sphex apicalis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 262. ♀.
Isodontia macrocephala var. *cinerea* Fernald, 1903. Canad. Ent. 35: 271.
Chlorion (*Isodontia*) *harrisi* Fernald, 1906. U. S. Natl. Mus., Proc. 31: 359. N. name.

exornata Fernald. N. C. to Fla., west to Tex.
Isodontia exornata Fernald, 1903. Canad. Ent. 35: 270. ♀.

philadelphica (Lepeletier). Eastern states, N. Y. to Kans., south to Fla. and Tex., Ariz., Calif.; Mexico. Ecology: Nests in cavities in log, and in rotten limb. Parasite: *Amobia floridensis* (Tns.). Prey: *Orocharis* sp.
Sphex philadelphica Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 340. ♀.
Sphex (*Isodontia*) *macrocephalus* Fox, 1890. Ent. News 1: 137. ♀.
Sphex aztecus var. *digueti* Berland, 1927. Paris Mus. d'Hist. Nat., Bul. 32: 283. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 143, figs. 29, 30 (larva; misdet. as *azteca* Sauss.).

Biology: Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 135 (nest). —Krombein, 1967. Trap-nesting wasps and bees, p. 239 (nest).

Genus ISODONTIA Subgenus MURRAYELLA Bohart and Menke

Isodontia Subg. *Murrayella* Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 137.
Type-species: *Sphex elegans* Smith. Orig. desig.

Species of this subgenus are sometimes called "grass carrier" wasps because they use grass stems and blades to form partitions between cells and to make the closing plug in their nests in cavities in wood, plants and even abandoned bee burrows in clay banks. Other plant materials, such as the fibrous inner bark of certain trees and Spanish moss, are also used in nest construction. Our three species show an interesting evolutionary development in nest structure; *elegans* always makes individual cells separated by partitions, *mexicana* sometimes makes similar nests but usually constructs just one larger brood chamber in which several larvae develop without cannibalism, and *auripes* always makes a nest in which there is just a brood chamber. Our species provision their nests with both Gryllidae and Tettigoniidae, but gryllids of the genus *Oecanthus* are preferred when they are available.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 239-251, figs. 57-61 (U. S. spp.).

auripes (Fernald). N. Y. to Fla., west to Mich., Kans. and Tex. Ecology: Nests in borings in wood and abandoned bee burrows in clay banks; nest contains only a single large brood cell in which several larvae are reared. Parasite: *Pseudoxenos auripedis* (Pierce); *Anthrax aterrimus* (Big.); Miltogrammini sp.; Phoridae sp.; *Melittobia chalybii* Ashm.; Chrysididae sp. Prey: *Neoxabea bipunctata* (DeG.), *Oecanthus exclamationis* Davis, ? *O. angustipennis* Fitch, *O. latipennis* Riley, *O.* sp.; *Orocharis saltator* Uhl., *O. luteolira* Wlkr., *O. vulgare* Harr., *O.* sp., *Conocephalus memorale* Scud., *C.* sp., *Scudderia* sp. Predator: *Lecontella cancellata* (LeC.).
Sphex tibialis Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 339. ♀. Preocc.
Chlorion (*Isodontia*) *auripes* Fernald, 1906. U. S. Natl. Mus., Proc. 31: 356. N. name.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 144, figs. 31, 32 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 147-148 (larva).

Biology: Packard, 1869. Guide Study Ins., pp. 168-169 (nest, cocoon). —Rau and Rau, 1918. Wasp studies afield, pp. 203-205 (nest). —Rau, 1926. St. Louis Acad. Sci., Trans. 25: 200-201 (nest). —Rau, 1928. St. Louis Acad. Sci., Trans. 25: 362-368 (prey, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 246-251, ? figs. 60, 61 (nest, prey, life cycle, parasites). —Krombein, 1970. Smithsn. Contrib. Zool. 46: 3-12, figs. 6-39 (nesting behavior, prey, life cycle).

elegans (Smith). B. C., U. S. west of 100th Meridian. Ecology: Nests in borings in wood or stems, and in abandoned borings of mining bees, each cell being separated by a partition. Parasite: *Sphaeropthalma ferruginosa* (D. T.), *S. unicolor* (Cr.); *Epistenia caeruleata* Westw.; *Amobia floridensis* (Tns.). Prey: *Oecanthus quadripunctatus* Beut., *O. c. californicus* Sauss., *O. niveus* (DeG.), *O.* spp.; *Dichopetala* sp., ? *Eremopedes* sp.; all nymphs.

Sphex elegans Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 262. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 238-239, figs. 13, 16 (larva).

Biology: Ashmead, 1894. Psyche 7: 64 (prey). —Davidson, 1899. Ent. News 10: 179-180 (nest, prey, parasites). —Fernald, 1906. U. S. Natl. Mus., Proc. 31: 364 (nest, prey, cocoon). —Ainslie, 1924. Canad. Ent. 56: 269-270 (nest, prey). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, parasites). —Krombein, 1967. Trap-nesting wasps and bees, pp. 240-242, fig. 57 (nest, prey, life cycle).

mexicana (Saussure). U. S. east of Rockies, Ariz.; Mexico, Central America; introduced into Hawaii, France. Ecology: Nests in borings in wood, hollow stems, pitcher plants and glass tubes; nest usually contains a single large brood cell, but occasionally cells of individual larvae are separated by flimsy partitions. Parasite: *Amobia distorta* (Wulp), *Senotainia trilineata* (Wulp), *S.* sp., *Sarcophaga* sp.; *Megaselia aletiae* (Comst.); *Eustalomyia vittipes* (Zett.). Prey: *Oecanthus angustipennis* Fitch, *O. quadripunctatus* Beut., *O. argentinus* Sauss., *O. fultoni* Wlkr., *O. nigricornis* Wlkr., *O. niveus* (DeG.), *O. fasciatus* Fitch, *O.* spp., *Gryllus assimilis* F., *Neoxabea bipunctata* (DeG.); *Orocharis saltator* Uhl., *Odontoxiphidium apterum* Morse, *Conocephalus fasciatus* DeG., *C.* spp., *Neoconocephalus* sp., *Orchelimum* sp., *Rehnia spinosa* Caud.; both adults and nymphs are stored. Predator: *Crematogaster* sp.

Sphex apicalis Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 588. Nom. nud.

Sphex apicalis Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 38. Preocc.

Sphex apicalis var. *mexicana* Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 38. ♀, ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 143, figs. 23-28 (larva; misdet. as *harrisi* Fern.). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 239-240 (larva).

Biology: Ashmead, 1895. U. S. Dept. Agr., Insect Life 7: 241 (prey). —Jones, 1904. Ent. News 15: 14-17, 2 pls. (nest, prey). —Engelhardt, 1929. Brooklyn Ent. Soc., Bul. 23: 269-271 (nest, prey). —Rau, 1935. Brooklyn Ent. Soc., Bul. 30: 65-68, 1 pl. (nest, prey, life cycle). —Suehiro, 1937. Hawaii. Ent. Soc., Proc. 9: 358 (nest, life cycle). —Rau, 1943. Ent. Soc. Amer., Ann. 36: 648 (nest). —Swezey, 1947. Hawaii. Ent. Soc., Proc. 13: 8 (nest). —Lin, 1962. Tex. Jour. Sci. 14: 429-430 (nest, prey, life cycle). —Medler, 1965. Ent. Soc. Amer., Ann. 58: 137-142, 4 figs. (nest, prey, life cycle, cocoon, parasites). —Lin, 1966. Wasmann Jour. Biol. 24: 239-247, 2 figs. (nest, prey, life cycle). —Krombein, 1967. Trap-nesting wasps and bees, pp. 242-246, figs. 58, 59 (nest, prey, life cycle, predator).

Tribe PRIONYXINI

Genus PALMODES Kohl

Palmodes Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 112.
Type-species: *Sphex occitanica* Lepeletier and Serville, Desig. by Fernald, 1906.

So far as known these are solitary ground-nesting wasps except for *carbo* which has been reported once as nesting gregariously. Most of our species prey upon Tettigoniidae except for *carbo* which uses Gryllacrididae.

Revision: Bohart and Menke, 1961. Ent. Soc. Wash., Proc. 63: 179-191, 17 figs.

californicus Bohart and Menke. Calif., Nev., Oreg., B. C. Prey: Immature adult, *Platylyra californica* Scud., *Neduba morsei* Caud.

Palmodes californicus Bohart and Menke, 1961. Ent. Soc. Wash., Proc. 63: 182, figs. 3, 13. ♂, ♀.

carbo Bohart and Menke. B. C. to Calif., east to N. W. T., Mont., Colo. and N. Mex. Ecology: Nests gregariously in sand with one cell per nest. Prey: *Cyphoderris monstrosa* Uhl., nymphs. Predator: *Philanthus zebratus nitens* (Bks.).
Sphex morio Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 321. ♂. Preocc.
Palmodes carbo Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 144. N. name.

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 483-484 (nest, prey).

dimidiatus (DeGeer). U. S. except northwest; Mexico (Chihuahua, Coahuila). Ecology: Nests in sand, the burrow short and oblique, the cell stored with one prey specimen. Prey: *Atlanticus pachymerus* (Burm.), *A.* sp., *Dissosteira carolina* (L.), *Pediodectes* sp., probably *stevensonii* (Thom.).
Sphex dimidiatus DeGeer, 1773. Mem. pour servir a l'Hist. des Ins. 3: 577, pl. 30, fig. 5. ♂.
Sphex violaceipennis Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 349.
Sphex rufiventris Cresson, 1872. Amer. Ent. Soc., Trans. 4: 211. ♀.
Sphex abdominalis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 211. ♂. Preocc.
Chlorion (*Palmodes*) *rufiventris* var. *opuntiae* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 557. ♀.
Sphex (*Palmodes*) *daggyi* Murray, 1951. U. S. Dept. Agr., Monog. 2: 974. N. name.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 141, figs. 12-14 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2, Sci. Ser. 1: 174-175, pl. 2, fig. 1 (nest, prey). —Williams, 1913. Kans. Univ. Sci. Bul. 8: 227 (prey). —Krombein, 1953 (1952). Wasmann Jour. Biol. 10: 281-282 (nest, prey, life cycle). —Krombein, 1955. Ent. Soc. Wash., Proc. 57: 150-151 (nest, prey, life cycle, cocoon).

hesperus Bohart and Menke. Calif. to B. C., Nev., Utah, Wyo., Colo. Ecology: Nests in sandy loam, one cell per nest. Prey: *Anabrus simplex* Hald., nymph.
Palmodes hesperus Bohart and Menke, 1961. Ent. Soc. Wash., Proc. 63: 184, fig. 6. ♂, ♀.

Biology: Bohart and Menke, 1961. Ent. Soc. Wash., Proc. 63: 185 (prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 484 (nest, prey).

insularis Bohart and Menke. Calif. (Channel Is.).
Palmodes insularis Bohart and Menke, 1961. Ent. Soc. Wash., Proc. 63: 186. ♂, ♀.

laeviventris (Cresson). A Great Basin species, Mont., Wyo. and Colo. west to Wash. and eastern Calif. Ecology: Makes a 1-celled nest and stores 2-4 crickets in it. Parasite: *Sphenometopa tergata* (Coq.); *Stizoides unicinctus* (Say). Prey: *Anabrus simplex* Hald., *Pediodectes* sp., probably *stevensonii* (Thos.).
Sphex laeviventris Cresson, 1865. Ent. Soc. Phila., Proc. 4: 463. ♀, ♂.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 227 (prey). —LaRivers, 1945. Amer. Midland Nat. 33: 743-763 (nest, prey, parasites).

lissus Bohart and Menke. Southern Calif., Ariz., Tex.
Palmodes lissus Bohart and Menke, 1961. Ent. Soc. Wash., Proc. 63: 187, figs. 5, 12. ♂, ♀.

pacificus Bohart and Menke. Coastal Calif.
Palmodes pacificus Bohart and Menke, 1961. Ent. Soc. Wash., Proc. 63: 188, figs. 8, 9, 14. ♂, ♀.

praestans (Kohl). Oreg., Calif., Nev., Utah, Ariz., N. Mex., west. Tex.; Mexico (Coahuila). Prey: *Capnobates fuliginosus* Thom.
Sphex (*Palmodes*) *praestans* Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 323. ♀.

Biology: Caudell, 1919. Ent. Soc. Wash., Proc. 21: 40 (prey).

stygicus Bohart and Menke. Calif., Nev., Utah, Ariz., N. Mex., a Great Basin species.
Palmodes stygicus Bohart and Menke, 1961. Ent. Soc. Wash., Proc. 63: 191, figs. 1, 11, 16. ♂, ♀.

Genus PRIONYX Vander Linden

Prionyx Vander Linden, 1827. Nouv. Mem. Acad. Roy. Sci. Bruxelles 4: 362.
Type-species: *Ammophila kirbii* Vander Linden. Monotypic.
Priononyx Dahlbom, 1843. Hym. Europaea, v. 1, p. 28.
Type-species: *Sphex thomae* Fabricius. Monotypic.

Enodia Dahlbom, 1843. Hym. Europaea, v. 1, p. 28. Preocc.
Type-species: *Sphex albisectus* Lepeletier and Serville. Desig. by Kohl, 1885.
Harpactopus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 264.
Type-species: *Harpactopus crudelis* Smith. Desig. by Patton, 1881.
Parasphex Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 267.
Type-species: *Sphex albisectus* Lepeletier and Serville. Desig. by Kohl, 1885.
Gastrosphaeria Costa, 1858. Fauna Regn. Napoli, Imen. Acul., Sphecidea, p. 10.
Type-species: *Gastrosphaeria anthracina* Costa. Monotypic.
Pseudosphex Taschenberg, 1869. Ztschr. Gesam. Naturw. Halle 34: 420. Preocc.
Type-species: *Pseudosphex pumilio* Taschenberg. Monotypic.
Calosphex Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 113.
Type-species: *Sphex niveatus* Dufour. Desig. by Pate, 1937.
Neosphex Reed, 1894. Ann. Univ. Chile 85: 627.
Type-species: *Neosphex albospiniferus* Reed. Monotypic.

Our North American species dig simple, shallow unicellular nests in a variety of soil types. The grasshopper prey is captured before the nest is dug, although some extralimital species are known to prepare the nest before capturing the single prey specimen.

Taxonomy: Parker, 1960. Pan-Pacific Ent. 36: 205-208, 1 pl. (key to N. A. spp.).

Biology: Evans, 1958. Ent. Soc. Amer., Ann. 51: 177-186, 3 figs. (nesting behavior).

atratus (Lepeletier). Transcont. in southern Canada and all of U. S.; Mexico (Durango).
Ecology: Nests in a variety of soils, the burrow varying from L-shaped to curved to oblique; nest has a single cell and is provisioned with one prey specimen. Parasite: *Pseudoxenos duryi* (Pierce); *Metopia argyrocephala* (Meig.), *Senotainia* sp.; *Stizoides unicinctus* (Say). Prey: *Ageneotettix d. deorum* Scud., *Aulocara elliotti* Thom., *Mermiria neomexicana* Thom., *Arphia xanthoptera* Burm., *Dissosteira carolina* L., *Pardalophora phoenicoptera* Burm., *Spharagemon collare* Scud., *Trimerotropis citrina* Scud., *Melanoplus angustipennis* Dodge, *M. arizonae* Scud., *M. bispinosus* Scud., *M. bivittatus* Say, *M. devastator* Scud., *M. differentialis* Thom., *M. femurrubrum* DeG., *M. foedus* Scud., *M. lakinus* Scud., *M. spretus* Walsh, *M.* spp., *Schistocerca lineata* Scud. Predator: *Apiomerus spissipes* (Say).
Sphex labrosa Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 588. Nom. Nud.
Sphex atrata Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 355. ♀.
Prononyx brunnipes Cresson, 1872. Amer. Ent. Soc., Trans. 4: 213. ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 142, figs. 15-20 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 75: 147 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 171-174 (nest, prey). —Bradley, 1908. Ent. Soc. Amer., Ann. 1: 128-129 (sleeping aggregation). —Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 227-230, pl. 33, fig. 2 (nest, prey, parasite). —Rau and Rau, 1918. Wasp studies afield, pp. 159-175, figs. 36-39 (nest, prey, parasite). —Rau, 1922. St. Louis Acad. Sci., Trans. 24: 23 (prey). —Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 308-310 (nest). —Evans, 1958. Ent. Soc. Amer., Ann. 51: 178-181, fig. 1 (prey transport, nest, parasite, life cycle).

canadensis (Provancher). B. C. to Man., south to Calif., Ariz., Colo. and Nebr., Ont., N. J., Va.
Prononyx Canadensis Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 258. ♀.
Sphex excisus Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 362. ♂.

fervens (Linnaeus). Calif. to Tex., south to South America, West Indies. Ecology: Nests in sand, the burrow oblique, the cell horizontal and provisioned with one prey specimen. Prey: *Xyleus* sp., probably *centralis* Rehn, *Schistocerca cancellata* (Serv.).
Sphex fervens Linnaeus, 1758. Syst. Nat., ed. 10, p. 569. ♀. Type from West Indies or Surinam, not Indies.
Pepsis Johannis Fabricius, 1804. Systema Piezatorum, p. 208. ♀.
Sphex Doumerci Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 357. ♀.
Prononyx striata Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 266.
Sphex (*Prononyx*) *laerma* Cameron, 1897. Ann. and Mag. Nat. Hist. (6) 19: 370.

Biology: Evans, 1958. Ent. Soc. Amer., Ann. 51: 184, figs. 2-3 (nest, prey).

foxi Bohart and Menke. Tex., Nev., Utah; northern Mexico.
Sphex (*Priononyx*) *ferrugineus* Fox, 1892. Ent. News 3: 170. ♀. Preocc.
Prionyx foxi Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 152. N. name.

parkeri Bohart and Menke. U. S. south to Isthmus of Tehuantepec. Ecology: Nests in a variety of soils, the burrow varying from oblique to nearly vertical, the cell provisioned with one prey specimen. Parasite: *Senotainia rubriventris* Macq. Prey: *Melanoplus scudderi* Uhl., *M. femurrubrum propinquus* Scud., *M.* sp., probably *femurrubrum* (DeG.), *Trimerotropis citrina* Scud., *Scirtetica marmorata picta* (Scud.), *Chortophaga australior* R. and H.
Prionyx parkeri Bohart and Menke, 1963. Univ. Calif. Pubs. Ent. 30: 154, figs. 35, 54, 96, 102. ♂, ♀.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 23 (nest, prey; misdet. as *bifoveolatum* Tasch.). —Evans, 1958. Ent. Soc. Amer., Ann. 51: 183-184 (nest, prey, parasite; misdet. as *pubidorsus* Costa). —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 156, fig. 4 (sleeping aggregation; misdet. as *pubidorsum*). —Krombein, 1964. Amer. Mus. Novitates 2201: 18-19 (nest, prey).

subatratus Bohart. Oreg. and Idaho south and east to Calif., Utah, Ariz., N. Mex., western Tex.; Mexico (Chihuahua).
Priononyx subatrata Bohart, 1958. Brooklyn Ent. Soc., Bul. 53: 90. ♂, ♀.

thomae (Fabricius). Southeastern and western states, south to Argentina. Ecology: Nests in a variety of soils, the burrow varying from L-shaped to curved to oblique; nest with a single cell and provisioned with one prey specimen. Parasite: *Stizoides unicinctus* (Say). Prey: *Amphitornus* sp., *Aulocara* sp., *Orphulella p. pelidna* Burm., *Arphia xanthoptera* Burm., *Dissosteira carolina* L., *Encoptolophus subgracilis texensis* Br., *Paraidemona* sp., probably *fratercula* Heb.
Sphex thomae Fabricius, 1775. Systema Ent., p. 346. ♂.
Pepsis crucis Fabricius, 1804. Systema Piezatorum, p. 209. ♀.
Enodia pubidorsum Costa, 1862. Mus. Zool. Napoli, Ann. 1: 69. ♂.
Priononyx thomae var. *antillarum* Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 43. ♀.
Priononyx thomae var. *mexicanus* Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 43. ♀, ♂.
Sphex (*Harpactopus*) *Edwardsi* Cameron, 1903. Amer. Ent. Soc., Trans. 29: 230. ♀, ♂.
Sphex platensis Brethes, 1908. Buenos Aires Mus. Nac. de Hist. Nat., An. 17: 146. ♂, ♀.
Sphex thomae var. *altibia* Strand, 1911. Arch. f. Naturgesch. 77, sup. 2: 152. ♂. This is a questionable synonym.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 142, figs. 21, 22 (larva).

Biology: Hartman, 1905. Tex. Univ., Bul. 65, Sci. Ser. 6: 62-65 (nest, prey, life cycle). —Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 227 (prey, sleeping aggregation). —Rau and Rau, 1918. Wasp studies afield, pp. 175-186, figs. 40-42 (nest, prey, parasite). —Evans, 1958. Ent. Soc. Amer., Ann. 51: 181-183 (nest, prey transport, life cycle).

Unplaced Taxon of Sphecinae

Sphex instabilis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 263. ♀. N. Amer. Possibly a senior syn. of *Isodontia exornata* Fern.

Subfamily AMMOPHILINAE

The North American genera are all fossorial in nesting habits, but one extralimital genus is known to nest in cavities in wood.

Taxonomy: Menke, 1966. Canad. Ent. 98: 147-152, 12 figs. (key to genera).

Genus PODALONIA Fernald

Psammophila Dahlbom, 1842. Dispos. Method. Spec. Scand. Ins. Hym., pt. 1, pp. 2, 8. Preocc.

Type-species: *Ammophila affinis* Kirby. Desig. by Fernald, 1927.

Podalonia Fernald, 1927. U. S. Natl. Mus., Proc. 71 (9): 11.
Type-species: *Ammophila violaceipennis* Lepeletier. Desig. by Internatl. Comn. Zool. Nomencl., Op. 857, 1968. Op. 857 also suppressed *Podalonia* Spinola, 1853 and validated *Podalonia* Fernald, 1927.

These wasps are fossorial and construct a single cell at the end of a short burrow. They prey upon caterpillars, usually those of the soil-burrowing cutworm type, and place only one prey specimen in the cell.

Revision: Melander, 1903. Psyche 10: 156-164. —Fernald, 1927. U. S. Natl. Mus., Proc. 71 (9): 1-42. —Murray, 1940. Ent. Amer. (n. s.) 20: 1-82.

Taxonomy: Menke, Bohart and van der Vecht, 1966. Bul. Zool. Nomencl. 23: 48-51 (request for suppression of *Podalonia* Spinola, 1853, validation of *Podalonia* Fernald, 1927, and desig. of *Ammophila violaceipennis* Lepeletier as type-species).

argentifrons (Cresson). West. States and Provinces. Parasite: *Pseudoxenos luctuosae* (Pierce).
Ammophila argentifrons Cresson, 1865. Ent. Soc. Phila., Proc. 4: 462. ♂.

argentipilis (Provancher). Ariz., Calif.
Pelopoeus argentipilis Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 256. ♀.
Ammophila morrisoni Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 21. ♂.
Psammophila nicholi Carter, 1924. Ent. News 35: 366. ♂.

caerulea Murray. Calif., Idaho.
Podalonia caerulea Murray, 1940. Ent. Amer. (n. s.) 20: 67. ♂.

clypeata Murray. West. States to Minn.
Podalonia clypeata Murray, 1940. Ent. Amer. (n. s.) 20: 49. ♂, ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 144, figs. 33-38 (larva).

communis communis (Cresson). U. S. west of 100th meridian; Mexico. Ecology: Nests in sand. Parasite: *Hilarella hilarella* Zett., *Metopia argyrocephala* (Meig.). Prey: Noctuidae spp., larvae. Predator: *Philanthus zebratus nitens* (Bks.). Other subspp. occur in Mexico and Central America.
Ammophila communis Cresson, 1865. Ent. Soc. Phila., Proc. 4: 462. ♂.

Biology: Newcomer, 1930. Ent. Soc. Amer., Ann. 23: 552-563 2 pls. (nest, prey, parasite, life cycle). —Hicks, 1931. South. Calif. Acad. Sci., Bul. 30: 75-82, pls. 22-25 (nest, prey). —Hicks, 1931. Pan-Pacific Ent. 8: 49-51 (hibernation). —Hicks, 1932. Psyche 39: 150-154 (nest, prey, parasite). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 484-485 (nest, prey, parasites, predator). The observations by both Newcomer and Hicks on *luctuosa* were made on both *luctuosa* and *c. communis*.

compacta Fernald. Calif., Oreg.
Podalonia violaceipennis var. *compacta* Fernald, 1927. U. S. Natl. Mus., Proc. 71 (9): 33. ♀, ♂.

luctuosa (Smith). Transcont. in northern tier of States and Canada, as far north as N. W. T. and Yukon. Ecology: Nests in sand. Parasite: *Pseudoxenos luctuosae* (Pierce); *Hilarella hilarella* (Zett.), *Metopia argyrocephala* (Meig.), *Taxigramma heteroneura* (Meig.). Prey: *Lycophotia saucia* Hbn., *L. margaritosa* Haw. ?, *Chorizagrotis agrestis* Grt., Noctuidae spp. Predator: *Philanthus zebratus nitens* (Bks.).
Ammophila luctuosa Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 224. ♀.
Psammophila pacifica Melander and Brues, 1902. Biol. Bul. 3: 40. ♂.

Biology: Newcomer, 1930. Ent. Soc. Amer., Ann. 23: 552-563, 2 pls. (nest, prey, parasite, life cycle). —Hicks, 1931. South. Calif. Acad. Sci., Bul. 30: 75-82, pls. 22-25 (nest, prey). —Hicks, 1931. Pan-Pacific Ent. 8: 49-51 (hibernation). —Hicks, 1932. Psyche 39: 150-154 (nest, prey, parasite). The observations by both Newcomer and Hicks on *luctuosa* were made on both *luctuosa* and *c. communis*.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14: 50, pl. 22, figs. O, P, S, T (male genitalia).

melaena Murray. West. States.
Podalonia melaena Murray, 1940. Ent. Amer. (n. s.) 20: 34. ♂, ♀.

mexicana (Saussure). West. States and Provinces; Mexico.
Ammophila mexicana Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 25. ♂, ♀.

mickeli Murray. West. Provinces and States to Minn.
Podalonia mickeli Murray, 1940. Ent. Amer. (n. s.) 20: 68. ♂, ♀.

occidentalis Murray. Alta., West. States. Prey: Tent-caterpillar.
Podalonia occidentalis Murray, 1940. Ent. Amer. (n. s.) 20: 54. ♂, ♀.

Biology: Murray, 1940. Ent. Amer. (n. s.) 20: 13 (prey).

parallela Murray. Calif.
Podalonia parallela Murray, 1940. Ent. Amer. (n. s.) 20: 65. ♂, ♀.

pubescens Murray. Tex. to Ariz.; Mexico.
Podalonia pubescens Murray, 1940. Ent. Amer. (n. s.) 20: 47. ♂, ♀.

puncta Murray. Kans., Colo., Okla., Tex., N. Mex.
Podalonia puncta Murray, 1940. Ent. Amer. (n. s.) 20: 36. ♂, ♀.

robusta (Cresson). Transcont. in Canada and U. S., as far north as N. W. T. and Yukon; south to Costa Rica. Prey: Acronyctinae sp. ?
Ammophila robusta Cresson, 1865. Ent. Soc. Phila., Proc. 4: 461. ♀.

Biology: Krombein, 1936. Ent. News 47: 93-99 (nest, prey; misdet. as *violaceipennis*).

sericea Murray. West. Provinces and States east to the Dakotas, very rare to Mich. Ecology: Nests along dirt road. Prey: *Zale lunata* (Dru.), *Homoptera salicis* Behr., Noctuidae sp.
Podalonia sericea Murray, 1940. Ent. Amer. (n. s.) 20: 57. ♂, ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 240-241, figs. 5, 8 (larva; misdet. as *robusta*).

Biology: Hicks, 1933. Pan-Pacific Ent. 9: 49-52 (prey; misdet. as *violaceipennis*). —Evans, 1963. Ent. News 74: 237, fig. 4 (nest, prey; misdet. as *robusta*). —Evans, 1970. Mus. Compar. Zool., Bul. 40: 485, fig. 18 (nest, prey).

sonorensis (Cameron). Alta., U. S. west of 100th meridian; Mexico.
Ammophila sonorensis Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 21. ♂, ♀.
Podalonia sonorensis differentia Murray, 1940. Ent. Amer. (n. s.) 20: 33. ♂, ♀.

valida (Cresson). West. Provinces and States east to Minn. Ecology: Nests in bare or densely vegetated soil, makes cluster of unicellular nests in a restricted site, digs burrow before hunting prey. Parasite: Bombyliidae sp. probably *Ligura* or *Exoprosopa*. Prey: *Estigmene acraea* (Dru.).
Ammophila valida Cresson, 1865. Ent. Soc. Phila., Proc. 4: 461. ♀.
Ammophila grossa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 209. ♀.

Biology: Steiner, 1974. Pan-Pacific Ent. 50: 73-77, 1 fig. (prey hunting and transport). —Steiner, 1975. Quaestiones Ent. 11: 113-127, 6 figs. (female territorial behavior, nest, prey, parasite).

violaceipennis (Lepeletier). East. States west to Colo. Ecology: Nests in sand or heavier soil. Parasite: *Pseudoxenos luctuosae* (Pierce); *Hilarella* sp. Prey: *Symmerista albifrons* S. and A., Noctuidae sp.
Ammophila violaceipennis Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 370. ♀.
Ammophila cementaria Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 224. ♀.

Biology: Parker, 1915. Ent. Soc. Wash., Proc. 17: 70-77 (nest, prey, parasite, life cycle). —Balduf, 1936. Canad. Ent. 68: 137-138 (prey).

Genus EREMNOPHILA Menke

Ammophila subg. *Eremnophila* Menke, 1964. Canad. Ent. 96: 875.
Type-species: *Ammophila opulenta* Guerin. Orig. desig.

aureonotata (Cameron). Southern Canada and U. S. east of 100th meridian, south to El Salvador. Ecology: Nests in sand or hard-packed loam, the burrow vertical, terminating in a horizontal cell provisioned with a single caterpillar. Parasite: *Pseudoxenos lugubris* (Pierce). Prey: *Heterocampa guttivitta* (Wlkr.), *H.* sp.; Hesperiidae sp.
Ammophila aureonotata Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 7. ♀, ♂.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 25-28 (prey transport, nest; misdet. as *gracilis* Lep.). —Peckham and Peckham, 1905. Wasps, social and solitary, pp. 43-46 (prey transport; misdet. as *gracilis* Lep.). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 24 (mating, prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 104 (nest, prey transport). —Evans, 1959. Amer. Midland Nat. 62: 464-465 (nest, prey transport).

Genus AMMOPHILA Kirby

Ammophila Kirby, 1798. Linn. Soc. London, Trans. 4: 199.
Type-species: *Sphex sabulosa* Linnaeus. Desig. by Internatl. Comn. Zool. Nomencl. Op. 180, 1946. Op. and Decl. by Internatl. Comn. Zool. Nomencl. 2: 569-585.
Ammophylus Latreille, 1802-1803. Hist. Nat. Crust. Ins. 3: 332. Emend. or lapsus.
Miscus Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 130. No species included.
Type-species: *Ammophila campestris* Latreille. Desig. by Shuckard, 1837.
Ammophilus Latreille, 1829. *In* Cuvier, Regn. Anim., v. 4, p. 322. Emend. or lapsus.
Coloptera Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 387.
Type-species: *Coloptera barbara* Lepeletier. Monotypic.
Argyrammophila Gussakovskij, 1928. Leningrad, Inst. Zool. Appl. Phytopath., Bul. 4: 7.
Type-species: *Ammophila induta* Kohl. Orig. desig.
Apycnemia Leclercq, 1961. Eos 37: 211.
Type-species: *Ammophila fallax* Kohl. Orig. desig.

The behavior of these slender, elongate wasps has been studied by a host of observers. All species are fossorial, usually solitary in nesting habits, although a few extralimital species are gregarious nesters. Typically, the nest consists of a short, oblique to perpendicular burrow terminating in a single cell, although 2-celled nests have been reported in two species. Usually, the nest is dug before prey is obtained, but two species have been reported as capturing prey before constructing the nest.

The prey used by *Ammophila* consists usually of hairless larvae although sparsely to densely haired larvae may be used occasionally. Lepidopterous larvae are frequently provided, but occasionally hymenopterous (sawfly) larvae are used. There is one record of weevil larvae being preyed upon by *azteca* Cam. which also uses lepidopterous and sawfly larvae. It is probable that caterpillars are the preferred prey, and that sawfly or weevil larvae are used only when there is not a ready supply of caterpillars. Wasps using larger larvae for prey, store only one per nest; those using smaller larvae may provide as many as 11 per cell. Most species are mass provisioners, but several practice progressive provisioning. Three species, including our native *azteca*, are known to maintain several nests simultaneously which are provisioned progressively.

The Peckhams observed one specimen of *urnaria* Dahlb. using a pebble to tamp the earth in the nest closure. They contended that this constituted improvisation of a tool and intelligent use of it. Subsequent observations on other species demonstrate conclusively that the supposed tool-using behavior is not an intelligent act but the culmination of a succession of instinctive behavioral traits.

Revision: Melander, 1903. Psyche 10: 156-164. —Fernald, 1934. No. Amer. and W. Indies *Sphex*, 167 pp. These are not reliable for identification of many North American species.

Biology: Evans, 1959. Amer. Midland Nat. 62: 449-473 (nesting behavior). —Powell, 1964. Kans. Ent. Soc., Jour. 37: 240-258 (nesting behavior). —Menke, 1965. Ent. News 76: 257-261 (identity of spp. studied by Hicks and Evans).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99, no. 14: 50, pl. 23, figs. K, M-R (male genitalia).

aberti Haldeman. West. Provinces and States east to Iowa; Mexico. Ecology: Nests in firm sand or hard soil, the vertical or oblique burrow terminating in a cell in which up to 10 small caterpillars are stored. Parasite: *Pseudoxenos lugubris* (Pierce); *Hilarella hilarella* (Zett.), *Metopia argyrocephala* (Meig.), *Opsidia* sp.; ? *Exoprosopa capucina* (F.); *Ceratochrysis trachypleura* Boh. Prey: *Euchlaena* sp., Sterrhinae sp., Geometridae spp.; Hesperiidae sp.
Ammophila aberti Haldeman, 1852. Stansburys Explor. Survey Salt Lake, App. C, Ins., p. 368. ♀.
Ammophila urnaria Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 381. ♀. Preocc.

Ammophila tarsata Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 219.
Ammophila yarrowi Cresson, 1875. Rpt. Geog. Geol. Explor. and Survey west of 100th meridian, v. 5, p. 713. ♂.
Sphex transversus Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 141. ♂.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 148, figs. 31-33 (larva).

Biology: Williston, 1892. Ent. News 3: 85-86 (nest, prey). —Hicks, 1932. Canad. Ent. 64: 145-151 (nest, prey, parasites; *Chrysis perpulchra* Cr. misdet.). —Evans, 1959. Amer. Midland Nat. 62: 454-456 (nest, prey, parasite). —Powell, 1964. Kans. Ent. Soc., Jour. 37: 244-251 (nest, prey, parasite, mating, life cycle).

acuta (Fernald). Western U. S.
Sphex acutus Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 150. ♂.

aphrodite Menke. Ariz., Nev., Calif.
Ammophila aphrodite Menke, 1964. Acta Hym. 2: 8, fig. 2. ♂, ♀.

azteca azteca Cameron. Transcont. in Canada and U. S., ranging as far north as N. W. T. and Yukon; Mexico. Ecology: Nest is a vertical burrow ending in a single cell; a female can maintain several nests simultaneously, provisioning each progressively with up to seven prey specimens. Prey: Lycaenidae spp.; Gecmetridae spp.; Gelechiidae sp.; Pterophoridae sp.; *Smerinthus* sp.; *Nematus* sp., *Amauronematus* sp.; *Hypera postica* (Gyll.). Predator: *Philanthus zebratus nitens* (Bks.).
Ammophila azteca Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 17. ♀.
Sphex pilosus Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 120. ♀, ♂.
Sphex aculeatus Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 145. ♀, ♂.
Sphex pilosus nudus Murray, 1938. Ent. Soc. Amer., Ann. 31: 28. ♂, ♀. Preocc.
Ammophila pilosa brevisericea Murray, 1951. U. S. Dept. Agr., Agr. Monog. 2: 976. N. name.

Biology: Hicks, 1933. Canad. Ent. 65: 49-51 (nest, prey, parasite; misdet. as *breviceps* Sm.). —Hicks, 1935. Pan-Pacific Ent. 11: 99-101 (nest; misdet. as *aculeatus* Fern.). —Evans, 1963. Ent. News 74: 238, fig. 5 (nest, prey). —Powell, 1964. Kans. Ent. Soc., Jour. 37: 244 (prey). —Evans, 1965. Psyche 72: 8-23, 9 figs. (nesting behavior, prey, life cycle).

azteca clemente Menke. Calif. (San Clemente Is.).
Ammophila azteca clemente Menke, 1967. Los Angeles Co. Mus., Contrib. Sci. 123: 7. ♂, ♀.

bella Menke. Ariz.; Mexico (Sonora, Sinaloa, Guerrero, Puebla).
Ammophila bella Menke, 1966. Biol. Soc. Wash., Proc. 79: 27. ♂, ♀.

bellula Menke. Ariz., N. Mex.; Mexico.
Ammophila bellula Menke, 1964. Acta Hym. 2: 17, fig. 10. ♂, ♀.

boharti Menke. Calif., Nev.
Ammophila boharti Menke, 1964. Acta Hym. 2: 9, fig. 7. ♂, ♀.

breviceps Smith. Southwestern U. S.; Mexico. Parasite: *Pseudoxenos lugubris* (Pierce); *Spintharosoma mesillae* (Ckll.).
Ammophila breviceps Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 221. ♀.

californica Menke. Western U. S.
Ammophila californica Menke, 1964. Acta Hym. 2: 18, fig. 16. ♂, ♀.

centralis Cameron. Tex. (Cameron Co.) south to Guatemala.
Ammophila centralis Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 6, pl. 1, fig. 12. ♂.
Ammophila consors Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 12, pl. 2, fig. 3. ♂, ♀.
Ammophila nigro-caerulea Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 12, pl. 1, fig. 8. ♀.

cleopatra Menke. Transcont. in U. S.; Mexico. Ecology: Nests in sand, the vertical burrow terminating in a horizontal cell containing one or two prey. Parasite: *Senotainia litoralis* Allen. Prey: *Macrurocampa marthesia* (Cram.).
Ammophila cleopatra Menke, 1964. Acta Hym. 2: 19, fig. 12. ♂, ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 147, figs. 60-62 (larva; misdet. as *juncea* Cr.).

Biology: Evans, 1959. Amer. Midland Nat. 62: 461-462 (nest, prey, parasite; misdet. as *juncea* Cr.).

coachella Menke. Southern Calif., deserts.
Ammophila coachella Menke, 1966. Biol. Soc. Wash., Proc. 79: 38, figs. 2, 5, 6. ♂, ♀.

conditor Smith. Fla.
Ammophila conditor Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 223. ♀.

dejecta Cameron. Ariz.; Mexico (Sonora).
Ammophila dejecta Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 14.

dysmica Menke. Calif., Nev., Oreg., Wyo. Ecology: Nest a vertical burrow ending in a single cell. Prey: Noctuidae sp. Predator: *Philanthus zebratus nitens* (Bks.).
Ammophila dysmica Menke, 1966. Biol. Soc. Wash., Proc. 79: 30. ♂, ♀.

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 485 (nest, prey, predator).

evansi Menke. Eastern United States. Parasite: *Pseudoxenos lugubris* (Pierce). Replaces *arvensis* of American authors, not Dahlbom.
Ammophila evansi Menke, 1964. Acta Hym. 2: 20, fig. 17. ♂, ♀.

extremitata Cresson. Western U. S.
Ammophila extremitata Cresson, 1865. Ent. Soc. Phila., Proc. 4: 457. ♀.

femurrubra Fox. Southwestern U. S. Parasite: *Spintharosoma mesillae* (Ckll.).
Ammophila femur-rubra Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 102. ♀.

fernaldi (Murray). Eastern U. S. west to Man. and Ariz.; Mexico. Ecology: Nests in sandy soil, the cell provisioned with a single larva. Prey: Noctuidae sp.
Sphex fernaldi Murray, 1938. Ent. Soc. Amer., Ann. 31: 19. ♀, ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 241-242, figs. 6, 7 (larva).

Biology: Evans, 1964. Amer. Ent. Soc., Trans. 99: 242 (nest, prey, life cycle).

ferruginosa Cresson. Western U. S. except Coastal States.
Ammophila ferruginosa Cresson, 1865. Ent. Soc. Phila., Proc. 4: 455. ♀.
Ammophila collaris Cresson, 1865. Ent. Soc. Phila., Proc. 4: 456. ♂.
Sphex cressoni Smith, 1908. Nebr. Univ., Studies 8: 329. ♂.

formicoides Menke. Ariz., N. Mex., Tex.; Mexico (Sonora, Durango).
Ammophila formicoides Menke, 1964. Acta Hym. 2: 10, fig. 3. ♂, ♀.

harti (Fernald). Vt. to Alta. to Utah, Tex. Ecology: Nests in sand, the burrow oblique; wasp larva is progressively provisioned. Prey: Ennominae spp., Sterrhinae spp., Geometridae spp.; Noctuidae, probably Acontiinae sp.
Ammophila argentata Hart, 1907. Ill. State Lab. Nat. Hist., Bul. 7: 266. ♀, ♂. Preocc.
Sphex harti Fernald, 1931. Ent. Soc. Amer., Ann. 24: 450. N. name.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 146, figs, 57-59 (larva).

Biology: Peckham and Peckham, 1900. Wis. Nat. Hist. Soc., Bul. 1: 90-91 (nest, prey; misdet. as *polita* Cr.). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 24-26 (nest, prey). —Evans, 1959. Amer. Midland Nat. 62: 459-461 (nest, prey).

hermosa Menke. Colo., Nev., Ariz., Calif.; Mexico (Chihuahua).
Ammophila hermosa Menke, 1966. Biol. Soc. Wash., Proc. 79: 31. ♂, ♀.

hurdi Menke. Southwestern U. S.
Ammophila hurdi Menke, 1964. Acta Hym. 2: 12, fig. 1. ♂, ♀.

imitator Menke. Ariz. (Cochise Co.); Mexico (Sonora).
Ammophila imitator Menke, 1966. Biol. Soc. Wash., Proc. 79: 38, figs. 1, 3. ♂.

juncea Cresson. Transcont. in U. S.; Mexico (Sonora).
Ammophila juncea Cresson, 1865. Ent. Soc. Phila., Proc. 4: 460. ♂.
Ammophila montezuma Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 13. ♂.

karenae Menke. Calif., Ariz., N. Mex., Nev., Idaho; Mexico (Baja California).
Ammophila karenae Menke, 1964. Acta Hym. 2: 21, fig. 9. ♂, ♀.

kennedyi (Murray). Entire U. S. and South. Canada. Parasite: *Pseudoxenos lugubris* (Pierce).
Ammophila vulgaris Cresson, 1865. Ent. Soc. Phila., Proc. 4: 458. ♀, ♂. Preocc.
Sphex kennedyi Murray, 1938. Ent. Soc. Amer., Ann. 31: 36. N. name.

leoparda (Fernald). Minn. southwest to Tex., east to Ga., north to Mich.
Sphex urnarius leopardus Fernald, 1934. No. Amer. and W. Indies *Sphex*, P. 125. ♀, ♂.

macra Cresson. Western U. S. Ecology: Nests in firm sandy loam, the burrow vertical with a horizontal cell. Prey: *Smerinthus geminatus* Say.
Ammophila macra Cresson, 1865. Ent. Soc. Phila., Proc. 4: 460. ♂.

Biology: Evans, 1965. Psyche 72: 21, fig. 9 (nest, prey).

marshi Menke. Calif., Nev.
Ammophila marshi Menke, 1964. Acta Hym. 2: 13, fig. 5. ♂, ♀.

mcclayi Menke. Calif., Nev.; Mexico (Baja California).
Ammophila mcclayi Menke, 1964. Acta Hym. 2: 24, fig. 13. ♂, ♀.

mediata Cresson. Canada and western U. S. as far north as N. W. T. and Yukon. Predator: *Philanthus zebratus nitens* (Bks.).
Ammophila mediata Cresson, 1865. Ent. Soc. Phila., Proc. 4: 459. ♀, ♂.

mescalero Menke. Tex., Colo., Ariz.; Mexico (Zacatecas, Queretaro, Puebla, Oaxaca).
Ammophila mescalero Menke, 1966. Biol. Soc. Wash., Proc. 79: 33, fig. 7. ♂, ♀.

mimica Menke. Southern Calif., Ariz.
Ammophila mimica Menke, 1966. Biol. Soc. Wash., Proc. 79: 36, fig. 4. ♂, ♀.

moenkopi Menke. Northern and central Ariz.
Ammophila moenkopi Menke, 1967. Los Angeles Co. Mus., Contrib. Sci. 123: 3, figs. 1, 3. ♂, ♀.

monachi Menke. Nev.
Ammophila monachi Menke, 1966. Biol. Soc. Wash., Proc. 79: 34. ♂, ♀.

murrayi Menke. Calif.
Ammophila murrayi Menke, 1964. Acta Hym. 2: 14, fig. 4. ♂, ♀.

nasalis Provancher. Calif. Ecology: Nests in loose sand of river bed or bank, digging a vertical burrow, the cell provisioned with up to seven caterpillars. Parasite: *Pseudoxenos lugubris* (Pierce). Prey: Geometridae sp.
Ammophila nasalis Provancher, 1895. Nat. Canad. 22: 111. ♂.
Sphex craspedotus Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 96. ♀.

Biology: Hicks, 1935. Pan-Pacific Ent. 11: 97-99 (nest, prey).

nearctica Kohl. Western U. S.
Ammophila nearctica Kohl, 1889. Zool.-Bot. Gesell. Wien, Verh. 39: 18. ♂.

nefertiti Menke. Wash., Oreg., Calif., Ariz., Nev., Idaho, a Great Basin sp.
Ammophila nefertiti Menke, 1964. Acta Hym. 2: 16, figs. 8, 11. ♂, ♀.

nigricans Dahlbom. Eastern U. S. Ecology: Nests in sandy-clay soil, the burrow oblique or vertical, terminating in a horizontal cell provisioned with one caterpillar. Prey: *Catocala* sp., *Zale* sp., *Euparthenos nubilis* Hbn.
Ammophila nigricans Dahlbom, 1843. Hym. Europaea, v. 1, p. 14. ♂.
Ammophila intercepta Lepeletier, 1845. Hist. Nat. Ins., Hym. v. 3, p. 378. ♀.

Biology: Rau, 1934. Canad. Ent. 66: 259 (nest, prey). —Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 310, fig. 6 (nest, prey, life cycle). —Evans, 1959. Amer. Midland Nat. 62: 465 (prey transport).

novita (Fernald). Southwestern U. S.; Mexico.
Sphex novitus Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 147. ♀, ♂.

parapolita (Fernald). Wash., Oreg., Idaho, Nev., Utah, Calif.
Sphex parapolitus Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 51. ♀, ♂.

parkeri Menke. Calif., Nev. Prey: Geometridae sp.
Ammophila parkeri Menke, 1964. Acta Hym. 2: 23, fig. 14. ♂, ♀.

Biology: Powell, 1964. Kans. Ent. Soc., Jour. 37: 243-244 (prey).

peckhami (Fernald). Colo. to Ariz.; Mexico.
Sphex willistoni Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 91, fig. 37. ♀.
Sphex peckhami Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 93. ♂.

picipes Cameron. Ariz. south to Panama.
Ammophila alticola Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 10, pl. 1, fig. 9a. ♂.

Ammophila picipes Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 11, pl. 2, fig. 4. ♂.
Ammophila volcanica Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 17. ♀.
Ammophila chiriquensis Cameron, 1888. Biol. Cent-Amer., Hym., v. 2, p. 18. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 156, fig. 3 (sleeping aggregation).

pictipennis Walsh. Eastern U. S.; Mexico. Ecology: Nests in sand, providing a single larva per nest. Parasite: *Pseudoxenos lugubris* (Pierce); *Hilarella hilarella* (Zett.). Prey: Noctuidae spp., *Leucania unipuncta* (Haw.), *Agrotis C-nigrum* (L.), *Prodenia ornithogalli* Guen., *Heliothis zeae* (Bod.); *Pholisora catullus* F.
Ammophila pictipennis Walsh, 1869. Amer. Ent. 1: 128, 164. ♀, ♂.
Ammophila anomala Taschenberg, 1869. Ztschr. Gesam. Naturw. Halle 34: 434. ♀, ♂.
Sphex nigropilosus Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 465. ♀. This is a questionable synonym.

Biology: Walsh and Riley, 1868. Amer. Ent. 1: 128 (nest, prey). —Rau and Rau, 1918. Wasp studies afield, pp. 207-237, figs. 45-49 (prey transport, nest, life cycle). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 23 (prey). —Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 310-311, fig. 7 (nest, prey; misdet. as *placida* Sm.).

placida Smith. Western U. S.; Mexico. Ecology: Nests in damp sand, the vertical burrow ending in a horizontal cell. Parasite: *Opsidia* sp. Prey: *Zale lunata* (Dru.), Noctuidae sp.; Hesperiidae sp.
Ammophila placida Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 221. ♂.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 148, fig. 34 (larva).

Biology: Hicks, 1932. Canad. Ent. 64: 193-198 (nest, prey, life cycle; misdet. as *xanthoptera* Cam.). —Hicks, 1934. South. Calif. Acad. Sci., Bul. 33: 39-41 (prey capture). —Evans, 1959. Amer. Midland Nat. 62: 456-458 (nest, prey transport, life cycle, parasite).

polita Cresson. Western U. S.
Ammophila polita Cresson, 1865. Ent. Soc. Phila., Proc. 4: 458. ♀.

procera Dahlbom. Transcont. in U. S., south to Guatemala. Ecology: Nests in compact sand, the burrow oblique to vertical, terminating in a cell containing one caterpillar. Parasite: *Senotainia vigilans* Allen, *Metopia lateralis* Macq., Miltogrammini sp. Prey: *Nadata gibbosa* (Abbot), *Heterocampa manteo* (Dbldy.), *H. astarte* Dbldy., *Datana* sp., *Schizura ipomoeae* (Dbldy.), *Symmerista* sp.; *Smerinthus cerisyi* Kby., Sphingidae sp.; Noctuidae sp.
Ammophila procera Dahlbom, 1843. Hym. Europaea, v. 1, p. 15.
Ammophila saeva Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 222. ♀.
Ammophila gryphus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 460. ♂.
Ammophila barbata Smith, 1873. Ann. and Mag. Nat. Hist. (4) 12: 260. ♀.
Ammophila ceres Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 8. ♂.
Ammophila championi Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 9. ♀.
Ammophila striolata Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 10. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 145, figs. 39-46 (larva).

Biology: Pergande, 1892. Ent. Soc. Wash., Proc. 2: 256-258 (nest, prey). —Hartman, 1905. Tex. Univ. Bul. 65, Sci. Ser. 6: 11-20, figs. 6, 8, 9, 13, 16-18, 22 (nest, prey). —Rau and Rau, 1918. Wasp studies afield, pp. 237-243, fig. 50 (nest, prey, sleeping aggregation). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 24 (nest). —Criddle, 1924. Canad. Field Nat. 38: 121-123 (nest, prey). —Wheeler and Wheeler, 1924. Science 59: 486 (nest closure). —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 211 (prey). —Hicks, 1935. Pan-Pacific Ent. 11: 101-102 (nest closure). —Krombein, 1953 (1952). Wasmann Jour. Biol. 10: 283-286 (nest, prey, parasite). —Bohart and Knowlton, 1953. Ent. Soc. Wash., Proc. 55: 100-101 (nest, prey, mating). —Krombein, 1953. Ent. Soc. Wash., Proc. 55: 118 (nest, prey, parasite). —Tilden, 1953. Pan-Pacific Ent. 29: 211-218 (nest, prey). —Krombein, 1955. Ent. Soc. Wash., Proc. 57: 151-152 (cocoon). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 104-105 (nest, prey, parasite, life cycle). —Evans, 1959. Amer. Midland Nat. 62: 451-454 (nest, prey transport, parasite). —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 156, fig. 4 (sleeping aggregation).

pruinosa Cresson. Western U. S. Ecology: Nests in sand, the burrow mostly vertical, the cell progressively provisioned with several caterpillars. Parasite: *Pseudoxenos lugubris* (Pierce). Prey: Geometridae spp.; Noctuidae spp.; Phycitinae sp.
Ammophila pruinosa Cresson, 1865. Ent. Soc. Phila., Proc. 4: 455. ♀, ♂.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 149, fig. 35 (larva).

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 156 (sleeping aggregation). —Powell, 1964. Kans. Ent. Soc., Jour. 37: 251-253, 256 (nest, prey).

regina Menke. Calif., Oreg.
Ammophila regina Menke, 1964. Acta Hym. 2: 25, fig. 15. ♂, ♀.

shoshone Menke. Wyo., Utah.
Ammophila shoshone Menke, 1967. Los Angeles Co. Mus., Contrib. Sci. 123: 5, fig. 5. ♂, ♀.

stangei Menke. Calif., Nev.
Ammophila stangei Menke, 1964. Acta Hym. 2: 15, fig. 6. ♂, ♀.

strenua Cresson. Western Canada and U. S.; Mexico.
Ammophila strenua Cresson, 1865. Ent. Soc. Phila., Proc. 4: 459. ♀.
Sphex dubius Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 139. Preocc.
Ammophila denningi Murray, 1951. U. S. Dept. Agr., Agr. Monog. 2: 975. N. name.

unita Menke. Colo., Wyo., Utah, Nev., Ariz., a Great Basin sp.
Ammophila unita Menke, 1966. Biol. Soc. Wash., Proc. 79: 35. ♂, ♀.

urnaria Dahlbom. Eastern U. S. Ecology: Nests in fairly firm soil, the burrow vertical or oblique, the cell provisioned with 1-6 caterpillars. Parasite: *Pseudoxenos lugubris* (Pierce). Prey: *Scoliopteryx libatrix* L., *Autographa* sp., *Panopoda* sp., ? *Polia adjuncta* Bdvl.; Ennominae spp., Geometridae spp. The earlier records of *urnaria* listed under Biology may refer to one or more species of *Ammophila*.
Ammophila urnaria Dahlbom, 1843. Hym. Europaea, v. 1, p. 14.
Ammophila inepta Cresson, 1872. Amer. Ent. Soc., Trans. 4: 209. ♀, ♂.
Sphex arvensis floridensis Fernald, 1933. Ent. News 44: 236. Nom. nud.
Sphex floridensis Fernald, 1934. No. Amer. and W. Indies *Sphex*, p. 126. ♀, ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 81: 146, figs. 47-49 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 6-28, pl. 3, figs. 5-8, pl. 8, figs. 1-5 (nest, use of "tool", prey, life cycle). —Peckham and Peckham, 1905. Wasps, Social and Solitary, pp. 18-39, 46-50 (nest, use of "tool", prey, life cycle). —Parker, 1915. Ent. Soc. Wash., Proc. 17: 75-76, fig. 8 (nest, prey, life cycle). —Fernald, 1933. Ent. News 44: 236-238 (prey transport, nest). —Frisch, 1940. Amer. Midland Nat. 24: 345-350 (nest closure). —Evans, 1959. Amer. Midland Nat. 62: 462-464 (nest, prey).

varipes Cresson. Central U. S.; Mexico (Sonora).
Ammophila varipes Cresson, 1865. Ent. Soc. Phila., Proc. 4: 457. ♀, ♂.
Ammophila comanche Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 19, pl. 1, fig. 14.

wrightii (Cresson). Western U. S. Ecology: Digs vertical burrow in soil *after* capturing prey. Prey: Geometridae sp.
Coloptera wrightii Cresson, 1865. Amer. Ent. Soc., Trans. 1: 378. ♀.

Biology: Hicks, 1934. Psyche 41: 150-157, 2 figs. (nesting behavior, prey).

zanthoptera Cameron. Ariz.; Mexico to Guatemala.
Ammophila zanthoptera Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 8. ♀.
Ammophila trichiosoma Cameron, 1888. Biol. Cent.-Amer., Hym., v. 2, p. 11. ♂.
Ammophila xanthoptera Cameron, 1900. Biol. Cent.-Amer., Hym., v. 2, p. xi. Emend.

Unplaced Taxon of Ammophilinae

Ammophila arvensis Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 384. ♀, ♂. Amer. Sept. Preocc. by Dahlbom.

Family PEMPHREDONIDAE

Members of this family are small for sphecoid wasps and include the smallest species (2 mm) in the superfamily. The majority of species prey on Homoptera, especially aphids, but some of the smallest species use Thysanoptera or Collembola. The family includes both ground-nesting species and those which use pre-existing cavities in twigs, galls, etc., as nesting sites.

Subfamily PSENINAE

The revisions listed under the subfamily heading are neither adequate nor reliable for identification of most members of the subfamily.

Revision: Fox, 1898. Amer. Ent. Soc., Trans. 25: 1-18 (N. Amer. spp.). —Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 1-60, 2 pls. (N. Amer. spp.).

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 139-145, figs. 1-22 (larvae). —Gittins, 1969. Amer. Ent. Soc., Trans. 95: 49-76, 21 figs. (generic reclassification).

Tribe PSENINI

Genus AMMOPSEN Krombein

Ammopsen Krombein, 1959. Brooklyn Ent. Soc., Bul. 54: 18.
Type-species: *Ammopsen masoni* Krombein. Monotypic.

Nothing is known of the biology except that the sole included species is frequently collected while visiting the flowers of mat *Euphorbia* in the desert. The presence in the female of a foretarsal comb and genal ammochaetae suggests that *masoni* is a ground-nesting species.

masoni Krombein. Southern Calif., Ariz., N. Mex., Utah, Nev.
Ammopsen masoni Krombein, 1959. Brooklyn Ent. Soc., Bul. 54: 19. ♂, ♀.

Genus MIMESA Shuckard

Mimesa Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 228.
Type-species: *Trypoxylon equestre* Fabricius. Orig. desig.
Aporia Wesmael, 1852. Acad. Roy. Sci. Belg., Bul. 19: 272. Preocc.
Type-species: *Trypoxylon equestre* Fabricius. Desig. by Kohl, 1896.
Aporina Gussakovskij, 1937. Trav. Inst. Zool. Acad. Sci. 4: 665. N. name. Preocc.

Wasps of this genus nest in the ground with several cells off the main burrow. So far as known they prey on leafhoppers, both nymphs and adults.

agalena Gittins. Calif.
Mimesa agalena Gittins, 1966. Ent. News 77: 251. ♀, ♂.

arizonensis (Malloch). Ariz. (Tucson, Roosevelt Lake).
Psen (*Mimesa*) *arizonensis* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 36. ♂.

barri Gittins. Idaho, Oreg., Calif.
Mimesa barri Gittins, 1966. Ent. News 77: 249. ♀, ♂.

basirufa Packard. Transcont. in Transit. and U. Austr. Zones. Ecology: Nests in flat compacted soil or vertical sand banks. Prey: *Idiocerus* sp. nymphs, *Macropsis viridis* (Fitch) adults, *Oncopsis variabilis* (Fitch) adults, *O. sorbrius* (Wlkr.) adults.
Mimesa basirufa Packard, 1867. Ent. Soc. Phila., Proc. 6: 406. ♀.
Mimesa nebrascensis Smith, 1908. Nebr. Univ., Studies 8: 390. ♀.

Biology: Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 64 (nest, prey). —Kurczewski and Lane, 1974. Ent. Soc. Wash., Proc. 76: 377-379, figs. 1, 3 (nest, prey transport, egg).

coquilletti (Rohwer). Calif., Nev.
Psen (*Mimesa*) *coquilletti* Rohwer, 1910. U. S. Natl. Mus., Proc. 12: 103. ♀ (♂ misdet.).

cressonii atriventris (Malloch). Ont. (Toronto).
Psen (*Mimesa*) *cressoni* (!) var. *atriventris* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 31. ♂.

cressonii cressonii Packard. Transcont. in Transit. and U. Austr. Zones. Ecology: Nests in level sand. Parasite: *Senotainia trilineata* (Wulp). Prey: *Doratura stylata* (Boh.) adults, *Diplocolenus configuratus* (Uhler) adult and nymphs, *Athysanella longicauda* Beirne adults, *Polyamia compacta* (Osborn and Ball) adults, *Laevicephalus melsheimeri* (Fitch) adults, *Scaphytopius* sp. ? nymphs; *Delphacodes campestris* Van Duzee adult, *D.* sp. nymph, *Laccocera vittipennis* Van Duzee adult, *Liburniella ornata* (Stal) adult; *Craspedolepta* sp. adult.
Mimesa Cressonii Packard, 1867. Ent. Soc. Phila., Proc. 6: 405. ♀.
Mimesa denticulata Packard, 1867. Ent. Soc. Phila., Proc. 6: 406. ♂.
Mimesa conica Smith, 1908. Nebr. Univ., Studies 8: 389. "♀" = ♂.

Biology: Kurczewski and Lane, 1974. Ent. Soc. Wash., Proc. 76: 379-382, figs. 2, 4-6 (nest, prey transport, egg, parasite).

dawsoni Mickel. Nebr. (Harrison).
Mimesa dawsoni Mickel, 1916. Amer. Ent. Soc., Trans. 42: 420. ♂.

edentata (Malloch). Calif. (San Diego Co.).
Psen (*Mimesa*) *edentatus* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 37. ♂.

ezra (Pate). Maine, Pa., Md., Wis., Kans., Colo., Wash. Ecology: Nests in sandy soil. Prey: *Exitianus exitiosus* (Uhler).
Mimesa argentifrons Cresson, 1865. Ent. Soc. Phila., Proc. 4: 487. ♀, ♂. Preocc.
Psen (*Mimesa*) *ezra* Pate, 1944. Canad. Ent. 76: 133. N. name.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 226, pl. 33, figs. 1, 3 (nest, prey).

granulosa (Fox). S. Dak., Mont., Idaho, N. Mex.
Psen granulosus Fox, 1898. Amer. Ent. Soc., Trans. 25: 15. ♂.

gregaria gregaria (Fox). Wyo., Colo., N. Mex.
Psen gregarius Fox, 1898. Amer. Ent. Soc., Trans. 25: 16. ♂.

gregaria simplex (Malloch). Idaho, Utah, Colo.
Psen (*Mimesa*) *gregarius* var. *simplex* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 42. ♀, ♂.

impressifrons (Malloch). Wash. (Perry).
Psen (*Mimesa*) *impressifrons* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 38. ♂.

maculipes Fox. Ont. to Fla.
Mimesa maculipes Fox, 1893. Canad. Ent. 25: 117. ♂.
Psen (*Mimesa*) *nigrescens* Rohwer, 1910. Ent. News 21: 168. ♂.
Psen (*Mimesa*) *perplexa* Rohwer, 1910. Ent. News 21: 169. ♀.

pauper Packard. Transit. Zone east of Rockies.
Mimesa pauper Packard, 1867. Ent. Soc. Phila., Proc. 6: 409. ♂.
Mimesa cingulata Packard, 1867. Ent. Soc. Phila., Proc. 6: 410. ♂.

polita (Malloch). Maine, Md., Nebr., N. Mex.
Psen (*Mimesa*) *politus* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 35. ♀, ♂.

proxima Cresson. Nebr., Colo., N. Mex., Wash.
Mimesa proxima Cresson, 1865. Ent. Soc. Phila., Proc. 4: 188. ♀.

punctifrons (Malloch). Calif. (Redlands).
Psen (*Mimesa*) *punctifrons* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 36. ♂.

pygidialis (Malloch). Mich., Colo., Alta.
Psen (*Mimesa*) *pygidialis* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 39. ♀, ♂.

sabina Gittins. Calif.
Mimesa sabina Gittins, 1966. Ent. News 77: 247. ♀, ♂.

unicincta Cresson. Colo., Calif., B. C. Predator: *Philanthus pulcher* D. T.
Mimesa unicincta Cresson, 1865. Ent. Soc. Phila., Proc. 4: 488. ♀.

Genus MIMUMESA Malloch

Psen subg. *Mimumesa* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 16.
Type-species: *Psen niger* Packard. Orig. desig.

The North American nigra (Pack.) nests in decaying timber and preys upon adult *Agallia* leafhoppers. Several species in the Old World have similar nesting habits and one species nests in clay banks. The Old World species prey upon both Cicadellidae and Delphacidae.

canadensis (Malloch). Ont., N. Y., Mich., N. Dak., Colo., Alaska.
Psen (*Mimumesa*) *canadensis* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 22. ♀, ♂.

clypeata (Fox). Colo., Utah, Nev., Idaho, Calif., Wash., Alaska, N. W. T.
Psen clypeatus Fox, 1898. Amer. Ent. Soc., Trans. 25: 15. ♀, ♂.

coloradoensis (Cameron). Colo. (Berkeley Co.).
Psen (*Mimesa*) *coloradoensis* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 232. ♀.

cylindrica (Fox). Ariz.
Psen cylindricus Fox, 1898. Amer. Ent. Soc., Trans. 25: 5. ♀, ♂.

fuscipes (Packard). Mass.
Psen fuscipes Packard, 1867. Ent. Soc. Phila., Proc. 6: 402. ♀.

interstitialis (Cameron). N. Mex.
Psen (*Mimesa*) *interstitialis* Cameron, 1908. Amer. Ent. Soc., Trans. 34: 233. ♂.

johnsoni Viereck. N. Y. to Va., W. Va.
Mimesa johnsoni Viereck, 1901. Amer. Ent. Soc., Trans. 27: 340. ♀, ♂.

leucopus (Say). N. H., Md., D. C., Va., Ind., Ill., Alta.
Psen leucopus Say, 1837. Boston Jour. Nat. Hist. 1: 370. ♀, ♂.
Psen elongatus Packard, 1867. Ent. Soc., Phila., Proc. 6: 400. "♀" = ♂.

longicornis (Fox). R. I., N. Y. to Fla., La., Iowa; Cuba, Cent. Amer.
Psen longicornis Fox, 1898. Amer. Ent. Soc., Trans. 25: 8. ♂.
Mimesa striatus Viereck, 1901. Amer. Ent. Soc., Trans. 27: 339. ♀.
Psen (*Mimesa*) *floridana* Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 102. ♀.

mandibularis Smith. Nebr.
Mimesa mandibularis Smith, 1908. Nebr. Univ., Studies 8: 392. ♀.

mellipes (Say). N. Y., Md., D. C., Ohio, Ind., Ill., Iowa, Nebr.
Psen mellipes Say, 1837. Boston Jour. Nat. Hist. 1: 369. ♀.
Psen chalcifrons Packard, 1867. Ent. Soc. Phila., Proc. 6: 401. ♀.

mixta (Fox). Transcont. in Transit. Zone. Predator: *Philanthus pulcher* D. T.
Psen mixtus Fox, 1898. Amer. Ent. Soc., Trans. 25: 7. ♀, ♂.
Mimesa alticola Viereck, 1903. Amer. Ent. Soc., Trans. 29: 65. ♀.
Psen (*Mimesa*) *similis* Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 101. ♂.

nigra (Packard). Transcont. in Transit. Zone. Ecology: Nests in decaying wood. Prey: *Agallia* sp. adults.
Psen niger Packard, 1867. Ent. Soc. Phila., Proc. 6: 399. ♀ (♂ misdet.).

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 143-144, figs. 21-22 (larva).

Biology: Gurney, 1951. Ent. Soc. Wash., Proc. 53: 280 (nest, prey).

propinqua Kincaid. Alaska.
Mimesa propinqua Kincaid, 1900. Wash. Acad. Sci., Proc. 2: 508. ♂.

psychrus (Pate). Canada (Hudson Bay).
Mimesa borealis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 431. ♂. Preocc.
Psen (*Mimesa*) *psychrus* Pate, 1944. Canad. Ent. 76: 133. N. name.

regularis (Fox). N. J., Pa.
Psen regularis Fox, 1898. Amer. Ent. Soc., Trans. 25: 6. ♀.

Taxonomy: Viereck, 1901. Amer. Ent. Soc., Trans. 27: 339. ♀.

Genus PSENEO Malloch

Psen subg. *Pseneo* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 7.
Type-species: *Psen kohlii* Fox. Orig. desig.

Meager records indicate that these wasps nest either in the soil or in decaying wood, and prey upon leafhoppers, both nymphs and adults.

Revision: Krombein, 1950. Ent. Soc. Wash., Proc. 52: 277-287 (N. Amer. spp.). —van Lith, 1975. Tijdschr. v. Ent. 118: 15-39, figs. 16-37 (New World spp.).

longiventris kohlii (Fox). N. Y. south to Ga., W. Va., Ala., Ind., Kans.
Psen Kohlii Fox, 1898. Amer. Ent. Soc., Trans. 25: 9. ♀ (♂ misdet.).
Psen (*Pseneo*) *fulvipes* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 11, fig. 3. ♀.
Psen (*Pseneo*) *angulatus* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 12. ♂.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 22, figs. E-J (male genitalia).

longiventris longiventris (Cameron). N. Mex., Ariz. south to Colombia and Surinam.
Mimesa longiventris Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 137, pl. 8, fig. 18. "♀" = ♂.
Mimesa montezuma Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 138. ♀.
Psen (*Pseneo*) *spicatus* Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 12. ♂.

punctatus carolina (Rohwer). Va. to north. Fla., Ala., Miss., Ark. Ecology: Nests in soil in flowerpot. Prey: *Homalodisca triquetra* (F.), *Graphocephala coccinea* (Foerster).
Psen (*Mimesa*) *punctata* var. *carolina* Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 103. ♀.

Biology: Krombein, 1950. Ent. Soc. Wash., Proc. 52: 283 (nest, prey).

punctatus ferrugineus (Viereck). South. Fla.
Mimesa ferruginea Viereck, 1901. Amer. Ent. Soc., Trans. 27: 341. ♂.

punctatus punctatus (Fox). S. Dak., Nebr., Colo.; Mexico (Morelos).
Psen punctatus Fox, 1898. Amer. Ent. Soc., Trans. 25: 9. ♀.

simplicicornis (Fox). Que., N. J. and Pa. south to N. C. Ecology: Nests in decaying wood; cocoons of reared series bear fragments of wood pulp. Prey: *Graphocephala* sp., Cicadellinae sp.
Psen simplicicornis Fox, 1898. Amer. Ent. Soc., Trans. 25: 10. ♀ (♂ misdet.).

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 142 (larva).

Biology: Krombein, 1950. Ent. Soc. Wash., Proc. 52: 286 (nest). —Krombein, 1951. U. S. Dept. Agr., Agr. Monog. 2: 959 (prey).

Genus PSEN Latreille

Psen Latreille, 1796. Precis Caract. Gen. Ins., p. 122. No species.
Type-species: *Sphex atra* Fabricius. First included species.
Psenia Stephens, 1829. System. Cat. Brit. Ins., p. 361.
Type-species: *Sphex atra* Fabricius. Desig. by Pate, 1937.
Dahlbomia Wissman, 1849. Stettin. Ent. Ztg. 10: 9.
Type-species: *Sphex atra* Fabricius. Monotypic.
Mesopora Wesmael, 1852. Acad. Roy. Sci. Belg., Bul. 19: 279.
Type-species: *Sphex atra* Fabricius. Monotypic.
Caenopsen Cameron, 1899. Ann. and Mag. Nat. Hist. (7) 4: 55.
Type-species: *Caenopsen fuscinervis* Cameron. Monotypic.
Punctipsen van Lith, 1968. Tijdschr. Ent. 111: 125.
Type-species: *Mimesa exarata* Eversmann. Orig. desig.

The North American *barthi* Vier. nests in dead wood and preys upon Membracidae, and *erythropoda* Roh. preys upon Cercopidae. Extralimital species have been reported as nesting in dead wood or in sandy or clay soil, and as preying upon Cicadellidae, Cercopidae and Membracidae.

Revision: van Lith, 1975. Tijdschr. v. Ent. 118: 2-15, figs. 1-15 (New World spp.).

barthi Viereck. Que., Conn., Pa., Md., Ga., Wis. Ecology: Nests in wood. Prey: *Cyrtolobus fenestratus* (Fitch); *Atymna inornata* (Say); *Micrutalis calva* (Say); cocoons from which type series of *myersiana* was reared bear attached fragments of Membracidae, perhaps *Enchenopa binotata* (Say).
Psen (*Mimesa*) *barthi* Viereck, 1907. Wis. Nat. Hist. Soc., Bul. 5: 251. ♀.
Mimesa myersiana Rohwer, 1909. Ent. News 20: 324. ♀, ♂.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 142-143, fig. 20 (larva).

Biology: Barth, 1907. Wis. Nat. Hist. Soc., Bul. 5: 251-257 (nest, prey).

erythropoda Rohwer. Ont., Maine to Ga., Wis., Ind. Prey: *Aphrophora quadrinotata* Say.
Psen (Mimesa) erythopoda (!) Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 102. ♀.
Psen (Mimesa) erythropoda Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 176. Emend.

Biology: Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 15 (prey).

monticola (Packard). Ont., N. H. to Ga., W. Va., Mich., Ala.
Mimesa monticola Packard, 1867. Ent. Soc. Phila., Proc. 6: 407. ♂.

unifasciculatus Malloch. N. Mex. (Beulah). Possibly the opposite sex of and a synonym of *montivagus* D. T.
Psen (Psen) unifasciculatus Malloch, 1933. U. S. Natl. Mus. Proc. 82 (26): 15. ♂.

Tribe PSENULINI

Genus PLUTO Pate

Psenia Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 44. Preocc.
Type-species: *Mimesa tibialis* Cresson. Orig. desig.
Pluto Pate, 1937. Amer. Ent. Soc., Mem. 9: 51. N. name.

Biological notes are available for only one species which nests in large aggregations in sandy soil and preys upon nymphal and adult leafhoppers. The presence of a foretarsal pecten in the female suggests that members of the genus are all ground-nesting.

aerofacies (Malloch). Tex.; Mexico.
Psenia aerofacies Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 49. ♀, ♂.

albifacies (Malloch). Iowa, Tex. Ecology: Nests gregariously in flat clay-sand, each nest with several cells and 5-12 prey per cell. Prey: *Opsius stactogalus* Fieb., nymphs and adults.
Psenia albifacies Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 50. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 140-141, figs. 1-6 (larva).

Biology: Evans, 1968. Ent. Soc. Amer., Ann. 61: 1344 (nest, prey).

angulicornis (Malloch). Tex.
Psenia angulicornis Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 58. ♀, ♂.

arenivagus Krombein. N. C., Ga., Fla.
Psenia angulicornis var. Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 48 (in key).
Pluto arenivagus Krombein, 1950 (1949). Elisha Mitchell Sci. Soc., Jour. 65: 268. ♀, ♂.

brevipetiolatus (Rohwer). Calif.
Psenulus (Neofoxia) brevipetiolatus Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 100. ♀.

clavicornis (Malloch). Ariz.; Mexico.
Psenia clavicornis Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 50. ♂.

littoralis (Malloch). Md., Fla.
Psenia littoralis Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 56. ♀, ♂.

longiventris (Malloch). Ariz., Calif.
Psenia longiventris Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 52. ♀, ♂.

marginatus (Malloch). S. C., La.
Psenia marginata Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 54. ♀, ♂.

minutus (Malloch). Tex. (San Diego).
Psenia minuta Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 59. ♀.

pallidistigma (Malloch). Ariz., Tex.
Psenia pallidistigma Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 52. ♀, ♂.

rufibasis (Malloch). Ga.
Psenia rufibasis Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 53. ♀, ♂.

sayi (Rohwer). Austr. Zone.
Psenulus (Neofoxia) sayi Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 100. ♀.

suffusus (Fox). N. Mex., Nev., Calif.
Psen suffusus Fox, 1898. Amer. Ent. Soc., Trans. 25: 18. ♀ (misdet. in part).

texanus (Malloch). Tex. (Brownsville).
Psenia texana Malloch. 1933. U. S. Natl. Mus., Proc. 82 (26): 56. ♀, ♂.

tibialis (Cresson). D. C., Va., S. C., Tenn., Ala., La., Mo., Tex.
Mimesa tibialis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 227. ♀, ♂.

Genus PSENULUS Kohl

Psenulus Kohl, 1896. K. K. Naturhist. Hofmus., Ann. 11: 254, 293.
Type-species: *Psen fuscipennis* Dahlbom. Desig. by Ashmead, 1899.
Neofoxia Viereck, 1901. Amer. Ent. Soc., Trans. 27: 338.
Type-species: *Psen atrata* (Fabricius) of Panzer. Orig. desig.
Stenomellinus Schulz, 1911. Zool. Ann. 4: 142.
Type-species: *Psen dilectus* Saussure. Monotypic.
Psenulus subg. *Eopsenulus* Gussakovskij, 1934. Mushi 7: 84.
Type-species: *Psenulus* (*Eopsenulus*) *iwatai* Gussakovskij. Orig. desig.
Nipponopsen Yasumatsu, 1938. Mushi 11: 84.
Type-species: *Nipponopsen anomoneurae* Yasumatsu. Orig. desig.

These wasps nest in pre-existing cavities in twigs, stems and grass, and also in abandoned beetle borings in wood. Prey records of North American species are Aphididae and Psyllidae. Some extralimital species prey upon Delphacidae and Cicadellidae.

Revision: Krombein, 1950. Brooklyn Ent. Soc., Bul. 45: 35-40 (N. Amer. spp.).

alienus (Krombein). Calif. Ecology: Nests in borings in *Sambucus* stems. Prey: Psyllidae sp. adults.
Diodontus (*Diodontus*) *alienus* Krombein, 1950. Brooklyn Ent. Soc., Bul. 45: 38. ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, prey).

frontalis (Fox). Colo., N. Mex., Ariz., Utah, Calif., Wash.
Psen frontalis Fox, 1898. Amer. Ent. Soc., Trans. 25: 4. ♀.
Diodontus occidentalis Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 5. ♀. Preocc.
Diodontus hesperus Pate, 1944. Canad. Ent. 76: 133. N. name.

pallipes parenosas (Pate). N. H. to Ga., Utah, Calif. Ecology: Nests in borings in wood, in old anobiid borings, and in canes of *Rubus*. Parasite: *Pyemotes ventricosus* (Newp.); *Lackerbaueria krombeini* Baker; Chrysididae sp., possibly *Omalus*. Prey: *Drepanaphis acerifoliae* (Thos.) adults, *D.* sp. nymphs, *Therioaphis* sp. ? nymphs, *Macrosiphum* sp. nymphs. Typical *pallipes* (Panz.) and other subspecies occur in the Palaearctic Region.
Diodontus parenosas Pate, 1944. Canad. Ent. 76: 133. N. name for Malloch's misdet. of *trisulcus* (Fox).

Taxonomy: Krombein, 1950. Brooklyn Ent. Soc., Bul. 45: 37 (lectotype desig.). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 144-145, figs. 13-19 (larva).

Biology: Krombein, 1951. U. S. Dept. Agr., Agr. Monog. 2: 958 (nest). —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 15-16 (nest, prey). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 22 (nest, prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 232-234 (nest, prey, life cycle, cocoon, parasites).

trisulcus (Fox). N. H. to Tenn., Mo., Kans. Ecology: Nests in elder stems. Parasite: *Omalus iridescens* (Nort.).
Psen trisulcus Fox, 1898. Amer. Ent. Soc., Trans. 25: 5. ♀.
Diodontus corusanigrens Rohwer, 1920. U. S. Natl. Mus., Proc. 57: 228. "♀" = ♂.
Diodontus sulcatus Malloch, 1933. U. S. Natl. Mus., Proc. 82 (26): 6. ♀.

Taxonomy: Pate, 1944. Canad. Ent. 76: 133.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 21-22 (nest).

Subfamily PEMPHREDONINAE

Revision: Fox, 1892. Amer. Ent. Soc., Trans. 19: 307-326 (N. Amer. spp.; not reliable for identification).

Taxonomy: Pate, 1937. Amer. Ent. Soc., Trans. 63: 90-93 (key to gen.). —Evans, 1958. Amer. Ent. Soc., Trans. 84: 126-136, figs. 49-57, 60-69 (larvae). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 246-253, figs. 17-25 (larvae).

Tribe PEMPHREDONINI

Genus DIODONTUS Curtis

Diodontus Curtis, 1834. Brit. Ent., v. 11, text for pl. 496.
Type-species: *Pemphredon tristis* Vander Linden. Desig. by Internatl. Comn. Zool. Nomencl., 1968. Op. 844, Bul. Zool. Nomencl. 25: 10.
Xylocelia Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 243.
Type-species: *Diodontus occidentalis* Fox. Orig. desig.

Members of this genus nest in the ground. Aphids are the normal prey, but there is one record of a leafhopper being used.

Taxonomy: Mickel, 1916. Ent. Soc. Amer., Ann. 9: 344-352 (N. Amer. spp.). —Krombein, 1939. Brooklyn Ent. Soc., Bul. 34: 143 (key to N. Y. spp.). —Bohart and Menke, 1965. Bul. Zool. Nomencl. 22: 257-258 (request to place *Diodontus* on Official List of Generic Names with *tristis* as type-species).

adamsi Titus. Mich. (Isle Royale).
Diodontus adamsi Titus, 1909 (1908). Mich. Board Geol. Survey Rpt. for 1908, p. 319. ♀.

americanus Packard. Maine, Wis. Ecology: Nests in soil. Prey: Choke-cherry aphids.
Diodontus americanus Packard, 1867. Ent. Soc. Phila., Proc. 6: 393. ♀.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 99-107, pl. 10, fig. 5, pl. 14, fig. 3 (nest, prey, life cycle).

antennatus (Mickel). Nebr. (Omaha).
Xylocelia antennatus Mickel, 1916. Ent. Soc. Amer., Ann. 9: 348. ♀.

argentinae Rohwer. Colo., Wyo. Ecology: Nests gregariously in flat sand and makes up to 5 cells per nest. Parasite: Diptera sp. Prey: Aphididae sp. or spp. Predator: *Philanthus pulcher* D. T.
Diodontus argentinae Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 104. ♂.

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 486 (nest, prey, parasite, predator).

ater (Mickel). Nebr., Kans., Pa. Ecology: Nests in vertical sand or clay bank, and in sloping gravel bank. Prey: Aphididae sp. or spp. Predator: *Philanthus pacificus* Cr.
Xylocelia ater Mickel, 1916. Ent. Soc. Amer., Ann. 9: 351. ♀.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 21 (nest). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 486-487 (nest, prey, predator).

beulahensis (Rohwer). N. Mex. (Beulah).
Xylocelia beulahensis Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 174. ♀.

bidentatus Rohwer. N. B., N. Y., Mich.
Diodontus bidentatus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 560. ♂.

brunneicornis Viereck. Kans. (Sedgwick Co.).
Diodontus brunneicornis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 212. ♂.

cockerelli Rohwer. Colo. (Florissant).
Diodontus cockerelli Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 105. ♂.

crassicornus Viereck. Oreg. (Corvallis).
Diodontus crassicornus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 243. ♂.

flavitarsis Fox. Colo.
Diodontus flavitarsis Fox, 1892. Amer. Ent. Soc., Trans. 19: 316. ♂.

florissantensis Rohwer. Colo. (Florissant).
Diodontus florissantensis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 107. ♀, ♂.

franclemonti (Krombein). N. Y., Pa., Md., D. C., Va., Mich. Ecology: Nests gregariously in sand.
Xylocelia franclemonti Krombein, 1939. Brooklyn Ent. Soc., Bul. 34: 141. ♀, ♂.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 133, figs. 65, 66 (larva).

Biology: Lin, 1967. Ent. Soc. Wash., Proc. 69: 343-346 (linear copulation).

fraternus Rohwer. Colo. (Florissant).
Diodontus fraternus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 106. ♂.

gillettei Fox. Nebr., Colo., Idaho. Predator: *Philanthus pulcher* D. T., *P. pacificus* Cr.
Diodontus Gillettei Fox, 1892. Amer. Ent. Soc., Trans. 19: 316. ♀.

leguminiferus Cockerell. N. Mex. (Santa Fe).
Diodontus leguminiferus Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 141. ♂.

maestus Mickel. Nebr., Colo.
Xylocelia maestus Mickel, 1916. Ent. Soc. Amer., Ann. 9: 347. ♂.

metathoracicus (Mickel). Ala., Mo., Nebr. Ecology: Nests in clay bank, the cell with up to 48 aphids. Prey: *Hysteroneura setariae* (Thos.).
Xylocelia metathoracicus Mickel, 1916. Ent. Soc. Amer., Ann. 9: 349. ♀.

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 102-108, figs. 27, 28 (nest, prey, mating).

neomexicanus Rohwer. N. Mex. (Rowe).
Diodontus neomexicanus Rohwer, 1909. Amer. Ent. Soc., Trans. 19: 317. ♀.

nigritus Fox. Colo.
Diodontus nigritus Fox, 1892. Amer. Ent. Soc., Trans. 19: 317. ♀.

occidentalis Fox. Nebr., Ariz., Calif. Ecology: Nests gregariously in level sand, the cells provisioned with 23-30 aphids. Parasite: *Omalus cressoni* (Aar.). Prey: *Aphis* sp., *Myzus persicae* Sulz. (?), *Macrosiphum* (*Acyrthosiphon*) sp., *Rhopalosiphum* sp.
Diodontus occidentalis Fox, 1892. Amer. Ent. Soc., Trans. 19: 315. ♀, ♂.

Biology: Powell, 1964. Wasmann Jour. Biol. 21: 155-176 (nest, prey, parasites, mating, life cycle, cocoon).

rugosus Fox. Ill., Nebr., Colo., Mont.
Diodontus rugosus Fox, 1892. Amer. Ent. Soc., Trans. 19: 315. ♂.

siouxensis (Mickel). Nebr. (Sioux Co.).
Xylocelia siouxensis Mickel, 1916. Ent. Soc. Amer., Ann. 9: 350. ♀.

spiniferus (Mickel). Nebr. (Omaha).
Xylocelia spiniferus Mickel, 1916. Ent. Soc. Amer., Ann. 9: 348. ♀.

striatus (Mickel). N. Dak., Wyo.
Xylocelia striatus Mickel, 1916. Ent. Soc. Amer., Ann. 9: 350. ♀.

vallicolae Rohwer. Colo. (Florissant, Boulder).
Diodontus vallicolae Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 104. ♂.
Diodontus vallicolae salicis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 105. ♂.

virginianus (Rohwer). N. Y., Md., Va. Ecology: Nests gregariously in flat soil, or in pockets of soil between roots, the cell provisioned with up to 5 aphids. Parasite: *Omalus intermedius* (Aar.). Prey: *Prociphilus tesselatus* (Fitch) nymphs; *Typhlocyba* sp. adult.
Xylocelia virginiana Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 175. ♂.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 133, fig. 67 (larva).

Biology: Krombein, 1951. U. S. Dept. Agr., Agr. Monog. 2: 964 (prey). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 22-24 (nest, prey). —Krombein, 1963. Ent. Soc. Wash., Proc. 65: 264 (parasite).

Genus PEMPHREDON Latreille

The species nest in twigs, deserted galls, abandoned beetle burrows, or in rotten wood and provision the cells with Aphididae.

Genus PEMPHREDON Subgenus PEMPHREDON Latreille

Pemphredon Latreille, 1796. Precis. Caract. Gen. Ins., p. 128. No species.
Type-species: *Crabro lugubris* Fabricius. Desig. by Shuckard, 1837.

Revision: Rohwer, 1917. Brooklyn Ent. Soc., Bul. 11: 97-102 (N. Amer. spp.).

concolor Say. Transcont. in Transit. Zone. Ecology: Nests in beetle borings in stump. Parasite: *Omalus janus* (Hald.), *O.* sp.; *Perithous mediator pleuralis* (Cr.); *Phalacrotophora longifrons* (Brues). Prey: *Longistigma caryae* (Harr.).
Pemphredon concolor Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 339.
Pemphredon Morio Cresson, 1865. Ent. Soc. Phila., Proc. 4: 486. ♀. Preocc.
Pemphredon concolor Provancher, 1882. Nat. Canad. 13: 78. ♀. Preocc.
Pemphredon Cressonii Dalla Torre, 1897. Cat. Hym., v. 8, p. 359. N. name.
Pemphredon Provancheri Dalla Torre, 1897. Cat. Hym., v. 8, p. 359. N. name.
Pemphredon shawii Rohwer, 1917. Brooklyn Ent. Soc., Bul. 12: 100. ♂.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 128-129, figs. 49-55 (larva).

Biology: Reinhard, 1929. Nature Mag. 13: 154-157, 7 figs. (nest, prey, cocoon, life cycle, parasites). —Reinhard, 1929. The Witchery of Wasps, pp. 192-214, 3 pls. (nest, prey, cocoon, life cycle, parasites).

confertim Fox. Wash., Oreg., Calif. Ecology: Nests in oak gall and in borings in stems. Parasite: *Anthrax irroratus* Say; *Senotainia trilineata* (Wulp); *Omalus janus* (Hald.), *O. purpuratus* (Prov.); *Perithous mediator neomexicanus* (Vier.).
Pemphredon confertim Fox, 1892. Amer. Ent. Soc., Trans. 19: 311. ♂.
Pemphredon errans Rohwer, 1917. Brooklyn Ent. Soc., Bul. 12: 99. ♀, ♂.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, parasites).

foxii Rohwer. Pa., N. J.
Pemphredon foxii Rohwer, 1917. Brooklyn Ent. Soc., Bul. 12: 101. ♀.

montanus Dahlbom. Transit. Zone east of Rocky Mts., B. C., N. W. T.; Europe.
Pemphredon lugubris var. *b.* Zetterstedt, 1838. Ins. Lapponica, p. 441.
Pemphredon montanus Dahlbom, 1844. Hym. Europaea, v. 1, p. 262. ♀, ♂.
Pemphredon angularis Fox, 1892. Amer. Ent. Soc., Trans. 19: 310. ♀, ♂.

nearcticus Kohl. Nev., Colo.
Pemphredon (*Cemonus*) *nearcticus* Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 55. ♀, ♂.
Pemphredon cockerelli Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 103. "♀" = ♂.

rileyi Fox. Calif. (Placer Co.).
Pemphredon Rileyi Fox, 1892. Amer. Ent. Soc., Trans. 19: 310. ♀ (♀ in part, ♂ misdet.).

tinctipennis Cameron. Ariz.
Pemphredon tinctipennis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 234. ♀.

virginianus Rohwer. N. Y., Pa., Va., W. Va., Wis. Ecology: Nests in rotten stump of tuliptree. Prey: *Cinara* sp.
Pemphredon virginiana Rohwer, 1917. Brooklyn Ent. Soc., Bul. 12: 101. ♀, ♂.

Genus PEMPHREDON Subgenus CEMONUS Panzer

Cemonus Jurine, 1801. Intell. Blatt. Litt. Ztg. Erlangen, v. 1, p. 164. Name suppressed by Internatl. Comn. Zool. Nomencl., Op. 135, 1939.
Cemonus Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 186.
Type-species: *Sphex unicolor* Panzer. Monotypic.
Cemonus Jurine, 1807. Nouv. Meth. Class., Hym. Dipt., p. 213. Preocc.
Type-species: *Sphex unicolor* Panzer. Desig. by Shuckard, 1837.
Dineurus Westwood, 1837. Mag. Nat. Hist. (n. s.) 1: 173.
Type-species: *Pemphredon unicolor* of Latreille. Orig. desig.
Cenomus Gimmerthal, 1836. Soc. Imp. Nat. Moscou 9: 436. Emend. or lapsus.
Diphlebus Westwood, 1840. Introd. Mod. Classif. Ins. 2, Gen. Synop., p. 81.
Type-species: *Pelopoeus unicolor* Fabricius of Panzer. Orig. desig.
Chevrieria Kohl, 1883. Schweiz. Ent. Gesell., Mitt. 6: 658. Preocc.
Type-species: *Pelopoeus unicolor* Fabricius of Panzer. Orig. desig.

bipartior Fox. N. Y. to Va., W. Va., Mo., Tex., N. W. T. Ecology: Nests in borings in twigs of sumac and elder. Parasite: *Omalus purpuratus* (Prov.) ?; *Perithous mediator pleuralis* (Cr.) ? Prey: *Eriosoma lanigerum* (Hausm.), *Rhopalosiphum rhois* Mon., Aphididae sp.
Pemphredon bipartior Fox, 1892. Amer. Ent. Soc., Trans. 19: 313. ♀.

Pemphredon bipartitor (!) Dalla Torre, 1897. Cat. Hym., v. 8, p. 356.
Pemphredon biparitor (!) Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 369.
Pemphredon (*Cereonus* (!)) *harbecki* Rohwer, 1910. Ent. News 21: 170. ♀.

Biology: Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 369-373, figs. 46, 47 (nest, prey, life cycle). —Rau, 1934. Canad. Ent. 66: 259 (nest, prey, life history). —Krombein, 1960. Ent. News 71: 34 (nest, prey).

grinnelli (Rohwer). B. C., Calif., Ariz., Utah, Colo. Ecology: Nests in borings in *Sambucus* stems. Parasite: *Anthrax irroratus* Say; *Omalus trilobatus* Boh. and Camp., *O. cressoni* (Aar.); *Eurytoma stigma* Ashm.; *Habrocytus analis* (Ashm.).
Ceratophorus gennelli (!) Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 104. ♀. This name was intended as a patronymic for F. Grinnelli, Jr., who collected the holotype.
Ceratophorus grinnelli utahensis Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 562. ♀.
Cemonus giffardi Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 246. ♀.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 129, fig. 57 (larva).

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, parasites).

inornatus Say. Transcont. in Transit. and U. Austr. Zones; Europe. Ecology: Nests in cavities in twigs, in rotten wood, and in exposed tree roots. Parasite: *Perithous mediator pleuralis* Cr. Prey: *Macrosiphum* sp.
Pemphredon inornatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 339.
Cemonus Shuckardi Morawitz, 1864. Acad. Imp. des Sci. St. Petersburg, Bul. 7: 460. ♀, ♂.
Cemonus dentatus Puton, 1871. Soc. Ent. de France, Ann. (5) 1: 94. ♀.
Pemphredon tenax Fox, 1892. Amer. Ent. Soc., Trans. 19: 313. ♀, ♂.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 128-129, figs. 49-55 (larva).

Biology: Rau and Rau, 1918. Wasp Studies Afield, p. 108 (nest, prey, life cycle). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 373-375 (nest, prey). —Rau, 1946. Brooklyn Ent. Soc., Bul. 41: 10. —Evans, 1958. Amer. Ent. Soc., Trans. 84: 129 (nest).

lethifer (Shuckard). Ont. south to Fla., Pa. west to Ill., Colo., Utah, Wash., Calif.; Europe. Ecology: Nests in North America in soft pith of roses, berries, sumac, hibiscus. Possibly adventive in North America. Parasite: *Perithous divinator* (Rossi); *Omalus auratus* (L.), *O. purpuratus* (Prov.). Prey: *Aphis gossypii* Glov., *A.* sp. nymphs, *Chaitophorus populicola patchae* H. R. L. nymphs and adults.
Cemonus lethifer Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 201. ♀, ♂.
Cemonus strigatus Chevrier, 1870. Schweiz. Ent. Gesell., Mitt. 3: 269. ♀, ♂.
Cemonus Fabricii Mueller, 1911. Ent. Rundschau 28: 107. N. name for *unicolor* Auctt.
Pemphredon (*Diphlebus*) *littoralis* Wagner, 1918. Deut. Ent. Ztschr., p. 143. ♀, ♂.
Pemphredon (*Diphlebus*) *fuscatus* Wagner, 1918. Deut. Ent. Ztschr., p. 143. ♂.
Pemphredon (*Diphlebus*) *neglectus* Wagner, 1918. Deut. Ent. Ztschr., p. 143. ♂.
Pemphredon (*Diphlebus*) *minutus* Wagner, 1918. Deut. Ent. Ztschr., p. 143. ♂.
Pemphredon (*Dineurus*) *lethifer* form *confusa* Wagner, 1932 (1931). Deut. Ent. Ztschr., p. 231. ♀.
Pemphredon (*Dineurus*) *brevipetiolatus* Wagner, 1932 (1931). Deut. Ent. Ztschr., p. 232, fig. 14. ♂.

Taxonomy: Krombein. 1959. Brooklyn Ent. Soc., Bul. 54: 95-96 (occurrence of *lethifer* in N. Amer. and differentiation from N. Amer. spp.). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 246-248, figs. 23-25 (larva).

Biology: Rau, 1948. Ent. Soc. Amer., Ann. 41: 326 (nest, prey; misdet. as *inornatus*). —Krombein, 1959. Brooklyn Ent. Soc., Bul. 54: 96 (parasite). —Krombein, 1960. Ent. News 71: 34-35 (nest, prey, cocoon, life cycle, parasite). —Krombein, 1964. Biol. Soc. Wash., Proc. 77: 99-100, fig. 17 (nest, prey, life cycle). —Thomas, 1964. Mich. Acad. Sci., Arts and Letters, Papers 49: 199-201 (nest, parasite, life history). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest).

Genus PASSALOECUS Shuckard

Xyloecus Shuckard, 1837. Essay Indig. Fossor. Hym., Conspect. Gen., No. 25. Preocc.

Passaloecus Shuckard, 1837. Essay Indig. Fossor. Hym., p. 188. N. name.
Type-species: *Pemphredon insignis* Vander Linden. Orig. desig.
Coeloecus Verhoeff, 1890. Ent. Nachr. 16: 383.
Type-species: *Diodontus gracilis* Curtis. Desig. by Pate, 1937.
Heroecus Verhoeff, 1890. Ent. Nachr. 16: 383. No species.
Type-species: *Pemphredon insignis* Vander Linden. Included and desig. by Pate, 1937.

Most *Passaloecus* nest in pre-existing borings, cavities in wood or twigs and stems, in decaying wood and in abandoned galls, although one extralimital species has been recorded as nesting in sandy soil. Two North American species, *annulatus* and *cuspidatus*, and the Holarctic *insignis*, have been reported in North America as making a series of linear cells with the partitions and closing plugs made from resin. The Peckhams' report (1905) of *annulatus* closing its nest with pellets of mud is questionable and may have been based on a misidentification. However, two species in Europe and Japan are known to form the cell partitions from grains of earth, insect feces and other debris, so perhaps *annulatus* is not so restricted in its choice of nesting materials as *cuspidatus* and *insignis*. Aphids are the preferred prey, but rarely, and perhaps inadvertently, a few *psyllids* may be included in a cell.

Taxonomy: Krombein, 1938. Brooklyn Ent. Soc., Bul. 33: 122-127 (key to N. Y. spp.).

annulatus annulatus (Say), n. status. Ont., transcont. in U. S. Ecology: Nests in deserted beetle burrows in wood or pith, and in logs. Prey: *Drepanaphis acerifoliae* (Thos.) ? nymph, *D.* sp. nymph, *Macrosiphum* sp. nymph, *Neothomasia populicola* (Thos.), Aphididae sp. Another subsp. occurs in Korea.
Pemphredon annulatus Say, 1837. Boston Jour. Nat. Hist. 1: 379. ♀, ♂.
Passalaccus (!) *rivertonensis* Viereck, 1904. Amer. Ent. Soc., Trans. 30: 243. ♂.
Passalaecus (!) *equalis* Viereck, 1906. Amer. Ent. Soc., Trans. 32: 212. ♀.

Biology: Peckham and Peckham, 1905. Wasps, Social and Solitary, pp. 87-89 (nest, prey, life cycle). —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 16 (prey). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 24 (nest, prey). —Krombein, 1960. Ent. News 71: 35-36 (nest, prey). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 65 (nest, prey).

armeniacae Cockerell. N. Mex., Ariz., Colo., Idaho, Calif., B. C.
Passaloecus armeniacae Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 141. ♀.

borealis Dahlbom. Alaska, western Canada, Rocky Mts. south to Utah, Colo.; north. Europe and at higher altitudes in south.
Passaloecus borealis Dahlbom, 1844. Hym. Europaea, v. 1, p. 247. ♀, ♂.

cuspidatus Smith. Transcont. chiefly in Transit. and U. Austr. Zones. Ecology: Nests in borings in wood, and provisions each cell with 11-52 aphids. Parasite: *Anthrax irroratus* Say; *Poemenia a. americana* (Cr.), *P. a. nebulosa* Hab. and Tow.; Chalcididae sp.; *Omalus aeneus* (F.), *O. purpuratus* (Prov.), *O. cressoni* (Aar.). Prey: *Cinara abieticola* (Chol.), *C. formacula* Hottes, *Pterocomma bicolor* (Oest.), *Macrosiphum euphorbiae* (Thos.), *M. rosae* (L.), *M.* spp., *Myzus porosus* (Sand.), *Masonaphis* sp., *Rhopalosiphum* sp., *Euceraphis betulae* (Koch). Predator: *Philanthus pulcher* D. T., *P. pacificus* Cr.
Passaloecus cuspidatus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 427. ♀.
Pemphredon mandibularis Cresson, 1865. Ent. Soc. Phila., Proc. 4: 487. ♀.
Passaloecus distinctus Fox, 1892. Amer. Ent. Soc., Trans. 19: 319.
Passaloecus dispar Fox, 1892. Amer. Ent. Soc., Trans. 19: 320. ♂.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 131-132, figs. 60-64 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 167 (larva). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 250-251 (larva).

Biology: Packard, 1869. Guide Study Ins., p. 161 (nest, prey, parasite). —Krombein, 1956. Brooklyn Ent. Soc., Bul. 51: 42-43 (nest, prey). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 24-25 (nest, prey). —Fye, 1965. Canad. Ent. 97: 740, 742 (nest, prey, parasite, life cycle). —Krombein, 1967. Trap-nesting wasps and bees, pp. 236-239, figs. 66, 67 (nest, prey, life cycle, parasites). —Evans, 1973. Great Basin Nat. 33: 154-155 (nest, prey, parasites, predators).

gracilis (Curtis). Pa. and N. J. to Tex. along coast, Ohio, Ind., Mich.; west. Europe. Ecology: Nests in borings in twigs. Adventive from Europe. Parasite: *Perithous divinator* (Rossi); *Omalus auratus* (L.).
Diodontus gracilis Curtis, 1834. Brit. Ent., v. 11, pl. 496. ♂.
Passaloecus turionum Dahlbom, 1844. Hym. Eur. 1: 246. ♀, ♂.
Passaloecus brevicornis Morawitz, 1864. Acad. Sci. St. Petersburg, Bul. 7: 462. ♀, ♂.

Taxonomy: Krombein, 1961. Ent. News 72: 258-259 (adventive in U. S. and separation from N. Amer. spp.).

Biology: Krombein, 1961. Ent. News 72: 258 (nest, parasite).

marginatus (Say). Pa.
Pemphredon marginatus Say, 1837. Boston Jour. Nat. Hist. 1: 379.

melanocrus Rohwer. Tex., Colo., Ariz. Ecology: Nests in abandoned burrows of *Dendroctonus barberi* Hopkins.
Passaloecus melanocrus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 561. ♂.

melanognathus Rohwer. Oreg., Calif.
Passaloecus melanognathus Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 104. ♀.

monilicornis ithacae Krombein, n. status (D. Vincent). Mass., Conn., N. Y., Va., Ont., Mich., Minn., Alta., Alaska. Ecology: Nests in borings in twigs and wood. Parasite: *Omalus aeneus* (F.), *O.* sp.; *Poemenia albipes* (Cr.), *P.* sp. Prey: *Cinara hottesi* (Gill. and Palm.), *C. abieticola* (Chol.), *C. fornacula* Hottes, *C. palmerae* (Gill.), *C. braggii* (Gill.), *C.* sp., *Neosymdobius americanus* (Baker), *Pterocomma smithiae* Mon. ?, *Amphorophora* sp., *Anuraphis rosea* Baker, *Rhopalosiphum fitchii* (Sand.), *Enceraphis betulae* (Koch). Typical *monilicornis* Dahlbom occurs in the Palaearctic Region.
Passaloecus ithacae Krombein, 1938. Brooklyn Ent. Soc., Bul. 33: 126. ♀, ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 249-250, fig. 22 (larva).

Biology: Fye, 1965. Canad. Ent. 97: 737-740, fig. 9 (nest, prey, parasites, life cycle). —Krombein, 1967. Trap-nesting wasps and bees, pp. 234-236 (nest, prey, life cycle).

relativus Fox. Wyo., Colo., Utah, Nev., Ariz. Parasite: *Poemenia americana nebulosa* Hab. and Tow. Predator: *Philanthus pulcher* D. T., *P. pacificus* Cr.
Passaloecus relativus Fox, 1892. Amer. Ent. Soc., Trans. 19: 319. ♂.

Taxonomy: Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 100. ♀.

singularis singularis Dahlbom. Mass., N. Y., Pa., Ohio, Mich., Utah, Colo.; Europe. Ecology: Nests in abandoned burrows of *Pissodes strobi* (Peck). Possibly adventive in N. Amer. Another subsp. occurs in Mongolia.
Passaloecus singularis Dahlbom, 1844. Hym. Europaea, v. 1, p. 243. ♂.
Passaloecus tenuis Morawitz, 1864. Acad. Imp. des Sci. St. Petersburg, Bul. 7: 462. ♀, ♂.
Passaloecus gertrudis Krombein, 1938. Brooklyn Ent. Soc., Bul. 33: 124. ♀, ♂.

Genus POLEMISTUS Saussure

Polemistus Saussure, 1892. *In* Grandidier, Hist. Nat. Madagascar, v. 20, p. 565.
Type-species: *Polemistus macilentus* Saussure. Desig. by Pate, 1937.
Polymistus Ashmead, 1899. Canad. Ent. 31: 222. Emend. or lapsus.

pusillus Saussure. Utah, Ariz.; Mexico. Ecology: Nests in abandoned *Trypargilum* mud nests and makes cell partitions and nest closure from a transparent glass-like substance (resin ?), and stores 6-8 aphids per cell. Parasite: *Monodontomerus* sp.; *Omalus* sp., *Chrysis* sp. Prey: *Aphis gossypii* Glov., *A.* sp., *Macrosiphum* sp.
Polemistus pusillus Saussure, 1892. *In* Grandidier, Hist. Nat. Madagascar, v. 20, p. 565. ♀.

Biology: Rau, 1943. Ent. Soc. Amer., Ann. 36: 647 (nest, prey, parasites).

Tribe STIGMINI

Genus STIGMUS Panzer

Taxonomy: Krombein, 1973. Biol. Soc. Wash., Proc. 86: 211-230, 16 figs. (synonymy, distribution and key to N. Amer. spp.).

Genus STIGMUS Subgenus STIGMUS Panzer

Stigmus Panzer, 1804. Faunae Ins. German., heft 86, No. 7.
Type-species: *Stigmus pendulus* Panzer. Monotypic.
Gonostigmus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 559.
Type-species: *Gonostigmus typicus* Rohwer. Orig. desig.

Most species nest in pre-existing cavities, often beetle borings, in twigs, wood, structural timber, shelf fungi and galls, but some tunnel in soft pith. The cells are usually placed in a linear series except when old galls are used.

So far as known, only aphids are preyed upon.

americanus Packard. Transcont. in Canada from Labrador and N. S. to B. C. and N. W. T., in U. S. east of 100th meridian and Wash. Ecology: Nests most commonly in old beetle borings in dead trees or structural timber, occasionally in twigs; cells in a linear series are separated by partitions of wood or pith particles, but there is an authentic record of two wasps developing in a single brood chamber. Parasite: *Omalus janus* (Hald.), *O. iridescens* (Nort.), *O. purpuratus* (Prov.). Prey: *Drepanaphis acerifoliae* (Thos.) nymphs, *D.* sp. nymphs and adult, *Rhopalosiphum* sp. nymphs, *Aphis* sp. nymph, *Anuraphis* sp. nymphs, *Myzocallis* ? sp. nymph, *Chaitophorus* ? sp. nymph, *Therioaphis* sp. nymphs and adults, Aphidini sp., Panaphidini sp. nymphs and adult, Aphidinae sp. nymph.
Stigmus americanus Packard, 1867. Ent. Soc. Phila., Proc. 6: 386. ♀, ♂.
Stigmus lucidus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 102. ♂.
Stigmus fraternus coloradensis Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 559. ♀.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 44-45 (nest, prey, parasite). —Krombein, 1954. Brooklyn Ent. Soc., Bul. 49: 6 (nest, prey). —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 16 (nest, prey). —Krombein, 1956. Brooklyn Ent. Soc., Bul. 51: 42. (prey). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 24 (nest, prey). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 64-65 (nest, prey, life cycle).

aphidiperda Rohwer. Pa. to N. C. Ecology: Nests in peach twig. Prey: *Aphis persicaeniger* Sm.
Stigmus aphidiperda Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 558. ♀, ♂.

fraternus Say. Mass. and N. H. to S. C., W. Va., Tenn., Mo. Ecology: Nests in twigs, old galls and beetle borings in structural timber. Prey: *Monellia* sp. nymphs, *Therioaphis* sp. nymphs, Aphididae spp.
Stigmus fraternus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 340.
Stigmus conestogorum Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 557. ♀.
Stigmus fraternus raui Rohwer, 1923. Ent. Soc. Wash., Proc. 25: 100. ♀, ♂.

Biology: Packard, 1869. Guide Study Ins., p. 161 (nest). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 379-381 (nest, prey, life cycle). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 24 (nest, prey).

fulvicornis Rohwer. Miss. (Starksville). Ecology: Nesting in floors of porch and in house. Prey: Aphididae sp.
Stigmus fulvicornis Rohwer, 1923. Wash. Acad. Sci., Jour. 13: 370. ♀.

Biology: Smith, 1923. Jour. Econ. Ent. 16: 553-554 (nest, prey).

hubbardi Rohwer. Colo., Utah, N. Mex., Ariz., Calif., Wash. Ecology: Nests in the shelf fungus *Polyporus.*
Stigmus inordinatus hubbardi Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 559. ♀, ♂.

Biology: Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 559 (nest).

inordinatus inordinatus Fox. Mont., Colo. and N. Mex. west to B. C. and Calif. Ecology: Nests in cavities or borings in twigs or stems of mulberry, peony, peach, raspberry and elderberry, constructing a linear series of cells stored with 12-30 aphids per cell. Parasite: *Omalus variatus* (Aar.), *O. glomeratus* (Buyss.), *O. cressoni* (Aar.). Prey: *Aphis frangulae* Kalt. ?, Aphididae sp.
Stigmus inordinatus Fox, 1892. Amer. Ent. Soc., Trans. 19: 322. ♀, ♂.
Stigmus fulvipes var. *coquilletti* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 559. ♀, ♂.
Stigmus reticulatus Mickel, 1918 (1917). Nebr. Univ., Studies 17: 330. ♀.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 134-135, figs. 68, 69 (larva).

Biology: Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 102 (prey). —Wasbauer and Simonds, 1964. Pan-Pacific Ent. 40: 114-116, 1 fig. (nest, prey, cocoon). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest, parasites).

inordinatus universitatis Rohwer. Conn. to Va., W. Va., Ill., Colo. Ecology: Nests in old insect galls on oak. Prey: Aphididae sp.

Stigmus inordinatus universitatis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 102. ♀.

Biology: Richardson, 1915. Psyche 22: 104-105 (nest, prey). —Krombein, 1973. Biol. Soc. Wash., Proc. 86: 224 (nest).

podagricus podagricus Kohl. South. Tex. and Ariz.; Mexico (Veracruz, Morelos).

Stigmus podagricus Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 65. ♂.

podagricus tarsalis Krombein. Ga., Fla., Ala., centr. and north. Tex.

Stigmus (*Stigmus*) *podagricus tarsalis* Krombein, 1973. Biol. Soc. Wash., Proc. 86: 225, figs. 6, 16. ♂, ♀.

Genus STIGMUS Subgenus ATOPOSTIGMUS Krombein

Stigmus subg. *Atopostigmus* Krombein, 1973. Biol. Soc. Wash., Proc. 86: 218.
Type-species: *Stigmus fulvipes* Fox. Orig. desig.

The single known species apparently nests in abandoned burrows of other insects in the soil. The preferred prey is unknown.

fulvipes Fox. B. C. transcont. in U. S.; Mexico (Morelos). Ecology: Nests in sand or mud banks in abandoned burrows of other insects.

Stigmus fulvipes Fox, 1892. Amer. Ent. Soc., Trans. 19: 324. ♀.

Taxonomy: Krombein, 1952. Amer. Ent. Soc., Trans. 78: 94 (separation from eastern spp.).

Biology: Krombein, 1973. Biol. Soc. Wash., Proc. 86: 218 (nesting site).

Nomen Nudum in Stigmus Panzer

coloradensis Ashmead. Colo.

Stigmus coloradensis Ashmead, 1889. *In* Cockerell, Colo. Biol. Assn., 10th Rept., p. 2. Probably published originally in Custer County Courant newspaper.

Genus SPILOMENA Shuckard

Celia Shuckard, 1837. Essay Indig. Fossor. Hym., p. 182. Preocc.
Type-species: *Stigmus troglodytes* Vander Linden. Monotypic.
Spilomena Shuckard, 1838. Ent. Soc. London, Trans. 2: 79 (footnote). N. name.
Microglossa Rayment, 1930. Roy. Soc. Victoria, Proc. (n. s.) 42: 212. Preocc.
Type-species: *Microglossa longifrons* Rayment. Orig. desig.
Microglossella Rayment, 1935. A Cluster of Bees, p. 634. N. name.
Taialia Tsuneki, 1971. Life Study (Fukui) 15: 10.
Type-species: *Taialia formosana* Tsuneki. Orig. desig.

Biological notes have been recorded for only three North American species. All of them nest in abandoned borings of anobiid beetles in structural timber or logs. They prey upon Thysanoptera, usually immatures although occasionally adults are captured. Some extralimital species nest in twigs or decayed wood; in addition to Thysanoptera these species also prey upon immature Psyllidae, Coccidae and Aphididae. About a dozen undescribed species occur in the southwestern deserts.

Taxonomy: Krombein, 1958. Ent. Soc. Wash., Proc. 60: 54, 60-61, figs. 2-6 (key to eastern spp.).

alboclypeata Bradley. B. C., Oreg., Calif., Idaho, Mont., Utah, Ariz., N. Mex., Colo., Kans., W. Va., Va. Ecology: Nests in abandoned borings of anobiid beetles. Prey: Immature Thysanoptera.

Spilomena alboclypeata Bradley, 1906. Canad. Ent. 38: 380. ♂.

Taxonomy: Krombein, 1958. Ent. Soc. Wash., Proc. 60: 60, figs. 4, 4a, 6. ♀, ♂.

Biology: Krombein, 1958. Ent. Soc. Wash., Proc. 60: 62 (prey, nest).

ampliceps Krombein. W. Va. (Lost River St. Pk.). Ecology: Presumably nests in old beetle borings in logs.
Spilomena ampliceps Krombein, 1952. Ent. Soc. Wash., Proc. 54: 178, figs. 1-3. ♂, ♀.

Taxonomy: Krombein, 1958. Ent. Soc. Wash., Proc. 60: 60, figs. 3, 3a. ♀, ♂.

barberi Krombein. Mass., N. Y. and Ont. south to Ga. and Tenn., Iowa, Kans., Colo., N. Mex., Ariz., Utah, Calif. Ecology: Nests in abandoned anobiid borings in wood. Prey: *Sericothrips* sp. larva, *Frankliniella* or *Thrips* sp. larva, Thripidae sp. larva.
Spilomena barberi Krombein, 1962. Biol. Soc. Wash., Proc. 75: 12. ♂, ♀.

foxii Cockerell. Colo., N. Mex., Ariz., Calif., Wash.; Mexico (Baja California, Puebla).
Spilomena foxii Cockerell, 1897. Entomologist 30: 136. ♀.

pusilla (Say). Conn. to N. C., west to Iowa, Kans. and Tenn. Ecology: Nests in abandoned anobiid burrows in structural timber and in logs. Prey: *Sericothrips* sp. larva in *variabilis* (Beach) section, Thripidae spp. larvae and adult.
Stigmus pusillus Say, 1837. Boston Jour. Nat. Hist. 1: 378. ♀, ♂.

Taxonomy: Krombein, 1952. Ent. Soc. Wash., Proc. 54: 178-179, figs. 4-6. ♀, ♂. —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 53, 61, figs. 2, 2a, 5. ♀, ♂.

Biology: Krombein, 1952. Ent. Soc. Wash., Proc. 54: 181 (nest). —Krombein, 1956. Ent. Soc. Wash., Proc. 58: 155 (nest, prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 53 (nest, prey).

Genus XYSMA Pate

Xysma Pate, 1937. Amer. Ent. Soc., Trans. 63: 94.
Type-species: *Ammoplanus ceanothae* Viereck. Orig. desig.
Telexysma Leclercq, 1959. Parc Natl. Upemba, I. Mission G. Witte, fasc. 53 (2), p. 2.
Type-species: *Telexysma africana* Leclercq. Orig. desig.

The North American *ceanothae* nests in abandoned anobiid borings in structural timber and preys upon immature Thysanoptera. Nothing is known of the biology of the only other *Xysma*, the South African *africana*.

ceanothae (Viereck). Pa., Md., D. C., Va., Ga. Ecology: Nests in abandoned anobiid borings in structural timber. Prey: Thripinae spp. larvae.
Ammoplanus ceanothae Viereck, 1904. Psyche 11: 72. ♀ (♀ in part, ♂, misdet.).

Taxonomy: Krombein, 1958. Biol. Soc. Wash., Proc. 71: 25. ♂.

Biology: Krombein, 1958. Biol. Soc. Wash., Proc. 71: 25 (nest, prey).

Tribe AMMOPLANINI

Genus PULVERRO Pate

Pulverro Pate, 1937. Amer. Ent. Soc., Trans. 63: 107.
Type-species: *Pulverro mescalero* Pate. Orig. desig.

This genus has been recorded only from the Nearctic Region. One species has been recorded as nesting in soil and preying upon Thysanoptera, mostly adults but a few immatures.

Revision: Pate, 1937. Amer. Ent. Soc., Trans. 63: 107-119, figs. 4, 6, 7, 9-12, 16, 20.

californicus Eighme. Calif. in North Coast Ranges.
Pulverro californica Eighme, 1973. Pan-Pacific Ent. 49: 49. ♂, ♀.

chumashano Pate. West. Calif.
Pulverro chumashano Pate, 1937. Amer. Ent. Soc., Trans. 63: 118. ♂.
Pulverro costano Pate, 1937. Amer. Ent. Soc., Trans. 63: 116. ♀.

Taxonomy: Pate, 1939. Amer. Ent. Soc., Trans. 64: 417, fig. 24 (female *chumashano*).

columbianus (Kohl). Colo., Utah, Idaho, Oreg., B. C.
Ammoplanus (?) *columbianus* Kohl, 1890. K. K. Naturhist. Hofmus., Ann. 5: 61. "♀" = ♂.
Ammoplanus eriogoni Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 101. ♂.
Pulverro colorado Pate, 1937. Amer. Ent. Soc., Trans. 63: 115. ♀.

constrictus (Provancher). South. Calif.
Anacrabro constrictus Provancher, 1895. Nat. Canad. 22: 141. ♀.
Pulverro serrano Pate, 1937. Amer. Ent. Soc., Trans. 63: 114, fig. 9. ♂.

Taxonomy: Pate, 1939. Amer. Ent. Soc., Trans. 64: 413, fig. 6 (female *serrano*).

laevis (Provancher). Calif. (Los Angeles).
Anacrabro laevis Provancher, 1895. Nat. Canad. 32: 142. ♀.

mescalero Pate. Tex., N. Mex., Ariz.; n. and cent. Mexico.
Ammoplanus mandibularis Ashmead, 1898. *In* Cockerell, Davenport Acad. Nat. Sci., Proc. 7: 148. Nom. nud.
Pulverro mescalero Pate, 1937. Amer. Ent. Soc., Trans. 63: 111. ♀, ♂.

Taxonomy: Pate, 1939. Amer. Ent. Soc., Trans. 64: 411.

monticola Eighme. Calif. in North Coast Ranges. Ecology: Nests in sloping banks, constructs several cells off side burrows, and provisions each with up to 21 thrips. Prey: *Frankliniella moultoni* Hood, *Aeolothrips fasciatus* (L.); mostly adults and some larvae.
Pulverro monticola Eighme, 1968. Pan-Pacific Ent. 44: 263, figs. 1-7. ♂, ♀.

Taxonomy: Bohart and Grissell, 1972. Pan-Pacific Ent. 48: 148-149, figs. 1-4 (larva).

Biology: Bohart and Grissell, 1972. Pan-Pacific Ent. 48: 145-148, fig. 5 (nest, prey, life cycle).

Genus AMMOPLANOPS Gussakovskij

Ammoplanops Gussakovskij, 1931. Soc. Espan. Hist. Nat., Bol. 31: 457.
Type-species: *Ammoplanops carinatus* Gussakovskij. Orig. desig.

Nothing is known of the nesting habits or prey. The presence of a tarsal pecten and pygidium in the female suggests that the species are ground-nesting.

Revision: Pate, 1939. Amer. Ent. Soc., Trans. 64: 392-411, figs. 3, 10-12, 17-23, 25.

ashmeadi Pate. Calif. (Palm Springs).
Ammoplanops ashmeadi Pate, 1939. Amer. Ent. Soc., Trans. 64: 397. ♀, ♂.

cockerelli (Ashmead). Tex., N. Mex., Colo., Utah, Ariz., Calif.
Ammoplanus cockerelli Ashmead, 1903. Ent. News 14: 295. ♀.

cressoni Pate. Ariz., Nev., Calif.
Ammoplanops cressoni Pate, 1939. Amer. Ent. Soc., Trans. 64: 395. ♂.

foxi Pate. Calif. (Clark Mt. in San Bernardino Co.).
Ammoplanops foxi Pate, 1939. Amer. Ent. Soc., Trans. 64: 409. ♂.

moenkopi Pate. N. Mex., Ariz., Utah.
Ammoplanops moenkopi Pate, 1939. Amer. Ent. Soc., Trans. 64: 402. ♂.

timberlakei Pate. Calif. (Andreas Canyon in Riverside Co.).
Ammoplanops timberlakei Pate, 1939. Amer. Ent. Soc., Trans. 64: 404. ♂.

vierecki Pate. N. Mex. (Alamogordo).
Ammoplanops vierecki Pate, 1939. Amer. Ent. Soc., Trans. 64: 406. ♀, ♂.

Genus AMMOPLANUS Giraud

Ammoplanus Giraud, 1869. Soc. Ent. France, Ann. (4) 9: 469.
Type-species: *Ammoplanus Perrisi* Giraud. Desig. by Pate, 1937.
Hoplocrabron De Stefani, 1886. Nat. Sicil. 6: 60.
Type-species: *Hoplocrabron Marathroicus* De Stefani. Monotypic.
Ammoplanus subg. *Ceballosia* Giner Mari, 1943. Eos 19: 293. Preocc.
Type-species: *Ammoplanus rjabovi* Gussakovskij. Orig. desig.

Nothing is known definitely as to the ethology of our species. In Europe and Africa species of this genus nest in pre-existing cracks in stone, wood or soil and provision the cells with immature Thysanoptera.

Revision: Pate, 1943 (1942). South. Calif. Acad. Sci., Bul. 41: 144-157, figs. 1, 5, 6, 8-12 (N. Amer. spp.).

chemehuevi Pate. Calif. (Riverside Co.).
Ammoplanus (*Ammoplanus*) *chemehuevi* Pate, 1943 (1942). South. Calif. Acad. Sci., Bul. 41: 151. ♀, ♂.

loti Pate. Calif. (Riverside).
Ammoplanus (*Ammoplanus*) *loti* Pate, 1943 (1942). South. Calif. Acad. Sci., Bul. 41: 146. ♀.

quabajai Pate. Calif.
Ammoplanus (*Ammoplanus*) *quabajai* Pate, 1943 (1942). South. Calif. Acad. Sci., Bul. 41: 156. ♀.

sechi Pate. Calif. (Riverside Co.).
Ammoplanus (*Ammoplanus*) *sechi* Pate, 1943 (1942). South. Calif. Acad. Sci., Bul. 41: 149. ♂.

tetli Pate. Calif. (Tetly Park, San Bernardino Mts.).
Ammoplanus (*Ammoplanus*) *tetli* Pate, 1943 (1942). South Calif. Acad. Sci., Bul. 41: 147. ♂.

unami Pate. Pa., W. Va. Ecology: Presumably nests in abandoned beetle borings in logs.
Ammoplanus (*Ammoplanus*) *unami* Pate, 1937. Amer. Ent. Soc., Trans. 63: 101. ♀.

Taxonomy: Krombein, 1956. Ent. Soc. Wash., Proc. 58: 159, figs. 2, 2a (male).

Biology: Krombein, 1956. Ent. Soc. Wash., Proc. 58: 160 (putative nest site).

vanyumi Pate. Calif., Idaho.
Ammoplanus (*Ammoplanus*) *vanyumi* Pate, 1943 (1942). South. Calif. Acad. Sci., Bul. 41: 154. ♀.

Genus AMMOPLANELLUS Gussakovskij

Revision: Pate, 1943 (1942). South. Calif. Acad. Sci., Bul. 41: 158-162, figs. 2-4, 7 (N. Amer. spp.).

Genus AMMOPLANELLUS Subgenus AMMOPLANELLUS Gussakovskij

Ammoplanus subg. *Ammoplanellus* Gussakovskij, 1931. Soc. Espan. Hist. Nat., Bol. 31: 442.
Type-species: *Ammoplanus* (*Ammoplanellus*) *chorasmius* Gussakovskij. Orig. desig.

The species are thought to nest in pre-existing holes or crannies in wood, and possibly to provision the cells with Thysanoptera.

umatilla (Pate). Wash.
Ammoplanus (*Ammoplanellus*) *umatilla* Pate, 1945. Pan-Pacific Ent. 21: 82. ♀.

xila (Pate). Ariz. (Phoenix). Ecology: Possibly nesting in chair containing burrows of *Hesperorhipis mirabilis* Knull.
Ammoplanus (*Ammoplanellus*) *xila* Pate, 1945. Pan-Pacific Ent. 21: 84. ♀.

Genus AMMOPLANELLUS Subgenus PARAMMOPLANUS Pate

Ammoplanus subg. *Parammoplanus* Pate, 1939. Amer. Ent. Soc., Trans. 64: 391.
Type-species: *Ammoplanus* (*Ammoplanellus*) *apache* Pate. Orig. desig.

apache (Pate). N. Mex., Ariz., Calif.
Ammoplanus (*Ammoplanellus*) *apache* Pate, 1937. Amer. Ent. Soc., Trans. 63: 106. ♂.

lenape lenape (Pate). Pa. (Lehigh Gap).
Ammoplanus (*Ammoplanellus*) *lenape* Pate, 1937. Amer. Ent. Soc., Trans. 63: 104. ♂.

lenape olamentke (Pate). Calif., Mont.
Ammoplanus (*Parammoplanus*) *lenape olamentke* Pate, 1943 (1942). South. Calif. Acad. Sci., Bul. 41: 160. ♀, ♂.

Genus TIMBERLAKENA Pate

Timberlakena subg. *Riparena* Pate, 1939. Amer. Ent. Soc., Trans. 64: 378.

Type-species: *Timberlakena* (*Riparena*) *cahuilla* Pate. Orig. desig.
Timberlakena subg. *Mojavena* Pate, 1939. Amer. Ent. Soc., Trans. 64: 381.
Type-species: *Timberlakena* (*Mojavena*) *yucaipa* Pate. Orig. desig.
Timberlakena subg. *Timberlakena* Pate, 1939. Amer. Ent. Soc., Trans. 64: 383.
Type-species: *Timberlakena* (*Timberlakena*) *nolcha* Pate. Orig. desig.

Females lack a tarsal pecten and pygidium so it is presumed that they may nest in pre-existing cavities, such as abandoned beetle borings, in twigs or structural lumber.

Revision: Pate, 1939. Amer. Ent. Soc., Trans. 64: 374-390, figs. 1, 2, 4, 5, 7-9, 13-16.

cahuilla Pate. Calif. (Riverside Co.).
Timberlakena (*Riparena*) *cahuilla* Pate, 1939. Amer. Ent. Soc., Trans. 64: 378. ♀, ♂.

hualga Pate. Calif.
Timberlakena (*Timberlakena*) *nolcha hualga* Pate, 1939. Amer. Ent. Soc., Trans. 64: 388. ♀, ♂.

nolcha Pate. Ariz., Calif., Idaho.
Timberlakena (*Timberlakena*) *nolcha nolcha* Pate, 1939. Amer. Ent. Soc., Trans. 64: 385. ♀, ♂.

ocha Pate. Calif. (Riverside Co.), Ariz.
Timberlakena (*Timberlakena*) *ocha* Pate, 1939. Amer. Ent. Soc., Trans. 64: 389. ♀.

yucaipa Pate. Calif. (San Bernardino Co.).
Timberlakena (*Mojavena*) *yucaipa* Pate, 1939. Amer. Ent. Soc., Trans. 64: 381. ♀, ♂.

Family ASTATIDAE

So far as is known all members of this family are ground-nesting forms, making one or more cells per nest, and preying principally upon nymphal Hemiptera. The only group that occurs in the New World is the typical subfamily Astatinae.

Subfamily ASTATINAE

Taxonomy: Maidl and Klima, 1939. Hym. Cat., Pars 8, Sphecidae, pp. 7-29 (world catalog). —Evans, 1958. Amer. Ent. Soc. Trans. 84: 109-113, Figs. 1-8, 46-48 (larvae). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 165-166 (larvae). —Parker, 1962. Ent. Soc. Amer., Ann. 55: 643-644 (key to genera). —Parker, 1966. Ent. Soc. Amer., Ann. 59: 765-766, 10 figs. (key to N. Amer. genera).

Biology: Evans, 1958 (1957). N. Y. Ent. Soc., Jour. 65: 159-185, 8 figs. (ethology of world spp.).

Genus DIPLOPLECTRON Fox

Diploplectron Fox, 1893. Amer. Ent. Soc., Trans. 20: 38.
Type-species: *Liris ? brunneipes* Cresson. Monotypic.

Revision: Parker, 1972. Ent. Soc. Amer., Ann. 65: 1192-1203, 37 figs. (N. Amer. spp.).

Taxonomy: Ashmead, 1899. Ent. News 10: 55-56 (key to N. Amer. spp.). —Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 123-124 (key to N. Amer. spp.). —Krombein, 1939. Brooklyn Ent. Soc., Bul. 34: 138-139 (key to N. Amer. spp.).

beccum Parker. Calif., Nev., Utah, Ariz., southwest. Tex.
Diploplectron beccum Parker, 1972. Ent. Soc. Amer., Ann. 65: 1195, figs. 5, 19, 32. ♂, ♀.

brunneipes (Cresson). Idaho, Wyo., Colo., Calif. Ecology: Makes a nest of 2-3 cells in hard-packed sandy clay, stores 6 prey per cell. Prey: *Uhleriola floralis* (Uhler), nymphs. Predator: *Philanthus pacificus* Cr.
Liris ? brunneipes Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. iii. ♀ (misdet. in part), ♂.
Diploplectron bidentatus Ashmead, 1899. Ent. News 10: 56. "♀" = ♂.
Diploplectron foxii Ashmead, 1899. Ent. News 10: 56. ♀.
Diploplectron bidentatiformis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 121. ♂.

Taxonomy: Krombein, 1939. Brooklyn Ent. Soc., Bul. 34: 138 (synonymy). —Evans, 1975. Great Basin Nat. 35: 123-125, 5 figs. (larva).

Biology: Evans, 1975. Great Basin Nat. 35: 123 (nest, prey).

californicum Parker. Calif., Oreg., Idaho. Prey: *Rhyparochromus californicus* Van D. adults, *Emblethis vicarius* Horv. ? nymphs, *Megalonotus chiragrus* (F.) adult.
Diploplectron californicum Parker, 1972. Ent. Soc. Amer., Ann. 65: 1199, figs. 1, 13, 25. ♂, ♀.

Biology: Williams, 1946. Hawaii. Ent. Soc., Proc. 12: 648 (prey).

diablense Williams. Coast Range and Sierra Nevada Mts. of Calif.
Diploplectron diablensis Williams, 1951 (1950). Wasmann Jour. Biol. 8: 363, fig. 1. ♂.

Taxonomy: Williams, 1959. Wasmann Jour. Biol. 17: 303, fig. 5. ♀.

ferrugineum Ashmead. Idaho, Colo., N. Mex., Ariz., Calif.
Diploplectron ferrugineus Ashmead, 1899. Ent. News 10: 56. "♀" = ♂.
Diploplectron ashmeadi Rohwer, 1909. Amer. Ent. Soc. Trans. 35: 122. ♂.
Diploplectron cressoni Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 123. ♀.
Diploplectron relativus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 123. ♀.

fossor Rohwer. B. C., Wyo., Colo., Utah, Nev., Calif. Prey: *Labops* sp. nymphs. Predator: *Philanthus pacificus* Cr.
Diploplectron fossor Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 120. ♀.
Diploplectron rufoantennatus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 120. ♂.

Biology: Parker, 1972. Ent. Soc. Amer., Ann. 65: 1193 (prey).

irwini Parker. South Ariz.
Diploplectron irwini Parker, 1972. Ent. Soc. Amer., Ann. 65: 1200, figs. 7, 12. ♂.

kantsi Pate. Southwest. Tex., south. N. Mex.; Mexico (Tamaulipas).
Diploplectron kantsi Pate, 1941. Ent. News 52: 6. ♂.

peglowi Krombein. N. Y., N. W. T., Wyo., Colo., Utah, Idaho, Nev., Calif. Ecology: Nests in sand, making either a unicellular nest or 3-4 cells per nest and storing 2-6 prey per cell. Parasite: *Hedychridium* sp. ? Prey: *Sphaerobius insignis* (Uhl.), *Lygaeus* sp., *Emblethis vicarius* Horv., *Sphragisticus nebulosus* (Fall.); *Aufeius impressicollis* Stal. All prey specimens were nymphs.
Diploplectron peglowi Krombein, 1939. Brooklyn Ent. Soc., Bul. 34: 136. ♀, ♂.

Biology: Williams, 1946. Hawaii. Ent. Soc., Proc. 12: 648 (prey, nest). —Parker, 1972. Ent. Soc. Amer., Ann. 65: 1193 (nest, prey). —Kurczewski, 1972. Ent. Soc. Wash., Proc. 74: 385-397, 4 figs. (nest, prey hunting and transport). —Kurczewski, 1975. Ent. Soc. Wash., Proc. 77: 97-99 (nest, prey, egg).

reticulatum Williams. South. Calif. and Ariz.
Diploplectron reticulatus Williams, 1946. Hawaii. Ent. Soc., Proc. 12: 648. ♂.

Taxonomy: Williams, 1951 (1950). Wasmann Jour. Biol. 8: 365, fig. 2. ♀.

secoense Parker. Calif. in Coast Range and Sierra Nevada Mts.
Diploplectron secoense Parker, 1972. Ent. Soc. Amer., Ann. 65: 1201, figs. 7, 20, 29. ♂, ♀.

sierrense Parker. Sierra Nevada Mts. of Calif. and Nev.
Diploplectron sierrense Parker, 1972. Ent. Soc. Amer., Ann. 65: 1199, figs. 5, 15, 30, 36, 37. ♂, ♀.

vierecki Pate. South. Ariz. and N. Mex., southwest. Tex. Prey: *Microporus obliquus* Uhl. nymph.
Diploplectron vierecki Pate, 1941. Ent. News 52: 4. ♂.

Genus ASTATA Latreille

Astatus Latreille, 1796. Precis Caract. Gen. Ins., p. 114. No species.
Astata Latreille, 1796. Precis Caract. Gen. Ins., p. xiii. Emend.
Type-species: *Tiphia abdominalis* Panzer. Desig. by Latreille. First included species. *Astata* placed on Official List of Generic Names, Op. 139, Op. and Declar. Internatl. Comn. Zool. Nomencl., v. 2, sect. A, p. 37, 1943.

Dimorpha Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, p. 126.
Type-species: *Tiphia abdominalis* Panzer. Monotypic.

The species of *Astata* build multicellular nests in soil of varying types ranging from sandy to hard-packed with included gravel. The cells may be in short series in some species separated by earthen partitions. They prey upon Hemiptera, principally Pentatomidae and Lygaeidae, and usually the nymphal stages.

Revision: Fox, 1892. Canad. Ent. 24: 232-235 (N. Amer. spp.). —Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 539-548 (N. Amer. spp.). —Parker, 1962. Ent. Soc. Amer., Ann. 55: 643-659, 42 figs. (spp. north of Mexico). —Parker, 1964. Ent. Soc. Amer., Ann. 57: 552-559, 21 figs. (Mexican and Cent. Amer. spp.).

bakeri Parker. Ont., Sask. to B. C., south to Tex. and Calif.; Mexico (Chihuahua, Jalisco, Guanajuato, Morelos, Puebla, Chiapas). Prey: *Nysius raphanus* How. adult and nymph, *Lygaeus bicrucis* Say ? nymph. Predator: *Philanthus crabroniformis* Sm.
Astata bakeri Parker, 1962. Ent. Soc. Amer., Ann. 55: 647, text fig. 1, figs. 11, 21. ♂, ♀.

Biology: Williams, 1946. Hawaiian Ent. Soc., Proc. 12: 647 (prey; rec. as *Astata* sp.).

bechteli Parker. Desert areas, Wash. and Colo., south to Calif. and Tex.; Mexico (Sonora).
Astata nubecula bechteli Parker, 1962. Ent. Soc. Amer., Ann. 55: 649. ♂, ♀.

bicolor Say. Southern Canada and U. S. east of Rocky Mts.; Mexico (Chihuahua, Sonora, Durango, San Luis Potosi, Jalisco, Guanajuato, Mexico). Ecology: Nests in hard-packed sand, sometimes beneath overhanging vegetation, provides up to 5 cells per nest with 6-8 nymphs per cell. Prey: Pentatomidae spp.
Astata bicolor Say, 1823. West. Quart. Rptr. 2: 78. ♂, ♀.
Astata terminata Cresson, 1872. Amer. Ent. Soc., Trans. 4: 218. ♂.
Astatus pygidialis Fox, 1892. Canad. Ent. 24: 234. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 165-166 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 92-97, 217, pls. 1, 4, 9 (nest, prey). —Peckham and Peckham, 1905. Wasps Social and Solitary, pp. 287-289 (orientation flight). —Mickel, 1918 (1917). Nebr. Univ., Studies 17: 108 (prey). —Evans, 1962. N. Y. Ent. Soc., Jour. 70: 30-31 (nest, prey).

bigeloviae Cockerell. Western Tex. to Calif.; Mexico (Jalisco).
Astatus bigeloviae Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 138. ♀.

boharti Parker. N. Mex., Ariz.
Astata boharti Parker, 1962. Ent. Soc. Amer., Ann. 55: 650, fig. 25. ♂, ♀.

clypeata Parker. East slope of Rocky Mts. in U. S.; Mexico (western mts.).
Astata clypeata Parker, 1962. Ent. Soc. Amer., Ann. 55: 651, figs. 15, 26. ♂, ♀.

femorata Parker. Ariz. (Pena Blanca in Santa Cruz Co.).
Astata femorata Parker, 1963. Pan-Pacific Ent. 39: 185, figs. 1-3, ♂.

leuthstromi Ashmead. Alaska, Canada, northern U. S., south in mts. to Ariz. Ecology: Nests in soil, sometimes beneath overhanging vegetation, provides 2 cells per nest with up to 5 nymphal prey per cell. Prey: *Acrosternum hilare* Say, *Cosmopepla bimaculata* Thom.
Astata leuthstromi Ashmead, 1897. Psyche 8: 129. ♀.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 98 (nest, prey). —Evans, 1958 (1957). N. Y. Ent. Soc., Jour. 65: 176-177 (nest, prey transport). —Evans, 1962. N. Y. Ent. Soc., Jour. 70: 31-32 (nest, prey).

mexicana Cresson. Canada and U. S. west of Rocky Mts.; Mexico south to El Salvador.
Astata mexicana Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. v. ♂.

nevadica Cresson. Western Canada and U. S.; Mexico (Chihuahua, Sonora, Durango, Zacatecas, Guanajuato, Mexico).
Astata nevadica Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. v. ♀.

nubecula Cresson. N. W. T., northern U. S. south to Va. in east and along mts. in Great Basin and in Calif. to San Diego. Ecology: Nests in hard, bare stony soil or in sand, provides up to 8 cells per nest, each cell provisioned with 2-4 nymphs. Parasite: *Senotainia*

trilineata Wulp, *Hilarella hilarella* Zett. ? Prey: *Chlorochroa uhleri* Stal ?, *Thyanta* sp., prob. *casta* Stal or *pallidovirens* Stal, Pentatomidae sp. Predator: *Philanthus zebratus nitens* (Bks.), *P. crabroniformis* Sm.
Astata nubecula Cresson, 1865. Ent. Soc. Phila., Proc. 4: 466. ♂.
Astata nigropilosa Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. iv. ♂, ♀.

Biology: Parker, 1962. Ent. Soc. Amer., Ann. 55: 649 (nest, prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 487-488 (male territoriality, nest, prey, parasites).

occidentalis Cresson. South. Canada, U. S.; Mexico (Chihuahua, Baja California, Guanajuato, Morelos, Michoacan, Puebla). Ecology: Nests in hard-packed clay devoid of vegetation, makes up to 14 cells per nest, and stores 3-9 usually adult prey per cell. Parasite: *Senotainia trilineata* Wulp; Diptera sp. Prey: *Hymenarcys nervosa* Say, *Thyanta calceata* (Say), *T. p. pallidovirens* Stal, *T. p. accerra* McAtee, *T. brevis* Van D., *T. custator* F., *T. punctiventris* Van D., *Euschistus variolarius* (Beauv.), *Holcostethus limbolarius* (Stal), *Banasa calva* (Say), *Perillus bioculatus* (F.), *Trichopepla* sp.
Astata occidentalis Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. iii. ♂.
Astata apicipennis Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 66., pl. 5, fig. 1. ♀.
Astata tinctipennis Cameron, 1890. Biol. Cent.-Amer., Hym. v. 2, p. 67. ♂.
Astatus sayi Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 542. ♀.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 110-111, figs. 1-8 (larva). —Parker, 1964. Ent. Soc. Amer., Ann. 57: 559 (synonymy).

Biology: Evans, 1958 (1957). N. Y. Ent. Soc., Jour. 65: 168-176, figs. 3-8 (nest, prey transport, parasite). —Powell and Burdick, 1960. Pan-Pacific Ent. 36: 25-30 (nest, prey transport, parasite).

unicolor Say. Southern Canada, U. S.; Mexico to El Salvador, Cuba, Jamaica. Ecology: Nests usually beneath overhanging vegetation in hard-packed sand or heavier soil containing gravel, makes 12-14 cells in a complete nest, and stores 2-4 nymphal prey per cell. Parasite: *Chrysis* sp. Prey: *Podisus modestus* F., *P. maculiventris* (Say), *Euschistus tristigmus* Say, *E. euschistoides* (Voll.) ?
Astata unicolor Say, 1824. *In* Keating, Narr. Long's 2nd Exped. v. 2, p. 337. ♀.
Astata insularis Cresson, 1865. Ent. Soc. Phila., Proc. 4: 140. ♀.
Astata rufiventris Cresson, 1872. Amer. Ent. Soc., Trans. 4: 218. ♀.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 111-112, figs. 46-48 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 88-92, pls. 9, 11, 12 (nest, prey, parasite). —Peckham and Peckham, 1905. Wasps Social and Solitary, pp. 289-290 (orientation flight). —Evans, 1958 (1957). N. Y. Ent. Soc., Jour. 65: 160-168, figs. 1, 2 (nest, prey hunting and transport, male behavior, life cycle).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 20, figs. L, M (male genitalia).

williamsi Parker. Oreg., Idaho, Utah, Nev., Calif.
Astata williamsi Parker, 1962. Ent. Soc. Amer., Ann. 55: 653, figs. 14, 29, 35, 36. ♂, ♀.

Genus DRYUDELLA Spinola

Dryudella Spinola, 1843. Soc. Ent. France, Ann. (2) 1: 135.
Type-species: *Dryudella ghilianii* Spinola. Desig. by Verhoeff, 1951.

Members of this genus have a wider prey range than other genera of the subfamily. In addition to Pentatomidae and Lygaeidae, they have been reported to prey upon Scutelleridae, Reduviidae, Cydnidae, Alydidae and Rhopalidae; both nymphs and adults are preyed upon.

Revision: Parker, 1969. Ent. Soc. Amer., Ann. 62: 963-976, 67 figs. (New World spp.).

bella (Cresson). Idaho, Nev., Calif., Ariz., N. Mex.; Mexico.
Astata bella Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. vi. ♂.

caerulea (Cresson). Wash., Idaho, Colo., Nev., Calif., Ariz., N. Mex.; Mexico south to Puebla. Ecology: Nests in sand under vegetation, 3 cells per nest, with 4-6 prey per cell. Prey: *Hyalmenus tarsatus* (F.) nymphs; *Euschistus conspersus* Uhl. nymphs.
Astata caerulea Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. iv. ♂.

Biology: Alcock, 1973. Wasmann Jour. Biol. 31: 328-329, fig. 4 (nest, prey).

elegans (Cresson). Idaho, Wyo., Utah, Nev., Calif., Ariz.
Astata elegans Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. vi. ♂, ♀.

immigrans (Williams). Wash., Idaho and Wyo. south to Calif. and southwest. Tex.; Hawaii; Mexico south to Chiapas including Baja California. Prey: *Nysius caenosulus* Stal nymphs. Adventive in Hawaii.
Astata immigrans Williams, 1946. Hawaii. Ent. Soc., Proc. 12: 641. ♂, ♀.

Biology: Williams, 1946. Hawaii. Ent. Soc., Proc. 12: 642-648 (prey, nesting under lab. conditions).

millsi Cockerell. Colo. (Canad. Zone of Long's Peak).
Dryudella millsi Cockerell, 1914. Ent. News 25: 32. ♀.

montana (Cresson). Wash. to Wyo. south to Calif. and Colo. Ecology: Nests in flat, bare sand, makes 2-3 cells per nest. Parasite: *Senotainia trilineata* (Wulp). Prey: *Zelus* or *Pselliopus* sp.; *Eurygaster alternatus* Say.; *Corimelaena montana* Van D.; *Alydus* sp.; *Aufeius impressicollis* Stal; *Euschistus conspersus* Uhl. All observed prey were nymphs.
Astata montana Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc. p. v. ♀.
Diploplectron florissantensis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 122. ♀.

Biology: Evans, 1963. Ent. News 74: 236 (nest, prey). —Parker, 1969. Ent. Soc. Amer., Ann. 62: 965 (prey). —Alcock, 1973. Wasmann Jour. Biol. 31: 324-326, figs. 2, 3, 7, 8 (nest, prey transport, parasite).

pernix Parker. South. Calif. to southwest. Tex.; Mexico (Hidalgo).
Dryudella pernix Parker, 1969. Ent. Soc. Amer., Ann. 62: 972, figs. 13, 22, 25, 40, 54, 66. ♂, ♀.

picta (Kohl). N. W. T., Oreg., Calif., Idaho, Nev., Utah, Colo., Ariz.; Mexico south to Morelos. Prey: *Liorhyssus hyalinus* (F.) adult; *Lygus* sp. nymphs in laboratory.
Astatus pictus Kohl, 1888. Zool.-Bot. Gesell. Wien, Verhandl. 38: 146. ♂.
Astata Kohli Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 68, pl. 5, figs. 2, 2a. ♀.
Astatus asper Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 546. ♂, ♀.
Astata aspera Dalla Torre, 1897. Cat. Hym., v. 8, p. 651. Emend.
Astata asperiformis Rohwer, 1909. Ent. News 20: 371. ♂.

Biology: Parker, 1969. Ent. Soc. Amer., Ann. 62: 965 (prey). —Steiner, 1973. Quaestiones Ent. 9: 23 (mating flight).

pinguis (Dahlbom). Alaska, N. W. T., Colo.; northern Europe and Asia. Prey: *Trapezonotus arenarius* (L.), *Drymus sylvaticus* (F.), *Nysius thymi* (Wolff) ? in Europe.
Larra pinguis Dahlbom, 1832. Exercit. Hym., fasc. 4, p. 50. ♀.
Astata jaculator Smith, 1845. Zoologist 3: 1157. ♀.

Biology: Verhoeff, 1951. Zool. Meded. 31: 162 (prey in Europe).

rhimpa Parker. B. C. to Calif., and Idaho and Wyo. to N. Mex.; Mexico south to Queretaro. Ecology: Nests in compact soil containing gravel. Prey: *Thyanta punctiventris* Van D. nymphs and adult; *Lygaeus* sp. nymph; *Leptocoris trivittatus* (Say) nymph.
Dryudella rhimpa Parker, 1969. Ent. Soc. Amer., Ann. 62: 970, figs. 5, 8, 17, 30, 44, 55, 62. ♂, ♀.

Biology: Parker, 1969. Ent. Soc. Amer., Ann. 62: 965 (nest, prey).

Family LARRIDAE

The contributions cited below treat only the subfamilies Larrinae and Miscophinae because the Trypoxyloninae have been associated with the former two groups only since 1964. The revisions are quite inadequate for identification in most genera for many additional species have been described in intervening years.

Revision: Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc., 45: 467-551 (U. S. spp.). —Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 121-213, pls. 22-30 (Kans. spp.).

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 113-126, figs. 9-45, 58, 59 (larvae). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 166-167, figs. 54-59 (larvae).

Subfamily LARRINAE

All of the American genera are ground-nesting but one extralimital genus is known to nest in twigs. The North American species are reported to prey upon various kinds of Orthoptera. However, no prey preference has been reported for our single species of *Prosopigastra;* in Europe some species of the genus prey upon Hemiptera and Homoptera. One extralimital genus preys upon lepidopterous larvae.

Tribe LARRINI

Genus LARRA Fabricius

Genus LARRA Subgenus LARRA Fabricius

Larra Fabricius, 1793. Ent. System., v. 2, p. 220.
Type-species: *Larra ichneumoniformis* Fabricius. Desig. by Latreille, 1810.

Larrana Rafinesque, 1815. Analyse Nature ou Tabl. Univers, Palmero, p. 124. Emend. or n. name.

Lara Drapiez, 1819. Bruxelles Gen. Sci. Phys., Ann., v. 1, p. 54. Lapsus or emend.

Monomatium Shuckard, 1840. *In* Swainson and Shuckard, Cabinet Cyclopedia of Lardner, v. 129, p. 181. No species.
Type-species: *Larraxena princeps* Smith. Desig. by Pate, 1935. First included species.

Tachytes subg. *Lyrops* Dahlbom, 1843. Hym. Europaea, v. 1, p. 132. Preocc.
Type-species: *Tachytes* (*Lyrops*) *pagana* Dahlbom. Monotypic.

Larraxena Smith, 1851. Ann. and Mag. Nat. Hist. (2) 7: 30.
Type-species: *Larraxena princeps* Smith. Monotypic.

Larrada Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 337.
Type-species: *Sphex anathema* Rossi. Orig. desig.

Only the typical subgenus occurs in North America. *Larra* preys upon mole crickets and several extralimital species have been introduced into other areas for control of these pests.

analis Fabricius. East. states north to N. Y., south to Fla., La., west to Tex., Nebr. Prey: *Gryllotalpa hexadactyla* Perty.
Larra analis Fabricius, 1804. Systema Piezatorum, p. 220. ♀.
Larrada canescens Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 292. ♀.
Larrada americana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 214. ♂.
Larra cressonii Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 482. N. name.

Taxonomy: Cushman, 1935. Ent. Soc. Wash., Proc. 37: 82-87 (larva).

Biology: Smith, 1935. Ent. Soc. Wash., Proc. 37: 65-82.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 20, figs. N, P, Q (male genitalia).

Genus LIRIS Fabricius

Genus LIRIS Subgenus LIRIS Fabricius

Liris Fabricius, 1804. Systema Piezatorum, p. 227.
Type-species: *Sphex aurata* Fabricius. Desig. by Patton, 1881.
Lirisis Rafinesque, 1815. Analyse Nature ou Tabl. Univers, Palermo, p. 124. Emend. or n. name.

The typical subgenus does not occur in the New World.

Genus LIRIS Subgenus LEPTOLARRA Cameron

Notogonia Costa, 1867. Mus. Zool. Univ. Napoli, Ann. 4: 83. Preocc.
Type-species: *Tachytes nigra* Fabricius of Vander Linden. Monotypic.
Caenolarra Cameron, 1900. Ann and Mag. Nat. Hist. (7) 5: 28.
Type-species: *Caenolarra appendiculata* Cameron. Monotypic.
Leptolarra Cameron, 1900. Ann. and Mag. Nat. Hist. (7) 5: 29.
Type-species: *Leptolarra reticulata* Cameron. Desig. by Richards, 1935.
Spanolarra Cameron, 1900. Ann. and Mag. Nat. Hist. (7) 5: 32.
Type-species: *Spanolarra rufitarsis* Cameron. Monotypic.
Notogonius Howard(!), 1901. Insect Book, pl. 6, fig. 1. Lapsus.
Chrysolarra Cameron, 1901. Ann. and Mag. Nat. Hist. (7) 8: 118.
Type-species: *Chrysolarra appendiculata* Cameron. Desig. by Pate, 1937.
Notogonidea Rohwer, 1911. Ent. Soc. Wash., Proc. 13: 234. N. name.
Dociliris Tsuneki, 1967. Etizenia 20: 26.
Type-species: *Larrada subtessellata* Smith. Orig. desig.
Nigliris Tsuneki, 1967. Etizenia 20: 27.
Type-species: *Notogonia japonica* Kohl. Orig. desig.
Liris subg. *Colloliris* Tsuneki, 1974. Polskie Pismo Ent. 44: 612.
Type-species: *Notogonidea negrosensis* Williams. Orig. desig.

The species of *Leptolarra* nest in soil, making one or several cells per nest at the end of a rather short burrow. The usual prey are crickets, although one extralimital species has been reported to use Gryllacrididae. Both nymphal and adult stages are used as prey, but in North America the nymphs are used more frequently.

Taxonomy: Krombein, 1954. Amer. Ent. Soc., Trans. 80: 15-17 (key to U. S. spp.).

apicipennis (Cameron). South. Tex. to Panama.
Notogonia apicipennis Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 58, pl. 4, figs. 16, 16a. ♀, ♂.

argentata (Beauvois). South. Ont. west to Nev., south to Fla., Ariz. and south. Calif.; south in Mexico to Chiapas, Venezuela ?; Cuba, Bahamas; adventive in Hawaii. Ecology: Nests in sand or compacted soil, makes 1-3 cells per nest and provides 1-6 prey per cell. Prey: *Gryllus pennsylvanicus* Burm., *G. rubens* (Scudd.)?, *G.* sp., *Miogryllus verticalis* (Serv.), *Acheta assimilis* F., *Nemobius fasciatus* DeG., *N.* sp., *Orocharis saltator* Uhl.; most prey records are of nymphs, but adults are used occasionally.
Larra Pensylvanica Beauvois, 1811. Ins. Afr., Amer., p. 118.
Larra argentata Beauvois, 1811. Ins. Afr., Amer., p. 119. ♀.
Tachytes murina Dahlbom, 1843. Hym. Europaea, v. 1, p. 132. ♀. N. syn.
Larrada Pennsylvanica Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 292. Emend.
Larra nuda Taschenberg, 1870. Ztschr. Gesam. Naturw. Halle 34: 5. ♀.

Taxonomy: Krombein, 1976. Ent. Soc. Wash., Proc. 78: 333 (syn. of *murina*).

Biology: Ashmead, 1894. Psyche 7: 63 (nest, prey). —Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 189-192, fig. 118 (nest, prey hunting and transport). —Rau and Rau, 1918. Wasp studies afield, pp. 152-158, fig. 35 (nest, prey). —Rau, 1922. Acad. Sci. St. Louis. Trans. 24 (7): 26 (prey, nest). —Reinhard, 1929. Witchery of wasps, pp. 67-71 (nest, prey). —Krombein and Evans, 1955. Ent. Soc. Wash., Proc. 57: 233 (prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 103 (prey). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 134 (prey).

argenticauda (Cameron). South. Tex. to Costa Rica.
Notogonia chrysura Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 57. pl. 4, fig. 14. ♂.
Notogonia argenticauda Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 58, pl. 4, fig. 15. ♂.

beata (Cameron). Transcont. in U. S. mostly in Austr. Zone south to Panama. Prey: *Acheta assimilis* F. nymph.
Notogonia violaceipennis Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 51, pl. 4, fig. 12. ♀. N. syn.
Notogonia montezuma Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 52. ♀. N. syn.
Notogonia truncata Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 54. ♀. Preocc. N. syn.
Notogonia beata Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 56, pl. 4, fig. 13. ♂.
Notogonia nigripennis Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 485. ♀. Preocc. N. syn.
Notogonia aequalis Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 486. ♀. N. syn.
Larra nigripennata Dalla Torre, 1897. Cat. Hym., v. 8, p. 670. N. name for *nigripennis* Fox. N. syn.
Larra truncatula Dalla Torre, 1897. Cat. Hym., v. 8, p. 675. N. name for *truncata* Cameron. N. syn.
Notogonia nigripennis var. *occidentalis* Viereck, 1903 (1902). Acad. Nat. Sci. Phila., Proc. 54: 731. ♀. N. syn.
Notogonia subaequalis Rohwer, 1909. Ent. News. 20: 370. ♀. N. syn.

Biology: Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 188 (prey).

fuliginosa muspa (Pate). South. Fla. Typical *fuliginosa* (Dahlbom) occurs in Cuba and Puerto Rico.
Motes muspa Pate, 1943. Canad. Ent. 75: 201. ♂.

Taxonomy: Krombein, 1976. Ent. Soc. Wash., Proc. 78: 333-334 (lectotype of *fuliginosa*).

luctuosa dahlbomi (Cresson). South. Fla.; Cuba, Puerto Rico, Virgin Islands, Dominica. Typical *luctuosa* (Smith) occurs in Santo Domingo, Mexico and Brazil.
Larrada Dahlbomi Cresson, 1865. Ent. Soc. Phila., Proc. 4: 138. ♀. A provisional name to be used if specimens identified as *fuliginosa* (Dahlbom) by Cresson were misidentified; they were.

Taxonomy: Krombein, 1976. Ent. Soc. Wash., Proc. 78: 334-335 (lectotype of *dahlbomi*).

mescalero (Pate). South. Tex. to south. Ariz., south to Honduras.
Motes mescalero Pate, 1943. Canad. Ent. 75: 200. ♂.

panamensis muesebecki (Krombein), n. status. South. Fla.
Motes muesebecki Krombein, 1954. Amer. Ent. Soc., Trans. 80: 15. ♂, ♀.

panamensis panamensis (Cameron), n. status. South. Tex. to Panama.
Notogonia panamensis Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 59, pl. 4, fig. 17. ♂.
Notogonidea sternalis Rohwer, 1914. U. S. Natl. Mus., Proc. 47: 519. ♂. N. syn.

Unplaced Taxon of Larrini

Tachytes dives Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 247. "♀" = ♂. Carolina. Bohart and Menke (1975) treat this as a questionable species of *Liris*. Presumably the locality is in error, for no species of Larrini in America north of Mexico has the coloration of vestiture, antenna and legs ascribed to *dives*.

Tribe TACHYTINI

Genus LARROPSIS Patton

Larropsis Patton, 1892. Ent. News 3: 90.
Type-species: *Larrada tenuicornis* Smith. Orig. desig.

So far as known this genus is restricted to the Nearctic Region. The scanty biological records indicate that the species are ground-nesting and that they prey upon cave and camel crickets (Gryllacrididae).

Revision: Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 653-685, 23 figs.

arizonensis Bohart and Bohart. Ariz., N. Mex., Utah.
Larropsis arizonensis Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 660, fig. 5. ♀, ♂.

atra Williams. Nebr., Kans., west. Tex., N. Mex., Ariz.
Larropsis ater Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 146. ♂.

chilopsidis (Cockerell). Kans., Colo., west. Tex., N. Mex.; Mexico (Chihuahua).
Ancistromma chilopsidis Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 137. ♀.
Ancistromma zerbeii Viereck, 1906. Amer. Ent. Soc., Trans. 32: 208. ♀.
Ancistromma tachysphecoides Viereck, 1906. Amer. Ent. Soc., Trans. 32: 209. ♂.

conferta (Fox). Mont., Nebr., Iowa, Kans., Colo., Tex.
Ancistromma conferta Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 494. ♀.
Ancistromma paenerugosa Viereck, 1906. Amer. Ent. Soc., Trans. 32: 210. ♂.
Ancistromma bruneri Smith, 1906. Ent. News 17: 248. ♂.
Larropsis minor Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 146. ♂.
Larropsis gracilis Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 244. ♀, ♂.

consimilis (Fox). Kans., Okla., Tex., N. Mex.
Ancistromma consimilis Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 496. ♀.
Ancistromma vegetoides Viereck, 1906. Amer. Ent. Soc., Trans. 32: 208. ♀.

deserta Bohart and Bohart. South. Calif. deserts.
Larropsis deserta Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 665, figs. 4, 23. ♀, ♂.

discreta (Fox). Ga., Fla.
Ancistromma discreta Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 493. ♀.

divisa (Patton). Mont., Wyo., Nebr., Kans., north. Tex., N. Mex. Ecology: Nests in burrow off crack in hard-packed soil. Prey: *Ceuthophilus* sp. nymphs.
Larra divisa Patton, 1879. U. S. Geol. Geog. Survey, Bul. 5: 368. ♀.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 192-193 (nest, prey).

elegans Bohart and Bohart. South. Tex., southeast N. Mex.
Larropsis elegans Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 667, figs. 1, 16. ♀, ♂.

filicornis Rohwer. West. Nebr., south. Okla., southeast. Tex. Prey: *Ammobaenetes* sp. nymph.
Larropsis filicornis Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 582. ♀.
Larropsis yatesi Mickel, 1918 (1917). Nebr. Univ., Studies 17: 412. ♂.

Biology: Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 655 (prey).

greenei Rohwer. N. J., S. C., Fla., Kans.
Larropsis greenei Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 173. ♀.

interocularis Bohart and Bohart. Kans., Ariz.
Larropsis interocularis Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 670, figs. 4, 8. ♀, ♂.

lucida Bohart and Bohart. Ariz. (Mohave Co.).
Larropsis lucida Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 671, fig. 7. ♀.

rugosa (Fox). Mont., N. Dak. and Iowa south to Kans. and Ariz.; Mexico (Chihuahua, Durango, Zacatecas).
Ancistromma rugosa Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 496. ♂.

sericea Bohart and Bohart. Nebr., Kans., Tex.
Larropsis sericea Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 672, fig. 6. ♀, ♂.

snowi Bohart and Bohart. Ariz. in U. and L. Sonoran Zones.
Larropsis snowi Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 673, figs. 6, 18. ♀, ♂.

sparsa Bohart and Bohart. West. Tex., N. Mex., Ariz.; Mexico (Coahuila, Durango).
Larropsis sparsa Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 675, fig. 6. ♂.

striata Bohart and Bohart. Calif. (San Bernardino Co.).
Larropsis striata Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 676, fig. 5. ♂.

tenuicornis (Smith). Wash., Idaho, Oreg., Nev., Calif.; Mexico (Baja California).
Larrada tenuicornis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 293. ♀.

testacea Bohart and Bohart. Kans. (Pottawatomie Co.).
Larropsis testacea Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 677, figs. 5, 14. ♀.

texensis Bohart and Bohart. Cent. and south. Tex.
Larropsis texensis Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 678, fig. 7. ♂.

uniformis Bohart and Bohart. Idaho, Nev. to Colo. south to Calif. and N. Mex.; Mexico (Chihuahua, Coahuila, Durango).
Larropsis uniformis Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 678, figs. 2, 12, 13. ♀, ♂.

vegeta (Fox). Wyo., Nebr., Colo., west. Tex., north. Ariz.
Ancistromma vegeta Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 497. ♀, ♂.

washoensis Bohart and Bohart. Nev. (Washoe Co.).
Larropsis washoensis Bohart and Bohart, 1966. Amer. Ent. Soc., Trans. 92: 681, figs. 3, 10, 15, 17, 21. ♀, ♂.

Genus ANCISTROMMA Fox

Ancistromma Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 487.
Type-species: *Larrada distincta* Smith. Desig. by Rohwer, 1911.

These ground-nesting wasps apparently construct multicelled nests at the bottom of pre-existing burrows or cavities. The recorded prey includes both typical crickets (Gryllidae) and cave crickets (Gryllacrididae); both nymphs and adults are used.

Revision: Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 21-37, 32 figs. (N. Amer. spp.).

aurantia (Fox). Alta. east to N. Dak., south to Ariz. and Kans. Prey: *Ceuthophilus fusiformis* Scudd.
Larra aurantia Fox, 1891. Ent. News 2: 194. ♀.
Ancistromma aurulenta(!) Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 388.

Biology: Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 25 (prey).

bradleyi (Bohart and Bohart). Oreg., Calif.
Larropsis (*Ancistromma*) *bradleyi* Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 25, figs. 20, 21, 31. ♀, ♂.

capax (Fox). B. C., Alta., east to N. Dak., south to Calif., Kans. and N. Mex. Prey: *Ceuthophilus* sp., nymph. Predator: *Philanthus zebratus* Cr.
Ancistromma capax Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 490. ♀.
Ancistromma dolosa Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 492. ♀.
Larropsis dolosana Rohwer, 1915. U. S. Natl. Mus., Proc. 49: 245. ♀.
Larropsis picina Mickel, 1916. Amer. Ent. Soc., Trans. 42: 418. ♀, ♂.

Biology: Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 30 (prey).

corrugata (Bohart and Bohart). B. C., Oreg., Calif.
Larropsis (*Ancistromma*) *corrugata* Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 31, figs. 3, 18, 19, 27. ♀, ♂.

distincta (Smith). Transcont., B. C. to Maine, south to Calif., Kans., N. C. Ecology: Nests in natural cavities in coarse soil, making up to 9 cells per nest, each cell provided with 1-3 adult crickets. Parasite: *Metopia argyrocephala* (Meig.), *Senotainia trilineata* (Wulp). Prey: *Nemobius fasciatus* (DeG.) adults.
Larrada distincta Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 292. ♀.
Larropsis distincta var. *semirufa* Banks, 1921. Ent. Soc. Amer., Ann. 14: 19. ♀, ♂.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 119-120, figs. 29-38 (larva).

Biology: Evans, 1958. Ent. News 69: 197-200 (nest, prey, parasites).

granulosa (Bohart and Bohart). Calif., Nev., Idaho, Ariz., N. Mex.
Larropsis (*Ancistromma*) *granulosa* Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 33, figs. 4, 6, 7, 28. ♀, ♂.

hurdi (Bohart and Bohart). Calif.
Larropsis (*Ancistromma*) *hurdi* Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 34, figs. 5, 8, 9, 30. ♀, ♂.

platynota (Bohart and Bohart). Ariz. (Tucson).
Larropsis (*Ancistromma*) *platynota* Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 35, figs. 24, 32. ♀.

portiana (Rohwer). Western Tex., N. Mex.
Larropsis portianus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 583. ♀, ♂.

sericifrons Smith. Nebr., Wyo., Tex., N. Mex., Ariz.
Ancistromma sericifrons Smith, 1906. Ent. News 17: 247. ♂.
Larropsis rubens Mickel, 1918 (1917). Nebr. Univ., Studies 17: 329. ♀.

shappirioi (Bohart and Bohart). D. C., Va.
Larropsis (*Ancistromma*) *shappirioi* Bohart and Bohart, 1962. Ent. Soc. Wash., Proc. 64: 37, figs. 14, 15, 28. ♀, ♂.

Genus TACHYTES Panzer

Tachytes Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 129.
Type-species: *Sphex tricolor* Fabricius. Monotypic.
Lyrops Illiger, 1807. Fauna Etrusca, v. 2, p. 162.
Type-species: *Andrena etrusca* Rossi. Monotypic.
Tachyptera Dahlbom, 1843. Hym. Europaea, v. 1, p. 133. Preocc.
Type-species: *Apis obsoleta* Rossi. Desig. by Patton, 1880.
Tachytes subg. *Holotachytes* Turner, 1917. Ann. and Mag. Nat. Hist. (8) 20: 10.
Type-species: *Tachytes dichroa* Smith. Orig. desig.
Tachytes subg. *Calotachytes* Turner, 1917. Ann. and Mag. Nat. Hist. (8) 20: 10.
Type-species: *Tachytes marshalli* Turner. Orig. desig.
Tachyoides Banks, 1942. Mus. Compar. Zool., Bul. 89: 397.
Type-species: *Tachytes mergus* Fox. Orig. desig.
Tachytes subg. *Tachyplena* Banks, 1942. Mus. Compar. Zool., Bul. 89: 397. N. name.
Tachytes subg. *Tachynana* Banks, 1942. Mus. Compar. Zool., Bul. 89: 398.
Type-species: *Tachytes obscurus* Cresson. Orig. desig.

Members of this genus are ground-nesting and usually construct multicellular nests. Some species begin their burrows in pre-existing holes such as rodent burrows or abandoned burrows of large insects, whereas others excavate their burrows from the ground surface. Members of the Aurulentus Species Group prey on katydids (Tettigoniidae), those of the Pepticus and Distinctus Groups use grasshoppers (Acrididae), species of the Abdominalis Group prey upon grasshoppers, grouse locusts (Tetrigidae) and pygmy mole crickets (Tridactylidae), and the Mergus Group uses only pygmy mole crickets. Members of the extralimital Ambidens Group have been observed preying upon geometrid caterpillars.

Revision: Fox, 1892. Amer. Ent. Soc., Trans. 19: 234-252 (N. Amer. spp.). —Banks, 1942. Mus. Compar. Zool., Bul. 89: 395-436 (N. Amer. spp.).

Biology: Evans and Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 323-332, 3 figs. (comparative behavior of a few N. Amer. spp.).

Species Group Aurulentus

This species group is the equivalent of *Tachytes* sens. str.

auricomans Bradley. Ga.
Tachytes auricomans Bradley, 1919. Ent. News 30: 298. ♂.

aurulentus (Fabricius). East. Canada and States south to Fla., north to N. J., west to Tex., Kans. Ecology: Nests in sand or clay with 2-4 cells per nest and 6-11 prey per cell. Prey: *Conocephalus saltans* (Scudd.), *C.* spp., *Orchelimum fidicinium* Rehn and Heb., *O.* spp., Tettigoniidae sp.; all nymphs.
Larra aurulenta Fabricius, 1804. Systema Piezatorum, p. 220. ♀.
Tachytes mandibularis Patton, 1881. Boston Soc. Nat. Hist., Proc. 20: 394. ♀, ♂.
Tachytes propinquus Rohwer, 1909. Ent. News 20: 198. ♀.
Tachytes duplicatus Rohwer, 1920. Ent. Soc. Wash., Proc. 22: 59. ♀.

Taxonomy: Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 307, figs. 1-2 (larva). —Evans, 1958. Amer. Ent. Soc., Trans. 84: 117, figs. 18-20 (larva). —van der Vecht, 1961. Zool. Verhandl. Rijksmus. Natuurlijke Hist. Leiden, No. 48, pp. 11-12 (synonymy).

Biology: Patton, 1892. Ent. News 3: 90 (prey). —Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 198 (prey hunting). —Dow, 1930. Psyche 37: 182 (prey transport). —Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 305-308, figs. 1-4 (nest, prey, cocoon, life cycle). —Evans and Kurczewski, 1966. Kans. Ent. Soc., Jour. 329-330 (nest, prey).

badius Banks. Tex. (Comal Co.), Ariz. (Baboquivari Mts.).
Tachytes (*Tachyplena*) *badius* Banks, 1942. Mus. Compar. Zool., Bul. 89: 417. ♀.

columbiae Fox. N. J., Md., Va., N. C.
Tachytes columbiae Fox, 1892. Amer. Ent. Soc., Trans. 19: 241. ♀, ♂.

crassus Patton. Conn., Mass., N. Y., Md., Wis., Iowa, Mo., Nebr. Ecology: Nests in sand or in heavy clay-loam, constructs as many as 9 cells per nest, and stores 5-10 prey per cell. Prey: *Orchelimum gladiator* Brun., *O.* spp., *Conocephalus f. fasciatus* (DeG.), *C. nigropleurus* (Brun.), *C. attenuatus* (Scudd.); most prey are nymphs but adults are occasionally stored.
Tachytes crassus Patton, 1881. Boston Soc. Nat. Hist., Proc. 20: 241. ♀, ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 285-286, figs. 96-98 (larva).

Biology: Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 64 (nest, prey transport). —Evans and Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 324-326, figs. 1-2 (nest, prey transport).

ermineus Banks. West. Tex., Ariz., south. Utah and Nev.; Mexico (Baja California).
Tachytes (*Tachyplena*) *ermineus* Banks, 1942. Mus. Compar. Zool., Bul. 89: 413. ♀, ♂.

exornatus Fox. Southwest. Tex., N. Mex., Ariz.; Mexico (Baja California). Parasite: *Zanysson t. texanus* (Cr.) ? Prey: *Conalcea* sp.? nymph.
Tachytes exornatus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 501. ♂.

Biology: Cockerell, 1903. Entomologist 36: 100 (parasite ?). —Krombein, 1960. Brooklyn Ent. Soc., Bul. 55: 75 (prey transport).

floridanus Rohwer. N. C. to Fla., west to Ariz.
Tachytes pepticus floridanus Rohwer, 1920. Ent. Soc. Wash., Proc. 22: 59. ♀.
Tachytes (*Tachyplena*) *foxi* Banks, 1942. Mus. Compar. Zool., Bul. 89: 416. ♀.
Tachytes (*Tachyplena*) *comanche* Banks, 1942. Mus. Compar. Zool., Bul. 89: 417. ♂.

harpax Patton. N. H., Mass., Conn., Pa., Va., N. C., Wis., Mich., Iowa, Nebr. Ecology: Nests in fine silt and sand, constructs several cells per nest and stores 2-3 prey per cell. Prey: *Conocephalus brevipennis* (Scudd.).
Tachytes harpax Patton, 1881. Boston Soc. Nat. Hist., Proc. 20: 395. ♀, ♂.
Tachytes dubitatus Rohwer, 1909. Ent. News 20: 202. ♀, ♂.

Biology: Parker, 1921. Ent. Soc. Wash., Proc. 23: 103-104 (nest, prey transport).

praedator Fox. Md. to Fla., west to Iowa, Kans. and Tex. Ecology: Nests in fine-grained, somewhat moist sand, apparently makes only a single cell stored with up to 5 prey. Prey: *Scudderia* sp., *Conocephalus f. fasciatus* (DeG.), *C.* sp., *Neoconocephalus* sp., *Eremopedes* sp.; usually nymphs are stored, but occasionally adults.
Tachytes praedator Fox, 1892. Amer. Ent. Soc., Trans. 19: 240. ♀, ♂.

Biology: Evans and Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 330-331 (nest, prey transport). —Lin, 1967. Amer. Midland Nat. 77: 241-242, 1 fig. (nest, prey hunt and transport).

sayi Banks. U. S. west of 100th meridian, Nebr. to Wash. south to Tex. and cent. Calif. Ecology: Nests in sandy soil. Prey: *Melanoplus lakinus* (Scudd.) adults.
Tachytes (*Tachytes*) *sayi* Banks, 1942. Mus. Compar. Zool., Bul. 89: 421. ♂, ♀.
Tachytes (*Tachytes*) *brevipilis* Banks, 1942. Mus. Compar. Zool., Bul. 89: 422. ♀.
Tachytes (*Tachytes*) *hesperus* Banks, 1942. Mus. Compar. Zool., Bul. 89: 423. ♀, ♂.

Biology: Evans and Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 331 (nest, prey).

validus Cresson. Ont. to Fla., west to Mich., Colo. and Tex. Ecology: Nests in sand, constructs 6 to more than 9 cells per nest and stores 1-5 prey per cell. Parasite: *Senotainia trilineata* (Wulp), Miltogrammini sp.; Diptera sp. Prey: *Conocephalus brevipennis* (Scudd.), *C. nigropleurum* (Brun.), *C. f. fasciatus* (DeG.), *C.* spp.; adults are preyed upon more frequently than nymphs.
Tachytes validus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 216. ♀, ♂.
Tachytes breviventris Fox, 1892. Amer. Ent. Soc., Trans. 19: 239. ♀, ♂.
Tachytes calcaratus Fox, 1892. Amer. Ent. Soc., Trans. 19: 239. ♀, ♂.
Tachytes calcaratiformis Rohwer, 1909. Ent. News 20: 204. ♀, ♂.
Tachytes (*Tachyplena*) *calcaratiformis* var. *coloradensis* Banks, 1942. Mus. Compar. Zool., Bul. 89: 411. ♀, ♂.
Tachytes (*Tachyplena*) *belfragei* Banks, 1942. Mus. Compar. Zool., Bul. 89: 411. ♀.
Tachytes quadrifasciatus Dreisbach, 1948. Ent. News 59: 151. ♂.

Biology: Parker, 1921. Ent. Soc. Wash., Proc. 23: 104-107 (nest, prey transport, cocoon, life cycle, parasite). —Evans and Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 326-329 (nest, prey transport, parasite). —Kurczewski and Ginsburg, 1971. Kans. Ent. Soc., Jour. 44: 113-131, 9 figs. (nest, prey transport, egg, parasites). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 132 (prey).

Species Group Pepticus

Revision: Bohart, 1962. Pan-Pacific Ent. 38: 117-129, 26 figs.

californicus Bohart. Calif., Oreg., Idaho.
Tachytes californicus Bohart, 1962. Pan-Pacific Ent. 38: 125, figs. 15-17. ♂, ♀.

chelatus Bohart. Ariz., Utah.
Tachytes pepticus chelatus Bohart, 1962. Pan-Pacific Ent. 38: 120, figs. 5, 6, 7. ♂, ♀.

fulviventris fulviventris Cresson. N. Dak. south to Tex., west to Wyo., Utah, N. Mex.; Mexico (Oaxaca). Ecology: Nests in deserted prairie-dog burrow. Parasite: Diptera sp. Prey: *Cordillacris crenulata* (Brun.) adults.
Tachytes fulviventris Cresson, 1865. Ent. Soc. Phila., Proc. 4: 466. ♀.
Tachytes caelebs Patton, 1879. U. S. Geol. Geog. Survey, Bul. 5: 355. ♂.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 197-198 (nest, prey, parasite).

fulviventris rossi Bohart. South. Calif.; Mexico (Baja California).
Tachytes fulviventris rossi Bohart, 1962. Pan-Pacific Ent. 38: 124, figs. 18-20. ♂.

nevadensis Bohart. Nev., Calif., Oreg., Wash.
Tachytes nevadensis Bohart, 1962. Pan-Pacific Ent. 38: 124, figs. 21-23. ♂, ♀.

pennsylvanicus Banks. N. Y. to Va. west to Idaho, Colo., N. Mex., Oreg., B. C.
Tachytes pennsylvanicus Banks, 1921. Ent. Soc. Amer., Ann. 14: 18. ♂.

pepticus (Say). N. C. to Fla. west to Ill., Kans., Nebr., Colo. and Tex. Prey: *Melanoplus* sp. nymph.
Lyrops pepticus Say, 1837. boston Jour. Nat. Hist. 1: 371. ♀, ♂.
Tachytes sericatus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 216. ♀ (male misdet.?).

Tachytes (*Tachytes*) *fulviventris* var. *inferioris* Banks, 1942. Mus. Compar. Zool., Bul. 89: 422. ♀.

Tachytes (*Tachytes*) *cressoni* Banks, 1942. Mus. Compar. Zool., Bul. 89: 425. ♀.

Biology: Evans and Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 331 (prey).

sculleni Bohart. Western Tex. to southern Calif., Nev.

Tachytes sculleni Bohart, 1962. Pan-Pacific Ent. 38: 126, figs. 8-11. ♂, ♀.

spatulatus Fox. Colo., N. Mex., Ariz., Utah, Nev., Wyo., Calif.

Tachytes spatulatus Fox, 1892. Amer. Ent. Soc., Trans. 19: 243. ♂.

Tachytes basirufus Rohwer, 1909. Ent. News 20: 197. ♂.

Tachytes (*Tachytes*) *utahensis* Banks, 1942. Mus. Compar. Zool., Bul. 89: 424. ♀, ♂.

Species Group Distinctus

amazonus Smith. N. C. to Fla., west to Nebr., Oreg. and Calif.; south through Cent. and South Amer. to Argentina. Prey: *Melanoplus* spp. adults and nymphs.

Tachytes Amazonum Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 303. ♀, ♂.

Tachytes clypeatus Taschenberg, 1870. Ztschr. Gesell. Naturwiss. 36: 10. ♀.

Tachytes scalaris Taschenberg, 1870. Ztschr. Gesell. Naturwiss. 36: 11. ♂.

Tachytes rufofasciatus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 247. ♂.

Tachytes fervens Smith, 1873. Ann. and Mag. Nat. Hist. (4) 12: 57. ♂.

Tachytes dives Holmberg, 1884. Soc. Cient. Argentina, An. 18: 220. ♂. Preocc.

Tachysphex rufomaculatus Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 64, pl. 4, fig. 23. ♀.

Tachytes Holmbergii Dalla Torre, 1897. Cat. Hym., v. 8, p. 690. N. name.

Tachytes nigricaudus Brethes, 1909. Mus. Nac. Buenos Aires, An. (3) 12: 241. ♂.

Tachytes Fiebrigi Brethes, 1909. Mus. Nac. Buenos Aires, An. (3) 12: 242. ♂.

Tachytes anisitsi Strand, 1910. Zool. Jahrb., Abt. f. System., v. 29, h. 2, p. 164. ♀.

Tachytes rufoannulatus Strand, 1910. Zool. Jahrb., Abt. f. System, v. 29, h. 2, p. 167. ♂.

Tachytes mimeticus Schrottky, 1909. Soc. Cient. Argentina, An. 68: 250.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Studies 8: 199-200 (nest, prey hunt and transport).

chrysocercus Rohwer. South. Tex. and Ariz.; Mexico (Coahuila, Baja California). Parasite: *Zanysson plesia* (Rohwer) ?

Tachytes chrysocercus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 581. ♀.

Tachytes (*Tachytes*) *elongatus* var. *apache* Banks, 1942. Mus. Compar. Zool., Bul. 89: 419. ♂.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, p. 90 (host ?).

distinctus distinctus Smith. Md. to Fla., west to B. C. and Calif.; Mexico south to South America. Ecology: Nests in sandy soil and inside lizard holes, makes up to 20 cells per nest and stores 1-4 mostly immature prey per cell; also nests in abandoned burrows of the cicada killer, *Sphecius speciosus* (Dru.). Parasite: Diptera sp.; *Zanysson texanus* (Cr.) ? Prey: *Melanoplus femurrubrum* (DeG.), *M.* spp., *Ageneotettix deorum* (Scudd.), *Orphulella* sp. near *speciosa* (Scudd.), *Schistocerca* sp., *Hesperotettix* sp., *Paraidemona* sp.; most prey is nymphal but occasionally adults are used. Another subsp. occurs in the Bahamas Islands.

Larrada fulvipes Smith, 1856. Cat. Hym., Brit. Mus., v. 4, p. 288. ♀.

Tachytes distinctus Smith, 1856. Cat. Hym., Brit. Mus., v. 4, p. 307. ♀.

Tachytes elongatus Cresson, 1872. Amer. Ent Soc., Trans. 4: 215. ♂.

Tachytes Yucatanensis Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 60, pl. 4, fig. 18. ♀.

Tachytes contractus Fox, 1892. Amer. Ent. Soc., Trans. 19: 245. ♀. Preocc.

Tachytes (*Tachytes*) *elongatus* var. *seminole* Banks, 1942. Mus. Compar. Zool., Bul. 89: 419. ♂.

Tachytes (*Tachytes*) *austrinus* Banks, 1942. Mus. Compar. Zool., Bul. 89: 419. N. name.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 116-117, figs. 9-17 (larva). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 286-287 (larva).

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 194-197, figs. 113-116 (nest, prey hunt and transport). —Rau, 1934. Canad. Ent. 66: 260 (nest). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 287 (nest, prey). —Lin, 1965. Brooklyn Ent. Soc., Bul. 59 and 60: 82-84, 1 fig. (nest). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 89-90 (host ?). —Lin, 1972. *In* Michener and Lin, Quart. Rev. Biol. 47: 140-141 (nest guarding by males, parasite).

guatemalensis Cameron. East. U. S. to Guatemala.
Tachytes Guatemalensis Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 60, pl. 4, fig. 19. ♀.
Liris coxalis Patton, 1892. Ent. News 3: 90. ♀, ♂.

Species Group Abdominalis

This is the equivalent of the subgenus *Tachynana* Banks.

abdominalis (Say). Kans., Tex. to Ariz., Utah; Mexico. Prey: *Melanoplus* sp.; Tetrigidae sp.; all prey were nymphs.
Larra abdominalis Say, 1823. Western Quart. Rptr. 2: 77. ♀.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 193 (nest, prey).

birkmanni Rohwer. Tex., Ariz.
Tachytes birkmanni Rohwer, 1909. Ent. News 20: 199. ♀.
Tachytes (*Tachynana*) *atomus* Banks, 1942. Mus. Compar. Zool., Bul. 89: 433. ♀.

chrysopyga obscurus Cresson. Md., Nebr. and Wash. south to Fla. and Ariz.; north. Mexico. Prey: Acrididae sp. Typical *chrysopyga* (Spinola) and other subspp. occur in Mexico, West Indies, Central and South America.
Tachytes obscurus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 217. ♀.
Tachytes texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 217. ♂.
Tachytes (*Tachynana*) *hirsutifrons* Banks, 1942. Mus. Compar. Zool., Bul. 89: 430. ♂.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 199 (prey).

intermedius (Viereck). N. Y. to Fla., west to Nebr. and Tex. Ecology: Nests in sand and may make only one cell per nest with several prey per cell. Prey: *Tridactylus apicalis* Say, *T. minutus* Scudd.; both nymphs and adults.
Tachysphex intermedius Viereck, 1906. Amer. Ent. Soc., Trans. 32: 211. ♂.
Tachytes minutus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 128. ♂.
Tachytes maestus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 417. ♀.
Tachytes austerus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 417. ♀.
Tachytes (*Tachynana*) *amiculus* Banks, 1942. Mus. Compar. Zool., Bul. 89: 432. ♂.

Biology: Krombein and Kurczewski, 1963. Biol. Soc. Wash., Proc. 76: 146 (prey). —Krombein, 1963. Biol. Soc. Wash., Proc. 76: 273 (prey hunt). —Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 147-154, figs. 2, 5 (nest, prey hunt and transport). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 132 (prey).

obductus Fox. N. Y. to Fla. west to Nebr. and Tex. Ecology: Nests in sand, constructs up to 6 cells per nest, and stores 3-7 prey per cell. Prey: *Tetrix o. ornata* (Say), Tetrigidae sp.; nymphs and adults.
Tachytes obductus Fox, 1892. Amer. Ent. Soc., Trans. 19: 250. ♀.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Studies 8: 198 (prey hunting and transport). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 133-134, 2 figs. (nest, prey).

parvus Fox. N. J. to Fla. west to Idaho and Calif. Prey: *Neotettix femoratus* (Scudd.) nymph.
Tachytes parvus Fox, 1892. Amer. Ent. Soc., Trans. 19: 249. ♂.
Tachytes (*Tachynana*) *pattoni* Banks, 1942. Mus. Compar. Zool., Bul. 89: 428. ♀.
Tachytes (*Tachynana*) *arizonicus* Banks, 1942. Mus. Compar. Zool., Bul. 89: 429. ♀.

Biology: Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 134 (prey transport).

Species Group Mergus

This is the equivalent of *Tachyoides* Banks.

mergus Fox. N. J. to Fla. west to Nebr. and Ariz.; Mexico. Ecology: Nests in pure sand with high water table, constructs 1-3 cells per nest, and stores 6-13 small prey per cell. Parasite: *Phrosinella fulvicornis* (Coq.). Prey: *Tridactylus apicalis* Say, *T. minutus* Scudd.; mostly nymphs but a few adults may be used.
Tachytes mergus Fox, 1892. Amer. Ent. Soc., Trans. 19: 250. ♀.
Tachytes minor Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 127. ♂.
Tachytes obscuranus Rohwer, 1909. Ent. News 20: 205. ♀, (♂ misdet.).
Tachyoides ariella Banks, 1942. Mus. Compar. Zool., Bul. 89: 434. ♀.

Taxonomy: Krombein, 1948. Brooklyn Ent. Soc., Bul. 43: 18-20. ♂. —Evans, 1964. Amer. Ent. Soc., Trans. 90: 287-288, figs. 85-87 (larva).

Biology: Krombein and Kurczewski, 1963. Biol. Soc. Wash., Proc. 76: 143-150, figs. 1-3 (nest, prey hunting and transport, egg, life cycle, parasites). —Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 147-154, figs. 1, 3, 4 (nest, prey hunt and transport).

Genus TACHYSPHEX Kohl

Tachysphex Kohl, 1883. Deut. Ent. Ztschr. 27: 166.
Type-species: *Tachysphex filicornis* Kohl. Desig. by Bingham, 1897.
Schistosphex Arnold, 1922. Transvaal Mus., Ann. 9: 137.
Type-species: *Schistosphex Breijeri* Arnold. Orig. desig.
Atelosphex Arnold, 1923. Transvaal Mus., Ann. 9: 177.
Type-species: *Atelosphex miscophoides* Arnold. Orig. desig.

Members of this genus are ground-nesting and usually construct shallow, multicellular nests in which one or several prey are stored per cell. All authenticated prey records are for various kinds of Orthoptera including grasshoppers, mantids, cockroaches, crickets and katydids. In America north of Mexico members of the Pompiliformis and Terminatus Groups prey mostly upon Acrididae and occasionally use Tettigoniidae, one member of the Undatus Group uses Acrididae, two members of the Brullii Group use Blattidae or Tettigoniidae respectively, and one member of the Julliani Group uses Mantidae.

Revision: Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 504-533 (N. Amer. spp.).

Taxonomy: Kurczewski, 1971. Ent. Soc. Wash., Proc. 73: 113-114 (key to Fla. spp.).

Biology: Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 436-453, 9 figs. (comparative male behavior).

Species Group Pompiliformis

acutus (Patton). East. States north to N. B., Ont., Man., west to S. Dak., Kans., south to N. C.
Larra acuta Patton, 1881. Boston Soc. Nat. Hist., Proc. 20: 390. ♀.
Tachysphex bruesi Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 577. ♀.

aethiops (Cresson). West. States north to B. C., N. W. T. and Sask., south to Calif. and Colo. Ecology: Constructs nest in sand off side of burrow of *Bembix*, up to 3 cells per nest, provides 1 prey per nest. Parasite: Diptera sp. Prey: *Trimerotropis suffusa* Scudd.?, *T.* sp., Acrididae sp. Predator: *Philanthus pulcher* D. T., *P. zebratus nitens* (Bks.).
Larrada aethiops Cresson, 1865. Ent. Soc. Phila., Proc. 4: 465. ♀.

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 489-490 (nest, prey, parasite). —Evans, 1973. Great Basin Nat. 33: 149-150 (nest, prey). —Alcock, 1973. Wasmann Jour. Biol. 31: 329, fig. 5 (nest, prey).

amplus Fox. West. States north to Oreg. and Wyo., south to Calif. and Tex.; Mexico (Zacatecas).
Tachysphex amplus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 522. ♀, ♂.
Tachysphex gillettei Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 571. ♀.
Tachysphex neomexicanus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 575. ♀.

angularis Mickel. Nebr. (Sioux Co.).
Tachysphex angularis Mickel, 1916. Amer. Ent. Soc., Trans. 42: 416. ♂.

antennatus Fox. Transcont., N. H., Mont. and Oreg., south to Va., La., Calif.; Mexico (Veracruz, Chiapas).
Tachysphex antennatus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 516. ♀.
Tachysphex sculptiloides Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 166. ♀. N. syn. (W. J. Pulawski).
Tachysphex nigrocaudatus Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 167. ♀, ♂. N. syn. (W. J. Pulawski).

crassiformis Viereck. N. C., Kans., Wyo., Calif. south to Fla., Tex., Ariz.; south through Mexico and Central America to Colombia and Venezuela. Ecology: Makes 1-celled nest in flat, loose sand, stores 1-3 prey per cell. Prey: *Psinidia fenestralis* (Serv.), *Scirtetica marmorata picta* Scudd., Tryxalinae sp.; only nymphs have been reported as prey.
Tachysphex crassiformis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 210. ♀.
Tachysphex wheeleri Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 579. ♀. N. syn. (W. J. Pulawski).
Tachysphex plenoculiformis Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 167. ♀. N. syn. (W. J. Pulawski).
Tachysphex boharti Krombein, 1963. Ent. News 74: 177. ♀, ♂. N. syn. (W. J. Pulawski).
Tachysphex gibbus Pulawski, 1974. Polskie Pismo Ent. 44: 20, figs. 9-17. N. syn. (W. J. Pulawski).

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 201-202 (prey). —Krombein, 1963. Ent. News 74: 179-180 (nest, prey transport).

crenulatus Fox. N. Mex., Ariz., Calif.
Tachysphex crenulatus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 512. ♀.

decorus Fox. N. Dak.
Tachysphex decorus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 524. ♀.

eldoradensis Rohwer. Calif., Oreg., Wyo., Canad. Zone. Ecology: Occurs in openings in forests.
Tachysphex eldoradensis Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 245. ♀.

erythraeus Mickel. Nebr. (Sioux Co.).
Tachysphex erythraeus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 415. ♀.

glabrior Williams. Kans., Tex.; Mexico (Puebla, San Luis Potosi), El Salvador, Costa Rica, Venezuela.
Tachysphex glabrior Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 170. ♀, ♂.

hurdi Bohart. Oreg., Calif.; Mexico (Baja California).
Tachysphex hurdi Bohart, 1962. Biol. Soc. Wash., Proc. 75: 33, figs. 13-15. ♂, ♀.

krombeini Kurczewski. Fla., Ga. Ecology: Makes 1-celled nest in flat sand and stores up to 7 prey. Prey: *Melanoplus* sp. nymphs; *Odontoxiphidium apterum* Morse nymph.
Tachysphex krombeini Kurczewski, 1971. Ent. Soc. Wash., Proc. 73: 111, 1 fig. ♂, ♀.

Biology: Kurczewski, 1971. Ent. Soc. Wash., Proc. 73: 115-116 (nest, prey hunt and transport, egg).

laevifrons (Smith). N. C., Fla., Kans., Tex. Ecology: Makes 1-celled nest in flat vegetated sand, stores 1 or a few larger prey. Prey: *Melanoplus* sp. nymphs.
Larrada laevifrons Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 291. ♀.
Tachysphex leensis Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 578. ♀. N. syn. (W. J. Pulawski).
Tachysphex consimiloides Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 164. ♀. N. syn. (W. J. Pulawski).

Biology: Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 439 (male behavior). —Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2, p. 393 (prey). —Kurczewski, 1971. Ent. Soc. Wash., Proc. 73: 114-116 (nest, prey).

montanus (Cresson). Mont., Wyo., Colo., Utah, Nev., Calif., B. C.
Larrada montana Cresson, 1865. Ent. Soc. Phila., Proc. 4: 465. ♀.
Tachysphex inusitatus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 524. ♂.
Tachysphex compactus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 528. ♂.
Tachysphex triquetrus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 528. ♀. N. syn. (W. J. Pulawski).

parvulus (Cresson). Colo., Wyo., Idaho, Oreg.; Canad. Zone. Ecology: Nests in sand bank with dense vegetation, 1 cell per nest, 1-2 prey per cell. Parasite: Miltogrammini sp. Prey: Acrididae spp.
Larrada parvula Cresson, 1865. Ent. Soc. Phila., Proc. 4: 465. ♂.
Tachysphex consimilis Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 526. ♀, ♂.
Tachysphex agryrotrichus Rohwer, 1911. U. S. Natl. Mus., Proc. 4: 572. ♂.

Biology: Alcock, 1973. Wasmann Jour. Biol. 31: 329-331, fig. 9 (nest, prey capture and transport, parasite).

pauxillus Fox. B. C., Wash., Oreg., Idaho, Colo., Utah, Calif. Ecology: Nests in sand. Parasite: *Senotainia* sp. ? Prey: *Melanoplus* sp. nymph. Predator: *Philanthus pulcher* D. T.
Tachysphex pauxillus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 530. ♀.
Tachysphex nigrior Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 530. ♀, ♂. N. syn. (W. J. Pulawski).

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 490 (nest, prey, parasite, predator).

pechumani Krombein. N. Y., N. J., Mich. Ecology: Nests in sparsely vegetated pine barrens.
Tachysphex tarsatus pechumani Krombein, 1938. Ent. Soc. Amer., Ann. 31: 468. ♀.

Taxonomy: Kurczewski, Elliott and Vasey, 1970. Ent. Soc. Amer., Ann. 63: 1594-1597, 5 figs. ♀, ♂.

powelli Bohart. Calif.
Tachysphex powelli Bohart, 1962. Biol. Soc. Wash., Proc. 75: 35, figs. 1-3. ♂, ♀.

psilocerus Kohl. Colo.; Mexico (Baja California, Durango, Mexico).
Tachysphex psilocerus Kohl, 1884 (1883). Zool.-Bot. Gesell. Wien, Verhandl. 33: 374. ♀.
Tachysphex helianthi Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 570. ♀. N. syn. (W. J. Pulawski).
Tachysphex niteloptéroides Williams, 1958. Pan-Pacific Ent. 34: 207, fig. 1. ♀, ♂. N. syn. (W. J. Pulawski).

punctifrons (Fox). U. S. east of Rocky Mts., north to Mich. and N. Y. Prey: *Melanoplus* sp. probably *bivittatus* (Say).
Larra punctifrons Fox, 1891. Ent. News 2: 194. ♀.
Tachysphex fedorensis Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 576. ♀, ♂.

quebecensis (Provancher). Que., Ont., Alta., N. W. T., Maine, Mass.
Larra quebecensis Provancher, 1882. Nat. Canad. 13: 150. ♀, ♂.
Larra abdominalis Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 266. Lapsus.

sculptilis Fox. Nebr. (Blaine Co.), Colo., Ariz., Nev., Calif.; montane.
Tachysphex asperatus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 516. ♀. N. syn. (W. J. Pulawski).
Tachysphex sculptilis Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 517. ♀.
Tachysphex nigrescens Rohwer, 1908. Ent. News 19: 220. ♀. N. syn. (W. J. Pulawski).
Tachysphex sphecodoides Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 578. ♀.

semirufus (Cresson). Yukon to Calif., east to Ont., Wyo., Colo., Ariz. Prey: *Melanoplus spretus* (Walsh), young nymphs.
Larrada semirufa Cresson, 1865. Ent. Soc. Phila., Proc. 4: 464. ♀.
Tachysphex punctulatus Smith, 1906. Ent. News 17: 246. ♀. Preocc.
Tachysphex puncticeps Smith, 1908. Nebr. Univ., Studies 8: 381. N. name.
Tachysphex giffardi Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 244. ♀.

Biology: Riley, 1878. U. S. Dept. Agr., Ent. Comn. Rpt. 1: 317 (prey).

sonorensis (Cameron). U. S. west of 100 degrees; Mexico (Baja California, Sonora, Chihuahua, Puebla).
Larra sonorensis Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 50. ♀.
Tachysphex dakotensis Rohwer, 1923. Ent. Soc. Wash., Proc. 25: 98. ♀. N. syn. (W. J. Pulawski).
Tachysphex schlingeri Bohart, 1962. Biol. Soc. Wash., Proc. 75: 36, figs. 4-6. ♂, ♀. N. syn. (W. J. Pulawski).

tarsatus (Say). Transcont. in U. S., Canad., Transit., and Austr. Zones.; Mexico (Baja California, Jalisco). Ecology: Makes unicellular nest in a variety of vegetated, sandy soils. Parasite: Diptera sp. Prey: *Melanoplus* spp., *Trimerotropis* sp. ?; only nymphs have been reported as prey.

Larra tarsata Say, 1823. Western Quart. Rptr. 2: 78. ♀.
Tachysphex dubius Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 515. ♂. Preocc.
Tachysphex dubiosus Dalla Torre, 1897. Cat. Hym., v. 8, p. 679. N. name.
Tachysphex hitei Rohwer, 1908. Ent. News 19: 221. ♀.
Tachysphex sanguinosus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 414. ♀. N. syn. (W. J. Pulawski).
Tachysphex zimmeri Mickel, 1916. Amer. Ent. Soc., Trans. 42: 415. ♀.

Biology: Riley, 1880. U. S. Dept. Agr., Ent. Comn. Rpt. 2: 270-271 (prey). —Peckham and Peckham, 1900. Wis. Nat. Hist. Soc., Bul. 1: 89-90 (nest, prey transport). —Williams, 1914 (1913). Kans. Univ. Sci. Bul. 17: 203-206, fig. 117 (nest, prey hunt and transport). —Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 439 (nest). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 490 (prey transport, nest). —Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 164 (nest, prey).

tenuipunctus Fox. West. Canada and U. S. in mountains south to Ariz., N. Mex. Ecology: Makes unicellular nest in sandy rangeland, stores 1-2 prey. Parasite: *Taxigramma heteroneura* (Meig.); *Sphaeropthalma orestes* (Fox). Prey: *Oedaleonotus enigma* (Scudd.), *Aulocara elliotti* (Thom.), *Melanoplus* sp.; only nymphs have been recorded as prey.

Tachysphex tenuipunctus Fox, 1894 (1893). Acad. Nat. Sci., Phila., Proc. 45: 525. ♀.
Tachysphex granulosus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 413. ♀.

Biology: Newton, 1956. Jour. Econ. Ent. 49: 615-619 (nest, prey hunt and transport, life cycle, egg, larva, cocoon, parasite).

texanus (Cresson). Transcont., north to N. Y., Mich., Mont., south to Fla., Tex., Ariz., Calif.; Mexico (Jalisco). Prey: Oedipodinae sp. nymph.

Larrada texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 214. ♀, ♂.
Tachysphex sepulcralis Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 169. ♀, ♂. N. syn. (W. J. Pulawski).
Tachysphex maneei Banks, 1921. Ent. Soc. Amer., Ann. 14: 19. ♀. N. syn. (W. J. Pulawski).

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 206 (prey).

williamsi Bohart. Calif. (San Francisco Co.).

Tachsphex williamsi Bohart, 1962. Biol. Soc. Wash., Proc. 75: 38, figs. 10-12. ♂, ♀.

Species Group Terminatus

alpestris Rohwer. N. W. T., Alta., B. C. to Calif., eastwards to Wyo., Nebr., Colo. and N. Mex., south to Costa Rica.

Tachysphex foxii var. *alpestris* Rohwer, 1908. Ent. News 19: 233. ♀.

apicalis apicalis Fox, n. status (W. J. Pulawski). D. C., N. C., Ga., Fla. Ecology: Makes multicellular nests with up to 7 prey per cell in open sand, frequently in sand cliffs. Prey: *Melanoplus* sp. possibly *puer* (Scudd.) nymph, Acrididae sp.

Tachysphex apicalis Fox, 1893. N. Y. Ent. Soc., Jour. 1: 53. ♀, ♂.
Tachysphex fumipennis Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 518. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 288-289, figs. 99-103 (larva).

Biology: Krombein, 1964. Amer. Mus. Novitates 2201: 15 (nest, prey transport, egg). —Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 436-453, figs. 2, 3, 5, 6b, 8, 9 (nest, male behavior). —Kurczewski and Snyder, 1968. Conservationist 23 (2): 30-31, 6 figs. (nest, prey).

apicalis fusus Fox, n. status (W. J. Pulawski). Transcont. except southeast. U. S., north to Md., Ky., N. Dak., Wash., south to Central America; introduced into Hawaii. Ecology: Nests in mortar between foundation rocks, in abandoned insect burrows in ground, in earthen bank and sand cliffs, stores several prey per cell in multicellular nests. Prey:

Melanoplus sp., *Chortophaga* sp., *Oxya* sp. ?, Tryxalinae sp.; only nymphs are used so far as recorded.
Tachysphex fusus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 519. ♀, ♂.
Tachysphex foxii Rohwer, 1908. Ent. News 19: 222. ♀.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 201 (prey, nest). —Rau and Rau, 1918. Wasp Studies Afield, pp. 149-150 (nest). —Kurczewski and Snyder, 1968. Conservationist 23 (2): 30-31 (nest, prey).

clarconis Viereck. Western States north to B. C., Wash. and Wyo., south to Calif. and N. Mex.
Tachysphex clarconis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 211. ♀.
Tachysphex plesia Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 245. ♀. N. syn. (W. J. Pulawski).

linsleyi Bohart. Western States north to Idaho and Wyo., eastwards to Colo. and Tex., south to Calif.; Mexico. Prey: Acrididae sp. nymph.
Tachysphex linsleyi Bohart, 1962. Biol. Soc. Wash., Proc. 75: 35, figs. 7-9. ♂, ♀.

Biology: Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2, p. 393 (prey).

similis Rohwer. North to N. B. and Sask., west to Alta., Utah, N. Mex.; Mexico. Ecology: Nests in open sand, makes multicellular nest, stores 4-10 prey per cell. Parasite: *Hedychridium fletcheri* Bod. Prey: *Radinotatum* sp., *Atenopedes* sp., *Schistocerca* sp., *Melanoplus* sp.; only nymphs have been recorded as prey.
Tachysphex similis Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 51. ♀, ♂.
Tachysphex similans Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 52. ♀.

Taxonomy: Elliott and Kurczewski, 1974. Ent. Soc. Amer., Ann. 67: 725-727, 2 figs. (character displacement).

Biology: Krombein and Evans, 1955. Ent. Soc. Wash., Proc. 57: 231 (prey transport). —Krombein, 1964. Amer. Mus. Novitates 2201: 15-17, fig. 1 (nest, prey transport, egg). —Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 436-453, fig. 4 (nest, male behavior). —Kurczewski, 1967. Kans. Ent. Soc., Jour. 40: 278-284 (parasite).

terminatus (Smith). Transcont. except Fla. and Pacific States, north to P. E. I., Que., Ont., Man., Sask., N. W. T., south to Colombia and north. brazil. Parasite: *Anthrax a. albofasciatus* Macq.; *Phrosinella fulvicornis* (Coq.), *Senotainia trilineata* (Wulp). Prey: *Phaneroptera* spp.; *Chortophaga viridifasciata* DeG., *Chloealtis conspersa* Harr., *Chorthippus curtipennis* (Harr.), *Dissosteira carolina* (L.), *Pardalophora apiculata* Harr. ?, *Melanoplus bivittatus* (Say), *M. femurrubrum* (DeG.), *M. keeleri luridus* (Dodge), *M.* spp., *Tryxalus* spp., Tryxalinae sp., *Syrbula admirabilis* Uhl., *Dichromorpha viridis* Scudd.; all recorded prey were nymphs.
Larrada terminata Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 291. ♂.
Larra minor Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 268. ♀, ♂.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 118, figs. 21-28 (larva). —Elliott and Kurczewski, 1974. Ent. Soc. Amer., Ann. 67: 725-727, 2 figs. (character displacement).

Biology: Ashmead, 1894. Psyche 7: 63 (prey). —Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 201 (prey). —Rau and Rau, 1918. Wasp Studies Afield, pp. 144-149 (nest, prey transport). —Rau, 1927. Acad. Sci. St. Louis, Trans. 25: 188-190 (nest, prey, life cycle). —Rau, 1946. Brooklyn Ent. Soc., Bul. 41: 10. —Strandtmann, 1953. Kans. Ent. Soc., Jour. 26: 49-51, fig. 2 (nest, prey transport, life cycle). —Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 317-322, 1 fig. (nest, prey transport). —Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 436-453, figs. 1, 6a, 7 (nest, male behavior, mating). —Kurczewski and Harris, 1968. N. Y. Ent. Soc., Jour. 76: 81-83 (parasites, nest). —Kurczewski and Snyder, 1968. Conservationist 23 (2): 28-31, 5 figs. (nest, prey, life cycle, parasite). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 491 (nest, prey).

Species Group Undatus

ashmeadii Fox. Oreg. to Calif., east to centr. Tex., Kans. and Wyo. in deserts. Ecology: Nests in sand. Prey: *Metator* sp. nymph, *Cordillacris crenulata* (Brun.) adult, *Trachyrhachys kiowa* (Thom.) adult, *Opeia* sp. nymph, *Phlibostroma* sp. adult.
Tachysphex ashmeadii Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 509. ♀.

Tachysphex posterus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 510. ♀.
Tachysphex spinosus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 511. ♀.
Tachysphex spissatus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 515. ♂.
Larra rufipes Provancher, 1895. Nat. Canad. 22: 129. ♀.
Tachysphex propinquus Viereck, 1904. Ent. News 15: 85. ♀. N. syn. (W. J. Pulawski).

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Studies 8: 202-203, fig. 112 (nest, prey hunt and transport). —Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2, pp. 392-393 (prey). —Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 164 (nest, prey).

Species Group Brullii

alayoi Pulawski. Fla. (Dania in Broward Co.); West Indies, Cuba to Virgin Islands. Prey: Blattidae sp. nymph.
Tachysphex alayoi Pulawski, 1974. Polskie Pismo Ent. 44: 84, figs. 121-128. ♀, ♂.

Biology: Pulawski, 1974. Polskie Pismo Ent. 44: 87 (prey).

belfragei (Cresson). D. C. to Fla. west to Iowa, Nebr., Tex. Prey: *Conocephalus* sp. nymphs.
Larrada belfragei Cresson, 1872. Amer. Ent. Soc., Trans. 4: 215. ♀.
Tachytes minimus Fox, 1892. Amer. Ent. Soc., Trans. 19: 248. ♀.

Biology: Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2, p. 392 (prey).

maurus Rohwer. Tex. to Ariz.; Mexico (Sonora).
Tachysphex maurus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 575. ♀, ♂.

mundus Fox. Transcontinental, north to south. Canada, south to Mexico (Chiapas).
Larra rufitarsis Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 50, pl. 4, fig. 11. ♂. Preocc. N. syn. (W. J. Pulawski).
Tachysphex aequalis Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 517. ♂. N. syn. (W. J. Pulawski).
Tachysphex exsectus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 526. ♀ (♂ misdet.). N. syn. (W. J. Pulawski).
Tachysphex mundus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 531. ♀, ♂.
Tachysphex johnsoni Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 573. ♀. N. syn. (W. J. Pulawski).
Tachysphex opwanus Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 574. ♂. N. syn. (W. J. Pulawski).
Tachysphex robustior Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 164. ♂. N. syn. (W. J. Pulawski).
Tachysphex crenuloides Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 168. ♀. N. syn. (W. J. Pulawski).
Tachysphex washingtoni Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 172. ♀. N. syn. (W. J. Pulawski).

Species Group Julliani

cockerellae Rohwer. Calif., Nev., Ariz.; Mexico south to Colombia.
Tachysphex cockerellae Rohwer 1914. U. S. Natl. Mus., Proc. 47: 518. ♂.

coquilletti Rohwer. Kans., Okla., Colo., N. Mex., Ariz., Nev., Calif.; Mexico (Baja California, Durango, Zacatecas). Prey: *Litoneutria minor* (Scudd.), *L.* sp., nymph.
Tachysphex coquilletti Rohwer, 1911. U. S. Natl Mus., Proc. 40: 572. ♀, ♂.
Tachysphex dentatus Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 169. ♀.

Biology: Kurczewski, 1966. Kans. Ent. Soc., Jour. 39: 317 (prey). —Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2, p. 393 (prey). —Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 164-165 (nest, orientation flight, prey).

Genus PROSOPIGASTRA Costa

Prosopigastra Costa, 1867. Mus. Zool. Napoli Ann. 4: 88.
Type-species: *Prosopigastra punctatissima* Costa. Monotypic.
Homogambrus Kohl, 1889. K. K. Naturhist. Hofmus., Ann. 4: 191.
Type-species: *Tachysphex globiceps* Morawitz. Monotypic.
Hologambrus Morice, 1897. Ent. Soc. London, Trans., p. 309. Lapsus or emend.

Three Old World species make multicellular nests in soil, and two of them utilize pre-existing burrows of other insects. Prey consists of Hemiptera and Homoptera belonging to the families Lygaeidae, Tropiduchidae or Pentatomidae.

nearctica Bohart. Calif., Ariz.
Prosopigastra nearctica Bohart, 1958. Ent. Soc. Wash., Proc. 60: 122, 6 figs. ♂, ♀.

Subfamily MISCOPHINAE

Two inadequate revisions are listed under the heading Subfamily Larrinae.

Genus LYRODA Say

Lyrops subg. *Lyroda* Say, 1837. Boston Jour. Nat. Hist. 1: 372.
Type-species: *Lyrops* (*Lyroda*) *subita* Say. Desig. by Patton, 1881.
Morphota Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 293.
Type-species: *Morphota fasciata* Smith. Desig. by Pate, 1937.
Odontolarra Cameron, 1900. Ann. and Mag. Nat. Hist. (7) 5: 35.
Type-species: *Odontolarra rufiventris* Cameron. Monotypic.
Lyrodon Howard, 1901. Insect Book, pl. 6, fig. 5. Lapsus. Preocc.

These wasps are ground-nesting and may utilize pre-existing burrows or cavities. One North American species preys upon crickets (Gryllidae) and several extralimital species use grouse locusts (Tetrigidae).

subita (Say). Transcont. in south Canada and U. S. Ecology: Nests in pre-existing burrows or cavities, makes up to 2 cells per nest and stores up to 9 prey per cell. Parasite: *Metopia argyrocephala* (Meig.). Prey: *Nemobius carolinus* Scudd., *N. fasciatus* (DeG.), *N.* spp.; nymphs.
Lyrops (*Lyroda*) *subita* Say, 1837. Boston Jour. Nat. Hist. 1: 372. ♀.
Larrada arcuata Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 293. ♀.
Lyroda cockerelli Rohwer, 1909. Ent. News 20: 369. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 281-282, figs. 78-84 (larva).

Biology: Patton, 1892. Ent. News 3: 90 (prey transport). —Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 169-171 (nest, prey transport, life cycle). —Peckham and Peckham, 1905. Wasps, Social and Solitary, pp. 253-256 (nest, prey transport, life cycle). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 282 (nest, prey transport, parasite). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 132 (prey).

triloba (Say). Canada, D. C., Ill., Ind., Kans., La., Tex.
Lyrops (*Lyroda*) *triloba* Say, 1837. Boston Jour. Nat. Hist. 1: 372. ♀.
Lyrops (*Lyroda*) *caliptera* Say, 1837. Boston Jour. Nat. Hist. 1: 373. Lapsus.

Genus PLENOCULUS Fox

Plenoculus Fox, 1893. Psyche 6: 554.
Type-species: *Plenoculus davisi* Fox. Monotypic.
Ptygosphex Gussakovskij, 1928. Inst. Zool. Appl. Phytopath., Leningrad, Bul. 4: 18.
Misspelled *Ptigosphex* in generic heading.
Type-species: *Ptygosphex murgabensis* Gussakovskij. Orig. desig.
Pavlovskia Gussakovskij, 1935. Trav. Fil. Acad. Sci. URSS, Tadjikistan 5: 424.
Type-species: *Pavlovskia tadzhika* Gussakovskij. Orig. desig.

These wasps nest in sand and construct 1- or multicelled nests. In North America several taxa prey upon Hemiptera or Homoptera but one species uses pyralidid caterpillars as prey.

Revision: Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 1-49, 90 figs. (N. Amer. spp.).

Taxonomy: Ashmead, 1899. Psyche 8: 337-338 (key to some N. Amer. spp.).

boharti Williams. Southern Calif.
Plenoculus boharti Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 28, figs. 40, 61, 83, 84. ♀, ♂.

boregensis boregensis Williams. Calif. (Borego in San Diego Co.).
Plenoculus boregensis boregensis Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 20, figs. 26-29. ♀, ♂.

boregensis perniger Williams. Calif. (Thousand Palms).
Plenoculus boregensis perniger Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 21. ♂.

cockerellii Fox. Southern Calif. to western Tex.; Mexico (Baja California, Guerrero). Ecology: Nests in sand. Prey: Pyralididae spp. larvae.
Plenoculus Cockerellii Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc., 45: 538. ♀.

Biology: Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 46-47 (nest, prey transport).

cuneatus Williams. Southern Calif. and Nev.
Plenoculus cuneatus Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 12, figs. 10, 17, 18, 24, 25. ♀, ♂.

davisi atlanticus Viereck. Coastal Conn. to Fla., Tex. Ecology: Nests in open sand, provides up to 7 prey per cell. Prey: *Phytocoris* sp. nymphs and adult.
Plenoculus atlanticus Viereck, 1902. Ent. News 13: 74. ♂.

Taxonomy: Krombein, 1955. Ent. Soc. Wash., Proc. 57: 146.

Biology: Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 181, 191, 192, 194-199, 202, 205 (nest, prey transport, egg).

davisi davisi Fox. Conn. to Fla. west to Alaska, B. C., Idaho and Calif.; Mexico (Baja California, Sinaloa, Nayarit, Durango). Ecology: Nests in sand, constructs 1-4 cells per nest and stores 2-24 prey per cell. Prey: *Arhyssus lateralis* (Say) adult; Aphidae sp. immature; *Adelphocoris rapidus* (Say), *Amblytylus nasutus* (Kirschb.), *Campylomma verbasci* (Meyer), *Chlamydatus associatus* (Uhl.), *Collaria* sp. ?, *Halticus bracteatus* (Say), *Lopidea robiniae* (Uhl.), *Lygus lineolaris* (Beauv.), *Neolygus* sp. ?, *Orthocephalus mutabilis* (Fall.), *Orthotylus chorionis* (Say), *O. marginatus* (Uhl.), *O. quercicola* Knight, *O.* sp., *Pilophorus amoenus* Uhl., *P.* sp., *Plagiognathus chrysanthemi* (Wolff), *P. politus* Uhl., *P.* sp., *Poecilocapsus lineatus* (F.), *Psallus seriatus* Reut. ?, *Stenotus binotatus* (F.), *Trigonotylus ruficornis* (Geoff.), *T.* sp., Mirinae spp., Phylini spp.; adults are stored more commonly than nymphs. Predator: *Philanthus pulcher* D. T., *P. crabroniformis* Sm.
Plenoculus davisi Fox, 1893. Psyche 6: 554. ♀, ♂.
Plenoculus abdominalis Ashmead, 1899. Psyche 8: 339. ♂.
Plenoculus apicalis Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 175. ♀, ♂.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 166-167, figs. 54-59 (larva).

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 207-208, fig. 120 (nest, prey transport). —Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 46 (prey). —Evans, 1961. Ent. News 72: 223-228 (nest, prey transport, life cycle). —Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 179-207, 20 figs. (nest, prey transport, egg). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 488 (nest, prey, predator).

davisi gracilis Williams. Calif. (Riverside Co.).
Plenoculus davisi gracilis Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 42, fig. 54. ♀.

davisi mojavensis Williams. Southern Calif., Ariz., N. Mex.
Plenoculus davisi mojavensis Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 39, figs. 86, 88. ♀, ♂.

davisi transversus Williams. Calif. (Tulare and Riverside Counties).
Plenoculus davisi transversus Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 40, figs. 8, 57, 59. ♀.

deserti Williams. Southern Calif.
Plenoculus deserti Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 26, figs. 85, 87. ♂, ♀.

gillaspyi Krombein. Tex. (Williamson Co.).
Plenoculus gillaspyi Krombein, 1938. Ent. Soc. Amer., Ann. 31: 468. ♀.

palmarum Williams. Southern Calif.
Plenoculus palmarum Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 22, figs. 9, 36, 37, 71, 73, 78. ♂, ♀.

parvus Fox. N. Mex. (Las Cruces).
Plenoculus parvus Fox, 1897. Ent. News 8: 71. ♀.

propinquus Fox. Wash. to Calif. east to Idaho, Colo., N. Mex. Ecology: Nests in open sand. Prey: *Lygus desertus* Knight, Miridae sp.; adults.
Plenoculus propinquus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 537. ♀.
Plenoculus propinquus var. *rufescens* Cockerell, 1898. Davenport Acad. Sci., Proc. 7: 144.

Biology: Kurczewski, 1968. Kans. Ent. Soc., Jour. 41: 181, 191, 197, 198, 202 (nest, prey transport, egg). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 488 (nest, prey).

sinuatus Williams. Southern Calif.
Plenoculus sinuatus Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 7, figs. 30, 32, 35. ♀, ♂.

stygius Williams. Southern Calif. and Ariz. Prey: Miridae sp.
Plenoculus stygius Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 31, figs. 5, 62, 90. ♀, ♂.

Biology: Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 46 (prey).

timberlakei Williams. Southern Calif. and Ariz.
Plenoculus timberlakei Williams, 1960. Calif. Acad. Sci., Proc. (4) 31: 11, figs. 2, 11, 19-22, 31, 38, 47, 49, 52, 77. ♀, ♂.

Genus SOLIERELLA Spinola

Solierella Spinola, 1851. *In* Gay, Hist. Fis. Pol. Chile, Zool., v. 6, p. 349.
Type-species: *Solierella miscophoides* Spinola. Monotypic.
Silaon Piccioli, 1869. Soc. Ent. Ital., Bol. 1: 282.
Type-species: *Silaon compedita* Piccioli. Monotypic.
Sylaon Piccioli, 1870. Soc. Ent. Ital., Bol. 2: pl. 1. Lapsus or emend.
Niteliopsis Saunders, 1873. Ent. Soc. London, Trans., p. 410.
Type-species: *Niteliopsis pisonoides* Saunders. Monotypic.
Ammosphecidium Kohl, 1878. Zool.-Bot. Gesell. Wien, Verh. 27: 701.
Type-species: *Ammosphecidium Helleri* Kohl. Monotypic.
Sylaon Kohl, 1885. Zool.-Bot. Gesell. Wien, Verh. 34: 290. Emend. or lapsus.
Lautara Herbst. 1920. Mus. Nac. Chile, Bol. 11: 217.
Type-species: *Lautara Jaffueli* Herbst. Monotypic.

Our species usually build multicelled nests in pre-existing cavities in lumber, twigs, stems, galls, nut hulls, or in abandoned burrows in the ground. The prey of some North American species has been recorded as Hemiptera of several families, Acrididae and Psocoptera.

Revision: Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 355-417 (Calif. spp.).

Taxonomy: Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 108-110 (key to some spp.).

abdominalis Williams. Calif.
Solierella abdominalis Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 381. ♀, ♂.

affinis (Rohwer). Kans., Colo., Wyo., Idaho, Calif. Ecology: Nests in soil, possibly in pre-existing burrows, stores 4 or more prey per cell. Prey: *Nabis* sp. nymphs.
Niteliopsis affinis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 113. ♀, ♂.

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 488-489 (nest, prey).

albipes (Ashmead). Colo., Idaho, Calif.
Plenoculus albipes Ashmead, 1899. Psyche 8: 339. ♂.

arcuata Williams. Calif. (San Rafael, Menlo Park).
Solierella arcuata Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 378. ♀, ♂.

australis Williams. Calif. (Riverside).
Solierella australis Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 379. ♀, ♂.

bicolor Williams. Calif.
Solierella bicolor Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 382. ♀.

blaisdelli (Bridwell). Calif., Ariz., Idaho. Ecology: Nests in stems of *Eriogonum*, sumac, elderberry, raspberry, and in borings in wood. Parasite: *Pseudolopyga taylori* (Bod.),

Hedychridium solierellae Boh. and Brum.; *Lomachaeta variegata* Mick. Prey: *Nysius raphanus* How., *N. tenellus* Barber, *N. ericae minutus* Uhl., *N.* sp.; nymphs.
Silaon blaisdelli Bridwell, 1920. Hawaii. Ent. Soc., Proc. 4: 401. ♀.

Taxonomy: Evans, 1958. Amer. Ent. Soc., Trans. 84: 123, fig. 42 (larva). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 285 (larva).

Biology: Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 394 (prey). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 177-178 (nest, prey, parasite, life cycle). —Carrillo, 1967. Pan-Pacific Ent. 43: 201-203 (larval instars). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 3 (nest, parasites). —Carrillo and Caltagirone, 1970. Ent. Soc. Amer., Ann. 63: 676-677 (nest, prey, parasites, life cycle).

boharti Williams. Calif.
Solierella boharti Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 366. ♀.
Solierella lasseni Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 366. ♀, ♂.

Taxonomy: Williams, 1953. Pan-Pacific Ent. 29: 157 (synonymy).

boregensis Williams. Calif. (San Diego Co.).
Solierella boregensis Williams, 1958. Pan-Pacific Ent. 34: 208, fig. 2. ♀, ♂.

bridwelli Williams. Calif.
Solierella bridwelli Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 384. ♀, ♂.

californica Williams. Calif. (Los Angeles).
Solierella californica Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 387. ♀, ♂.

clypeata Williams. Calif.
Solierella clypeata Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 376. ♀.

corizi Williams. Calif., Tex. Ecology: Nests in burrows of other insects in soil, makes 2-3 cells per nest and stores 3-4 prey per cell. Prey: *Corizus hyalinus* (F.) adult and nymphs; *Perilabus abbreviatus* (Uhl.) nymph.
Solierella corizi Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 372. ♀, ♂.

Biology: Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 392-394 (nest, prey transport).

fossor (Rohwer). Colo., N. Mex., Ariz. Prey: Oedipodinae sp. nymph.
Niteliopsis foxii Viereck, 1906. Amer. Ent. Soc., Trans. 32: 207. ♀. Preocc.
Niteliopsis fossor Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 116 ♀, ♂.

Biology: Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 116 (prey).

foxii (Viereck). N. J. (North Woodbury).
Plenoculus foxii Viereck, 1902. Ent. News 13: 73. ♀, ♂.

inermis (Cresson). N. C., Fla., Ill. to Tex. west to Idaho and Colo. Ecology: Nests in abandoned burrows of other arthropods in sand or clay. Prey: *Thyanta pallidovirens* (Stal); *Harmostes reflexulus* (Say), *Liorhyssus hyalinatus* (F.),; *Chariesterus antennator* (F.); *Rhynocoris ventralis* (Say)?; Miridae sp.; all prey stored were nymphs.
Nysson? inerme Cresson, 1872. Amer. Ent. Soc., Trans. 4: 224. ♀.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 208-209, pl. 30, fig. 119 (nest, prey). —Kurczewski, 1967. Kans. Ent. Soc., Jour. 40: 203-208, 1 fig. (nest, prey, egg).

kansensis (Williams). Kans.
Niteliopsis kansensis Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 178. ♀.

levis Williams. Calif.
Solierella levis Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 383. ♀.

lucida (Rohwer). Colo. (Boulder).
Niteliopsis lucidus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 109. ♂.

major (Rohwer). Wash., Calif.
Silaon major Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 247. ♀.

masoni Williams. Calif. (Thousand Palms).
Solierella masoni Williams, 1959. Ent. Soc. Wash., Proc. 61: 74, 5 figs. ♀, ♂.

mirifica Pate. Ariz. (Pima Co.).
Solierella (*Silaon*) *mirificus* Pate, 1934. Ent. News 45: 243. ♂.

modesta (Rohwer). Colo. (Boulder).
Niteliopsis modestus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 116. ♂.

nigrans Krombein. W. Va., Colo., Calif.
Niteliopsis niger Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 115. ♀, ♂. Preocc.
Solierella nigrans Krombein, 1951. U. S. Dept. Agr., Monog. 2: 943. N. name.

nitens Williams. Calif. Ecology: Nests in ground.
Solierella nitens Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 376. ♀.

Biology: Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 395 (nest).

peckhami (Ashmead). N. Y. to Fla. west to Idaho and Calif.; adventive in Hawaii and Marshall Islands. Ecology: Nests in cavities in twigs, stems of elderberry, sumac, raspberry, and in cavities in almond hulls. Parasite: *Pseudolopyga taylori* (Bod.). Prey: *Nysius raphanus* How., *N. tenellus* Barber, *N. ericae minutus* Uhl., *N.* sp., *Pachybrachius* sp.; nymphs.
Plenoculus peckhami Ashmead, 1897. Psyche 8: 130. ♂.
Plenoculus niger Ashmead, 1899. Psyche 8: 339. ♀.
Silaon rohweri Bridwell, 1920. Hawaii. Ent. Soc., Proc. 4: 398.
Solierella (Silaon) arenaria Krombein, 1939. Brooklyn Ent. Soc., Bul. 34: 139. ♀.

Taxonomy: Carrillo and Caltagirone, 1970. Ent. Soc. Amer., Ann. 63: 673, figs. 3-6 (egg, larva, pupa).

Biology: Peckham and Peckham, 1905. Wasps, Social and Solitary, pp. 95-96 (nest, prey). —Rau and Rau, 1918. Wasp Studies Afield, pp. 134-135 (nest, parasite). —Bridwell, 1920. Hawaii Ent. Soc., Proc. 4: 399-400 (nest, prey). —Williams, 1926. Hawaii. Ent. Soc., Proc. 6: 442-444, figs. 4-7 (nest, prey, life cycle). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 375-378, figs. 48, 49 (nest, life cycle). —Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 394 (prey). —Carrillo, 1967. Pan-Pacific Ent. 43: 201-203 (larval instars). —Carrillo and Caltagirone, 1970. Ent. Soc. Amer., Ann. 63: 673-676, figs. 1, 2, 7 (nest, prey, life cycle, parasites).

plenoculoides plenoculoides (Fox). N. H. to Va., west to Colo. and Tex., Ariz. Ecology: Nests in galls on goldenrod of *Eurosta solidaginis* (Fitch).
Niteliopsis plenoculoides Fox, 1893. Psyche 6: 555. ♀.

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 943 (nest).

plenoculoides similis (Bridwell). Calif., Oreg. Ecology: Nests in borings in stems of *Sambucus*, *Foeniculum*, *Eriogonum* and Umbelliferae, stores up to 4 prey per cell. Parasite: *Senotainia trilineata* (Wulp); *Eurytoma stigmi* Ashm.; *Lomachaeta variegata* Mick. Prey: Acrididae sp. nymphs.
Silaon similis Bridwell, 1920. Hawaii. Ent. Soc., Proc. 4: 402. ♀.

Biology: Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 391-392 (nest, prey). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest, parasites).

prosopidis Williams. Calif. (San Bernardino Co.). On flowers of *Prosopis*.
Solierella mandibularis Williams, 1958. Pan-Pacific Ent. 34: 212, figs. 4, 4a. ♀. Preocc.
Solierella prosopidis Williams, 1959. Pan-Pacific Ent. 35: 116. N. name.

sayi (Rohwer). Colo., Calif. Ecology: Nests in sand, stores several prey per cell. Prey: *Psocus californicus* Bks. adults; *Lepidilla kelloggi* Ribago.
Niteliopsis sayi Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 114. ♀, ♂.

Biology: Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 395 (nest, prey).

semirugosa Williams. Calif. (San Diego, Riverside and Yolo Counties).
Solierella semirugosa Williams, 1958. Pan-Pacific Ent. 34: 210, figs. 3-3d. ♀, ♂.

sonorae Williams. Calif.
Solierella sonorae Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 368. ♀.

striatipes (Ashmead). Calif.; Mexico (Baja California). Ecology: Makes unicellular nest in soil which may contain 1-2 prey each bearing an egg. Parasite: *Taxigramma* sp.? Prey: *Melanoplus ligneolus* Scudd. adult and penultimate instar nymph.
Niteliopsis striatipes Ashmead, 1899. Ent. News 10: 9. "♀" = ♂.

Biology: Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 389-391, fig. 3 (nest, prey hunt and transport).

timberlakei Williams. Calif.
Solierella timberlakei Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 380. ♀.

vandykei Williams. Calif. (Tahoe).
Solierella vandykei Williams, 1950. Calif. Acad. Sci., Proc. (4) 26: 371. ♀.

vierecki (Rohwer). Colo., Ariz., Calif.
Niteliopsis vierecki Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 112. ♀, ♂.
Niteliopsis parvus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 113. ♂.

weberi Williams. Calif. (Riverside).
Solierella weberi Williams, 1955. Pan-Pacific Ent. 31: 85, 1 fig. ♂.

Genus MISCOPHUS Jurine

The shallow nests of these wasps are dug in loose sandy soil and contain one or several cells. The prey consists of small, usually immature spiders and the number stored per cell ranges from 2 to 30.

Biology: Kurczewski, 1969. Kans. Ent. Soc., Jour. 42: 470-509, 13 figs. (comparative behavior).

Genus MISCOPHUS Subgenus MISCOPHUS Jurine

Miscophus Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 206.
Type-species: *Miscophus bicolor* Jurine. Monotypic.

americanus Fox. N. Y. to Fla. west to Colo., Kans. and Tex., N. W. T. Ecology: Makes a 1-celled nest in loose to well-packed sand and provides 5-11 small spiders per cell. Prey: *Theridion australe* Bks., *T. differens* Em., *T. murarium* Em.
Miscophus americanus Fox, 1890 Ent. News 1: 138. ♀.

Biology: Kurczewski, 1969. Kans. Ent. Soc., Jour. 42: 472-479, figs. 1, 3-5, 13 (nest, prey transport, egg).

Genus MISCOPHUS Subgenus NITELOPTERUS Ashmead

Nitelopterus Ashmead, 1896. *In* Kohl, K. K. Naturhist. Hofmus., Ann. 11: 497.
Type-species: *Nitelopterus slossonae* Ashmead. Monotypic.
Miscophus subg. *Hypomiscophus* Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 321.
Type-species: *Miscophus* (*Hypomiscophus*) *arenarum* Cockerell. Monotypic.
Miscophinus Ashmead, 1898. Ent. News 9: 187.
Type-species: *Miscophinus laticeps* Ashmead. Orig. desig.

Biology: Powell, 1967. Kans. Ent. Soc., Jour. 40: 331-346, 1 fig. (comparative behavior of some N. Amer. spp.).

aenescens (Bridwell). Oreg. (Mt. Jefferson).
Hypomiscophus aenescens Bridwell, 1920. Hawaii. Ent. Soc. Proc. 4: 394. ♂.

arenarum Cockerell. N. Mex. (Mesilla Park).
Miscophus (*Hypomiscophus*) *arenarum* Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 321. ♀.

californicus (Ashmead). Calif., Ariz.
Miscophinus californicus Ashmead, 1898. Ent. News 9: 188. ♂.

cyanurus (Rohwer). Colo. (Boulder).
Miscophinus cyanurus Rohwer. 1909. Amer. Ent. Soc., Trans. 35: 125. ♀, ♂.

evansi (Krombein). Wyo., Wash. Ecology: Nests in sand, constructs up to 6 cells per nest and stores 10-20 small spiders per cell. Parasite: *Senotainia* sp. in *trilineata* (Wulp) complex ? Prey: *Dictyna* sp. juveniles.
Nitelopterus evansi Krombein, 1963. Ent. News 74: 61. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 283, figs. 88-92 (larva).

Biology: Evans, 1963. Ent. News 74: 234-236, figs. 1-2 (nest, prey, parasite). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 489 (nest, prey, parasite).

galei (Rohwer). Colo.
Miscophinus galei Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 124. "♀" = ♂.

kansensis (Slansky). Kans. (Lawrence). Ecology: Makes a 1-celled nest in sand, usually stores 13-16 small spiders per cell, although as few as 7 or as many as 29 prey may be placed in a single completed cell. Prey: *Theridion rabuni* Chamb. and Ivie, *T. glaucescens* Beck., *Euryopis texana* Bks.; *Tennesseellum formica* (Em.); *Grammonota sclerata* Ivie and Barr.; *Tetragnatha laboriosa* Hentz; *Oxyopes salticus* Hentz; *Dictyna bicornis* Em., *D.* sp.; mostly immatures are stored although adults are used occasionally.
Nitelopterus kansensis Slansky, 1969. Kans. Ent. Soc., Jour. 42: 467, 3 figs. ♂, ♀.

Biology: Kurczewski, 1969. Kans. Ent. Soc., Jour. 42: 483-492, figs. 2, 6-8, 13 (nest, prey transport, egg).

laticeps (Ashmead). Calif., Ariz. Ecology: Makes 1-celled nest in sand, stores 4-8 prey per completed cell. Prey: *Psilochorus rockefelleri* Gertsch adults; *Oecobius* sp. juvenile; *Sitticus* sp., *Pellenes* sp., both juveniles; *Pardosa* sp. juvenile.
Miscophinus laticeps Ashmead, 1898. Ent. News 9: 188. ♀.

Biology: Cazier and Mortenson, 1965. Pan-Pacific Ent. 41: 21-26, 1 fig. (nest, prey, egg). —Powell, 1967. Kans. Ent. Soc., Jour. 40: 332-345 (nest, prey transport, egg, life cycle; misdet. as *californicus*).

maurus (Rohwer). Colo.
Miscophinus maurus Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 126. ♀, ♂.

nigrescens (Rohwer). Colo. (Rifle).
Miscophinus nigrescens Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 125. ♀.

nigriceps (Rohwer). Calif. (Santa Monica).
Miscophinus nigriceps Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 587. ♀.

slossonae barberi (Krombein). Fla. Ecology: Makes a 1-celled nest in sand and provides up to 3 prey per cell. Prey: *Meioneta formica* (Em.); *Pellenes* sp.; *Lycosa* sp., *Geolycosa* sp.; all prey were immatures.
Nitelopterus slossonae barberi Krombein, 1954. Amer. Ent. Soc., Trans. 80: 12, fig. 8. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 283-284 (larva).

Biology: Krombein and Kurczewski, 1963. Biol. Soc. Wash., Proc. 76: 140-143 (nest, prey hunt and transport). —Krombein, 1964. Amer. Mus. Novitates 2201: 14-15 (nest, prey, life cycle).

slossonae slossonae (Ashmead). Fla. Ecology: Makes a 1-celled nest in sand and provides up to 11 small spiders in a completed cell. Prey: *Habrocestum pulex* (Hentz), *Metaphidippus* sp.; *Meioneta formica* (Em.); *Dictyna altamira* Gertsch and Davis; *Arctosa* sp., *Lycosa* spp., *Pardosa* sp.; *Steatoda ergoniformis* (Camb.); *Tetragnatha laboriosa* Hentz; most prey were juveniles but occasionally adults were used.
Nitelopterus slossonae Ashmead, 1896. *In* Kohl, K. K. Naturhist. Hofmus., Ann. 11: 497. ♂.

Biology: Krombein and Evans, 1954. Ent. Soc. Wash., Proc. 56: 232 (prey transport). —Krombein and Evans, 1955. Ent. Soc. Wash., Proc. 57: 231 (prey transport, nest). —Krombein and Kurczewski, 1963. Biol. Soc. Wash., Proc. 76: 140-143 (nest, prey transport). —Krombein, 1964. Amer. Mus. Novitates 2201: 13-14 (prey transport). —Kurczewski, 1969. Kans. Ent. Soc., Jour. 42: 494-500, figs. 9-12 (nest, prey transport, egg).

texanus (Ashmead). Tex., Ariz. Ecology: Nests in loose sand. Prey: *Steatoda fulva* Keys. subadult, *Latrodectus mactans* F. juvenile.
Miscophinus texanus Ashmead, 1898. Ent. News 9: 189. ♀.

Biology: Cazier and Mortenson, 1965. Pan-Pacific Ent. 41: 26-28 (nest, prey transport; the wasp was provisionally identified as *texanus*).

timberlakei (Bridwell). Calif. (Mt. San Jacinto).
Hypomiscophus timberlakei Bridwell, 1920. Hawaii. Ent. Soc., Proc. 4: 394. ♀.

Genus NITELA Latreille

Genus NITELA Subgenus NITELA Latreille

Nitela Latreille, 1809. Gen. Crust. Ins., v. 4, p. 77.
Type-species: *Nitela Spinolae* Latreille. Monotypic.
Rhinonitela Williams, 1928. Hawaii Sugar Planters' Assoc. Expt. Sta., Bul. Ent. Ser. 19: 97.
Type-species: *Rhinonitela domestica* Williams. Orig. desig.

Only the typical subgenus occurs in North America. Two of our species have been recorded as nesting in abandoned burrows of other insects in wood or twigs. There are no prey records for American species; several Palaearctic species have been reported to prey upon Psocoptera, Aphididae and Psyllidae.

Taxonomy: Pate, 1937. Brooklyn Ent. Soc., Bul. 32: 5-7 (key to N. Amer. spp.).

cerasicola Pate. N. Y. (Long Isl.). Ecology: Reared from burrow in dead cherry tree.
Nitela cerasicola Pate, 1937. Brooklyn Ent. Soc., Bul. 32: 5. ♀.

floridana Pate. Fla.
Nitela floridana Pate, 1934. Ent. News 45: 241. ♀.

leoni Krombein. Fla.
Nitela leoni Krombein, 1968. Nat. Canad. 95: 700. ♀, ♂.

townesorum Krombein. Calif. (Yosemite Park).
Nitela townesorum Krombein, 1950. Pan-Pacific Ent. 26: 130. ♀.

virginiensis Rohwer. N. Y. to Fla., W. Va., Mich., Wis., Miss. Ecology: Nests in twigs of *Rhus glabra*.
Nitela virginiensis Rohwer, 1923. Ent. Soc. Wash., Proc. 25: 100. ♀.

Taxonomy: Krombein, 1958. Ent. Soc. Wash., Proc. 60: 60. ♂.

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 945 (nest).

Subfamily TRYPOXYLONINAE

So far as known all members of this subfamily prey upon small spiders, storing rather large numbers per cell. A few species nest in the ground, utilizing pre-existing cavities or burrows of other arthropods. A number of species build free mud cells; our familiar pipe-organ wasp, *Trypargilum politum*, is the only North American representative having this habit. The majority of species nest above ground in cavities of various kinds such as abandoned beetle borings in twigs, logs or structural timber, old mud-dauber nests and hollow stems.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 89-99, figs. 36-68 (larvae). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 157-161, figs. 64-70 (larvae).

Genus PISONOPSIS Fox

Pisonopsis Fox, 1893. Psyche 6: 553.
Type-species: *Pisonopsis clypeata* Fox. Monotypic.

The North American *birkmanni* makes a linear series of cells in borings in stems. *P. clypeata* apparently usually makes a similar series of cells in pre-existing burrows in the soil, but it has also been reported as nesting in trap stems at ground level.

Revision: Williams, 1954. Pan-Pacific Ent. 30: 235-246 (N. Amer. spp.).

birkmanni Rohwer. Tex. to south. Calif.; Mexico. Ecology: Nests in borings in *Sambucus*, in stems of oats, white sage, poison hemlock, and in trap stems. Parasite: *Ceratochrysis antyga* Boh.; *Photopsis* sp. Prey: Thomisidae spp.
Pisonopsis birkmanni Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 129. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 157, figs. 64-70 (larva).

Biology: Williams, 1954. Pan-Pacific Ent. 30: 236, 238 (nest, prey, cocoon). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94-95 (nest, parasite). —Parker and Bohart, 1968. Pan-Pacific Ent. 44: 3 (nest, parasite).

clypeata clypeata Fox. Wyo., Nev., Calif. Ecology: Nests in pre-existing burrows in soil and in trap stems, making a linear series of cells, provides 9-17 prey per cell. Parasite: Sarcophagidae sp. Prey: *Chrysso nordica* (Chamb. and Ivie), *Theridion rabuni* (Chamb. and Ivie), *T. petraeum* (Koch); *Singa* sp.; most of prey were adult females, but one juvenile was stored.
Pisonopsis clypeata Fox, 1893. Psyche 6: 553. ♀, ♂.

Biology: Parker and Bohart, 1968. Pan-Pacific Ent. 44: 3 (nest, parasite). —Evans, 1969. Kans. Ent. Soc., Jour. 42: 118-121, figs. 1-4 (nest, prey transport).

clypeata occidentalis Williams. Calif. Ecology: Nests in ground in *Diadasia* burrows.
Pisonopsis clypeata occidentalis Williams, 1954. Pan-Pacific Ent. 30: 242, figs. 1-5, 8, 10, 15, 20, 22, 23, 26, 29. ♀, ♂.

Biology: Linsley, MacSwain and Smith, 1952. Calif. Univ. Pubs. Ent. 9: 274 (nest).

triangularis californica Williams. Calif.
Pisonopsis triangularis californica Williams, 1954. Pan-Pacific Ent. 30: 245, figs. 6, 9, 11, 13, 16-18, 24, 31. ♀, ♂.

triangularis triangularis Ashmead. Colo., Wyo., Idaho, Calif.
Pisonopsis triangularis Ashmead, 1899. Ent. News 10: 9. ♀.

Genus PISON Jurine

Genus PISON Subgenus PISON Jurine

Pison Jurine, 1808. *In* Spinola, Insectorum Liguriae, v. 2, p. 255.
Type-species: *Pison Jurini* Spinola. Monotypic.
Tachybulus Latreille, 1809. Gen. Crust. Ins., v. 4, p. 75.
Type-species: *Tachybulus niger* Latreille. Monotypic.
Nephridia Brulle, 1833. Soc. Ent. France, Ann. 2: 408.
Type-species: *Nephridia Xanthopus* Brulle. Monotypic.
Pison subg. *Pisonitus* Shuckard, 1838. Ent. Soc. London, Trans. 2: 79.
Type-species: *Pison* (*Pisonitus*) *argentatus* Shuckard. Desig. by Pate, 1937.
Pseudo-Nysson Radoszkowski, 1876. Soc. Ent. Rossica, Horae 12: 104.
Type-species: *Pseudo-Nysson fasciatus* Radoszkowski. Monotypic.
Taranga Kirby, 1883. Ent. Soc. London, Trans., p. 201.
Type-species: *Taranga dubia* Kirby. Monotypic.
Pisum Agassiz, 1847. Nomencl. Zool., fasc. 12, p. 293. Emend. Preocc.
Pisum Schulz, 1906. Spolia Hym., p. 212. Emend. Preocc.

It is not at all certain that the single species of typical *Pison* described from North America was correctly labeled as to locality. It has never been collected since in Georgia. In habitus the unique holotype is very reminiscent of some of the glossy black Micronesian and Melanesian species which suggests that perhaps it actually came from New Georgia in the Solomon Islands.

laeve Smith. Ga.
Pison laevis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 317. "♀" = ♂.

Genus PISON Subgenus KROMBEINIELLUM Richards

Paraceramius Radoszkowski, 1887. Soc. Ent. Rossica, Horae 21: 432. Preocc.
Type-species: *Paraceramius Koreensis* Radoszkowski. Monotypic.
Pison subg. *Krombeiniellum* Richards, 1962. A Revisional Study of the Masarid Wasps, p. 118. N. name.

Taxonomy: Menke, 1968. Canad. Ent. 100: 1100-1107, 15 figs. (review of New World spp.).

agile (Smith) Md., Va., Ill., Mich., Kans.; Japan, Korea, China, India, Sri Lanka. Ecology: Makes delicate mud cells in cracks, small depressions, old *Sceliphron* nests; cells are placed side by side, end to end, or in a clump; stores 20-31 small spiders per cell. Adventive after World War II, probably from Japan. Parasite: *Melittobia chalybii* Ashm. Prey: *Dictyna bellans* Chamb., *D. sublata* Hentz, *D.* sp.; both adults and juveniles.
Parapison agilis Smith, 1869. Ent. Soc. London, Trans., p. 300. ♀.

Paraceramius Koreensis Radoszkowski, 1887. Soc. Ent. Rossica, Horae 21: 433, figs. 1-3. ♀. N. syn. (K. V. Krombein).

Taxonomy: Krombein, 1958. Ent. News 69: 166-167. —Sheldon, 1968. Psyche 75: 111-114, figs. 5-10 (egg, larva, cocoon).

Biology: Krombein, 1958. Ent. News 69: 167 (nest, cocoon). —Sheldon, 1968. Psyche 75: 107-111, figs. 1-4 (nest, prey transport).

Genus TRYPOXYLON Latreille

Trypoxylon Latreille, 1796. Precis Caract. Gen. Ins., p. 121. No species.
Type-species: *Trypoxylon figulus* Linnaeus. First included species.
Tripoxylon Spinola, 1806. Insectorum Liguriae, v. 1, p. 65. Lapsus or emend.
Apius Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 106.
Type-species: *Sphex figulus* Linnaeus. Monotypic.
Apius Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 140. Preocc.
Type-species: *Sphex figulus* Fabricius. Desig. by Morice and Durrant, 1915.
Trypoxilon Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., pp. 2, 141. Lapsus or emend.
Trypoxylum Agassiz, 1847. Nomencl. Zool., p. 380. Emend.
Trypoxylum Schulz, 1906. Spolia Hym., p. 212. Emend. Preocc.
Trypoxylon subg. *Asaconoton* Arnold, 1959. South. Rhodesia Natl. Mus., Occas. Papers, no. 23, B, p. 322.
Type-species: *Trypoxylon* (*Asaconoton*) *egregium* Arnold. Orig. desig.

Sandhouse (1940) is the most reliable source for identification of North American species for Richards (1934) does not include all of our species. The revisions cited below include the species of both *Trypoxylon* and *Trypargilum* which are considered herein to be separate genera.

Most species of *Trypoxylon* nest in pre-existing cavities such as hollow stems or twigs, abandoned beetle borings in dead wood or structural timber, or, rarely, in soil. The Species Group Fabricator is unusual in that some species build free mud cells whereas others nest in pre-existing cavities in wood or soil. The preferred prey of the North American species are small spiders, usually immatures, belonging to several families of snare-builders, but errant spiders are used occasionally; as few as 4 and as many as 20 spiders may be stored in a single cell. *Trypoxylon* males do not participate in some of the nesting activities as do those belonging to *Trypargilum;* there is one report of a male usually being present in the nest of an extralimital species of the Fabricator Group, but this needs confirmation. The cocoons of our North American species are delicate silken structures except in *johnsoni* which constructs a brittle cocoon incorporating sand from the cell partition.

Revision: Fox, 1891. Amer. Ent. Soc., Trans. 18: 136-148, 1 pl. (N. Amer. spp.). —Fox, 1893. Acad. Nat. Sci. Phila., Proc. 45: 472-474 (revised key to N. Amer. spp.). —Richards, 1934. Roy. Ent. Soc. London, Trans. 82: 173-362, 56 text figs., 5 pls. (New World spp.). —Sandhouse, 1940. Amer. Midland Nat. 24: 133-176, 4 pls. (N. Amer. spp.).

Species Group Figulus

Members of Species Group Fabricator are included here.

aldrichi Sandhouse. Alta., Mont. and Wyo. west to B. C. and north. Calif. Ecology: Nests in borings in trap stems. Predator: *Philanthus zebratus nitens* (Bks.).
Trypoxylon (*Trypoxylon*) *aldrichi* Sandhouse, 1940 Amer. Midland Nat. 24: 158, figs. 25, 53, 62, 66, 67. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 95, figs. 56-58 (larva).

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest).

bidentatum Fox. Wash. and Idaho south to Calif. and Ariz. Ecology: Nests in borings in *Sambucus* and in trap stems. Parasite: *Trichrysis doriae* (Grib.).
Trypoxylon bidentatum Fox, 1891. Amer. Ent. Soc., Trans. 18: 143. ♀, ♂ (? in part).
Trypoxylon morrisoni Richards, 1934. Roy. Ent. Soc. London, Trans. 82: 319. ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest, parasite).

clarkei Krombein. Mass. to Fla., Tenn., Ill., Mo., Tex. Ecology: Nests in trap-nests, stores 4-6 prey per cell. Prey: *Mangora gibberosa* Hentz.
Trypoxylon (Trypoxylon) clarkei Krombein, 1962. Biol. Soc. Wash., Proc. 75: 9. ♂, ♀.

Biology: Krombein, 1967 Trap-nesting wasps and bees, pp. 229-230 (nest, prey, life cycle).

fastigium Fox. D. C., Ga., Miss., Tex., Okla., Mo., Ark., Kans., Nebr., Idaho, Utah, Nev., Ariz., Calif. Parasite: *Trichrysis doriae* (Grib.).
Trypoxylon carinifrons Fox, 1891. Amer. Ent. Soc., Trans. 18: 142. ♀, ♂. Preocc.
Trypoxylon fastigium Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc. 45: 476. N. name.
Trypoxylon subfrigidum Rohwer, 1909. Ent. News 20: 378. ♂.
Trypoxylon nigrellum Rohwer, 1909. Ent. News 20: 379. ♀.

figulus figulus (Linnaeus). Que., Maine, N. H., Mass.; Europe. Ecology: In Europe it nests in hollow stems or beetle borings and preys mostly upon Araneidae. Possibly adventive in North America. Parasite: *Perithous divinator* (Rossi). Other subspp. occur in the Palaearctic Region.
Sphex figulus Linnaeus, 1758. Syst. Nat., ed. 10, p. 570.
Sphex fuliginosa Scopoli, 1763. Ent. Carn., p. 292.
Trypoxylon figulum var. *major* Kohl, 1883. Schweiz. Ent. Ges., Mitt. 6: 657. ♂.
Trypoxylon apicalis Fox, 1891. Amer. Ent. Soc., Trans. 18: 142, fig. 10. ♀.
Trypoxylon figulum var. *minor* de Beaumont, 1945. Schweiz. Ent. Ges., Mitt. 19: 478. ♀, ♂.

Taxonomy: Giordani Soika, 1934. Soc. Ent. France, Ann. 103: 342-343, pl. 3, fig. 2 (larva). —Pate, 1943. Brooklyn Ent. Soc., Bul. 38: 46 (synonymy of *apicale*).

frigidum frigidum Smith. Hudson Bay south to N. C., west to Wash. and N. Mex. Ecology: Nests in hollow stems and twigs, in abandoned beetle borings in dead wood and structural timber, and in trap-nests, stores 4-16 prey per cell. Parasite: *Pyemotes ventricosus* (Newp.); *Megaselia* sp.; *Anthrax* sp.; *Amobia distorta* (Allen); *Melittobia chalybii* Ashm.; Cleonymidae sp., possibly *Ptinobius magnificus* (Ashm.); *Trichrysis doriae* (Grib.). Prey: *Achaearanea globosa* (Hentz), *Thymoites unimaculata unimaculata* (Em.), *Theridion albidum* Bks., *T. differens* Em., *T. frondeum* Hentz ?, *T. globosum* Hentz, *T. lyra* Hentz, *T. murarium* Em., *T.* sp. in Murarium Group, *T. unimaculatum* Em.; Salticidae sp.; *Eustala anastera* (Walck.), *E.* sp., Araneidae spp.; *Tennesseellum formicum* (Em.); *Leucauge venusta* (Walck.), *Tetragnatha* sp.; *Ceratinopsis interpres* Camb., *C. purpurescens* Keys., Micryphantidae sp.; both adults and immatures are stored and most are snare-building species. Other subspp. occur in the Palaearctic Region.
Trypoxylon frigidum Smith, 1856. Cat. Hym. Brit Mus., v. 4, p. 381. ♀.
Trypoxylon plesium Rohwer, 1920. U. S. Natl. Mus., Proc. 57: 229. ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 96, figs. 59-60 (larva).

Biology: Packard, 1867. Ent. Soc. Phila., Proc. 6: 415 (nest). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 22. —Blackman and Stage, 1924. N. Y. State Col. Forestry, Syracuse Univ., Tech. Pub. 17: 197 (nest). —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 197 (nest). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 439-441, figs. 65, 66 (nest, parasites). —Taylor, 1928. Psyche 35: 225 (nest). —Pate, 1937. Brooklyn Ent. Soc., Bul. 22: 5 (nest). —Thomas, 1962. Amer. Midland Nat. 67: 365 (nest, parasite). —Thomas, 1963. Mich. Acad. Sci., Arts, Letters, Papers 48: 127-130 (nest, life cycle, parasite). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 223-227, fig. 11 (nest, prey, life cycle, parasites). —Medler, 1967. Amer. Midland Nat. 78: 344-358 (nest, prey, cocoon, parasites, life cycle).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 21, figs. M-P (male genitalia).

johnsoni Fox. Ont., N. Y. to Fla. west to Mich., Mo., Okla., Tex. Ecology: Nests in hollow stems or borings in wood, and possibly in pre-existing burrows in earth. Prey: *Tetragnatha* spp.; *Micrathena gracilis* (Walck.), *Araneus* sp.?; prey consisted of immatures and penultimate stages of both sexes.
Trypoxylon Johnsoni Fox, 1891. Amer. Ent. Soc., Trans. 18: 147. ♀.
Trypoxylon ornatipes Fox, 1891. Amer. Ent. Soc., Trans. 18: 148. ♂.

Trypoxylon (*Trypoxylon*) *adelphiae* Sandhouse, 1940. Amer. Midland Nat. 24: 151. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 97, fig. 61 (larva).

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 137-139 (nest, prey). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 22 (nest ?). —Krombein, 1952. Amer. Ent. Soc., Trans. 78: 93 (prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 229-231 (nest, prey, life cycle, cocoon).

kolazyi Kohl. N. Y. to Ga., W. Va., Ill., Mo.; Austria, Mediterranean area. Ecology: Nests in abandoned anobiid borings in structural lumber and in trap-nests. Adventive from Europe. Parasite: *Trichrysis doriae* (Grib.). Prey: *Tennesseellum formicum* (Em.); Micryphantidae sp.; adults and subadults.

Trypoxylon Kolazyi Kohl, 1893. Zool.-Bot. Gesell. Wien, Verhandl. 43: 29. ♂, ♀.

Trypoxylon (*Trypoxylon*) *backi* Sandhouse, 1940. Amer. Midland Nat. 24: 164, figs. 18, 74, 75. ♀, ♂. N. syn. (R. E. Coville).

Biology: Sandhouse, 1940. Amer. Midland Nat. 24: 165 (nest). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 21-22 (nest, prey). —Thomas, 1962. Amer. Midland Nat. 67: 364 (parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 227-228 (nest, prey, life cycle).

pennsylvanicum pennsylvanicum Saussure. Que. and Maine to Fla. west to Colo. and Tex. Ecology: Nests in cavity in twig. Prey: Araneidae sp. immature. Another subsp. occurs in Japan.

Trypoxylon pennsylvanicum Saussure, 1867. Reise d. Novara, Zool. 2, Hym., p. 82. ♀.

Biology: Sandhouse, 1940. Amer. Midland Nat. 24: 160 (nest). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 64 (prey).

regulare Viereck. Mo., Kans.

Trypoxylon regulare Viereck, 1906. Amer. Ent. Soc., Trans. 32: 205. "♀" = ♂.

sculleni Sandhouse. Mont. to Ariz. west to B. C. and Calif. Ecology: Nests in cavities in twigs, *Sambucus*, *Rhus glabra*, and *Eriogonum*, and in trap stems. Parasite: *Anthrax irroratus* Say; *Trichrysis doriae* (Grib.).

Trypoxylon (*Trypoxylon*) *sculleni* Sandhouse, 1940. Amer. Midland Nat. 24: 160, figs. 15, 52, 58, 59, 65. ♀, ♂.

Biology: Sandhouse, 1940. Amer. Midland Nat. 24: 162 (nest). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest, parasites).

Species Group Rufidens

bridwelli Sandhouse. Tex. (Brownsville).

Trypoxylon (*Trypoxylon*) *bridwelli* Sandhouse, 1940. Amer. Midland Nat. 24: 168, figs. 24, 40. ♂.

richardsi Sandhouse. Ont., N. Y. to Fla., west to Mich., Ind., Mo., Ala., Tex. Ecology: Nests in cavity in twig of *Chionanthus virginiana* and in twig gall on oak. Prey: Small spiders.

Trypoxylon (*Trypoxylon*) *richardsi* Sandhouse, 1940. Amer. Midland Nat. 24: 167, figs. 22, 42, 43. ♀, ♂.

Biology: Sandhouse, 1940. Amer. Midland Nat. 24: 168 (nest). —Krombein, 1959. Biol. Soc. Wash., Proc. 72: 101-102 (nest, prey, life cycle).

timberlakei Sandhouse. Ariz., Calif. Ecology: Nests in deserted gall of *Callirhytis hamiformis* (Bass.) on *Quercus wislizenii*.

Trypoxylon (*Trypoxylon*) *timberlakei* Sandhouse, 1940. Amer. Midland Nat. 24: 169. ♀.

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 956 (nest).

Species Group Scutatum

carinatum Say. U. S. east of 100th meridian north to Mass. Ecology: Reared from burrow in partly decayed trunk of tulip-tree, also nests in borings in wood. Prey: *Theridion lyricum* Walck.

Trypoxylon carinatus Say, 1837. Boston Jour. Nat. Hist. 1: 374. ♂.

Biology: Sandhouse, 1940. Amer. Midland Nat. 24: 154 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 228-229 (nest, prey, life cycle, cocoon).

Species Group Marginatum

punctivertex Richards. Okla., Tex. south to Brazil.
Trypoxylon (*Trypoxylon*) *punctivertex* Richards, 1934. Roy. Ent. Soc. London, Trans. 82: 333. ♀.

Genus TRYPARGILUM Richards

Trypoxylon subg. *Trypargilum* Richards, 1934. Roy. Ent. Soc. London, Trans. 82: 191.
Type-species: *Trypoxylon nitidum* Smith. Orig. desig.

Sandhouse (1940) is the most reliable source for identification of North American species for Richards (1934) does not include all of our species. The revisions cited below include the species of both *Trypargilum* and *Trypoxylon* which are considered herein to be separate genera.

Some aspects of the ethology are unique among wasps. This genus and some species of *Pison* are the only wasps in which males are known to assist in some of the nesting activities. They remain in the nest while the female is hunting for prey and discourage attack by at least some of the parasites that afflict wasps. Activities in which the males may participate include cleaning out a pre-existing boring which is to serve as a nesting site, taking prey from the female and placing it in the cell, and helping the female seal inner partitions of cells with mud which she brings to the nest. The larvae also exhibit unusual behavior in that the cocoon which incorporates silk, other salivary secretions and mud from the cell partition is specifically different in each of the North American species which have been observed.

North American species have been reported to store 3-36 small, usually immature spiders per cell. Some species use only snare-building spiders as prey, one uses predominantly snare-building spiders but does include some errant spiders, and others use predominantly errant types but with a number of snare-builders. This suggests that there are specific differences in the way that groups of species hunt for prey.

In North America members of the Spinosum, Nitidum and Punctulatum Groups nest in pre-existing cavities such as hollow stems or twigs, old insect galls or mud dauber nests, abandoned beetle borings in dead wood or structural timber and in trap-nests. Our single member of the Albitarse Group is a mud dauber and builds the familiar pipe-organ nest.

Revision: Fox, 1891. Amer. Ent. Soc., Trans. 18: 136-148, 1 pl. (N. Amer. spp.). —Fox, 1894 (1893). Acad Nat. Sci. Phila., Proc. 45: 472-474 (revised key to N. Amer. spp.). —Richards, 1934. Roy. Ent. Soc. London, Trans. 82: 173-362, 56 text figs., 5 pls. (New World spp.). —Sandhouse, 1940. Amer. Midland Nat. 24: 133-176, 4 pls. (N. Amer. spp.).

Taxonomy: Krombein, 1959. Ent. Soc. Wash., Proc. 61: 152-153 (key to red-marked Fla. taxa).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 178-185, text fig. 2 (male behavior, cocoon differences, prey preferences, competition for nesting sites, differing emergence dates).

Species Group Spinosum

Members of this group prey upon both errant and snare-building spiders, but prefer the former by a substantial margin.

bicalcaratum (Richards), n. comb. South. Ariz.; Mexico.
Trypoxylon (*Trypargilum*) *bicalcaratum* Richards, 1934. Roy. Ent. Soc. London, Trans. 82: 235. ♂.

californicum Saussure. Tex., N. Mex., Ariz., Utah, Nev., Calif., Oreg., Wash. Ecology: Nests in borings in wood, stores 8-19 prey per cell. Parasite: Chrysididae sp. Prey: *Agassa* sp., *Habronattus* sp., *Metaphidippus* sp., *Phidippus* sp., *Synemosyna* sp., Salticidae spp.; *Ebo* sp., *Misumenops* sp., *Philodromus* sp., Thomisidae spp.; *Oxyopes tridens* Brady, *O.* sp.; Clubionidae sp.; *Dictyna* sp.; Araneidae spp.; stores mostly errant spiders, only a few snare-builders.
Trypoxylon californicum Saussure, 1867. Reise d. Novara, Zool. 2, Hym., p. 78. ♀.
Trypoxylon arizonense Fox, 1891. Amer. Ent. Soc., Trans. 18: 145. ♀. N. syn. (R. E. Coville).

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 92, figs. 47-48 (larva).

Biology: Matthews and Matthews, 1968. Psyche 75: 285-293, 2 figs. (nest, prey, cocoon).

clavatum clavatum (Say), n. status (R. E. Coville). Ont., U. S. east of Rockies except New England, Ariz. Ecology: Nests in borings in wood, old mud dauber and *Polistes* nests, and old mining bee burrows; stores 5-22 spiders per cell. Parasite: *Pyemotes ventricosus* (Newp.); *Anthrax aterrima* (Big.); *Megaselia* sp. ?; *Amobia distorta* (Allen), Miltogramminae spp.; *Melittobia chalybii* Ashm.; *Sphaeropthalma p. pensylvanica* (Lep.), *S. p. scaeva* (Bl.); *Trichrysis carinata* (Say). Prey: *Dictyna sublata* (Hentz); *Clubiona* sp., Clubionidae sp.; *Anyphaena pectorosa* Koch, *A.* sp., *Anyphaenella saltabunda* (Hentz), Anyphaenidae spp.; *Misumenops asperatus* (Hentz), *M. oblongus* (Keys.), *M.* spp., *Misumenoides aleatorius* (Hentz), *Synema parvula* (Hentz), *Xysticus triguttatus* Keys., *X.* spp., *Philodromus rufus* Walck., *P. marxii* Keys., *P. pernix* Blackw. *P. satullus* Keys., *P. washita* Bks., *P.* spp., *Thanatus formicinus* (Oliv.), *T. striatus* Koch, Misumeninae spp.; *Salticus scenicus* (L.), *Evarcha hoyi* Peckh., *Onondaga lineata* (Koch), *Habronattus* sp., *Phidippus audax* (Hentz), *P. clarus* Keys., *P.* spp., *Paraphidippus marginatus* (Walck.), *P.* spp., *Zygoballus bettini* Peckh., *Z. nervosus* (Peckh.), *Z. sexpunctatus* (Hentz), *Thiodina iniquies* (Walck.), *T. puerpera* (Hentz), *Hentzia mitrata* (Hentz), *Maevia vittata* (Hentz), *Icius elegans* (Hentz), *I. hartii* Em., *Metaphidippus insignis* (Bks.), *M. protervus* (Walck.), *M. galathea* (Walck.), Salticidae spp.; *Dapanus mira* (Walck.); *Pardosa* sp., Lycosidae spp.; *Oxyopes salticus* Hentz, Oxyopidae spp.; *Argiope aurantia* Luc., *A. trifasciata* (Forsk.), *Mangora gibberosa* (Hentz), *M. maculata* (Keys.), *Eustala anastera* (Walck.), *E.* sp., *Neoscona minima* Camb., *N. domiciliorum* (Hentz), *N.* sp., *Araneus juniperi* (Em.), *A.* spp., *Araniella displicata* (Hentz), Araneidae spp.; Theridiidae spp.; *Tetragnatha* sp.; prefers errant to snare-building spiders by ratio of 4: 1. Predator: *Cymatodera* sp.?, *Lecontella cancellata* (LeC.); *Trogoderma ornatum* Say.

Trypoxylon clavatus Say, 1837. Boston Jour. Nat. Hist. 1: 374.

Trypoxylon annulare Dahlbom, 1844. Hym. Europaea, v. 1, pp. 282, 509. ♀.

Trypoxylon rufozonalis Fox, 1891. Amer. Ent. Soc., Trans. 18: 145. ♀, ♂. N. syn. (R. E. Coville).

Trypoxylon quintilis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 206. ♂.

Trypoxylon cockerellae Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 130. ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 91, figs. 36-43 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85 160 (larva).

Biology: Ashmead, 1894. Psyche 1: 45 (nest). —Rau and Rau, 1916. Jour. Anim. Behavior 6: 34, figs. 16, 19, 24, 25 (nest). —Rau and Rau, 1918. Wasp Studies Afield, pp. 135-137, fig. 32 (nest). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 22 (nest). —Blackman and Stage, 1924 N. Y. State Col. Forestry, Syracuse Univ., Tech. Pub. 17: 196 (nest). —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 198 (nest). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 406 (prey, life cycle). —Rau, 1931. Ent. News 42: 200 (homing experiments). —Muma and Jeffers, 1945. Ent. Soc. Amer., Ann. 38: 246, 252, 255, pl. 2, figs. 5, 6 (nest, prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 203-210, text fig. 2b, figs. 11, 133 (nest, prey, life cycle, egg, cocoon, parasites, predators).

clavatum johannis (Richards), n. status (R. E. Coville). Ga., Fla. Ecology: Nests in borings in wood, stores 8-17 spiders per cell. Parasite: *Amobia floridensis* (Tns.), Miltogrammini sp. Prey: *Lyssomanes viridans* (Hentz), *L. viridis* (Walck.); *Misumenops bellulus* (Bks.), *M. celer* (Hentz), *M.* sp., *Tmarus* sp., *Tibellus* sp., Thomisidae sp.; *Pellenes* sp., *Paraphidippus marginatus* (Walck.), *Phidippus audax* (Hentz), *P. variegatus* Luc., *P. clarus* Keys., *P.* sp., *Icius* sp., *Hentzia ambigua* (Walck.), *H. palmarum* Hentz, *H.* sp., *Maevia hobbsi* Barnes, *M. michelsoni* Barnes, *Thiodina sylvana* Hentz, *T. pseustes* Chamb. and Ivie; *Mimetus notius* Chamb.; *Pardosa* sp.; *Oxyopes salticus* Hentz, *O.* sp., *Peucetia abboti* (Walck.); *Gea heptagon* (Hentz), *Drexelia directa* (Hentz), *Eustala anastera* (Walck.), *Mangora placida* (Hentz), *Wagneriana tauricornis* Chamb., *Neoscona arabesca* (Walck.), *N. minima* (Keys.), *N.* sp., *Argiope aurantia* Luc., *A. trifasciata* (Forsk.), Araneidae sp.; *Leucauge venusta* (Walck.); prefers errant to snare-building spiders by a ratio of 3:1.

Trypoxylon (*Trypargilum*) *johannis* Richards, 1934. Roy. Ent. Soc. London, Trans. 82: 238. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 92, figs. 44-46 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 160 (larva).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 210-214, text fig. 2c, fig. 52 (nest, prey, life cycle, egg, cocoon, parasites).

saussurei (Rohwer), n. comb. South. Ariz. south to Guanacaste Prov., Costa Rica. Ecology: Nests in old *Sceliphron* cells.

Trypoxylon Mexicanum Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 78, pl. 4, fig. 45. ♀, ♂. Preocc.

Trypoxylon saussurei Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 478. N. name.

Biology: Rau, 1943. Ent. Soc. Amer., Ann. 36: 649 (nest).

spinosum (Cameron). Tex. to Panama. Ecology: Nests in holes in masonry, crevices along tree trunk and in bamboo stems; stores 11-20 spiders per cell. Parasite: Sarcophagidae sp. Prey: *Aysha decepta* Bks., *A. gracilis* (Hentz), *Anyphaena* sp.; *Gea ergaster* (Walck.), *Neoscona* sp.; *Mimetus notius* Chamb.; *Peucetia viridans* (Hentz); *Hentzia palmarum* (Hentz), *Metaphidippus* sp., *Paraphidippus marginatus* (Walck.); *Misumenops oblongus* (Keys.); *Uloborus glomosus* Walck.; both adults and immatures are stored.

Trypoxylon spinosum Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 46. ♀, ♂.

Trypoxylon cinereo-hirtum Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 44. ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 93, fig. 49 (larva).

Biology: Lin, 1969. Wasmann Jour. Biol. 27: 125-128 (nest, prey hunt, life cycle, egg, cocoon).

texense (Saussure). Ga., Fla., Ala. to Ill. west to N. Mex., Colo., S. Dak. Ecology: Nests in abandoned mud-dauber cells, old burrows of other arthropods in sand banks, and crevices in wooden or stone wall; stores 9-15 spiders per cell. Parasite: *Anthrax limatulus artemisia* Marst. Prey: *Oxyopes salticus* Hentz, *Peucetia viridis* (Walck.); *Neoscona arabesca* (Walck.), *Gea ergaster* (Walck.), *Argiope trifasciata* (Forsk.), *A.* sp., *Eustala cepina* (Walck), *Metepeira* sp., *Araneus cornutus* Clerck; *Tetragnatha pallescens* Camb., *T. versicolor* Walck.; *Misumenops delphinus* (Walck.), *M. oblongus* (Keys.), *Tibellus duttoni* (Hentz), *Xysticus* sp., *Philodromus* sp., *Misumena* sp.; *Zygoballus nervosus* Peckh., *Habronattus brunneus* (Peckh.), *Hentzia ambigua* (Walck.), *Marpissa pikei* (Peckh.), *Metaphidippus galathea* (Walck.), *Paraphidippus marginatus* (Walck.), *Phidippus audax* Hentz, *P. rimator* (Walck.); *Pardosa distincta* (Blackw.); *Mimetus* sp.; *Theridion intritum* Bish. and Cros., *T. murarium* Em.; *Rucinia* sp.; *Dendryphantes* sp.; stores both immatures and adults, and about equal numbers of errant and snare-building species.

Typoxylon texense Saussure, 1867. Reise d. Novara, Zool. 2, Hym., p. 77. ♀.

Trypoxylon sulcus La Munyon, 1877. Nebr. Assoc. Adv. Sci., Proc., March 8.

Trypoxylon aureolum Rohwer, 1909. Ent. News 20: 381. ♀, ♂.

Trypoxylon relativum Rohwer, 1909. Ent. News 20: 382. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 159 (larva).

Biology: Hartman, 1905. Tex. Acad. Sci., Trans. 7: 71-73, pl. 4, fig. 23 (nest, prey). —Hungerford and Williams, 1912. Ent. News 23: 248, fig. 5 (nest, prey). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 441 (nest). —Rau, 1940. Ent. Soc. Amer., Ann. 33: 592 (nest). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 159 (nest). —Kurczewski, 1963. Fla. Ent. 46: 243-245 (nest, prey, egg). —Lin, 1969. Wasmann Jour. Biol. 27: 128-129 (nest, prey).

xantianum (Saussure), n. comb. South. Calif.; Mexico (Baja California).

Trypoxylon xantianum Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 78. ♂, ♀.

Species Group Punctulatum

lactitarse (Saussure). Ont. and Mass. to Fla., west to Wis., Tex. and Ariz., south to Argentina. Ecology: Nests in borings of other insects in dead wood and structural timber, in trap nests, in old mud dauber nests, and in old burrows of mining bees. Parasite: *Amobia aurifrons* (Tns.), *A. distorta* (Allen), *Senotainia* sp. in *trilineata* (Wulp) complex; *Anthrax a. argyropygus* Wied., *A. aterrimus* (Big.); *Megaselia* sp.; *Tyrophagus* sp.; *Melittobia chalybii* Ashm.; *Trichrysis carinata* (Say); *Sphaeropthalma pensylvanica*

scaeva (Bl.). Prey: *Clubiona obesa* Hentz, *C. pallens* Hentz; *Aysha gracilis* (Hentz), *Anyphaena celer* (Hentz), *A. fraterna* (Bks.), *A. pectorosa* Koch; *Philodromus washita* Bks., *P. infuscatus* Keys., *P. praelustris* Keys., *P. rufus* (Walck.), *P. pernix* Blackw., *P.* spp.; Salticidae sp.; *Pisaurina mira* (Walck.), *P.* sp.; *Mimetus puritanus* Chamb.; *Wixia ectypa* (Walck.), *Eustala anastera* (Walck.), *E. emertoni* Bks., *Acacesia hamata* (Hentz), *Mangora gibberosa* (Hentz), *M. maculata* (Keys.), *Neoscona arabesca* (Walck.), *N. domiciliorum* (Hentz), *N. minima* Camb., *N.* spp., *Araneus juniperi* (Em.), *A. patagiatus* Clerck, *A. marmoreus* Clerck, *A.* spp., *Araniella displicata* Hentz, *Neosconella pegnia* (Walck.), *Argiope trifasciata* (Forsk.), *Conepeira glyphica* Archer, Araneidae spp.; *Theridion differens* (Em.), *T. murarium* (Em.); *Poecilochroa capulata* (Walck.); snare-building spiders are preferred to errant by ratio of 13: 1. Predator: *Trogoderma ornatum* Say; *Lecontella cancellata* (LeC.).

Trypoxylon lactitarse Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 81. ♂.
Trypoxylon striatum Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 283. ♀.
Trypoxylon cinereum Cameron, 1889. Biol. Cent.-Amer., Hym., v. 2, p. 40. ♀, ♂.
Trypoxylon albopilosum Fox, 1891. Amer. Ent. Soc., Trans. 18: 139. ♀, ♂.
Trypoxylon albopilosum planoense Rohwer, 1909. Ent. News 20: 380. ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 94, fig. 55 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 161 (larva). —Menke, 1974. Ent. Soc. Wash., Proc. 76: 418 (identity of *lactitarse* Sauss.).

Biology: Peckham and Peckham, 1895. Psyche 7: 303 (nest, prey, male behavior in nest). —Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 77-87 (nest, prey, male behavior in nest). —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 199 (nest). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 423 (nest, prey). —Krombein, 1956. Ent. Soc. Wash., Proc. 58: 155-156 (nest, prey). —Balduf, 1961. Brooklyn Ent. Soc., Bul. 56: 82-83 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 214-222, text fig. 2e, figs. 53-56, 132, 134, 135 (nest, prey, life cycle, egg, cocoon, parasites, predator). —Medler, 1967. Amer. Midland Nat. 78: 344-358 (nest, prey, cocoon, parasites, life cycle).

Species Group Nitidum

Members of this group prey entirely upon snare-building spiders.

collinum collinum (Smith). Ga., Fla. Ecology: Nests in cavities in twigs and in trap nests, stores 13-25 spiders per cell. Parasite: *Anthrax a. argyropygus* Wied.; Phoridae sp.; *Trichrysis carinata* (Say). Prey: *Theridion flavonotatum* Beck., *T. glaucescens* Beck.; *Eustala anastera* (Walck.), *E. triflex* (Walck.), *Acacesia folifera* (Marx), *A. hamata* (Hentz), *Neoscona minima* Camb., *N.* spp., *Araneus juniperi* (Em.), *Conaranea floridensis* Bks., *C.* sp., *Neosconella pegnia* (Walck.), Araneidae spp. Predator: *Crematogaster* sp.

Trypoxylon collinum Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 381. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 160 (larva).

Biology: Krombein, 1964. Amer. Mus. Novitates 2201: 18 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 185-187 (nest, prey, life cycle, cocoon, parasites, predator). —Krombein, 1970. Smithsn. Contrib. Zool. 46: 22-26, figs 62-78 (nesting behavior, prey, life cycle).

collinum rubrocinctum (Packard). Que. to Ga., west to Minn., Kans., Nev. Ecology: Nests in cavities in twigs, trap nests, abandoned beetle borings, hollow straws, and in crevices in mortar; stores 5-27 spiders per cell. Parasite: *Anthrax a. argyropygus* Wied., *A. aterrimus* (Big.); *Megaselia* sp.; Miltogramminae sp.; *Sphaeropthalma pensylvanica scaeva* (Bl.); *Trichrysis carinata* (Say), *T. doriae* (Grib.), *Chrysis pellucidula* Aar., *C.* sp.; *Messatoporus compressicornis* Cush. Prey: *Conopistha* sp., *Theridula opulenta* (Walck.), *Theridion lyricum* Walck., *T. murarium* Em., *T. spirale* Em., *T. flavonotatum* Beck., *T. lyra* Hentz, *T. alabamense* Gertsch and Archer, *T. albidum* (Bks.), *T. differens* (Em.), *T.* spp., *Argyrodes* sp., Theridiidae spp.; *Eustala anastera* (Walck.), *E. emertoni* Bks., *E.* spp., *Cyclosa conica* (Pall.), *Neoscona arabesca* (Walck.), *N.* spp., *Araneus attestor* Petrunk., *A. juniperi* (Em.), *A. trifolium* (Hentz), *A.* spp., *Argiope aurantia*

Luc., *A. trifasciata* (Forsk.), *Mangora gibberosa* (Hentz), Araneidae spp.; *Linyphia clathrata* Sund., *L.* sp.; *Leucauge venusta* (Walck.).

Trypoxylon rubro-cinctum Packard, 1867. Ent. Soc. Phila., Proc. 6: 416. ♀.

Taxonomy: Evans, 1957. Amer. Ent. soc., Trans. 83: 94, fig. 63 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 161 (larva).

Biology: Peckham and Peckham, 1895. Psyche 7: 303 (nest, prey, life cycle). —Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 77-84 (nest, prey, life cycle). —Peckham and Peckham, 1905. Wasps, social and solitary, pp. 178-193, 2 figs. (nest, prey, male behavior in nest). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 22 (nest, parasite). —Krombein, 1954. Brooklyn Ent. Soc., Bul. 49: 5 (nest, prey). —Krombein, 1967. Trap-nesting wasps and bees, pp. 187-193, text fig. 2a, figs. 126, 135-139 (nest, prey, life cycle, cocoon, parasites). —Medler, 1967. Amer. Midland Nat. 78: 344-358 (nest, prey, cocoon, parasites, life cycle).

orizabense (Richards), n. comb. South. Ariz.; Mexico (Orizaba).

Trypoxylon (*Trypargilum*) *orizabense* Richards, 1934. Roy. Ent. Soc. London, Trans. 82: 273. ♀, ♂.

tridentatum archboldi (Krombein). Fla. Ecology: Nests in borings in wood, stores 9-36 spiders per cell. Parasite: *Anthrax a. argyropygus* Wied., *Lepidophora lepidocera* (Wied.) ?; *Pyemotes ventricosus* (Newp.). Prey: *Mimetus* sp.; *Gea heptagon* (Hentz), *Drexelia directa* (Hentz), *Eustala anastera* (Walck.) *Larinia directa* (Hentz), *Singa* sp., *Neoscona arabesca* (Walck.), *N.* sp., *Conarnea floridensis* Bks., *C.* sp., Araneidae spp.; *Theridula quadripunctata* Keys., *Theridion flavonotatum* Beck., *Chrysso clementinae* (Petrunk.), Theridiidae spp.

Trypoxylon (*Trypargilum*) *tridentatum archboldi* Krombein, 1959. Ent. Soc. Wash., Proc. 61: 150. ♀, ♂.

Biology: Krombein, 1959. Ent. Soc. Wash., Proc. 61: 151-152 (nest, prey, cocoon). —Krombein, 1967. Trap-nesting wasps and bees, pp. 200-202 (nest, prey, life cycle, cocoon, parasites).

tridentatum tridentatum (Packard). Conn. to Fla., west to B. C. and Calif. Ecology: Nests in *Sambucus* and white sage stems, borings in wood and old mud dauber nests. Parasite: *Trichrysis mucronata* (Br.), *T. deversor* Boh., *Ceratochrysis antyga* Boh., *Chrysis pellucidula* Aar.; *Sphaeropthalma uro* (Bl.), *S. amphion* (Fox), *S. abdominalis* (Bl.); *Tetrastichus* sp.; *Amobia floridensis* (Tns.), *A.* spp. ?; Bombyliidae sp.; *Pyemotes ventricosus* (Newp.). Prey: *Latrodectus mactans* (F.), *Theridion murarium* Em., *T. dilutum* Levi, *T.* sp.; *Mimetus hesperus* Chamb.; *Eustala rosae* Chamb. and Ivie, *E.* sp., *Metepeira arizonica* Chamb. and Ivie, *M.* sp., *Neoscona vertebrata* (McCook), *N.* sp., *Araneus* sp., *Acanthepeira stellata* (Walck.), *Cyclosa conica* (Pall.), Araneidae spp.

Trypoxylon tridentatum Packard, 1867. Ent. Soc. Phila., Proc. 6: 417. ♀.

Trypoxylon projectum Fox, 1891. Amer. Ent. Soc., Trans. 18: 141. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 93, figs. 50-52 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 161 (larva).

Biology: Rau and Rau, 1918. Wasp Studies Afield, p. 134 (nest, life cycle). —Blackman and Stage, 1924. N. Y. State Col. Forestry, Syracuse Univ., Tech. Pub. 17: 196-197 (nest). —Rau, 1934. Canad. Ent. 66: 259 (nest, parasite). —Hicks, 1934. Colo. Univ., Studies 21: 267 (nest, parasite). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest, parasites). —Krombein, 1967. Trap-nesting wasps and bees, pp. 193-200, text fig. 2d, figs. 115-118 (nest, prey, life cycle, egg, cocoon, parasites). —Paetzel, 1973. Pan-Pacific Ent. 49: 26-30, 3 figs. (male behavior in nest, mating; misdet. as *rubrocinctum*). —Paetzel, 1973. Outdoor World 6 (2): 42-45, 4 figs. (nest, prey, life cycle, male behavior in nest; misdet. as *rubrocinctum*).

Species Group Albitarse

politum (Say). Mass. to Fla. west to Kans. and Tex. Ecology: Builds linear series of mud cells in parallel rows resembling pipes of an organ, stores 3-18 prey per cell. Parasite: *Vidia* sp.; *Anthrax limatulus fur* (O. S.), *A. aterrimus* (Big.); *Amobia aurifrons* (Tns.), *A. distorta* (Allen), *Helicobia rapax* Wlkr., *Senotainia* sp.; *Sphaeropthalma p. pensylvanica*

(Lep.), *S. p. scaeva* (Bl.), *Dasymutilla v. vesta* (Cr.); *Melittobia chalybii* Ashm.; *Trichrysis tridens* (Lep.). Prey: *Neoscona minima* Keys., *N. benjamina* Walck., *N.* spp., *Eustala anastera* (Walck.), *Wixia ectypa* (Walck.), *Aranea* spp.; Theridiidae spp.; preys upon adults and immatures. Because of its nest this wasp is popularly known as the pipe-organ wasp.

Trypoxylon politus Say, 1837. Boston Jour. Nat. Hist. 1: 373.
Trypoxylon neglectum Kohl, 1884. Zool.-Bot. Gesell. Wien, Verh. 33: 340. ♂.
Trypoxylon basale Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 475. ♀, ♂.
Trypoxylon politiforme Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 476. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 95, fig. 62 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 161 (larva).

Biology: Rau, 1913. Ent. News 24: 401 (larval feeding). —Rau and Rau, 1916. Jour. Anim. Behavior 6: 31-35, fig. 5 (nest, prey, male behavior in nest). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 428-439, figs. 57-62 (nest, prey, life cycle, male behavior in nest, cocoon, parasites). —Osborne, 1929. Conn. Agr. Expt. Sta., Bul. 305: 751-753, 1 pl., 1 fig. —Dow, 1930. Brooklyn Ent. Soc., Bul. 25: 98-101 (nest). —Fattig, 1936. Canad. Ent. 68: 44 (nest, prey). —Hartman, 1944. Ent. News 55: 7 (prey). —Rau, 1944. Ent News 55: 9 (prey hunt). —Muma and Jeffers, 1944. Ent. News 55: 50 (nest). —Muma and Jeffers, 1945. Ent. Soc. Amer., Ann. 38: 246, 252, 254-255, figs. 3, 4 (nest, prey). —Lin, 1969. Wasmann Jour. Biol. 27: 129-130 (prey). —Johnson, 1974. Ent. Soc. Wash., Proc. 76: 448-449 (parasite). —Cross, Stith and Bauman, 1975. Ent. Soc. Amer., Ann. 68: 901-916, 10 figs. (mating, nest construction and provisioning, prey hunting, cocoon, life history, parasites).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 21, figs. L, Q, R (male genitalia).

Subfamily BOTHYNOSTETHINAE

Genus BOTHYNOSTETHUS Kohl

Bothynostethus Kohl, 1884. Zool.-Bot. Gesell. Wien, Verhandl. 33: 344.
Type-species: *Bothynostethus Saussurei* Kohl. Monotypic.

distinctus Fox. N. Y. to Fla. west to Idaho and Ariz. Ecology: Nests in sand, occasionally utilizing a rodent burrow, makes up to 8 cells per nest, stores 4-9 chrysomelid beetles per cell. Parasite: *Senotainia* sp. ? Prey: *Monoxia* sp., *Pyrrhalta decora* (Say), *P. perplexa* Fall., *P. spiraeae* Fall, *P. cavicollis* (LeC.), *Ophraella notata* (F.).
Bothynostethus distinctus Fox, 1891. Ent News 2: 31. ♀, ♂.

Taxonomy: Kurczewski and Evans, 1972. Psyche 79: 97-99, figs. 8-15 (larva).

Biology: Cazier and Mortenson, 1965. Pan-Pacific Ent. 41: 31-32 (nest, prey). —Kurczewski and Evans, 1972 Psyche 79: 88-97, figs. 1-7 (nest, prey transport, cocoon, parasites).

Family CRABRONIDAE

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 99-113, figs 69-115 (larvae). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 162-165, figs. 43-53, 61 (larvae). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 289-296, figs. 104-114 (larvae).

Subfamily OXYBELINAE

So far as known all species nest in the ground making uni- or multicellular nests and preferring rather friable soil.

Taxonomy: Pate, 1940. Amer. Ent. Soc., Trans. 66: 3-5 (group characters and key to world genera).

Genus BELOMICRUS Costa

Belomicrus Costa, 1871 (1866). R. Univ. Napoli Mus. Zool., Ann. 6: 80.
Type-species: *Belomicrus italicus* Costa. Monotypic.

Oxybeloides Radoszkowski, 1877. *In* Fedtschenko, Reise in Turkestan, Imp. Obschch. Moskva Izv. 26 (1): 68.
Type-species: *Oxybeloides fasciatus* Radoszkowski. Monotypic.
Oxybelomorpha Brauns, 1896. *In* Kohl, K. K. Naturhist. Hofmus, Ann. 11: 475.
Type-species: *Oxybelomorpha Kohlii* Brauns. Monotypic.
Belomicrus subg. *Nototis* Arnold, 1927. Transvaal Mus., Ann. 12: 64.
Type-species: *Belomicrus* (*Nototis*) *bicornutus* Arnold. Monotypic.
Belomicrus subg. *Pseudoxybelus* Gussakovskij, 1933. Akad. Nauk S. S. S. R., Zool. Inst., Trudy 1: 286.
Type-species: *Belomicrus* (*Pseudoxybelus*) *persa* Gussakovskij. Monotypic.

Scanty information is available on the biology of five species, two of which have been reported to construct multicellular nests with up to 4 cells per nest. Three North American species prey upon nymphal or adult mirid bugs; one North American and one European species prey upon adult melyrid beetles.

Revision: Pate, 1940. Amer. Ent. Soc., Trans. 66: 11-96, 209-257, 55 figs. (N. Amer. spp.)

apache Pate. N. Mex., Ariz.
Belomicrus apache Pate, 1940. Amer. Ent. Soc., Trans. 66: 15. ♀.

bridwelli Pate. Va., Tenn., Fla.
Belomicrus bridwelli Pate, 1940. Amer. Ent. Soc., Trans. 66: 93. ♂, ♀.

cahuilla Pate. Calif.
Belomicrus cahuilla Pate, 1940. Amer. Ent. Soc., Trans. 66: 39. ♂.

cladothricis (Cockerell). Tex. to Calif., Nev., Idaho; Mexico (Baja California).
Oxybelus cladothricis Cockerell, 1895. Canad. Ent. 27: 309. ♂, ♀.
Belomicrus cladothricis prosopidis Pate, 1940. Amer. Ent. Soc., Trans. 66: 72. ♂, ♀.
Belomicrus minidoka Pate, 1940. Amer. Ent. Soc., Trans. 66: 79. ♂.

coloratus Baker. Idaho, Nev., Calif. Prey: Miridae sp. nymphs.
Belomicrus colorata Baker, 1909. Pomona Col., Jour. Ent. 1: 29. ♀.

Biology: Bohart and Menke, 1976. Sphecid wasps of world, p. 363 (prey).

cookii Baker. Calif.
Belomicrus Cookii Baker, 1909. Pomona Col., Jour. Ent. 1: 29. ♂, ♀.

cucamonga Pate. Wash., Calif.
Belomicrus cucamonga Pate, 1940. Amer. Ent. Soc., Trans. 66: 76. ♀.

eriogoni Pate. Calif., Oreg., Nev., Utah.
Belomicrus cladothricis eriogoni Pate, 1940. Amer. Ent. Soc., Trans. 66: 70. ♂, ♀.

forbesii (Robertson). Colo. and Wyo. north to Man. and west to B. C. and Calif. Ecology: Nests in compact, sandy-clay soil sometimes mixed with gravel, makes 4-8 cells per nest, stores 5-13 prey per cell. Parasite: *Senotainia trilineata* (Wulp). Prey: *Orectoderes obliquus* Uhl. nymphs and a few adults, Miridae sp. nymphs. Predator: *Philanthus pulcher* D. T.
Oxybelus Forbesii Robertson, 1889. Amer. Ent. Soc., Trans. 16: 85. ♂.
Oxybelus (*Oxybeloides*) *columbianus* Kohl, 1892. K. K. Naturhist. Hofmus., Ann. 7: 208. ♂, ♀.
Belomicrus larimerensis Rohwer, 1908. Ent. News 19: 417. ♀.

Taxonomy: Evans, 1969. Kans. Ent. Soc., Jour. 42: 123-124, figs. 6-9 (larva).

Biology: Evans, 1969. Kans. Ent. Soc., Jour. 42: 122-123, fig. 5 (nest, prey transport).

franciscus Pate. Calif. Ecology: Nests in sand. Prey: *Trichochrous antennatus* Mots. adults.
Belomicrus franciscus Pate, 1931. Ent. News 42: 77. ♂, ♀.
Belomicrus quemaya Pate, 1940. Amer. Ent. Soc., Trans. 66: 47. ♂.

Biology: Williams, 1936. Pan-Pacific Ent. 12: 3-6 (nest, prey).

istam Pate. Calif.
Belomicrus istam Pate, 1940. Amer. Ent. Soc., Trans. 66: 81. ♂, ♀.

jurumpa Pate. Calif.
Belomicrus jurumpa Pate, 1940. Amer. Ent. Soc., Trans. 66: 53. ♂, ♀.

maricopa Pate. Ariz., N. Mex.
Belomicrus maricopa Pate, 1947. Ent. Soc. Wash., Proc. 49: 54. ♀.

mescalero Pate. Calif., N. Mex.
Belomicrus mescalero Pate, 1940. Amer. Ent. Soc., Trans. 66: 87. ♀.

mono Pate. Calif.
Belomicrus serrano mono Pate, 1940. Amer. Ent. Soc., Trans. 66: 46. ♀.

pachappa Pate. Calif.
Belomicrus pachappa Pate, 1940. Amer. Ent. Soc., Trans. 66: 73. ♀.

penuti Pate. Calif., Nev., Oreg. Prey: Miridae sp. nymphs.
Belomicrus forbesii penuti Pate, 1940. Amer. Ent. Soc., Trans. 66: 27. ♂, ♀.

Biology: Bohart and Menke, 1976. Sphecid wasps of world, p. 363 (prey).

potawatomi Pate. Iowa.
Belomicrus potawatomi Pate, 1947. Ent. Soc. Wash., Proc. 49: 57. ♀.

querecho Pate. N. Mex.
Belomicrus querecho Pate, 1940. Amer. Ent. Soc., Trans. 66: 36. ♂.

sechi Pate. South. Calif.
Belomicrus sechi Pate, 1940. Amer. Ent. Soc., Trans. 66: 60. ♂.

serrano Pate. Calif.
Belomicrus serrano serrano Pate, 1940. Amer. Ent. Soc., Trans. 66: 42. ♂, ♀.

timberlakei Pate. Calif.
Belomicrus timberlakei Pate, 1940. Amer. Ent. Soc., Trans. 66: 91. ♂.

tuktum Pate. Calif.
Belomicrus tuktum Pate. 1940. Amer. Ent. Soc., Trans. 66: 84. ♂.

vanyume Pate. Calif.
Belomicrus vanyume Pate, 1940. Amer. Ent. Soc., Trans. 66: 17. ♀.

vierecki Pate. Calif., N. Mex.; Mexico (Baja California, Puebla).
Belomicrus vierecki Pate, 1940. Amer. Ent. Soc., Trans. 66: 56. ♂, ♀.

Genus ENCHEMICRUM Pate

Enchemicrum Pate, 1929. Ent. News 40: 219.
Type-species: *Enchemicrum australe* Pate. Orig. desig.

The genus contains only one species.

Revision: Pate, 1940. Amer. Ent. Soc., Trans. 66: 257-264.

australe Pate. Ga. to Ariz. north to Okla. and Ill. Ecology: Makes multicellular nest in firmly packed sand, stores 12-16 flies per cell. Prey: *Paralimna texana* Cr., *Zeros flavipes* Cr.; *Medetera californiensis* Whlr. Predator: *Iridomyrmex pruinosus analis* (Andre), *Dorymyrmex pyramicus* (Rog.).
Enchemicrum australe Pate, 1929. Ent. News 40: 220. ♂, ♀.

Biology: Bohart and Holland, 1966. Pan-Pacific Ent. 42: 161 (nest, prey, predators).

Genus OXYBELUS Latreille

Oxybelus Latreille, 1796. Precis Caract. Gen. Ins., p. 129. No species.
Type-species: *Crabro uniglumis* of Fabricius. First included species.
Notoglossa Dahlbom, 1845. Hym. Europaea, v. 1, p. 514.
Type-species: *Notoglossa sagittata* Dahlbom. Monotypic.
Alepidaspis Costa, 1882. Accad. delle Sci. Fis. e Mat. Napoli, Atti 9 (11): 35.
Type-species: *Alepidaspis diphyllus* Costa. Monotypic.
Oxybelus subg. *Anoxybelus* Kohl, 1923. Konowia 2: 274.
Type-species: *Oxybelus* (*Anoxybelus*) *Maidlii* Kohl. Monotypic.
Gonioxybelus Pate, 1937. Amer. Ent. Soc., Mem. 9: 28.
Type-species: *Oxybelus nigripes* Olivier. Orig. desig.
Orthoxybelus Pate, 1937. Amer. Ent. Soc., Mem. 9: 45.
Type-species: *Vespa uniglumis* Linnaeus. Orig. desig.
Latroxybelus Noskiewicz and Chudoba, 1950. Polskie Pismo Ent. 19: 300.

Type-species: *Oxybelus latro* Olivier. Monotypic.

Bohart and Schlinger (1957) recognized six species groups in the Nearctic fauna. However, Peckham, Kurczewski and Peckham (1973) reported that some ethological information is not in concordance with this classification. It seems preferable not to recognize species groups at this time pending further systematic studies based on both morphology and ethology.

The majority of species nest in easily friable soil such as sand, and construct uni- or multicellular nests. Adult Diptera are preyed upon, some species using flies as large as themselves, others much smaller kinds. The prey is transported in flight either impaled on the sting or carried by the legs; some species which carry the prey with their legs may land and impale the prey on the sting before entering the nest. A number of species store mosty male flies, and a few are known to prey upon males only. The cell may be stored with as few as 2 flies or as many as 38, depending upon the species of wasp.

Taxonomy: Robertson, 1889. Amer. Ent. Soc., Trans. 16: 77-85. —Mickel, 1918 (1917). Nebr. Univ. Studies 17: 44-51 (Nebr. spp.). —Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 157-165 (annotated synonymical list of N. Amer. spp.). —Bohart and Schlinger, 1957. Calif. Ins. Survey, Bul. 4: 103-142, 23 maps, 93 figs. (descr. of Calif. spp. and key to N. Amer. spp.).

Biology: Bohart, Lin and Holland, 1966. Ent. Soc. Amer., Ann. 59: 820 (prey records of N. Amer. spp.). —Peckham, Kurczewski and Peckham, 1973. Ent. Soc. Amer., Ann. 66: 658-660 (ethology of N. Amer. spp.).

abdominalis Baker. U. S. west of 100th meridian, north to Idaho, Nebr,; north. Mexico.
Oxybelus abdominalis Baker, 1896. Ent. News 7: 158. ♂.
Notolossa calligaster Viereck, 1906. Amer. Ent. Soc., Trans. 32: 214. ♀.

argenteopilosus Cameron. West. N. Amer. from Colo. and Oreg. south to Mexico (Tehuantepec).
Oxybelus argenteopilosus Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 158, pl. 9, figs. 23, 23a. ♀.

argypheus Bohart and Schlinger. Calif., Ariz., south. Colo.
Oxybelus argypheum Bohart and Schlinger, 1956. Biol. Soc. Wash., Proc. 69: 38. ♀.

bipunctatus bipunctatus Olivier. Maine to Va.; Europe, Japan. Ecology: Nests in sand, makes 1-4 cells per nest, stores 2-12 prey per cell. Apparently adventive from Europe in 1935. Parasite: *Phrosinella fulvicornis* (Coq.), *Senotainia trilineata* (Wulp), Sarcophagidae spp. Prey: *Allognosta fuscitarsis* (Say), *Caloparyphus tetraspilus* (Lw.), *Euparyphus stigmaticalis* Lw., *Microchrysa polita* (L.), *Nemotelus nigrinus* Fall., *Oxycera picta* Wulp, *O. variegata* Oliv., *Sargus decorus* Say; *Chrysopilus quadratus* (Say), *Symphoromyia* sp.; *Psilocephala Haemorrhoidalis* (Macq.); *Diaphorus pseudopacus* Robinson; *Callomyia venusta* Snow, *Platypeza anthrax* Lw.; *Pipunculus* sp; *Chrysogaster inflatifrons* Shann., *C. nigripes* Lw., *Heringia salax* (Lw.), *Neocnemodon elongatus* (Curr.), *Platycheirus erraticus* Curr.; *Lonchaea nudifemorata* Mall., *L.* spp.; *Pholeomyia indecora* (Lw.); *Hylemya florilega* (Zett.), *H. fugax* (Meig.), *H. platura* (Meig.), *H. ciliciura* (Rond.), *H.* sp.; *Azelia* sp., *Fannia canicularis* (L.), *F. coracina* (Lw.), *F. depressa* (Stein), *F. manicata* (Meig.), *F. nidicola* Mall., *F. sociella* (Zett.), *Gymnodia cilifera* (Mall.), *Hebecnema vespertina* (Fall.), *Hydrotaea armipes* (Fall.), *H. basdeni* Coll., *H. occulta* (Meig.), *Spilogona* sp.; *Melanomya* sp.; *Metopia argyrocephala* (Meig.); *Alophorella aeneoventris* (Will.), *A. fumosa* (Coq.), *A. pulverea* (Coq.), *Hyalomya purpurascens* (Tns.), *Hyalomyodes triangulifer* (Lw.); prey consists of male Brachycera and Cyclorrhapha, rarely females of latter. Another subsp. occurs in the Mediterranean area.
Oxybelus bipunctatus Olivier, 1811. Encycl. Meth. Ins., v. 8, p. 597. ♀.
Oxybelus nigroaeneus Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 113. ♂.
Oxybelus laevigatus Schilling, 1848. Schles. Gesell. f. Vaterland. Kult. Arb. im Jahre 1847, p. 105.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 111, figs. 107-115 (larva).

Biology: Pate, 1946 (1945). Brooklyn Ent. Soc., Bul. 40: 165 (prey). —Krombein, 1948. Ent. Soc. Wash., Proc. 50: 67 (nest, prey). —Krombein, 1956. Brooklyn Ent. Soc., Bul. 51: 43

(prey). —Kurczewski and Harris, 1968. N. Y. Ent. Soc., Jour. 76: 81-83 (nest, parasites). —Peckham, Kurczewski and Peckham, 1973. Ent. Soc. Amer., Ann. 66: 647-651, figs. 1, 3-7 (nest, prey transport, egg, mating, parasites).

californicus Bohart and Schlinger. West. U. S. and north. Mexico.
Oxybelus californicum Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 147. ♂, ♀.

canalis Bohart and Schlinger. Southwest. U. S., north to Utah; north. Mexico.
Oxybelus canalis Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 149. ♂, ♀.

cochise Pate. Calif., Ariz., N. Mex., Tex.; Mexico (Chihuahua, Baja California).
Oxybelus cochise Pate, 1943. Brooklyn Ent. Soc., Bul. 38: 93. ♂.

cocopa Pate. Calif.
Oxybelus cocopa Pate, 1943. Pan-Pacific Ent. 19: 121. ♂.

cornutus Robertson. U. S. west of 100 degrees W., Montana south to Mexico (Guadalajara).
Oxybelus cornutus Robertson, 1889. Amer. Ent. Soc., Trans. 16: 80. ♂.
Oxybelus quadricolor Cockerell and Baker, 1896. Psyche 7 (sup.): 21. ♀.
Oxybelus polygoni Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 116. ♀.

crandalli Bohart and Schlinger. Ariz., Ark.
Oxybelus crandalli Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 154. ♀.

cressonii Robertson. Centr. U. S., Utah, and Tex., east to Va., north to Mich. Ecology: Makes unicellular nest in sand, stores 10-15 prey per cell. Prey: *Neopachygaster maculicornis* (*Hine*); *Thaumatomyia bistriata* (Wlkr.); *Coelotanypus scapularis* (Lw.).
Oxybelus Cressonii Robertson, 1889. Amer. Ent. Soc., Trans. 16: 83. ♀.

Biology: Krombein, 1948. Ent. Soc. Wash., Proc. 50: 67 (prey). —Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 398-400, fig. 1a, b (nest, prey transport).

decorosus (Mickel). U. S. east of 100 degrees W., Vt. and Minn., south to Fla.
Notoglossa decorosa Mickel, 1916. Amer. Ent. Soc., Trans. 42: 430. ♀.

emarginatus Say. U. S. and south. Canada, Mexico south nearly to Mexico City. Ecology: Usually makes unicellular nest in sand, occasionally a 2-celled nest, stores 4-38 prey per cell. Parasite: Diptera spp., Miltogrammini sp. ? Prey: *Anarete buscki* (Felt), *Lestremia* sp.; *Chironomus* sp.; *Chaoborus punctipennis* Say; *Culicoides stellifer* (Coq.); *Simulium* sp. in *jenningsi* Mall. group; *Microchrysa polita* (L.); *Syneches simplex* Wlkr.; *Chrysotus obliquus* Lw., *C. pomeroyi* Parent, *C.* spp., *Condylostylus caudatus* (Wied.), *C. flavipes* (Ald.), *C. nigrofemoratus* (Wlkr.), *C. patibulatus* (Say), *Diaphorus gibbosus* Van D., *D. similis* Van D., *Gymnopternus exilis* Lw., *G.* spp., *Medetera veles* Lw., *M. vittata* Van D., *M.* sp., *Neurigona lateralis* (Say); *Pipunculus* sp.; *Mesograpta marginata* (Say), *Toxomerus geminatus* (Say); *Euxesta notata* (Wied.); *Amphicnephes pullus* (Wied.), *Rivellia variabilis* Lw., *R. winifredae* Namba, *R.* sp.; *Euaresta bella* (Lw.); *Sepsis punctum* (F.); *Camptoprosopella borealis* Shew., *Lyciella annulata* (Mel.), *L.* sp., *Minettia lupulina* (F.); *Leptocera ferruginata* (Sten.), *L. Pararoralis* Duda, *L.* sp.; *Desmometopa sordida* (Fall.), *D. tarsalis* Lw., *Leptometopa latipes* (Meig.), *Madiza glabra* Fall., *P. indecora* (Lw.); *Notiphila* sp.; *Drosophila buscki* Coq., *D. robusta* Sturt., *D.* sp., *Scaptomyza pallida* (Zett.); *Conioscinella minor* (Adams), *Diplotoxa versicolor* (Lw.), *Ectecephala sulcata* Sabr., *Gaurax* sp., *Hippelates particeps* (Beck.), *H.* spp., *Oscinella frit* (L.), *O. luteiceps* Sabr., *O. soror* (Macq.), *O. umbrosa* (Lw.), *O.* sp., *Thaumatomyia glabra* (Meig.); *Agromyza* sp., *Cerodontha* sp., *Melanagromyza* sp., *Ophiomyia nasuta* (Mel.), *O.* sp.; *Mumetopia terminalis* (Lw.); *Hylemya florilega* (Zett.), *H. platura* (Meig.), *H.* sp.; *Coenosia* sp., *Atherigona orientalis* Schin., *Fannia* sp., *Schoenomyza dorsalis* (Lw.); *Medina barbata* (Coq.); usual prey are Brachycera and Cyclorrhapha, rarely Nematocera. Predator: Ants.
Oxybelus emarginatus Say, 1837. Boston Jour. Nat. Hist. 1: 375. ♂.
Oxybelus dilutus Baker, 1896. Ent. News 7: 159. ♀.
Oxybelus trifidus Cockerell and Baker, 1896. Psyche 7 (sup): 23. ♂.
Notoglossa americana Robertson, 1901. Amer. Ent. soc., Trans. 27: 204. ♂, ♀.
Notoglossa pacifica Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 119. ♂.
Notoglossa minor Mickel, 1916. Amer. Ent. Soc., Trans. 42: 428. ♂.

Biology: Hartman, 1905. Tex. Univ. Bul. 65: 29-31 (prey). —Pate, 1930. Brooklyn Ent. Soc., Bul. 25: 40 (prey). —Krombein and Kurczewski, 1963. Biol. Soc. Wash., Proc. 76: 150-151 (nest, prey carriage, parasite ?). —Krombein, 1964 (1963). Brooklyn Ent. Soc., Bul. 58: 120 (prey). —Krombein, 1964. Amer. Mus. Novitates 2201: 24-26 (nest, prey transport, mating, male burrows). —Snoddy, 1968. Ent. Soc. Amer., Ann. 61: 1029-1030 (prey capture on cattle). —Peckham, Kurczewski and Peckham, 1973. Ent. Soc. Amer., Ann. 66: 655-656, figs. 12, 15 (nest, prey transport, mating, parasites).

exclamans Viereck. West. U. S., north to S. Dak., east to Fla., south to Mexico (Chihuahua).
Ecology: Makes unicellular nest in sand stored with 5 prey. Prey: *Senotainia* sp.
Oxybelus exclamans Viereck, 1906. Amer. Ent. Soc., Trans. 32: 215. ♀.
Oxybelus townsendi Rohwer and Cockerell, 1908. Ent. News 19: 180. ♂.
Oxybelus argentarius Mickel, 1916. Amer. Ent. Soc., Trans. 42: 431. ♀.
Oxybelus pectorosus Mickel, 1918 (1917). Nebr. Univ. Studies 17: 321. ♂.

Biology: Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 400-402, fig. 1c (nest, prey transport).

fossor Rohwer and Cockerell. U. S. west of 100 degrees W., north to Nebr.; Mexico (Baja California).
Oxybelus fossor Rohwer and Cockerell, 1908. Ent. News 19: 179. ♀.
Oxybelus umbrosus Mickel, 1916. Amer. Ent Soc., Trans. 42: 432. ♂.
Oxybelus puente Pate, 1943. Pan-Pacific Ent. 19: 125. ♂, ♀.

frontalis Robertson. U. S. east of Rocky Mts., Tex. north to Mich. and Pa.; Mexico (Veracruz).
Oxybelus frontalis Robertson, 1889. Amer. Ent. Soc., Trans. 16: 83. ♂, ♀.

inornatus (Robertson). Northeast. U. S., Mich. to Mass., south to N. C. Prey: *Pholeomyia indecora* (Lw.). Predator: *Efferia albibarbis* (Macq.).
Notoglossa inornata Robertson, 1901. Amer. Ent. Soc., Trans. 27: 203. ♂, ♀.

Biology: Krombein, 1956. Brooklyn Ent. Soc., Bul. 51: 43-44 (prey).

krombeini Bohart and Schlinger. Calif.
Oxybelus krombeini Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 149. ♂, ♀.

laetus fulvipes Robertson. Southeast. Coastal States north to Va.
Oxybelus fulvipes Robertson, 1889. Amer. Ent. Soc., Trans. 16: 82. ♂.
Oxybelus floridanus Robertson, 1901. Amer. Ent. Soc., Trans. 27: 203. ♂.

laetus laetus Say. U. S. east of 100 degrees W., Tex. to N. C., north to Mich. and Mass.
Oxybelus laetus Say, 1837. Boston Jour. Nat. Hist. 1: 375. ♂.

linsleyi Bohart and Schlinger. Calif. Prey: Therevidae sp.
Oxybelus linsleyi Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 151. ♂, ♀.

Biology: Bohart and Menke, 1976. Sphecid wasps of world, p. 366 (prey).

macswaini Bohart and Schlinger. Calif., Ariz.
Oxybelus macswaini Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 153. ♂, ♀.

major Mickel. East. U. S., Tex. to N. C., north to Nebr., Mich. and Va.
Oxybelus major Mickel, 1916. Amer. Ent. Soc., Trans. 42: 434. ♂.

niger Robertson. Southeast. Canada and northeast. U. S., Minn. and Ill. to N. Y. Prey: *Lonchaea polita* Say.
Oxybelus niger Robertson, 1889. Amer. Ent. Soc., Trans. 16: 82. ♂.

Biology: Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1: 202 (prey).

packardii Robertson. U. S., Calif. to Fla., north to Ill., Ohio, and N. J.
Oxybelus Packardii Robertson, 1889. Amer. Ent. Soc., Trans. 16: 80. ♂, ♀.
Oxybelus Packardii var. *texanus* Robertson, 1889. Amer. Ent. Soc., Trans. 16: 81. ♂, ♀.
Oxybelus heterolepis Cockerell and Baker, 1896. Psyche 7 (sup.): 22. ♂.
Oxybelus heterolepis var. *defectus* Cockerell and Baker, 1896. Psyche 7 (sup.): 23
Oxybelus unicus Mickel, 1918 (1917). Nebr. Univ. Studies 17: 323. ♀.
Oxybelus carolinus Banks, 1921. Ent. Soc. Amer., Ann. 14: 18. ♀.

paenemarginatus (Viereck). Kans.
Notoglossa paenemarginatus Viereck, 1906 Amer. Ent. Soc., Trans. 32: 214. ♀.

paracochise Bohart and Schlinger. Ariz., Tex.; north. Mexico.
Oxybelus paracochise Bohart and Schlinger, 1956. Biol. Soc. Wash., Proc. 69: 37. ♂, ♀.

parvus Cresson. U. S. west of 100° W., Nebr., and Utah to south. Calif. and north. Mexico.
Oxybelus parvus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 476. "♀" = ♂.
Oxybelus intermedius Baker, 1896. Ent. News 7: 160. ♀.
Oxybelus coloradensis Baker, 1896. Ent. News 7: 160. ♂.
Notoglossa incisura Mickel, 1916. Amer. Ent. Soc., Trans. 42: 430. ♂.

pitanta Pate. Calif., Nev., Ariz., N. Mex.
Oxybelus pitanta Pate, 1943. Pan-Pacific Ent. 19: 123. ♂.

rancocas Pate. N. J.
Oxybelus rancocas Pate. 1943. Brooklyn Ent. Soc., Bul. 38: 91. ♂.

rejectus Baker. Colo.
Oxybelus rejectus Baker, 1896. Ent. News 7: 59. ♂.

robertsonii Baker. Northwest. U. S., Nebr. to Oreg., south to Nev. and Calif.
Oxybelus robertsonii Baker, 1896. Ent. News 7: 156. ♂.
Oxybelus varicoloratus Baker, 1896. Ent. News 7: 157. ♀.
Oxybelus hirsutus Baker, 1896. Ent. News 7: 157. ♀.
Oxybelus apicatus Smith, 1908. Nebr. Univ. Studies 8: 409. ♂.
Oxybelus gleuensis Smith, 1908. Nebr. Univ. Studies 8: 410. ♀.

sericeus Robertson. Mass. to Fla. west to S. Dak., Utah, Oreg. and Calif.; Mexico (Baja California, Nayarit). Ecology: Makes 1-4 cells in moist sand, stores 10-20 flies per cell. Parasite: *Senotainia litoralis* Allen. Prey: *Ephydra riparia* Fall.; *Chaetopsis aenea* (Wied.), *C. fulvifrons* (Macq.).
Oxybelus sericeus Robertson, 1889. Amer. Ent. Soc., Trans. 16: 81. ♀.
Oxybelus delicatus Mickel, 1918 (1917). Nebr. Univ. Studies 17: 322. ♂.
Oxybelus sericeus crocatus Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 73. ♂, ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 112, figs. 105-106 (larva).

Biology: Pate, 1930. Brooklyn Ent. Soc., Bul. 25: 41 (prey). —Krombein, 1955, Brooklyn Ent. Soc., Bul. 50: 74 (nest, mating, prey). —Bohart and Marsh, 1960. Pan-Pacific Ent. 36: 115-118 (nest, prey carriage, mating, life cycle, parasite).

similis Cresson. U. S. west of Rocky Mts.
Oxybelus similis Cresson, 1865. Ent. Soc. Phila., Proc. 4: 476. ♀.
Notoglossa striatifrons Mickel, 1916. Amer. Ent. Soc., Trans. 42: 429. ♂.

sparideus Cockerell. Southwest. U. S., Ariz. to Tex., Okla., south to Mexico (Veracruz). Ecology: Nests in damp sand, makes 2-3 cells per nest, stores 3-6 prey per cell. Parasite: Sarcophagidae spp. from maggots emerging from female prey. Prey: *Ceracia dentata* Coq., *Chaetonodexodes* sp., *Pseudoperichaeta erecta* (Coq.), *Spathimeigenia hylotomae* (Coq.), *Winthemia rufopicta* (Big.), *Lespesia flavifrons* Ben.; *Helicobia rapax* (Wlkr.), *Oxysarcodexia ventricosa* (Wulp), *Ravinia derelicta* (Wlkr.), *Senotainia* sp., *Sarcophaga davidsoni* Coq.; *Psilocephala haemorrhoidalis* (Macq.).
Oxybelus sparideus Cockerell, 1895. Amer. Ent. Soc., Trans. 22: 292. ♂.

Biology: Bohart, Lin and Holland, 1966. Ent. Soc. Amer., Ann. 59: 818-820 (nest, prey transport, egg, life cycle, cocoon, parasitism by prey).

subcornutus Cockerell. U. S. from Ariz. to East Coast, N. Y. and Mich. south to Mexico (Chihuahua). Ecology: Nests in sand, makes 1-6 cells per nest, stores 2-8 prey per cell. Parasite: *Macronychia aurata* (Coq.), *Senotainia trilineata* (Wulp). Prey: *Allograpta obliqua* (Say), *Carposcalis obscura* (Say), *Melangyna* sp., *Neocnemodon coxalis* (Curr.); all prey were males.
Oxybelus subcornutus Cockerell, 1895. Amer. Ent. Soc., Trans. 22: 293. ♀.
Oxybelus punctatus Baker, 1896. Ent. News 7: 60. ♂.
Oxybelus striatus Baker, 1896. Ent. News 7: 60. ♂.
Oxybelus cockerellii Baker, 1896. Ent. News 7: 61. ♂.
Oxybelus denverensis Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 118. ♀.

Biology: Pate, 1945. Brooklyn Ent. Soc., Bul. 40: 165 (prey). —Peckham, Kurczewski and Peckham, 1973. Ent. Soc. Amer., Ann. 66: 656-658, figs. 14, 16, 17 (nest, prey transport, parasites).

subulatus Robertson. Northeast. U. S., Colo. to Mass. north to Canada. Ecology: Nests in sand, makes 1-8 cells per nest, stores 3-11 prey per cell; male wasp guards nest entrance. Parasite: *Phrosinella fulvicornis* (Coq.), *P.* sp., *Senotainia trilineata* (Wulp), *Metopia argyrocephala* (Meig.), *Macronychia* sp. Prey: *Psilocephala haemorrhoidalis* (Macq.), *P. frontalis* Cole, *Thereva candidata* Lw., *Furcifera rufiventris* (Lw.); preys only upon males.

Oxybelus mucronatus Packard, 1867. Ent. Soc. Phila., Proc. 6: 436. ♂, ♀. Preocc.
Oxybelus subulatus Robertson, 1889. Amer. Ent. Soc., Trans. 16: 79. ♂, ♀.
Oxybelus Packardi Dalla Torre, 1890. Wien. Ent. Ztg. 9: 203. Preocc.
Oxybelus acutus Baker, 1896. Ent. News 7: 61. ♀.
Oxybelus albosignatus Smith, 1908. Nebr. Univ. Studies 8: 407. ♀.
Oxybelus mottensis Mickel, 1918 (1917). Nebr. Univ. Studies 17: 323. ♀.

Biology: Peckham, Kurczewski and Peckham, 1973. Ent. Soc. Amer., Ann. 66: 652-655, figs. 8, 10, 11, 13 (male behavior, nest, prey transport, parasites).

taenigaster (Viereck). Cent. U. S., incl. Ariz., N. Mex., Nebr., south to Mexico (Oaxaca).
Notoglossa taenigaster Viereck, 1906. Amer. Ent. Soc., Trans. 32: 215. ♀.
Oxybelus fastigatus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 433. ♂, ♀.
Notoglossa albomaculata Mickel, 1918 (1917). Nebr. Univ. Studies 17: 320. ♂.

timberlakei Bohart and Schlinger. Calif.
Oxybelus timberlakei Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 150. ♂, ♀.

uniglumis (Linnaeus). Alaska, N. W. T., South. Canada and U. S. south in Mexico to Puebla; Palaearctic, Europe to Mongolia. Ecology: Nests in sand, makes 1-5 cells per nest, transports prey on sting, stores 2-13 prey per cell. Parasite: *Senotainia rubriventris* (Macq.)?, *Metopia argyrocephala* (Meig.), *Phrosinella fulvicornis* (Coq.); these records are all from U. S. Prey: *Allognosta fuscitarsis* (Say); *Chrysopilus modestus* Lw., *Symphoromyia atripes* Big., *S. montana* Ald.; *Anthrax albofasciatus* Macq.; *Condylostylus patibulatus* (Say); *Metasyrphus venablesi* (Curr.); *Rivellia* sp. in *melliginis* group; *Anthomyia procellaris* Rond., *Emmesomyia socia* (Fall.), *Eustalomyia vittipes* (Zett.), *Hydrophoria conica* (Wied.), *H. implicata* Huck., *Hylemya depressa* Stein, *H. fugax* (Meig.), *H. lasciva* Zett., *H. platura* Meig., *H. cilicrura* (Rond.), *Pegomyia affinis* Stein; *Sapromyza monticola* Mel.; *Fannia coracina* (Lw.), *F. enatohensis* Seago, *F. pellucida* (Stein), *F. scalaris* (F.), *Helina duplicata* (Meig.), *Musca domestica* L., *Myospila meditabunda* (F.), *Ophyra aenescens* (Wied.), *O. leucostoma* (Wied.), *Phaonia fusca* (Stein), *Spilogona* sp.; *Bufolucilia silvarum* (Meig.), *Lucilia* sp., *Phaenicia sericata* (Meig.), *Pollenia rudis* (F.); *Blaesoxipha hunteri* (Hough), *B. reversa* (Ald.), *Boettcheria cimbicis* (Tns.), *Helicobia rapax* (Wlkr.), *Metopia argyrocephala* (Meig.), *Oxysarcodexia cingarus* (Ald.), *Phrosinella fulvicornis* (Coq.), *Ravinia acerba* (Wlkr.), *R. lherminieri* (Desv.), *Senotainia trilineata* (Wulp); *Admontia nasoni* (Coq.), *Alophora* sp., *Eulasiona comstocki* Tns., *Lixophaga* sp.; *Medina barbata* (Coq.), *Voria aurifrons* (Tns.); prey in U. S. consist principally of male Brachycera and Cyclorrhapha, rarely females of latter group. Predator: *Philanthus flavifrons* Cr., *P. pulcher* D. T.

Vespa uniglumis Linnaeus, 1758. Syst. Nat., Ed. 10, v. 1, p. 573. ♀.
Vespa uniglummis (!) Christ, 1791. Naturgesch. Class. Nomencl. Ins., p. 246.
Nomada punctata Fabricius, 1793. Ent. Syst., v. 2, p. 346.
Crabro tridens Fabricius, 1798. Sup. Ent. Syst., p. 270. ♀.
Vespa decim-maculata Donovan, 1806. Nat. Hist. Brit. Ins., v. 11, pl. 376, fig. 1. This is a questionable synonym.
Oxybelus pygmaeus Olivier, 1811. Encycl. Meth., Ins., v. 8, p. 597.
Oxybelus quadrinotatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, app., p. 338.
Oxybelus impatiens Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 390. ♀.
Oxybelus interruptus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 475. ♀.
Oxybelus fallax Gerstaecker, 1867. Ztschr. Gesam. Naturw. Halle 30: 91. ♀.
Oxybelus Brodiei Provancher, 1883. Nat. Canad. 14: 36. ♀.
Oxybelus quadrinotatus var. *montanus* Robertson, 1889. Amer. Ent. Soc., Trans. 16: 78. ♂, ♀.
Oxybelus hispanicus Giner, 1943. Inst. Espan. Ent., Trab., Fam. Sphecidae, p. 260. ♂, ♀.

Biology: Peckham and Peckham, 1898. Wis. Geol. and Nat. Hist. Survey, Bul. 2: 73-76 (nest, prey transport). —Parker, 1915. Ent. Soc. Wash., Proc. 17: 74-75 (nest, prey transport, parasites). —Pate, 1930. Brooklyn Ent. Soc., Bul. 25: 41 (prey). —Williams, 1936. Pan-Pacific Ent. 12: 1-3, fig. 1 (nest, prey transport, predator). —Krombein, 1936. Ent. News 47: 95 (prey transport). —Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 313 (nest, prey transport, parasite). —Krombein, 1948. Ent. Soc. Wash., Proc. 50: 67 (prey). —Krombein, 1956. Brooklyn Ent. Soc., Bul. 51: 44 (prey transport). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 493 (nest, prey transport, parasites, predator). —Peckham, Kurczewski and Peckham, 1973. Ent. Soc. Amer., Ann. 66: 651-652, figs. 2, 9 (nest, prey transport, parasites).

ventralis Fox. Pacific Coast, Wash., south to Mexico (Baja California).
Oxybelus ventralis Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 107. ♀.
Oxybelus manni Rohwer, 1909. Amer. Ent. Soc., Trans. 35: 117. ♀.

xerophilus Bohart and Schlinger. Calif., Ariz.
Oxybelus xerophilum Bohart and Schlinger, 1956. Pan-Pacific Ent. 32: 154. ♂.

Subfamily CRABRONINAE

This large subfamily includes species which nest in the ground, in pre-existing cavities in wood, twigs, stems, and in the soft pith of various plants or shrubs.

Revision: Fox, 1895. Amer. Ent. Soc., Trans. 22: 129-226 (N. Amer. spp.).

Taxonomy: Pate, 1944. Amer. Midland Nat. 31: 329-384 (gen. of world). —Leclercq, 1954. Monog. Hym. Crabron., 371 pp., 40 figs., 84 maps (phylogeny, zoogeography, key to world gen., catalog of world spp.).

Genus ANACRABRO Packard

Anacrabro Packard, 1866. Ent. Soc. Phila., Proc. 6: 67.
Type-species: *Anacrabro ocellatus* Packard. Monotypic.

ocellatus boerhaviae Cockerell. N. Mex., Ariz.; Mexico (Chihuahua, Sonora, Sinaloa, Durango, Colima ?).
Anacrabro boerhaviae Cockerell, 1895. Canad. Ent. 27: 308. ♂.

ocellatus ocellatus Packard. S. Canada and U. S. east of Rockies, except Fla. Ecology: Nests in sand, makes 1-9 or more cells per nest, stores 4-7 prey per cell. Parasite: Miltogrammini sp.?, Diptera sp. Prey: *Lygus oblineatus* (Say), *L. lineolaris* (Beauv.), *Plagiognathus politus* Uhl.; only adults are stored. Predator: *Acanthomyops claviger* (Rog.), *Monomorium* sp.
Anacrabro ocellatus Packard, 1866. Ent. Soc. Phila., Proc. 6: 68. ♀.
Thyreopus rugoso-punctatus Provancher, 1883. Faune Ent. Canada, Hym., p. 664. ♀. A secondary homonym in *Crabro*.
Crabro rugulosopunctatus Dalla Torre, 1897. Cat. Hym., v. 8, p. 624. N. name.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 102, figs. 75-84 (larva).

Biology: Barth, 1909 (1908). Wis. Nat. Hist. Soc., Bul. 6: 147-153, 10 figs. (nest, prey, parasite, predator). —Kurczewski and Peckham, 1970. Ent. Soc. Amer., Ann. 63: 1419-1424, 7 figs. (nest, prey transport, egg, parasite, predator).

ocellatus robertsoni Rohwer. Fla.
Anacrabro robertsoni Rohwer, 1920. Ent. Soc. Wash., Proc. 22: 58. ♀.

Taxonomy: Krombein, 1948. Brooklyn Ent. Soc., Bul. 43: 20-21 (status of N. Amer. spp.). —Leclercq, 1973. Acta Zool. Lilloana 30: 38-41 (key to New World spp., and revision of Neotropical spp.).

Genus ENCOPOGNATHUS Ashmead

The name *Encopognathus* was first employed by Kohl, 1896 (K. K. Naturhist. Hofmus., Ann. 11: 485, 486). However, it may not be validated from that date, for Kohl proposed it as a name for a species group ("Artengruppe") of the subgenus *Lindenius*. The earliest use of the name in

a generic or subgeneric sense was by Ashmead, 1899, who characterized it as a genus.

The species nest in soil, and African forms have been reported to provision their nests with ants. One species in North America and two species in Sri Lanka have been observed recently preying upon Miridae, both nymphs and adults.

Revision: Pate, 1943. Lloydia 6: 53-76, 15 figs. (key to subg. and revision of N. Amer. spp.).

Genus ENCOPOGNATHUS Subgenus ENCOPOGNATHUS Ashmead

Encopognathus Ashmead, 1899. Canad. Ent. 31: 166.
Type-species: *Crabro* (*Encopognathus*) *Braueri* Kohl. Orig. desig.

The typical subgenus does not occur in North America.

Genus ENCOPOGNATHUS Subgenus RHECTOGNATHUS Pate

Encopognathus subg. *Rhectognathus* Pate, 1936. Ent. News 47: 147.
Type-species: *Encopognathus* (*Rhectognathus*) *pectinatus* Pate. Orig. desig.

pectinatus Pate. Calif.
Encopognathus (*Rhectognathus*) *pectinatus* Pate, 1936. Ent. News 47: 148. ♀, ♂.

rufiventris Timberlake. Calif. (San Bernardino Co.).
Encopognathus (*Rhectognathus*) *rufiventris* Timberlake, 1940. Ent. News 51: 167. ♀.

Genus ENCOPOGNATHUS Subgenus TSAISUMA Pate

Encopognathus subg. *Tsaisuma* Pate, 1943. Lloydia 6: 57.
Type-species: *Lindenius wenonah* Banks. Orig. desig.

wenonah (Banks). Calif., Oreg.
Lindenius wenonah Banks, 1921. Ent. Soc. Amer., Ann. 14: 16. ♂.

Genus ENTOMOGNATHUS Dahlbom

These wasps nest in the ground and prey upon adult chrysomelid beetles.

Biology: Miller and Kurczewski, 1972. Psyche 79: 61-69, 72-75 (nesting behavior).

Genus ENTOMOGNATHUS Subgenus ENTOMOGNATHUS Dahlbom

Entomognathus Dahlbom, 1844. Hym. Europaea, v. 1, p. 295.
Type-species: *Crabro brevis* Vander Linden. Monotypic.

The typical subgenus does not occur in North America.

Genus ENTOMOGNATHUS Subgenus TONCAHUA Pate

Entomognathus subg. *Toncahua* Pate, 1944. Amer. Midland Nat. 31: 341.
Type-species: *Entomognathus texanus* Cresson. Orig. desig.
Encopognathus subg. *Florkinus* Leclercq, 1956. Inst. Roy. Sci. Nat. Belg., 32 (20): 2.
Type-species: *Encopognathus* (*Florkinus*) *evolutionis* Leclercq. Orig. desig.

Taxonomy: Krombein, 1963. Biol. Soc. Wash., Proc. 76: 247-254 (spp. of eastern U. S.).

arenivagus Krombein. Fla. (Arcadia), N. C. (?). Ecology: Nests in sand.
Entomognathus (*Toncahua*) *arenivaga* Krombein, 1963. Biol. Soc. Wash., Proc. 76: 249. ♂, ♀.

lenapeorum Viereck. N. J. to Va., Kans. Ecology: Nests in open wooded areas.
Entomognathus lenapeorum Viereck, 1904. Amer. Ent. Soc., Trans. 30: 239. ♀.

memorialis Banks. Conn. to Va., Kans. Ecology: Nests in sandy-loam cliffs, occasionally in pre-existing burrows, makes 9-20 cells per nest which may be arranged singly, in fan-shaped clusters, or in tandem; stores 3-9 prey per cell. Prey: *Altica ulmi* Woods, *A. marevagans* Horn; adults.
Entomognathus memorialis Banks, 1921. Ent. Soc. Amer., Ann. 14: 16. ♀.

Taxonomy: Miller and Kurczewski, 1972. Psyche 79: 69-72, figs. 5-12 (larva).

Biology: Miller and Kurczewski, 1972. Psyche 79: 64-69, figs. 1-4 (mating, nest, prey transport, egg, cocoon).

texanus Cresson. Pa., Kans. to Tex., N. Mex.; Mexico (Tamaulipas). Prey: *Diabrotica tricincta* Say adult.

Entomognathus texanus Cresson, 1887. Amer. Ent. Soc., Trans., Sup. Vol., p. 286. ♀, ♂.
Anothyreus panurgoides Viereck, 1904. Amer. Ent. Soc., Trans. 30: 239. ♂ (♀ misdet.).

Biology: Cazier and Mortenson, 1965. Pan-Pacific Ent. 41: 33 (prey).

Genus LINDENIUS Lepeletier and Brulle

Lindenius Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 791.
Type-species: *Crabro albilabris* Fabricius. Desig. by Westwood, 1839.
Lindenius subg. *Chalcolamprus* Wesmael, 1852. Acad. Roy. Sci. Belg., Bul. 19: 590.
Type-species: *Crabro albilabris* of Vander Linden. Monotypic.
Crabro subg. *Trachelosimus* Morawitz, 1866. Acad. Imp. Sci. St. Petersburg, Bul. 9: 249.
Type-species: *Crabro armatus* Vander Linden. Monotypic.

These small wasps nest in firmly packed sand or fine gravel, frequently in large aggregations, and construct a vertical main burrow which usually leads to a short horizontal passage. The prey consists of small adult Hymenoptera and Diptera, and both nymphal and adult Hemiptera; specific differences as to the kinds of prey stored are found among the six species studied.

Taxonomy: Pate, 1947. Notulae Nat. 185: 4-7 (key to subg. and syn. of N. Amer. spp.).

Biology: Miller and Kurczewski, 1974 (1973). Ins. Sociaux 20: 365-378, 1 fig. (male-female interactions in aggregations of several spp.). —Miller and Kurczewski, 1975. N. Y. Ent. Soc., Jour. 83: 82-120, 12 figs. (comparative behavior of several Nearctic and Palaearctic spp.).

armaticeps (Fox). South. Canada, U. S. northeast from Colo. and Tex. Ecology: Nests in sand cliffs or in flat hard-packed sand, makes 3-11 cells per nest, stores 3-15 prey per cell. Parasite: *Phrosinella fulvicornis* (Coq.), *Senotainia* sp. ? Prey: *Diplotoxa versicolor* (Lw.), *Meromyza* sp. near *pratorum* Meig., *Parectecephala eucera* (Lw.), *P. sanguinolenta* (Lw.), *Thaumatomyia glabra* (Meig.), *T.* sp., *Chlorops* sp.; all prey records are of Chloropidae.

Crabro armaticeps Fox, 1895. Amer. Ent. Soc., Trans. 22: 185. ♂.
Crabro flaviclypeus Fox, 1895. Amer. Ent. Soc., Trans. 22: 186. ♀.
Crabro (*Lindenius*) *zellus* Rohwer, 1909. Ent. News 20: 151. ♀.

Biology: Kurczewski, 1972. Kans. Ent. Soc., Jour. 45: 399 (prey). —Miller and Kurczewski, 1974 (1973). Ins. Sociaux 20: 368, 372-378 (male-female intraspecific interaction, nest, parasites). —Miller and Kurczewski, 1975. N. Y. Ent. Soc., Jour. 83: 90-96, figs. 1-5 (nest, prey capture and transport, egg, cocoon, life cycle, parasite).

buccadentis Mickel. U. S. east from Wyo., north from Ark. Ecology: Nests in bare, level hard-packed roadbeds of coarse sand, makes up to 4 cells per completed nest, stores 22-77 prey per cell. Prey: *Drapetis* sp. near *divergens* Lw.; *Agathis* spp., *Apanteles paralechiae* Mues., *A.* sp., *Bracon* sp., *Diaeretus* sp., *Orgilus* sp., *Pauesia* sp., *Phanerotoma* sp., *Rhaconotus cressoni* Mues. and Walkl.; *Acrolytina* sp., *Mesochorus* sp., *Toxophoroides scitulus* (Cr.); *Achrysocharella silvia* Gir., *Chrysocharis* sp., *Closterocerus tricinctus* (Ashm.), *Euderus* sp., *Eulophus anomocerus* (Cwfd.), *Euplectrus* sp., *Hyssopus* sp., *Tetrastichus whitmani* (Gir.), *T.* spp.; *Perilampus fulvicornis* Ashm., *P. robertsoni* Cwfd.; *Ormyrus brunneipes* Prov.; *Capellia* sp., *Erythromalus* sp., *Gastrancistrus aphidis* (Gir.), *Pachyneuron siphonophorae* (Ashm.), Pteromalinae sp.; *Bruchophagus* sp., *Eudecatoma* sp.; *Spilochalcis* sp.; *Charips* spp., Cynipinae sp.; *Apenesia parapolita* Evans, *Goniozus* sp.; *Monomorium minimum* (Buckl.), *Tapinoma sessile* (Say); preferred prey were species of Ichneumonoidea and Chalcidoidea, and only one dipteran was stored.

Lindenius buccadentis Mickel, 1916. Amer. Ent. Soc. Trans. 42: 427. ♀, ♂.

Biology: Miller and Kurczewski, 1974 (1973). Ins. Sociaux 20: 368, 372-378 (male-female intraspecific interaction). —Miller and Kurczewski, 1975. N. Y. Ent. Soc., Jour. 83: 96-101, fig. 6 (nest, prey transport, egg, cocoon).

californicus Court and Bohart. Calif.
Lindenius californicus Court and Bohart, 1958. Pan-Pacific Ent. 34: 161, figs. 1, 8, 11. ♂, ♀.

columbianus (Kohl). South. Canada, U. S. Ecology: Nests in dense aggregations in firmly packed clay-sand, occasionally in pre-existing burrows and in sand cliffs, may make up to 10 cells per nest, stores 8-76 prey per cell. Parasite: *Phrosinella fulvicornis* (Coq.), *Senotainia* sp. ?; *Phalacrotophora halictorum* Mel. and Brues ?; *Myrmosa unicolor* Say? Prey: *Dasyhelea grisea* (Coq.), *D.* spp., *Forcipomyia brevipennis* (Macq.), *Jenkinshelea magnipennis* (Joh.); *Chironomus* spp., *Cricotopus* sp., *Orthocladius* spp., *Paratendipes subaequalis* (Mall.), *Pentaneura* sp., *Procladius* spp., *Psectrocladius* sp., *Tanytarsus* sp.; *Bradysia* sp.; *Swammerdamella obtusa* Cook, *S. sagittata Cook*, *Scatopse fuscipes* Meig.; *Anarete johnsoni* (Felt), *A. pritchardi* Kim, *A.* spp., *Asteromyia carbonifera* (O. S.), *Clinodiplosis* sp., *Dasineura* sp., *Mayetiola* sp., *Neolasioptera* spp., *Ozirhincus millefolii* (Wachtl), *Porricondyla* sp., *Procystiphora* sp.; *Drapetis septentrionalis* Mel., *D.* sp., *Platypalpus trivialis* Lw., *P.* sp., *Rhamphomyia* sp.; *Chamaemyia juncorum* (Fall.), *Leucopis* sp.; *Madiza parva* (Adams), *Leptometopa halteralis* (Coq.), *L. latipes* (Meig.), *Paramyia nitens* (Lw.); *Philygria debilis* Lw., *Hydrellia* sp.; *Conioscinella melancholica* (Beck.), *C. minor* (Adams), *C. triorbiculata* (Sabr.), *Diplotoxa versicolor* (Lw.), *Hippelates bishoppi* Sabr., *H.* sp. near *bishoppi* Sabr., *Meromyza* sp., *Olcella cinerea* (Lw.), *O. parva* (Adams), *O. quadrivittata* Sabr., *O. trigramma* (Lw.), *Oscinella carbonaria* (Lw.), *O. frit* (L.), *O. luteiceps* Sabr., *O. soror* (Macq.), *O. umbrosa* (Lw.), *O.* sp., *Siphonella nigripalpis* (Mall.); *Agromyza* sp., *Cerodontha dorsalis* (Lw.), *C.* sp., *Liriomyza* sp., *Ophiomyia* sp., *Phytoliriomyza arctica* (Lundb.), *Pseudonapomyza lacteipennis* (Mall.); Diptera spp.; *Orius insidiosus* (Say), *O. tristicolor* (White); *Chlamydatus associatus* (Uhl.), Miridae spp.; Lygaeidae sp.; *Aphis* sp., *Capitophorus elaeagni* (Del Guer.), *Rhopalosiphum maidis* (Fitch), *Schizaphis* sp.; Hemiptera spp.; *Agathis* spp., *Apanteles limentidis* Riley, *A. xylinus* (Say), *A.* spp., *Aphidius obscuripes* Ashm., *A.* spp., *Bracon* sp., *Chelonus* sp., *Dacnusa* sp., *Diaeretiella* spp., *Elasmosoma* sp., *Euphoriana uniformis* Gah., *Lysaphidus* sp., *Lysiphlebus* spp., *Microplitis* sp., *Orgilus gelechiae* (Ashm.), *O.* sp., *Praon* spp., *Trioxys* spp.; *Adelognathus flavopictus* Davis; *Polynema* sp.; *Aprostocetus* sp., *Chrysocharis* sp., *Diaulinopsis callichroma* Cwfd., *Euderus subopacus* (Gah.), *Euderus* sp., *Hemiptarsenus americanus* (Gir.), *Hyssopus novus* Gir., *Necremnus* sp., *Notanisomorpha ainsliei* Cwfd., *Pnigalio* sp., *Sympiesis bimaculatipennis* (Gir.), *Tetrastichus bruchophagi* Gah., *T. chlamytis* Ashm., *T. fumipennis* (Gir.), *T. incertus* (Ratz.), *T. semilongifasciatus* (Gir.), *T. tesserus* Burks, *T.* spp., Entedontini sp.; *Copidosoma* sp., Anagyrini sp., Bothriothoracini sp.; *Eupelmella vesicularis* (Retz.), *Eupelmus allynii* (French), *E.* sp.; *Pseudometagea schwarzii* (Ashm.), Eucharitidae sp.; *Eiridontomerus isosomatis* (Riley), *Pseudotorymus* lazulellus (Ashm.); *Asaphes lucens* (Prov.), *Ecrizotes* sp., *Erixestus winnemanna* Cwfd., *Habrocytus* sp., *Halticoptera patellanna* (Dalm.), *H.* sp., *Heteroschema* sp., *Homoporus chalcidiphagus* (Walsh and Riley), *H. febriculosus* (Gir.), *Mesopolobus* sp., *Pachyneuron allograptae* Ashm., *P. siphonophorae* (Ashm.), *P.* sp., *Parecrizotes marylandensis* Gir., *Pteromalus puparum* (L.), *P. vanessae* Harr., *Systasis* sp., *Tridymus* sp., Pirenini sp., Pteromalini sp., Tridymini sp.; *Bruchophagus* sp., *Eudecatoma* sp., *Eurytoma* sp., *Harmolita* sp., *Systole* sp., *Spilochalcis albifrons* (Walsh); Chalcidoidea sp.; *Lygocerus* sp.; *Lasius* sp.; *Spilomena pusilla* (Say); prey preferences vary at different localities depending upon ecological factors; Chironomidae are preferred prey in nesting sites near water; in other areas Pteromalidae, Scatopsidae, Chloropidae, Eulophidae, Ceratopogonidae, Milichiidae, Cecidomyiidae, Eucharitidae and Anthocoridae are important as prey. Predator: *Philanthus pulcher* D. T., *P. pacificus* Cr.
Crabro (*Lindenius*) *columbianus* Kohl, 1892. K. K. Naturhist. Hofmus., Ann. 7: 203. ♀.
Crabro errans Fox, 1895. Amer. Ent. Soc., Trans. 22: 184. ♀, ♂.
Crabro pinguis Fox, 1895. Amer. Ent. Soc., Trans. 22: 186 ♀.
Ammoplanus salicis Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 402. ♀.

Biology: Evans, 1970. Mus. Compar. Zool. 140: 491 (nest, prey, predators). —Miller and Kurczewski, 1974 (1973). Ins. Sociaux 20: 368-378, 1 fig. (male-female intraspecific interactions, nest, prey, parasites ?). —Miller and Kurczewski, 1975. N. Y. Ent. Soc., Jour.

83: 101-115, figs. 7-15 (nest, prey capture and transport, egg, cocoon, life cycle). —Bohart and Menke, 1976. Sphecid wasps of world, p. 383 (nest, prey capture and transport).

inyoensis Court and Bohart. Calif., Nev.
Lindenius inyoensis Court and Bohart, 1958. Pan-Pacific Ent. 34: 164, figs. 3, 5, 14. ♀, ♂.

latifrons (Fox). Tex.
Crabro latifrons Fox, 1895. Amer. Ent. Soc., Trans. 22: 185. ♀.

montezuma (Cameron). South. Calif. to west. Tex.; Mexico (Guanajuato, Guerrero).
Crabro montezuma Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 151, pl. 9, fig. 13, 13a. ♀, ♂.
Lindenius (Trachelosimus) dugesianus Leclercq, 1950. Inst. Roy. Sci. Nat. Belg., Bul. 26, no. 6, p. 1. ♀.

neomexicanus Court and Bohart. N. Mex., Colo.
Lindenius neomexicanus Court and Bohart, 1958. Pan-Pacific Ent. 34: 166, figs. 2, 4, 6, 13. ♀, ♂.

tecuya Pate. Calif. Ecology: Nests in mixed sand-gravel at edge of river. Prey: Diptera spp., 6 families; Chalcidoidea spp., 3 families; Anthocoridae sp.
Lindenius (Trachelosimus) tecuya Pate, 1947. Notulae Nat. 185: 5. ♀, ♂.

Biology: Bohart and Menke, 1976. Sphecid wasps of world, pp. 383-384 (nest, prey).

tylotis Court and Bohart. Calif. Ecology: Nests in silty soil at creek edge, makes 4-24 cells per nest, and stores an average of 8 prey per cell. Parasite: *Myrmosa bradleyi* Rob. Prey: Diptera spp.; Hemiptera spp.; Hymenoptera spp.
Lindenius tylotis Court and Bohart, 1958. Pan-Pacific Ent. 34: 164, figs. 9, 10, 12. ♂, ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 162-163, figs. 51-53 (larva).

Biology: Bohart and Menke, 1976. Sphecid wasps of world, p. 383 (nest, prey, parasite).

Genus RHOPALUM Stephens

The North American species, and most of the extralimital taxa, nest in the pith of twigs, in hollow stems or reeds, in rotten wood, and in abandoned beetle borings in wood. One extralimital species is known to nest in the ground. Prey of the species occurring in North America includes small Diptera and Psocoptera. Some extralimital taxa prey upon Aphididae, Psyllidae, winged Formicidae and Microlepidoptera.

Taxonomy: Bohart, 1974. Ga. Ent. Soc., Jour. 9: 252-260, 33 figs. (review of N. Amer. spp.).

Genus RHOPALUM Subgenus RHOPALUM Stephens

Euplilis Risso, 1826. Hist. Nat. Europ. Merid., v. 5, p. 227.
Type-species: *Crabro rufiventris* Panzer. Desig. by Pate, 1935.
Rhopalum Stephens, 1829. Nomencl. Brit. Ins., p. 34.
Type-species: *Crabro rufiventris* Panzer. Desig. by Curtis, 1837.
Physoscelus Lepeletier and Brulle, 1835. Soc. Ent. France, Ann. 3: 804.
Type-species: *Crabro rufiventris* Panzer. Desig. by Westwood, 1839.
Physoscelis Westwood, 1837. Introd. Mod. Classif. Ins. 2, Gen. Synop., p. 80. Lapsus or emend.

Taxonomy: Menke, Bohart and Richards, 1974. Bul. Zool. Nomencl. 30: 219-220 (petition to suppress *Euplilis* Risso, 1826, and place *Rhopalum* Stephens, 1829, on Official List of Generic Names). —Day *et al.*, 1975. Bul. Zool. Nomencl. 32: 96-99 (comments on petition by Menke *et al.*). —Krombein, 1976. Bul. Zool. Nomencl. 32: 205-207 (comment on petition by Menke *et al.*).

atlanticum Bohart. Ga. (Athens, Atlanta), N. Y. (Long Island). Ecology: Nests in abandoned borings of *Ceratina* sp. in dead *Erianthus* sp. (plume grass), stores 31-41 adult or nymphal Psocoptera per cell. Parasite: *Eurytoma inornata* Bugbee. Prey: *Caecilius pinicola* Bks.; *Peripsocus madidus* Hagen, *P. quadrifasciatus* Harr.; *Lachesilla forcepeta* Chapm., *L.* sp.; *Psocidus pollutus* Walsh, *Trichadenotecnum circuluroides* Bed.
Rhopalum atlanticum Bohart, 1974. Ga. Ent. Soc., Jour. 9: 256, figs. 26-33. ♂, ♀.

clavipes clavipes (Linnaeus). Maine, N. H., R. I., Md., Idaho, Wash., Oreg., Calif.; cent. and south Europe. Ecology: In Europe nests in straws, stores 16-26 psocid prey per cell. Prey: In Europe *Graphopsocus cruciatus* (L.), *Peripsocus phaeopterus* (Ste.), *Ellipsocus westwoodi* Mclack., *Mesopsocus immunis* (Ste.), *Loenisia variegata* (Latr.), *Hyperates questfalicus* Kolb.; mostly adult females, a few nymphs, one adult male. Another subsp. occurs in Japan.

Sphex clavipes Linnaeus, 1758. Syst. Nat., ed. 10, p. 569.
Crabro rufiventris Panzer, 1799. Faunae Ins. German., heft 72, fig. 12.

Taxonomy: Marechal, 1929. Soc. Ent. France, Ann. 98: 115-116 (larva).

Biology: Freeman, 1938. Roy. Ent. Soc. London, Proc., Ser. A, 13: 1-2 (nest, prey, cocoon, life cycle in England).

Genus RHOPALUM Subgenus CORYNOPUS Lepeletier and Brulle

Corynopus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 802.
Type-species: *Crabro tibialis* Panzer. Monotypic.
Dryphus Herrich-Schaeffer, 1840. Nomencl. Ent., heft. 2, p. 123.
Type-species: *Crabro tibialis* Fabricius. Monotypic.
Alliognathus Ashmead, 1899. Canad. Ent. 31: 219.
Type-species: *Crabro occidentalis* Fox. Orig. desig.

Taxonomy: Pate, 1947. Notulae Nat. 185: 7-10 (synonymic notes on N. Amer. spp.).

coarctatum (Scopoli). Canada and U. S. in Transit. and U. Austr. Zones east of Rocky Mts.; Europe, Siberia. Ecology: Nests in soft pith of dead hibiscus stems and in borings in wood, makes up to 12 cells per nest, stores as many as 20 prey per cell. Parasite: *Tetrabaeus americanus* (Brues); *Eurytoma inornata* Bugb.; *Melittobia chalybii* Ashm.; *Megaselia* sp.? Prey: *Palpomyia subasper* (Coq.); *Chironomus fulvus* Joh., *C. viridulus* (L.), *C. nervosus* Staeg., Chironomidae sp.?

Sphex coarctata Scopoli, 1763. Ent. Carn., p. 293, pl. 42, fig. 778. ♂.
Crabro crassipes Fabricius, 1798. Sup. Ent. System., p. 270.
Crabro tibialis Fabricius, 1798. Sup. Ent. System., p. 271. Preocc.
Rhopalum modestum Rohwer, 1908. Ent. News 19: 257. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 292-293, figs. 111-112 (larva).

Biology: Krombein, 1964. Biol. Soc. Wash., Proc. 77: 90-92 (nest, prey, life cycle, cocoon, parasites). —Krombein, 1967. Trap-nesting wasps and bees, pp. 259-260 (nest, prey, life cycle, parasites).

occidentale (Fox). Maine, Conn., N. Y., N. C., Mich., Colo., Wyo., Nev., Calif., Oreg., B. C.

Crabro occidentalis Fox, 1895. Amer. Ent. Soc., Trans. 22: 200. ♀.
Rhopalum (*Alliognathus*) *carolina* Banks, 1921. Ent. Soc. Amer., Ann. 14: 17. ♀.

pacificum Bohart. Nev., Calif., Oreg. Ecology: Nests in *Sambucus* stems. Parasite: *Diomorus zabriskiei* Cr.

Rhopalum pacificum Bohart, 1974. Ga. Ent. Soc., Jour. 9: 258, figs. 6-14. ♂, ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, parasite; misdet. as *arapaho* Pate).

pedicellatum Packard. Maine, Mass., Conn., N. Y., Md., Wis., Minn., Colo. Ecology: Nests in pre-existing cavities in old stump and in raspberry stalks, stores 25-33 prey per cell. Prey: *Chironomus* sp.

Rhopalum pedicellatum Packard, 1867. Ent. Soc. Phila., Proc. 6: 380. ♀, ♂.
Rhopalum rubrocinctum Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 43. ♀.
Euplilis (*Corynopus*) *arapaho* Pate, 1947. Notulae Nat. 185: 8. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 104-105, figs. 99-104 (larva).

Biology: Packard, 1869. Guide Study Ins., p. 158 (nest). —Peckham and Peckham, 1895. Wis. Geol. Nat. Hist. Survey, Bul. 2: 42-43 (nest, prey).

rufigaster Packard. U. S. e. of 100th meridian. Ecology: Nests in pith of green and dead *Hibiscus* stems and in old anobiid borings in wood, makes 3-27 cells per nest, stores 29-50 prey per cell. Parasite: *Tetrabaeus americanus* (Brues); *Eurytoma inornata* Bugb.; *Diomorus zabriskiei* Cr.; *Ptychoneura aristalis* (Coq.). Prey: *Chironomus fulvus* Joh., *C. modestus* Say, *C. neomodestus* Mall., *C. nervosus* Staeg., *C. nigrovittatus* Mall., *C. xenolabis* (K.), *Cricotopus* spp., *Calopsectra* sp., *Procladius culiciformis* (L.), *Tanytarsus* sp., Orthocladiinae sp., Chironomidae spp.; *Polymeda cana* (Wlkr.); *Bezzia setulosa* (Lw.).

Rhopalum rufigaster Packard, 1867. Ent. Soc. Phila., Proc. 6: 382. ♀, ♂.
Rhopalum lucidum Rohwer, 1909. Ent. News 20: 324. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 291-292, fig. 110 (larva).

Biology: Krombein, 1958. Biol. Soc. Wash., Proc. 71: 26 (nest, prey transport). —Krombein, 1964. Biol. Soc. Wash., Proc. 77: 92-98, figs. 12-14 (nest, prey, life cycle, cocoon, parasites).

Genus MONIAECERA Ashmead

Moniaecera Ashmead, 1899. Canad. Ent. 31: 220.
Type-species: *Crabro abdominalis* Fox. Orig. desig.

The described species are all recorded from America north of Mexico, but there are some undescribed taxa in Mexico. These wasps nest in the soil and prey upon a variety of insect groups including leafhoppers, psyllids, mirids and chironomids.

Revision: Pate, 1948. Amer. Ent. Soc., Trans. 74: 41-60, 6 figs., 1 map.

abdominalis (Fox). Ga., Tex., Kans., Ariz. Ecology: Nests in sand. Prey: *Tylozygus bifidus* (Say).

Crabro abdominalis Fox, 1895. Amer. Ent. Soc., Trans. 22: 198. ♀.

Biology: Hartman, 1905. Tex. Acad. Sci., Trans. 7: 57-58 (nest, prey).

asperata (Fox). Tex., N. Mex., Ariz., Calif. Ecology: Nests in powdery clay-sand or hard packed soil, 2-3 females sharing same burrow entrance but presumably making individual cells stored with about 20 prey each. Prey: *Procladius* sp. near *bellus* (Lw.); *Heteropsyllus texana* Cwfd., *Aphalaroida* spp., *Paratrioza* sp.; *Circulifer tenellus* (Bak.), *Empoasca abrupta* DeLong, *Erythroneura* sp., Typhlocybinae sp.; Miridae sp.; all prey were adults.

Crabro asperatus Fox, 1895. Amer. Ent. Soc., Trans. 22: 199. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 293-294, figs. 74-77 (larva).

Biology: Evans, 1964. Ins. Sociaux 11: 71-78, 3 figs. (communal nesting, prey transport). —Cazier and Mortenson, 1964. Pan-Pacific Ent. 40: 111-114, 1 fig. (nest, prey).

evansi Pate. Ariz. (Tucson).

Moniaecera evansi Pate, 1947. Ent. News 57: 239. ♂.

foxiana Pate. Calif.

Moniaecera (*Moniaecera*) *foxiana* Pate, 1948. Amer. Ent. Soc., Trans. 74: 49. ♀, ♂.

pinal Pate. Ariz., Calif.

Moniaecera pinal Pate, 1947. Notulae Nat. 185: 10. ♂.

Genus HUAVEA Pate

Moniaecera subg. *Huavea* Pate, 1948. Amer. Ent. Soc., Trans. 74: 58.
Type-species: *Moniaecera* (*Huavea*) *chontale* Pate. Orig. desig.

The morphological features of the female suggest that members of this genus nest in the ground.

pima Court and Bohart. Ariz. (Santa Cruz and Pima Co's.).

Huavea pima Court and Bohart, 1966. Pan-Pacific Ent. 42: 331, figs. 1, 2. ♂, ♀.

Genus CROSSOCERUS Lepeletier and Brulle

This large genus contains a number of subgenera and numerous species. Some of the subgenera are ground-nesters, others nest in pre-existing burrows or cavities in wood, or construct their own burrows in soft pith of herbs and stems or in rotten wood. Most species prey upon small Diptera, but some prey upon Homoptera, Trichoptera, Microlepidoptera, Hemiptera, and, rarely, Mecoptera and Ephemeroptera. So far as known, our North American species do not store this entire range of prey.

Taxonomy: Pate, 1944 (1943). Lloydia 6: 267-271 (key to subg.). —Leclercq, 1968. Soc. Roy. Sci. Liege, Bul. 27: 99-100 (key to xylicolous subg.).

Genus CROSSOCERUS Subgenus CROSSOCERUS Lepeletier and Brulle

Crossocerus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 763.
Type-species: *Crabro scutatus* Fabricius. Desig. by Westwood, 1839.
Crabro subg. *Microcrabro* Saussure, 1892. *In* Grandidier, Hist. Nat. Madagascar 20: 574. N. syn. (R. C. Miller).
Type-species: *Crabro* (*Microcrabro*) *micromegas* Saussure. Monotypic.
Stenocrabro Ashmead, 1899. Canad. Ent. 31: 216.
Type-species: *Crabro planipes* Fox. Orig. desig.
Synorhopalum Ashmead, 1899. Canad. Ent. 31: 218.
Type-species: *Crabro decorus* Fox. Orig. desig.
Ischnolynthus Holmberg, 1903. Mus. Nac. Buenos Aires, An. 9: 472.
Type-species: *Ischnolynthus foveolatus* Holmberg. Monotypic.
Crossocerus subg. *Yuchiha* Pate, 1944 (1943). Lloydia 6: 272. N. syn. (R. C. Miller).
Type-species: *Crossocerus* (*Yuchiha*) *xanthochilos* Pate. Orig. desig.

Relatively little is known of the biology of members of this subgenus. Some species are known to nest in the ground; this is substantiated by some of the morphological features of the females. However, a few species are known to nest in pre-existing burrows in wood above the ground. It is possible that many species utilize pre-existing burrows, modifying them as required as nesting sites. If this is so, perhaps the few species which have been reported as nesting in wood may be found eventually to nest in the ground also.

chromatipus Pate. Nev., Calif., Oreg., Wash.
Crabro pictipes Fox, 1895. Amer. Ent. Soc., Trans. 22: 187. ♂. Preocc.
Crossocerus (*Crossocerus*) *chromatipus* Pate, 1944 (1943). Lloydia 6: 280. N. name.

decorus (Fox). Nebr., Colo., Utah, west. Tex. to south. Calif., south in Mexico to Chiapas.
Ecology: Nests in sand, clay, and softer spots of rocky root-shrouded stream banks; pre-existing burrows of other insects are used and new side branches are constructed, resulting in twisted burrows 8.5-15.0 cm long, weakly branched, with tight clusters or linear series of cells grouped around end of burrow; up to 9 cells per nest with 8-29 prey per cell. Prey: Chloropidae, Pipunculidae, Stratiomyidae, Ceratopogonidae, Empididae, Sciaridae, Dolichopodidae, Tachinidae, Simuliidae, Tephritidae, Agromyzidae, Chironomidae.
Crabro decorus Fox, 1895. Amer. Ent. Soc., Trans. 22: 200. ♀.

Biology: Cockerell, 1898. Davenport Acad. Nat. Sci., Proc. 7: 148 (nest). —Smith, 1908. Nebr. Univ. Studies 8: 395 (nest).

elongatulus elongatulus Vander Linden. Transit. and U. Austr. Zones, N. S., Que., Ont., Maine to Va. west to Utah and Wash; Palaearctic south of Arctic Circle including North Africa; adventive in Argentina. Ecology: In Europe it is recorded as nesting in soil or wood, and sometimes in pre-existing burrows of wood-boring insects; nests have been found in such odd habitats as soil clinging to roots of fallen trees, old mortar of buildings, crevices in stone walls, and in cracks of rock outcrops; communal nesting has been reported once. Parasite: In Europe a species of *Macronychia* has been recorded. Prey: Chloropidae, Lauxaniidae, Scatopsidae, Cecidomyiidae, Empididae, Phoridae, Dolichopodidae, Syrphidae, Agromyzidae, Milichiidae, Tachinidae, Ephydridae,

Drosophilidae, Diastatidae, Calliphoridae, Stratiomyidae, Muscidae, Sciaridae, and one record of Aphidoidea. Another subspecies occurs in Sicily.

Crossocerus elongatulus Vander Linden, 1829. Nouv. Mem. Acad. Roy. Sci., Belles-Lettres Bruxelles 5: 64. ♂, ♀.

Crossocerus varipes Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 773. ♀, ♂.

Crossocerus pallidipalpis Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 779. ♀, ♂.

Crossocerus morio Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 781. ♀, ♂.

Crossocerus affinis Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 781. ♂.

Crossocerus luteipalpis Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 785. ♂.

Crossocerus annulatus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 787. ♀.

Crabro proximus Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 156. ♂. This is a questionable synonym.

Crabro hyalinus Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 161. ♀.

Crabro transversalis Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 162. ♂.

Crabro obliquus Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 167. ♀, ♂.

Crabro propinquus Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 168. ♂.

Crossocerus elongatus Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 193. Lapsus or emend.

Crabro scutellaris Smith, 1851. List Brit. Anim. Brit. Mus. 6: 121. ♀. Preocc.

Crabro sulcus Fox, 1895. Amer. Ent. Soc., Trans. 22: 187. ♀.

Ischnolynthus foveolatus Holmberg, 1903. Mus. Nat. Buenos Aires, An. 9: 472. ♂.

Stenocrabro plesius Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 472. ♂.

Crossocerus elongatus berlandi Richards, 1928. Soc. Ent. France, Bul., p. 223. ♂.

Biology: Leclercq, 1954. Monog. Syst., Phylogen., Zoogeogr. Crabron., Hym. p. 307 (nest, prey, refs. to biol. in Europe).

eriogoni (Rohwer). Alta., Colo., N. Mex., Ariz.; Mexico (Chihuahua, Coahuila, Zacatecas, Durango, Mexico). Ecology: Nests in softer spots of rocky root-shrouded stream banks; apparently nests in pre-existing burrows of other insects and makes a sometimes branched burrow 8-16 cm long; makes up to 3 cells per nest in a small cluster at end of burrow and stores 18-22 prey per cell. Prey: Pipunculidae, Chloropidae, Tephritidae, Empididae, Chamaemyiidae.

Crabro (*Crossoceros* (*!*)) *eriogoni* Rohwer, 1908. Ent. News 19: 256. ♀.

lentus (Fox). Que. west to B. C., Yukon Terr., N. W. T., Alaska south to Fla. and N. Mex., apparently not occurring west of Rocky Mts. in U. S. Ecology: Nests in vertical banks of sand and in stony, root-shrouded banks of firm clayey sand; pre-existing burrows are used and new side branches are constructed with clusters of cells located around, off to the side, or at the end of the main burrow; burrows are 7.0-10.5 cm long, linear or branched; up to 12 cells per nest with 5-30 prey per cell, newly captured prey stored at end of burrow, not in cell. Prey: Simuliidae, Chloropidae, Empididae, Ceratopogonidae, Chironomidae, Agromyzidae.

Crabro scutellatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 341. ♀. Preocc. N. syn. (R. C. Miller).

Crabro lentus Fox, 1895. Amer. Ent. Soc., Trans. 22: 190. ♀.

Crabro scutellifer Dalla Torre, 1897. Cat. Hym., v. 8, p. 625. N. name. N. syn. (R. C. Miller).

Biology: Peckham and Peckham, 1905. Wasps, Social and Solitary, p. 101 (nest, prey).

maculiclypeus (Fox). Newfoundland west to B. C., Yukon Terr., N. W. T., Alaska, south to Pa. and Kans. in the east, and to N. Mex. and Calif. in the west. Ecology: Nests in sparsely vegetated sand, burrows 4.0-11.5 cm long, extremely variable in shape, but main burrow usually enters at acute angle to surface; entrances usually concealed under small sand ledges or leaves, at bases of plants, or in depressions; cells arranged in clusters at the end of or off to the side of the main burrow with up to 9 cells per nest, each cell with 5-20 prey; pre-existing burrows are often used but new burrows are begun in small crevices or depressions in sand; newly captured prey sometimes stored in open cell at end of burrow, sometimes at end of burrow in a section only slightly or not at all widened. Prey: *Helobia* sp., *Molophilus* sp.; *Palpomyia* sp.; *Cricotopus* sp., *Hydrobaenus* sp., Chironomidae sp.; *Bradysia* sp.; *Drapetis* sp., *Hilara femorata* Lw., *Platypalpus*

holosericus Mel., *P. cellarius* Mel., *P. xanthopodus* Mel., *Bicellaria pectinata* Mel., *Rhamphomyia* sp.; *Chrysotus* sp., *Peloropeodes* sp., *Thrypticus willistoni* (Whlr.); *Conioscinella melancholica* Beck., *C.* sp., *Meromyza* sp., *Oscinella* sp., *Chlorops* sp.; *Agromyza* sp., *Liriomyza* sp., *Melanagromyza* sp., *Ophiomyia labiatarum* Her., *Phytobia* sp., *Phytomyza* sp.; *Psila angustata* Cr., *P. rosae* F.; *Rhagoletis fausta* (O. S.); *Plunomia elegans* Curr.; Coenosiinae sp.; preferred prey are Brachycera and acalyptrate Cyclorrhapha. Predator: *Philanthus pacificus* Cr.

Crabro maculiclypeus Fox, 1895. Amer. Ent. Soc., Trans. 22: 189. ♀, ♂.

Thyreopus (*Crossocerus*) *daeckei* Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 51. ♀.

Biology: Kurczewski, Burdick and Gaumer, 1969. N. Y. Ent. Soc., Jour. 77: 92-104, 8 figs. (nest, prey transport). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 491-492 (nest, prey).

minimus (Packard). N. B. to Ont., N. W. T., Maine to N. C. west to S. Dak. and Tex.

Blepharipus minimus Packard, 1867. Ent. Soc. Phila., Proc. 6: 377. ♀, ♂.

Crabro propinquus Fox, 1895. Amer. Ent. Soc., Trans. 22: 189. ♀. Preocc.

Crossocerus (*Crossocerus*) *pelas* Pate, 1944 (1943). Lloydia 6: 280. N. name.

planifemur Krombein. N. Y. to N. C., W. Va. Ecology: Nests in abandoned beetle borings in logs.

Crossocerus (*Crossocerus*) *planifemur* Krombein, 1952. Ent. Soc. Wash., Proc. 54: 181. ♀, (♂ misdet.).

Crossocerus (*Crossocerus*) *spangleri* Krombein, 1962. Biol. Soc. Wash., Proc. 75: 16. ♂, (♀ misdet.). N. syn. (R. C. Miller).

Biology: Krombein, 1952. Ent. Soc. Wash., Proc. 54: 182 (nest).

planipes (Fox). Newfoundland to B. C., Yukon, N. W. T., Alaska, Maine to Ga. west to Wash. and Calif. Ecology: Usually nests in vertical sand or clay banks, but has been found nesting in level or gently sloping bare soil; nests are 10-40 cm long, straight or curved, rarely branched; cells arranged in irregular linear series or tight clusters, up to 7 cells per nest, each new group of cells started at a point farther along main burrow than most recent cell of preceding group; females investigate and eventually renovate pre-existing burrows and holes; 6-20 prey stored per cell; newly captured prey stored in cell at end of burrow or at unwidened end of burrow. Prey: *Procladius bellus* (Lw.); *Chelifera* sp., *Chersodromia* sp., *Drapetis* sp., *Hilara testacea* Lw., *Leptopeza borealis* Zett., *Oedalia ohioensis* Mel., *Platypalpus holosericus* Mel.; *Rhamphomyia pusio* Lw., *Trichina nura* Mel.; *Chrysotus* sp.; *Psila* sp.; *Homoneura disjuncta* (Johns.), *Minettia* sp.; *Meromyza* sp., *Parectecephala sanguinolenta* (Lw.).

Crabro incavus Fox, 1895. Amer. Ent. Soc., Trans. 22: 188. ♀.

Crabro planipes Fox, 1895. Amer. Ent. Soc., Trans. 22: 193. ♂.

Crabro (*Crossoceros* (*!*)) *cockerelli* Rohwer, 1908. Ent. News 19: 255. "♀" = ♂, ♂.

Taxonomy: Bohart and Menke, 1976. Sphecid wasps of world, p. 402 (synonymy).

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 21 (nest). —Krombein, 1964. Brooklyn Ent. Soc., Bul. 58: 119-120 (nest, prey).

similis (Fox). Ont., Vt. and N. Y. to Fla., Mich., Wis., Ohio, Ill., Tenn.

Crabro similis Fox, 1895. Amer. Ent. Soc., Trans. 22: 191. ♀.

Stenocrabro flavitrochantericus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 242. ♀.

wesmaeli Vander Linden. N. W. T.; widespread in Europe, Russia, Manchuria and Japan. Ecology: In Europe nests in sand, loess and clay cliffs, cells scattered 2-5 cm below surface, burrows linear or simply branched, up to 9 cells per nest, stores 8-39 prey per cell; newly captured prey stored in open cell at end of burrow. Prey: In Europe Ceratopogonidae, Chironomidae, Cecidomyiidae, Sciaridae, Agromyzidae, Ephydridae, Tipulidae, Chloropidae, Empididae, Chamaemyiidae, Simuliidae; Psocoptera; Cicadellidae; Anthocoridae.

Crabro Wesmaeli Vander Linden, 1829. Nouv. Mem. Acad. Roy. Sci., Belles-Lettres Bruxelles 5: 65. ♀, ♂.

Ceratocolus Ziegleri Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 748. ♀.

Ceratocolus maurus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 748. ♀.

Biology: Leclercq, 1954. Monog. Syst., Phylogen., Zoogeogr. Hym. Crabron., pp. 307-308 (nest, prey, refs. to biol. in Europe). —Tsuneki, 1960. Fac. Liberal Arts, Fukui Univ., Mem., Ser. 2, No. 10, pp. 47-48 (nest, prey).

xanthochilos Pate. Md. to Ga. west to Tex., Mo., Kans., Ill. Ecology: Nests in clay bank. Prey: *Condylostylus* sp.
Crossocerus (*Yuchiha*) *xanthochilos* Pate, 1944 (1943). Lloydia 6: 274. ♀.

Taxonomy: Krombein, 1952. Amer. Ent. Soc., Trans. 78: 96. ♂.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 21 (nest; misdet. as *scutellatus*).

xanthognathus (Rohwer). Ariz.; Mexico (Chihuahua).
Thyreopus (*Crossocerus*) *xanthognathus* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 566. ♀.

Genus CROSSOCERUS Subgenus ABLEPHARIPUS Perkins

Ablepharipus Perkins, 1913. Ent. Soc. London, Trans., p. 390.
Type-species: *Crabro podagricus* Vander Linden. Monotypic.

The European *podagricus* usually nests in abandoned burrows of wood-boring Coleoptera, and provisions the cells with small nematocerous and acalyptrate Diptera. A female of the rare North American *unicus* was collected on the trunk of a dead hemlock, where, presumably, it nested in an abandoned beetle boring.

unicus (Patton). Conn., N. Y., Pa., Mich., Ind., Minn., Mont., Man.
Blepharipus unicus Patton, 1879. Canad. Ent. 11: 214. ♀.
Stenocrabro nelli Viereck, 1904. Amer. Ent. Soc., Trans. 30: 241. ♀.

Genus CROSSOCERUS Subgenus EPICROSSOCERUS Ashmead

Epicrossocerus Ashmead, 1899. Canad. Ent. 31: 215.
Type-species: *Crabro insolens* Fox. Orig. desig.

insolens (Fox). N. Y., Mich., Mo., Colo., Utah, Ariz., Calif., Oreg. Ecology: Nests in *Sambucus* stems. Parasite: *Diomorus zabriskiei* Cr. Prey: *Pachyneuron* sp.; *Tetrastichus pattersonae* Full., *T.* sp.
Crabro insolens Fox., 1895. Amer. Ent. Soc., Trans. 22: 192. ♀.
Crabro (*Epicrossocerus*) *universitatis* Rohwer, 1909. Ent. News 20: 152. ♀. N. syn. (R. C. Miller).
Epicrossocerus rani Rohwer, 1923. Ent. Soc. Wash., Proc. 25: 99. ♀. N. syn. (R. C. Miller).

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, prey, parasite).

Genus CROSSOCERUS Subgenus HOPLOCRABRO Thomson

Crabro subg. *Hoplocrabro* Thomson, 1874. Hym. Scand., v. 3, p. 277.
Type-species: *Crabro quadrimaculatus* Fabricius. Monotypic.

The European *quadrimaculatus* nests in sandy soil and provisions with nematocerous and brachycerous Diptera and Trichoptera.

Taxonomy: Pate, 1942. Canad. Ent. 74: 177-185, 5 figs.

angelicus (Kincaid). Nebr., Alta., Mont. and Wyo. west to B. C. and north. Calif. Prey: Muscoid Diptera.
Crabro angelicus Kincaid, 1900. Ent. News 11: 358. "♀" = ♂.
Crabro (*Hoplocrabro*) *vierecki* Smith, 1908. Nebr. Univ. Studies 8: 401. ♀.
Crabro (*Hoplocrabro*) *boulderensis* Rohwer, 1909. Ent. News 20: 323. ♂.
Crabro (*Hoplocrabro*) *spinibuccus* Viereck, 1909. Ent. Soc. Wash., Proc. 11: 44. ♀.

Biology: Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2: 420 (prey).

Genus CROSSOCERUS Subgenus BLEPHARIPUS Lepeletier and Brulle

Blepharipus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 728.
Type-species: *Blepharipus nigrita* Lepeletier and Brulle. Desig. by Ashmead, 1899.
Crabro subg. *Coelocrabro* Thomson, 1874. Hym. Scand., v. 3, p. 262.

Type-species: *Crabro pubescens* Shuckard. Desig. by Richards, 1935.

Dolichocrabro Ashmead, 1899. Canad. Ent. 31: 216.
Type-species: *Dolichocrabro Wickhamii* Ashmead. Orig. desig.

Acanthocrabro Perkins, 1913. Ent. Soc. London, Trans., p. 391. N.. syn. (R. C. Miller).
Type-species: *Crabro vagabundus* Panzer. Monotypic.

Crossocerus subg. *Nothocrabro* Pate, 1944 (1943). Lloydia 6: 314. N. syn. (R. C. Miller).
Type-species: *Crabro nitidiventris* Fox. Orig. desig.

Crossocerus subg. *Stictoptila* Pate, 1944 (1943). Lloydia 6: 315. N. syn. (R. C. Miller).
Type-species: *Crabro confertus* Fox. Orig. desig.

Crossocerus subg. *Neoblepharipus* Leclercq, 1968. Soc. Roy. Sci. Liege, Bul. 27: 98. N. syn. (R. C. Miller).
Type-species: *Crossocerus* (*Neoblepharipus*) *potosus* Leclercq. Orig. desig.

Crossocerus subg. *Fentis* Tsuneki, 1971. Etizenia 51: 13. N. syn. (R. C. Miller).
Type-species: *Crossocerus* (*Fentis*) *quinquedentatus* Tsuneki. Orig. desig.

Crossocerus subg. *Bnunius* Tsuneki, 1971. Etizenia 51: 15. N. syn. (R. C. Miller).
Type-species: *Crossocerus* (*Bnunius*) *domicola* Tsuneki. Orig. desig.

These species nest in the soft pith of plant stems or twigs, or in decaying wood. Most species make a series of linear cells separated by partitions of particles of the substrate.

Revision: Pate, 1944 (1943). Lloydia 6: 290-312 (N. Amer. spp.).

annulipes annulipes (Lepeletier and Brulle). N. S. to B. C. south to Ga., Utah, Nev. and Calif.; widely distributed in Palaearctic Region except Japan. Ecology: In North America nests in rotting stumps and logs, and in old anobiid burrows in structural timber, stores 4-46 prey per cell. Prey: *Alebra albostriella* (Fall.), *Ribautiana* ? sp., *Empoa* ? sp., *Empoasca alboneura* Gill., *E. bifurcata* DeL., *E. bipunctata* (Osh.), *E. birdii* Godg., *E. erigeron* DeL., *E. fabae* Harr., *E. gelbata* DeL. and Dav., *E. livingstoni* Gill., *E. maligna* Walsh, *E. obtusa* Walsh, *E. patula* DeL., *E. pergandei* Gill., *E. solana* DeL., *E.* spp., *Edwardsiana rosae* (L.), *Typhlocyba gillettei* Van D., *T. pomaria* McAtee, *T. australis* Frogg., *T. modesta* Gibson, *T. melite* Mcatee, *T.* sp. or *Ossiannilssonola* sp., *Erythroneura comes* (Say), *E. confirmata* McAtee, *E. dowelli* Beamer, *E. lawsoniana* Baker, *E. tricincta* Fitch, *E. vulnerata* Fitch, *E. ziczac* Walsh, *E. lawsoni* Rob., *E. vitis* (Harr.), *E. hartii* (Gill.), *E. magnacalx* Beamer, *E. elegans* McAtee, *E. rubra* (Gill.), *E. albescens* Beamer; adults are the preferred prey but some nymphs are stored; many other leafhoppers are recorded as prey in Europe; Miridae sp.; Chironomidae sp. Another subsp. occurs in Japan.

Blepharipus annulipes Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 729. ♀.
Crossocerus gonager Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 785. ♀.
Crabro nigritus Gimmerthal, 1836. Soc. Imp. Nat. Moscow, Bul. 9: 435.
Crabro ambiguus Dahlbom, 1842. Dispos. Method. Spec. Scand. Ins. Hym., p. 14. ♀.
Crabro (*Crossocerus*) *capito* Zeller, 1845. *In* Dahlbom, Hym Europaea, v. 1, p. 524.
Blepharipus parkeri Banks, 1921. Ent. Soc. Amer., Ann. 14: 17. ♀.
Crabro (*Blepharipus*) *davidsoni* Sandhouse, 1938. Ent. Soc. Amer., Ann. 31: 1. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 106, figs. 69-74 (larva).

Biology: Davidson and Landis, 1938. Ent. Soc. Amer., Ann. 31: 5-8, 3 figs. (nest, prey, life cycle). —Krombein, 1958. Biol. Soc. Wash., Proc. 71: 26 (nest, prey, life cycle). —Michener, 1971. Kans. Ent. Soc., Jour. 44: 405-407 (nest, prey).

barbipes (Dahlbom). Que. to B. C., Alaska, Yukon Terr. south to N. C., Tenn., and S. Dak., in mts. to N. Mex. and Calif.; north. Palaearctic, Lapland and Holland to Japan. Ecology: Nests in hole in wooden shingle and in twigs of *Salix* and *Sambucus*, and in dead standing tree. Prey: *Empoasca* sp., possibly *obtusa* Walsh or *patula* DeL.; in Japan preys upon small Diptera, storing 3-6 prey per cell.

Crabro barbipes Dahlbom, 1845. Hym. Europaea, v. 1, p. 521. ♂.
Crabro ater Cresson, 1865. Ent. Soc. Phila., Proc. 4: 477. ♀. Preocc. N. syn. (R. C. Miller).
Crabro hirtipes Morawitz, 1866. Acad. Imp. Sci. St. Petersburg, Bul. 9: 258. ♂.
Dolichocrabro Wickhamii Ashmead, 1899. Canad. Ent. 31: 215. ♂. N. syn. (R. C. Miller).
Dolichocrabro wickhami Ashmead, 1902. Wash. Acad. Sci., Proc. 4: 133. ♂. Preocc. N. syn. (R. C. Miller).

Crossocerus (*Blepharipus*) *pammelas* Pate, 1944 (1943). Lloydia 6: 299. N. name. N. syn. (R. C. Miller).

Biology: Steyskal, 1944. Brooklyn Ent. Soc., Bul. 39: 170 (nest, prey). —Tsuneki, 1960. Fac. Lib. Arts Fukui Univ., Mem. Ser. 2, Nat. Sci. (10) 1: 42 (nest, prey).

cinctipes (Provancher). Newfoundland, N. B., N. S. west to Alaska, Yukon Terr., N. W. T., south to Md., Mich., Minn. and in the mts. to N. Mex. and Calif.

Plepharipus(!) *cinctipes* Provancher, 1882. Nat. Canad. 13: 133. ♂.
Crabro niger Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 419. ♀. Preocc.
Crabro nigror Fox, 1895. Amer. Ent. Soc., Trans. 22: 196. ♀.
Crabro nigrior Fox, 1896. Amer. Ent. Soc., Trans. 23: 80. Emend.
Crabro servus Dalla Torre, 1897. Cat. Hym., v. 8, p. 626. N. name.
Stenocrabro cinctitarsis Ashmead, 1901. Psyche 9: 185. ♂.
Blepharipus columbiae Bradley, 1906. Canad. Ent. 38: 380. ♀.
Thyreopus (*Blepharipus*) *utensis* Mickel, 1916. Amer. Ent. Soc., Trans. 42: 421. ♀.
Thyreopus (subgenus?) *stygius* Mickel, 1916. Amer. Ent. Soc., Trans. 42: 422. ♀.

fergusoni Pate. Utah, Nev., Calif., Oreg. Ecology: Nests in *Sambucus* stems. Parasite: *Diomorus zabriskiei* Cr.; *Amobia floridensis* (Tns.), *Macronychia* sp. Prey: Stratiomyidae ? sp.; Empididae; Muscoid Diptera.

Crossocerus (*Blepharipus*) *fergusoni* Pate, 1944 (1943). Lloydia 6: 307. ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 107, figs. 97-98 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 165, fig. 61 (larva).

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1022 (prey). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, parasites).

harringtonii (Fox). Que. west to B. C., south to Ga., Tenn., Kans. and Mont. Ecology: Reared from branches of white oak.

Crabro Harringtonii Fox, 1895. Amer. Ent. Soc., Trans. 22: 195. ♀.

Taxonomy: Krombein, 1952. Ent. Soc. Wash., Proc. 54: 184. ♂.

impressifrons (Smith). Ont., Mass. south to Fla., west to Nebr. and Ark. Ecology: Nests in rotten log and in dense frass beneath tight bark of dead American elm logs, and in hickory; one nest 10 cm long, branching and with 6 cells, some in linear series. Prey: *Condylostylus* sp., Dolichopodidae sp.; Tephritidae; Empididae; Syrphidae; Chironomidae; Trichoptera sp.

Crabro tibialis Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 340. ♀. Preocc.
Crabro pusillus Harris, 1835. *In* Hitchcock, Rpt. Geol., Mineral. Bot. Zool. Mass., p. 68. Nom. nud.
Crabro impressifrons Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 417. N. name.
Blepharipus scutellatus Packard, 1867. Ent. Soc. Phila., Proc. 6: 375. ♂. Preocc.
Blepharipus Harrisii Packard, 1867. Ent. Soc. Phila., Proc. 6: 376. ♂.
Crabro (*Blepharipus*) *tridentatus* Rohwer, 1909. Ent. News 20: 150. ♀, ♂. Preocc.

maculipennis (Smith). Que. to B. C. south to Va., W. Va., Ill., Minn. and in mts. to N. Mex. and Calif. Ecology: Nests in cavities in log and old apple tree. Prey: *Nephrotoma tenuis* (Lw.), *Pales ferrugineus* (F.), Tipulidae sp.

Blepharipus maculatus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 730. ♀. Preocc.
Crabro pictus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 417. N. name. Preocc.
Crabro maculipennis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 417. N. name.
Crabro confertus Fox, 1895. Amer. Ent. Soc., Trans. 22: 181. ♀, ♂.
Crabro ventralis Fox, 1895. Amer. Ent. Soc., Trans. 22: 183. ♀.
Crabro canonicola Viereck, 1908. Amer. Ent. Soc., Trans. 33: 402. ♀.
Crabro albertus Carter, 1925. Canad. Ent. 57: 135. ♂.

Biology: Erikson, 1940. Brooklyn Ent. Soc., Bul. 35: 172 (nest, prey). —Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1023 (prey).

maculitarsis (Cameron). Ariz., Tex.; Mexico (Guerrero, Morelos, Chiapas). Ecology: Reared from *Quercus*.

Crabro maculitarsis Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 154. ♀.

melanius (Rohwer). Alta., Colo., N. Mex., Ariz.; Mexico (Chihuahua, Durango, Morelos).
Thyreopus (*Blepharipus*) *melanius* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 565. ♀, ♂.

nigricornis (Provancher). Newfoundland to B. C., Yukon and Alaska, south to N. C., Tenn., Nebr., in mts. south to N. Mex. and Calif. Ecology: Nests in *Sambucus* stems and in twig of living box elder tree; one nest 20.5 cm long, linear, contained 11 cells each with 6-14 prey per cell. Prey: Primarily Dolichopodidae and Empididae especially *Platypalpus* sp., but also Ceratopogonidae, Mycetophilidae, Chironomidae, Tipulidae, Phoridae, Chloropidae, other acalyptrate Cyclorrhapha, Muscidae and Anthomyiidae.
Blepharipus nigricornis Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 294. ♂.

Biology: Pate, 1944 (1943). Lloydia 6: 306-307 (nest, prey).

nitidiventris (Fox). Que. and Ont. to Ga. west to Minn. and Tex. Prey: *Nephrotoma virescens* Lw., Tipulidae sp.
Crabro nitidiventris Fox, 1892. Ent. News 3: 9. ♀.

Taxonomy: Krombein, 1953. Wasmann Jour. Biol. 10: 338. ♀.

Biology: Krombein, 1967. U. S. Dept. Agr., Monog. 2, Sup. 2, p. 420 (prey).

stictochilos Pate. Mass. to Ga., Mich., Ill., Ark. Ecology: Nests in pith of green *Hibiscus* stem. Prey: Diptera.
Crossocerus (*Blepharipus*) *stictochilos* Pate, 1944 (1943). Lloydia 6: 304. ♀, ♂.

Biology: Krombein, 1964. Biol. Soc. Wash., Proc. 77: 90 (nest, prey, cocoon, life cycle).

stricklandi Pate. Alta., B. C., Wyo., Colo., Utah.
Crossocerus (*Blepharipus*) *stricklandi* Pate, 1944 (1943). Lloydia 6: 301. ♂.

tarsalis (Fox). Que., Ont., Maine south to Ga., west to Tenn., Mo., Mich., Colo., Idaho.
Crabro tarsalis Fox, 1895. Amer. Ent. Soc., Trans. 22: 193. ♂.

Genus TRACHELIODES Morawitz

Crabro subg. *Brachymerus* Dahlbom, 1845, Hym. Europaea, v. 1, p. 519. Preocc.
Type-species: *Crabro* (*Brachymerus*) *Megerlei* Dahlbom. Monotypic.
Tracheliodes Morawitz, 1866. Acad. Imp. Sci. St. Petersburg, Bul. 9: 249.
Type-species: *Brachymerus megerlei* Dahlbom. Desig. by Ashmead, 1899.
Fertonius Perez, 1892. *In* Ferton, Soc. Linn. Bordeaux, Actes 44: 341.
Type-species: *Crossocerus luteicollis* Lepeletier and Brulle. Desig. by Pate, 1937.

Our species nest in plant stems or borings in wood, but one European species is known to nest in soil, another in abandoned beetle borings. Our species prey upon worker ants of the genus *Liometopum;* European species use workers of both *Liometopum* and *Tapinoma.*

Revision: Pate, 1942. Lloydia 5: 222-224, 7 figs. (N. Amer. spp.).

amu Pate. N. Mex., Ariz. Ecology: Nests in borings in wood, constructs a brood chamber in which 1-3 wasps develop, stores as many as 42 prey per egg. Prey: *Liometopum occidentale luctuosum* Whlr. workers.
Tracheliodes amu Pate, 1942. Lloydia 5: 235. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 290-291, figs. 104-109 (larva).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 257-259, figs. 68, 69 (nest, prey, life cycle, cocoon).

foveolineatus (Viereck). Colo., Oreg., Calif. Ecology: Nests in *Sambucus* stems. Prey: *Liometopum occidentale luctuosum* Whlr. workers.
Crabro (*Cuphopterus*) *foveolineatus* Viereck, 1909. Ent. Soc. Wash., Proc. 11: 44. ♀.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest, prey).

hicksi Sandhouse. Colo., Ariz. Prey: *Liometopum* sp. workers.
Tracheliodes hicksi Sandhouse, 1936. Ent. News 47: 2. ♀.

Biology: Hicks, 1936. Ent. News 47: 4-7 (prey capture).

Genus CRABRO Fabricius

Crabro Fabricius, 1775. Systema Ent., p. 373. Preocc., but placed on Official List of Generic Names of Internatl. Comn. Zool. Nomencl., 1936., Op. 144.
Type-species: *Vespa cribraria* Linnaeus. Desig. by Internatl. Comn. Zool. Nomencl., 1943.
Carabro Say, 1823. West. Quart. Rptr. 2: 78. Lapsus.
Crabro subg. *Thyreopus* Lepeletier and Brulle, 1835. Soc. Ent. France, Ann. 3: 519.
Type-species: *Sphex cribrarius* (Linnaeus). Desig. by Westwood, 1839.
Crabro subg. *Thyreocnemus* Costa, 1871. Mus. Zool. Napoli, Ann. 6: 64.
Type-species: *Crabro pugillator* Costa. Monotypic.
Anothyreus Dahlbom, 1845. Hym. Europaea, v. 1, p. 526.
Type-species: *Anothyreus lapponicus* of Dahlbom. Desig. by Ashmead, 1899.
Paranothyreus Ashmead, 1899. Canad. Ent. 31: 213.
Type-species: *Crabro hilaris* Smith. Orig. desig.
Synothyreopus Ashmead, 1899. Canad. Ent. 31: 213.
Type-species: *Thyreopus tumidus* Packard. Orig. desig.
Pemphilis Pate, 1944. Amer. Midland Nat. 31: 340.
Type-species: *Vespa cribraria* Linnaeus. Orig. desig.
Dyscolocrabro Pate, 1944. Amer. Midland Nat. 31: 349.
Type-species: *Crabro chalybeus* Kohl. Orig. desig.
Agnosicrabro Pate, 1944. Amer. Midland Nat. 31: 349.
Type-species: *Crabro occultus* Fabricius. Orig. desig.
Hemithyreopus Pate, 1944. Amer. Midland Nat. 31: 349.
Type-species: *Crabro* (*Ceratocolus*) *Loewi* Dahlbom. Orig. desig.
Parathyreopus Pate, 1944. Amer. Midland Nat. 31: 349.
Type-species: *Crabro filiformis* Radoszkowski. Orig. desig.
Pemphilis subg. *Norambega* Pate, 1947. Notulae Nat. 185: 12.
Type-species: *Thyreopus argus* Packard. Orig. desig.

Subgenera have frequently been recognized in this large genus, but Bohart and Menke believe that on morphological grounds it is preferable to recognize only species groups. This concept is substantiated by a consideration of the ethology, for clearcut differences have not been demonstrated for the several species groups. These wasps nest in the soil, usually constructing multicellular nests, some nesting gregariously, others are solitary. The prey consists of Diptera and, frequently, each species has preferences for flies belonging to one or another suborder or section.

Biology: Kurczewski and Acciavatti, 1968. N. Y. Ent. Soc., Jour. 76: 196-212 (nesting behavior of N. Amer. spp.).

Species Group Hilaris

This is the equivalent of *Paranothyreus* Ashm.

aequalis Fox. U. S. east of 100th meridian, north to N. J. and N. Dak., south to Fla.
Crabro aequalis Fox, 1895. Amer. Ent. Soc., Trans. 22: 164. ♀.
Paranothyreus rugicollis Viereck, 1904. Amer. Ent. Soc., Trans. 30: 241. ♂.
Thyreopus (subgenus?) *knoxensis* Mickel, 1916. Amer. Ent. Soc., Trans. 42: 424. ♂.

cingulatus (Packard). N. J. to Ala. west to Wis., Nebr., Tex.; Mexico. Ecology: Nests in vertical sand banks, makes 2-8 cells per nest, stores 11-20 flies per cell. Prey: *Paralimna punctipennis* (Wied.).
Thyreopus cingulatus Packard, 1867. Ent. Soc. Phila., Proc. 6: 366. ♂, (♀ misdet.).
Crabro clarconis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 213. ♀.

Biology: Rau and Rau, 1918. Wasp Studies Afield, pp. 96-101, figs. 24-26 (nest, prey transport). —Rau, 1938. Ent. Soc. Amer., Ann. 31: 543.

cognatus Fox. Alta., U. S. except Pacific States, N. H. to Ga. west to Mont., Utah and Tex.
Crabro cognatus Fox, 1895. Amer. Ent. Soc., Trans. 22: 178. ♀, ♂.

hilaris Smith. N. J. to Fla., Ill., Nebr., Tex.
Crabro hilaris Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 416. ♀.

rufibasis (Banks). Fla. Ecology: Nests in vertical face of sand pit. Prey: *Furcifera pictipennis* (Wied.), *Psilocephala festiva* (Coq.), *P. notata* (Wied.); Bombyliidae sp.; *Chrysotus discolor* Lw., *Condylostylus caudatus* (Wied.), *C. chrysoprasi* (Wlkr.), *C. graenicheri* (Van D.), *Plagioneurus univittatus* Lw.; *Allograpta obliqua* (Say), *Baccha costata* Say, *B.* sp. near *loewi* Sedman, *Mesograpta* spp., *Mixogaster* sp., *Toxomerus* sp.; *Euxesta basalis* (Wlkr.), *E. eluta* Lw., *E. notata* (Wied.); *Xanthaciura insecta* (Lw.); *Atrichomelina pubera* (Lw.); *Homoneura* sp., *Poecilominettia valida* (Wlkr.); *Pholeomyia decorior* Steysk., *P. dispar* (Beck.); *Chlorops abdominalis* Coq.; *Pegomya gopheri* Johns.; *Atherigona orientalis* Schin., *Coenosia* spp., *Coenosopsia prima* Mall., *Fannia* sp., *Gymnodia arcuata* (Stein), *G. cilifera* (Mall.), *G. debilis* (Will.), *Limnophora narona* (Wlkr.), *Ophyra aenescens* (Wied.), *Orthellia caesarion* (Meig.); *Cochliomyia macellaria* (F.), *Phaenicia cluvia* (Wlkr.); *Johnsonia elegans* Coq., *Ravinia derelicta* (Wlkr.); *Acronarista cornuta* Reinh., *Actia* sp., *Catharosia nebulosa* (Coq.), *Chaetonodexodes vanderwulpi* (Tns.), *Chaetophlepsis townsendi* (Sm.), *Clausicella floridensis* (Tns.), *Elfia mellissopodis* (Coq.), *Exoristoides* sp., *Gaediopsis flavipes* Coq., *Leskiella brevirostris* James, *Lespesia aletiae* (Riley), *Lixophaga mediocris* Ald., *Lidella* sp. near *thomsoni* Hert., *Medina* sp., *Miamimyia cincta* Tns., *Paradidyma singularis* (Tns.), *Phasiopsis floridana* Tns., *Pseudochaeta* sp. near *finalis* Reinh., *Pseudomyothyria ancilla* (Wlkr.), *Prophryno parviteres* (Ald. and Webb.), *Trichopoda plumipes* (F.).

Thyreopus rufibasis Banks, 1921. Ent. Soc. Amer., Ann. 14: 17. ♀.

snowii Fox. N. Y., Md., Va., Minn., Kans.

Crabro snowii Fox, 1896. Amer. Ent. Soc., Trans. 23: 79. ♀, ♂.

Species Group Tumidus

This is *Synothyreopus* Ashm., in part.

lacteipennis Rohwer. Tex., Colo., Ariz.; Mexico (Nuevo Leon, Durango).

Crabro (*Thyreopus*) *lacteipennis* Rohwer, 1909. Ent. News 20: 150. ♀.

peltista Kohl. Tex., Ariz.; Mexico to Nicaragua.

Crabro (*Thyreopus*) *peltista* Kohl, 1888. Zool. Jahrb., Ztschr. f. System. 3: 586. ♀, ♂.

Crabro incertus Fox, 1895. Amer. Ent. Soc., Trans. 22: 174. ♀ (♂ misdet.).

tenuiglossa Packard. Ont., Mich., Ill., Minn., N. Dak., S. Dak., Alta.

Crabro tenuiglossa Packard, 1866. Ent. Soc. Phila., Proc. 6: 98. ♀.

Thyreopus discifer Packard, 1867. Ent. Soc. Phila., Proc. 6: 363. ♂.

tumidus (Packard). N. Y. to S. C., Ill., Nebr.

Thyreopus tumidus Packard, 1867. Ent. Soc. Phila., Proc. 6: 364. ♀, ♂.

Species Group Advena

This is *Synothyreopus* Ashm., in part.

advena Smith. South. Canada and U. S. east of 100th meridian. Ecology: Nests in hard clay loam or sand, makes 2 to more than 16 cells per nest, stores 1-10 prey per cell. Prey: *Chrysopilus proximus* (Wlkr.), *Symphoromyia pluralis* (Curr.); *Chrysops univittata* Macq.; *Syrphus rectus* O. S.; *Euxesta notata* (Wied.), *Callopistromyia annulipes* (Macq.), *Otitidae* sp.; *Pegomya finitima* Stein, *P. lipsia* (Wlkr.), *Hydrophoria conica* (Wied.), Anthomyiidae sp.; *Muscina assimilis* (Fall.), *Musca autumnalis* DeG., *M. domestica* L., *Coenosia tigrina* (F.), *Fannia scalaris* (F.); *Pollenia rudis* (F.), *Phaenicia sericata* (Meig.), Calliphoridae sp.; *Sarcophaga scoparia* Pand., *S.* sp., *Senotainia* sp.; *Belvosia unifasciata* Desv., *Aplomyiopsis* sp., *Lespesia* sp., Blondeliini sp.; preferred prey are calyptrate Cyclorrhapha but Orthorrhapha are also used.

Crabro pegasus Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 68. Nom. nud.

Crabro advena Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 421. ♀ (♂ misdet.).

Crabro succinctus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 479. ♀.

Thyreopus signifer Packard, 1867. Ent. Soc. Phila., Proc. 6: 361. ♀, ♂.

Thyreopus pegasus Packard, 1867. Ent. Soc. Phila., Proc. 6: 362. ♀, ♂.

Thyreopus elegans Provancher, 1883. Faune Ent. Canada, Hym., p. 665. ♀, ♂.

Crabro discretus Fox, 1895. Amer. Ent. Soc., Trans. 22: 165. ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 104, figs. 95-96 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 164, figs. 47, 48 (larva).

Biology: Patton, 1897. Canad. Ent. 29: 248 (nest, prey). —Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1017 (prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 53 (prey). —Evans, 1960. N. Y. Ent. Soc., Jour. 68: 123-127, fig. 1 (nest, prey transport, egg, larval life). —Kurczewski and Acciavatti, 1968. N. Y. Ent. Soc., Jour. 76: 200-209, figs. 1-11 (nest, prey transport, egg). —Kurczewski, Burdick and Gaumer, 1969. N. Y. Ent. Soc., Jour. 77: 152-170, figs. 1-8 (nest, prey transport, egg).

bruneri (Mickel). Nebr., Oreg.
Thyreopus (*Synothyreopus*) *bruneri* Mickel, 1916. Amer. Ent. Soc., Trans. 42: 422. ♀, ♂.

florissantensis Rohwer. Colo. and Wyo. to Oreg. and Wash. Predator: *Philanthus pulcher* D. T.
Crabro (*Synothyreopus*) *florissantensis* Rohwer, 1909. Ent. News 20: 149. ♂.

henrici Krombein. N. J., Va.
Thyreopus (*Synothyreopus*) *vierecki* Rohwer, 1910. Ent. Soc. Wash., Proc. 12: 50. ♂. Preocc.
Crabro (*Synothyreopus*) *henrici* Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1016. N. name.

hispidus Fox. Oreg., Wash., B. C.
Crabro hispidus Fox, 1895. Amer. Ent. Soc., Trans. 22: 192. ♀.

vernalis (Packard). Transcont. in N. Amer. in Transit. Zone including Alaska.
Thyreopus vernalis Packard, 1867. Ent. Soc. Phila., Proc. 6: 369. ♀.
Crabro (*Thyreopus*) *brachycarpae* Rohwer, 1908. Ent. News 19: 252. ♂.
Crabro (*Paranothyreus*) *gillettei* Rohwer, 1908. Ent. News 19: 418. ♀.

virgatus Fox. Calif., Nev., Oreg., Idaho, Alta.
Crabro virgatus Fox, 1895. Amer. Ent. Soc., Trans. 22: 174. ♂.
Crabro veles Carter, 1925. Canad. Ent. 57: 134. ♂.

Species Group Thyreophorus

This is *Synothyreopus* Ashm., in part.

thyreophorus Kohl. Nev., Calif., Oreg.
Crabro (*Thyreopus*) *thyreophorus* Kohl, 1888. Zool. Jahrb., Ztschr. f. System. 3: 585, pl. 14. ♀, ♂.

Species Group Cribrarius

This is *Crabro* F., sens. str., and *Norumbega* Pate.

argusinus Bohart. Transcont. in south. Canada and U. S. Ecology: Nests in sand, makes 1-4 or more cells per nest, stores 10-19 flies per cell. Parasite: *Senotainia* sp. near *trilineata* (Wulp), *Phrosinella fumosa* Allen ? Prey: *Dolichopus coercens* Wlkr., *D. gladius* Van D., *D.* sp., *Rhaphium vanduzeei* Curr., *Argyra albicans* Lw., *A. calceata* Lw., *Hercostomus barbatulus* Lw., *H. crassicauda* Lw., *H. frequens* Lw., *H. ornatus* Van D., *Liancalus genualis* Lw., *Plastoneurus vagans* Lw.; *Parydra bituberculata* Lw., *P. borealis* Cr., *P. breviceps* Lw.; *Lispe albitarsis* Stein, *L. nasoni* Stein; Dolichopodidae are the preferred prey, but some Ephydridae and a few Muscidae are also used.
Crabro argus Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 68. Nom. nud.
Thyreopus argus Packard, 1867. Ent. Soc. Phila., Proc. 6: 359. ♂. Preocc.
Crabro argusinus Bohart, 1976. *In* Bohart and Menke, Sphecid wasps of world, p. 407. N. name.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 164, figs. 49, 50 (larva).

Biology: Hartman, 1905. Tex. Acad. Sci., Trans. 7: 44 (prey, nest). —Dow, 1930. Psyche 37: 181 (prey). —Evans, 1960. N. Y. Ent. Soc., Jour. 68: 129-132, fig. 1 (nest, prey, parasites).

conspicuus Cresson. Colo., Nev., Calif., Wash., Alta.
Crabro conspicuus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 480. ♀.
Crabro medius Fox, 1895. Amer. Ent. Soc., Trans. 22: 167. ♂.

cribrellifer (Packard). N. H. to Fla., Ont., Mich., Ind. Prey: *Ommatius tibialis* Say, *Tolmerus novaescotiae* (Macq.).
Thyreopus cribrellifer Packard, 1867. Ent. Soc. Phila., Proc. 6: 358. ♂.
Thyreopus sinuatus Provancher, 1883. Faune Ent. Canada, Hym., p. 664. ♀. Preocc.
Crabro Provancheri Fox, 1895. Amer. Ent. Soc., Trans. 22: 168. N. name.

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1017 (prey). —Kurczewski and Acciavatti, 1968. N. Y. Ent. Soc., Jour. 76: 198 (prey).

juniatae Krombein. Pa., Va., W. Va. Prey: *Hylemya ciliciura* (Rond.).
Crabro (*Crabro*) *juniatae* Krombein, 1938. Ent. Soc. Amer., Ann. 31: 469. ♀.

Biology: Krombein, 1952. Ent. Soc. Wash., Proc. 54: 181 (prey).

largior Fox. U. S., transcont. in Transit. Zone.
Crabro largior Fox, 1895. Amer. Ent. Soc., Trans. 22: 161. ♀, ♂.

latipes Smith. Transcont. in Alaska, Canada, U. S. in Transit. and Canad. Zones. Ecology: Nests in sand, makes 8 or more cells per nest, stores 6-10 flies per cell. Prey: *Platycheirus peltatus* (Meig.); *Symphoromyia pluralis* Curr.; *Dolichopus adultus* Van D., *D. nigricornis* Meig., *D. nodipennis* Van D., *D. remus* Van D., *D. socius* Lw., *Gymnopternus spectabilis* Lw., *Rhaphium armatum* Curr., *R. crassipes* (Meig.); *Musca domestica* L., *M. autumnalis* DeG., *Fannia maniceta* (Meig.), *Muscina assimilis* (Fall.), *Phaonia bysia* (Wlkr.); *Lucilia illustris* (Meig.); *Aplomyiopsis* sp., *Icteriophyto tibialis* (Curr.), *Oswaldia assimilis* (Tns.); *Hydrophoria conica* (Wied.), *Hylemya setigera* (Joh.), *H. stratifrons* Huck., *Pegomya affinis* Stein, *P. lipsia* (Wlkr.); preferred prey are calyptrate Cyclorrhapha, but Orthorrhapha are also used. Predator: *Philanthus zebratus nitens* (Bks.).
Crabro gryphus Harris, 1835. *In* Hitchcock Rpt. Geol. Mineral. Bot. Zool. Mass., p. 68. Nom. nud.
Crabro latipes Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 396. ♂.
Crabro vicinus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 479. ♀.
Thyreopus coloradensis Packard, 1867. Ent. Soc. Phila., Proc. 6: 356. ♂.
Thyreopus elongatus Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 293. ♂.
Crabro canadensis Dalla Torre, 1897. Cat. Hym., v. 8, p. 585. N. name.
Crabro (*Anothyreus*) *viciniformis* Viereck, 1907. Amer. Ent. Soc., Trans. 33: 381. ♀.
Crabro pratus Carter, 1925. Canad. Ent. 57: 133. ♀.

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1017 (prey). —Krombein, 1955. Brooklyn Ent. Soc., Bul. 50: 17 (prey). —Kurczewski and Acciavatti, 1968. N. Y. Ent. Soc., Jour. 76: 199 (prey). —Kurczewski, Burdick and Gaumer, 1969. N. Y. Ent. Soc., Jour. 77: 152-170, figs. 1, 3-8 (nest, prey transport, egg).

monticola (Packard). Alaska, Canada, Maine to Ga. Ecology: Nests in sand or gravel road, makes 11 to 15 or more cells per nest, stores 3-5 flies per cell. Prey: *Tabanus lasiophthalmus* Macq., *T. microcephalus* O. S., *Stonemyia tranquilla* (O. S.), *Chrysops celer* O. S., *C. venus* Phil.; *Thereva* sp.; preferred prey are tabanid males.
Thyreopus monticola Packard, 1867. Ent. Soc. Phila., Proc. 6: 367. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 163, figs. 43-46 (larva).

Biology: Evans, 1960. N. Y. Ent. Soc., Jour. 68: 127-129, fig. 1 (nest, prey transport, cocoon). —Pechuman, 1963. N. Y. Ent. Soc., Jour. 71: 218-219 (nest, prey).

pallidus Fox. Mont., Oreg.
Crabro pallidus Fox, 1895. Amer. Ent. Soc., Trans. 22: 163. ♀, ♂.

pleuralis Fox. Nebr., Colo., Wyo., Alta., B. C., Wash., Oreg. Predator: *Philanthus zebratus nitens* (Bks.).
Crabro pleuralis Fox, 1895. Amer. Ent. Soc., Trans. 22: 162. ♀, ♂.

tenuis Fox. Mich. to Colo. and Wash., Alta.
Crabro tenuis Fox, 1895. Amer. Ent. Soc., Trans. 22: 166. ♀, ♂.

villosus Fox. Calif. (Los Angeles Co.).
Crabro villosus Fox, 1895. Amer. Ent. Soc., Trans. 22: 158. ♀.

Genus ENOPLOLINDENIUS Rohwer

The genus occurs only in the New World. Nothing is known of the biology, but morphological characters of the female suggest that these are ground-nesting species.

Revision: Pate, 1942. Rev. de Ent. 13: 386-421 (New World spp.).

Genus ENOPLOLINDENIUS Subgenus ISKUTANA Pate

Enoplolindenius subg. *Iskutana* Pate, 1942. Rev. de Ent. 13: 390.
Type-species: *Enoplolindenius* (*Iskutana*) *georgia* Pate. Orig. desig.

robertsoni (Rohwer). Ga., La., Tex., Kans., Nebr., Iowa, Ill.
Lindenius robertsoni Rohwer, 1920. Ent. Soc. Wash., Proc. 22: 57. ♂.
Enoplolindenius (*Iskutana*) *georgia* Pate, 1942. Rev. de Ent. 13: 393. ♂.
Enoplolindenius (*Iskutana*) *ponca* Pate, 1942. Rev. de Ent. 13: 395. ♀.

Genus ENOPLOLINDENIUS Subgenus ENOPLOLINDENIUS Rohwer

Lindenius subg. *Enoplolindenius* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 562.
Type-species: *Lindenius* (*Enoplolindenius*) *clypeatus* Rohwer. Orig. desig.

clypeatus (Rohwer). Tex. (Brownsville).
Lindenius (*Enoplolindenius*) *clypeatus* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 562. ♂.

Genus ECTEMNIUS Dahlbom

In the North American fauna a number of species nest in the soft pith of living or dead stems or twigs; the nests of these species consist usually of a linear series of cells separated from each other by partitions of pith particles. Other species make burrows in decaying wood. None of our species has been reported as nesting in the ground, as do members of several extralimital subgenera, but morphological characters of the females suggest that members of the subgenus *Protothyreopus* nest in the ground.

Genus ECTEMNIUS Subgenus PROTOTHYREOPUS Ashmead

Protothyreopus Ashmead, 1899. Canad. Ent. 31: 170.
Type-species: *Crabro rufifemur* Packard. Orig. desig.

Nothing is known of the biology of this subgenus, but the species probably nest in the ground.

dilectus (Cresson). Transit. and U. Austr. Zones in most of U. S. except west of Sierra Nevada and Cascade ranges.
Crabro dilectus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 478. ♀, ♂.
Crabro bigeminus Patton, 1879. Canad. Ent. 11: 213. ♀, ♂.
Crabro (*Protothyreopus*) *megacephalus* Rohwer, 1908. Ent. News 19: 249. ♀. Preocc.
Crabro (*Protothyreopus*) *dilectiformis* Rohwer, 1909. Ent. News 20: 146. ♀.
Crabro (*Protothyreopus*) *crassiceps* Mickel, 1916. Amer. Ent. Soc., Trans. 42: 425. ♀.

Taxonomy: Pate, 1946. Notulae Nat. 171: 2 (synonymy).

rufifemur rufifemur (Packard). Transit. and U. Austr. Zones east of Rockies. Another subsp. occurs in Mexico.
Crabro rufifemur Packard, 1866. Ent. Soc. Phila., Proc. 6: 81. ♀, ♂.

Genus ECTEMNIUS Subgenus CLYTOCHRYSUS Morawitz

Crabro subg. *Clytochrysus* Morawitz, 1864. Acad. Imp. Sci. St. Petersburg, Bul. 7: 453.
Type-species: *Crabro chrysostomus* Lepeletier and Brulle. Desig. by Richards, 1935.

Several species of this subgenus are known to nest in decaying wood of logs or stumps. The burrows may have a number of branches each ending in one or two cells.

lapidarius (Panzer). U. S. and Canada, transcont. in Canad., Transit. and U. Austr. Zones; Palaearctic also. Ecology: Nests in rotting stumps or logs, stores 2-16 prey per cell, makes 1-2 cells at end of each branch of the burrow and as many as 16 cells per nest.

Prey: *Syritta pipiens* (L.), *Chrysogaster* sp., *Toxomerus occidentalis* Curr., *Sphaerophoria contigua* Macq., *Mesograpta marginata* (Say), *Parapenium* sp., *Paragus tibialis* (Fall.); Syrphidae seem to be the preferred prey, but occasionally Anthomyiidae are used in Europe.

Crabro lapidarius Panzer, 1804. Faunae Ins. German., heft 90, pl. 12. ♂.
Crabro sinuatus Fabricius, 1804. Systema Piezatorum, p. 310.
Crabro cinctus Spinola, 1806. Insectorum Liguriae, v. 1, p. 104. ♀, ♂. This is a questionable synonym.
Crabro chrysostomus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 704. ♀. Preocc.
Crabro comptus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 705. ♂.
Crabro xylurgus Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 139. ♀, ♂.
Crabro interstinctus Smith, 1851. Zoologist 9: cxxvi. ♂.
Crabro obscurus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 418. ♀, ♂.
Crabro gracilissimus Packard, 1866. Ent. Soc. Phila., Proc. 6: 78. ♂.
Crabro denticulatus Packard, 1866. Ent. Soc. Phila., Proc. 6: 97. ♂.
Crabro effossus Packard, 1866. Ent. Soc. Phila., Proc. 6: 104. ♂.
Crabro papagorum Viereck, 1908. Amer. Ent. Soc., Trans. 33: 401. ♀.

Taxonomy: Pate, 1946. Notulae Nat. 171: 2-3 (synonymy).

Biology: Michener, 1971. Kans. Ent. Soc., Jour. 44: 405-407, 1 fig. (nest, prey).

ruficornis ruficornis (Zetterstedt). Canada and U. S., transcont. chiefly in Transit. Zone; Mexico (Guerrero); also Palaearctic. Prey: *Syrphus ribesii* (L.) in N. Amer. Another subsp. occurs in Taiwan.

Crabro ruficornis Zetterstedt, 1838. Ins. Lappon. 1: 443. ♂.
Crabro aurilabris Herrich-Schaeffer, 1841. Faunae Ins. German., h. 179, p. 12. ♂.
Crabro nigrifrons Cresson, 1865. Ent. Soc. Phila., Proc. 4: 482. ♂.
Crabro contiguus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 484. ♀.
Crabro septentrionalis Packard, 1866. Ent. Soc. Phila., Proc. 6: 110. ♀.
Crabro (*Solenius*) *planifrons* Thomson, 1870. Opusc. Ent., v. 2, p. 173. ♀, ♂.
Crabro hector Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 147, pl. 9, fig. 8. ♀.
Crabro (*Clytochrysus*) *longipalpis* Verhoeff, 1892. Ent. Nachr. 18: 70. ♀.
Crabro vestor Ashmead, 1899. Canad. Ent. 31: 173. Lapsus for *hector* Cam.
Crabro chipsanii Matsumura, 1911. Hokkaido Imp. Univ., Faculty Agr., Jour. 4: 102. ♀.
Crabro lineatotarsis Matsumura, 1911. Hokkaido Imp. Univ., Faculty Agr., Jour. 4: 103. ♀.

Taxonomy: Pate, 1946. Notulae Nat. 171: 2 (synonymy).

Biology: Krombein, 1936. Ent. News 47: 95 (prey).

yosemite Pate. Calif. (Mariposa Co.).

Ectemnius (*Clytochrysus*) *yosemite* Pate, 1946. Notulae Nat. 171: 3. ♀.

Genus ECTEMNIUS Subgenus METACRABRO Ashmead

Metacrabro Ashmead, 1899. Canad. Ent. 31: 169.
Type-species: *Crabro Kollari* Dahlbom. Orig. desig.
Solenius subg. *Lophocrabro* Rohwer, 1917 (1916). Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 667.
Type-species: *Crabro singularis* Smith. Orig. desig.

In Europe *cephalotes* (Oliv.) has been reported to nest in both sound lumber and in decaying trunks.

cephalotes (Olivier). Ont., Que., Conn., N. Y., N. J., Pa., Md., Ill.; Europe. Ecology: In Europe nests both in sound lumber and in decaying logs; several females use a common entrance but presumably have their own cells. Probably adventive in N. Amer. Prey: In Europe stores many species of muscoid Diptera, occasionally Tabanidae and Syrphidae, and one specimen of Nematinae was found in a cell.

Crabro tibialis Olivier, 1792. Encycl. Meth. Ins., v. 6, p. 513.
Crabro cephalotes Olivier, 1792. Encycl. Meth. Ins., v. 6, p. 513.
Crabro floralis Olivier, 1792. Encycl. Meth. Ins., v. 6, p. 517.
Crabro geniculatus Olivier, 1792. Encycl. Meth. Ins., v. 6, p. 517.

Crabro cephalotes Panzer, 1799. Faunae Ins. German., h. 6, pl. 62, fig. 16. Preocc. This is a questionable synonym.
Crabro striatus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 707. ♀, ♂.
Crabro ornatus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 709. ♀.
Blepharipus striatulus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 737. ♂.
Ceratocolus striatus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 744. ♂. Preocc.
Crabro Lindenius Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 143. ♀, ♂.
Crabro Shuckardi Dahlbom, 1838. Exam. Crabron. Scand., p. 98. ♀, ♂.
Crabro interruptus Dahlbom, 1845. Hym. Europaea, v. 1, p. 418. ♀, ♂. N. name for *Shuckardi*.
Crabro Fargeii Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 410. N. name for *Ceratocolus striatus*.
Crabro Lindensis Inchbald, 1859. Ent. Weekly Intelligencer 6: 199. Lapsus.
Crabro aciculatus Provancher, 1882. Nat. Canad. 13: 108. ♀, ♂.
Crabro (*Solenius*) *ruthenicus* Morawitz, 1892. Soc. Ent. Rossica, Horae 26: 174. ♀.
Crabro Lindenii Dalla Torre, 1897. Cat. Hym., v. 8, p. 621. Lapsus for *lindensis* Inchb.

Taxonomy: Pate, 1945. Brooklyn Ent. Soc., Bul. 40: 41-43 (synonymy). —van der Vecht, 1961. Zool. Verhandl. Rijksmus. Natuurlijke Hist. Leiden, No. 48, pp. 70-71 (identity of *cephalotes* Oliv.).

Biology: Hamm and Richards, 1926. Ent. Soc. London, Trans., pp. 306-307, 321-322 (nest, prey in Europe; misdet. as *quadricinctus* F.).

maculosus (Gmelin). Canada and U. S. in Transit. Zone east of 100th meridian. Parasite: *Crabrovidia ectemnii* Fain. Prey: *Tubifera arbustorum* (L.).
Crabro maculatus Fabricius, 1781. Spec. Ins., v. 1, p. 470. Secondary homonym in *Vespa*.
Vespa (*Crabro*) *maculosa* Gmelin, 1790. *In* Linnaeus, Syst. Nat., Ed. 13, v. 1, p. 2761. N. name.
Crabro singularis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 417. ♂.
Crabro frigidus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 419. ♀.
Crabro quadrangularis Packard, 1866. Ent. Soc. Phila., Proc. 6: 85. ♀.
Crabro 14-maculatus Packard, 1866. Ent. Soc. Phila., Proc. 6: 87. ♂.
Crabro oblongus Packard, 1866. Ent. Soc. Phila., Proc. 6: 88. ♀.
Crabro trapezoideus Packard, 1866. Ent. Soc. Phila., Proc. 6: 89. ♂.
Crabro quadrangulus Cresson, 1928. Amer. Ent. Soc., Mem. 5: 55. Lapsus.

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1025 (prey).

Genus ECTEMNIUS Subgenus HYPOCRABRO Ashmead

Hypocrabro Ashmead, 1899. Canad. Ent. 31: 168.
Type-species: *Crabro 10-maculatus* Say. Orig. desig.
Pseudocrabro Ashmead, 1899. Canad. Ent. 31: 169.
Type-species: *Crabro chrysarginus* of Lepeletier. Orig. desig.
Xestocrabro Ashmead, 1899. Canad. Ent. 31: 169.
Type-species: *Crabro 6-maculatus* Say. Orig. desig.
Xylocrabro Ashmead, 1899. Canad. Ent. 31: 169.
Type-species: *Crabro stirpicola* Packard. Orig. desig.
Ectemnius subg. *Apoctemnius* Leclercq, 1950. Rev. Franc. d'Ent. 17: 200.
Type-species: *Ectemnius* (*Apoctemnius*) *domingensis* Leclercq. Orig. desig.

Some of our species nest in the soft pith of living or dead stems or twigs and make a linear series of cells separated by partitions of pith particles. Other species nest in decaying trunks, stumps or limbs.

alpheus Pate. Calif., Wash., Utah.
Ectemnius (*Hypocrabro*) *alpheus* Pate, 1946. Notulae Nat. 171: 5. ♀, ♂.

arcuatus (Say). Transcont. in Transit. and Austr. Zones. Ecology: Nests in logs. Prey: *Musca domestica* L.
Crabro arcuatus Say, 1837. Boston Jour. Nat. Hist. 1: 377. ♀.
Crabro Packardii Cresson, 1865. Ent. Soc. Phila., Proc. 4: 477. ♀, ♂.
Crabro honestus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 485. "♀" = ♂.

Crabro villosifrons Packard, 1866. Ent. Soc. Phila., Proc. 6: 84. ♀.
Crabro (subgenus?) *nokomis* Rohwer, 1908. Ent. News 19: 251. ♀.
Solenius (*Hypocrabro*) *nokonis* (!) Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 242.

Taxonomy: Pate, 1946. Notulae Nat. 171: 9-10 (synonymy).

Biology: Rau and Rau, 1918. Wasp studies afield, pp. 94, 96 (nest, prey).

besseyae (Rohwer). Calif., Colo., Utah, N. Mex.
Crabro (*Xylocrabro?*) *besseyae* Rohwer, 1908. Ent. News 19: 419. ♀.

centralis (Cameron). Tex., N. Mex., Ariz.; Mexico south to Colombia and Trinidad.
Crabro centralis Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 146. ♀.

continuus continuus (Fabricius). Canada and U. S., transcont. in Canad., Transit. and U. Austr. Zones; Palaearctic Region. Ecology: Nests in borings in tree root or rotten branch. Parasite: *Macronychia aurata* (Coq.). Prey: *Archytas aterrimus* (Desv.), *Winthemia* sp., Tachinidae sp.; *Sarcophaga* sp., Sarcophagidae sp.; *Pollenia rudis* (F.), *Phaenicia* ? sp., Calliphoridae sp.; Muscidae sp.; in Europe muscoid Diptera are also the preferred prey but Syrphidae are used occasionally. Another subsp. occurs in the Canary Islands.
Crabro continuus Fabricius, 1804. Systema Piezatorum, p. 312.
Crabro 6-maculatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 341. ♀. Preocc.
Solenius punctatus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 720. ♂.
Ceratocolus punctatus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 749. ♀, ♂. Preocc.
Crabro fuscitarsis Herrich-Schaeffer, 1841. Faunae Ins. German., h. 181, pl. 7. ♀.
Crabro impressus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 401. N. name for *Ceratocolus punctatus* Lep. and Br.
Crabro sulphureipes Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 415. ♂.
Crabro (*Ectemnius*) *fuscitarsus* Schenck, 1857. Nassau. Ver. f. Naturk., Jahrb. 12: 70. Lapsus.
Crabro vagatus Smith, 1869. Entomologist 4: 208. ♀.
Crabro granulatus Walker, 1871. List Hym. Egypt, p. 26. ♂.
Crabro rugoso-punctatus Taschenberg, 1875. Ztschr. f. Naturw. 45: 385. ♂.
Crabro validus De Stefani, 1884. Nat. Sicil., v. 3, p. 218. ♂.
Crabro vagans Fokker, 1887. Tijdschr. v. Ent. 30: xx. Lapsus.
Xylocrabro slossonae Ashmead, 1902. Ent. News 13: 5. ♂. Nom. nud.
Crabro sayi Cockerell, 1910. Entomologist 43: 61. N. name for *Crabro sexmaculatus* Say.
Crabro bisexmaculatus Viereck, 1910 (1909). *In* Smith, N. J. State Mus. Ann. Rpt. 1909, p. 681. N. name for *Crabro sexmaculatus* Say.
Crabro hispanicus Kohl, 1915. K. K. Naturhist. Hofmus. Wien, Ann. 29: 81. ♀.
Solenius (*Hypocrabro*) *giffardi* Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 242. ♀, ♂.

Taxonomy: Pate, 1946. Notulae Nat. 171: 10 (synonymy). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 295, fig. 114 (larva).

Biology: Peckham and Peckham, 1905. Wasps Social and Solitary, pp. 97-101, 1 fig. (nest, prey). —Reinhard, 1929. The Witchery of Wasps, pp. 228-231, 4 figs. (nest, prey, parasite). —Krombein, 1961. Brooklyn Ent. Soc., Bul. 56: 65 (prey). —Krombein, 1964. Brooklyn Ent. Soc., Bul. 58: 120 (nest, prey, cocoon, life cycle). There is also an extensive European literature.

decemmaculatus decemmaculatus (Say). U. and L. Austr. Zones east of Rocky Mts.; Mexico.
Crabro 10-maculatus Say, 1823. West. Quart. Rptr., v. 2, p. 78.
Crabro chrysargyrus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 711. ♀.
Crabro chrysarginus Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 114. Lapsus.
Crabro chrysargurus Dahlbom, 1845. Hym. Europaea, v. 1, p. 386. Lapsus.
Crabro collinus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 420. ♂.
Crabro aurifrons Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 420. ♀.
Crabro (*Hoplocrabro*) *novanus* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 564. ♀, ♂.

Taxonomy: Pate, 1946. Notulae Nat. 171: 8 (synonymy).

decemmaculatus tequesta Pate. Cent. and south. Fla.
Ectemnius (*Hypocrabro*) *10-maculatus tequesta* Pate, 1946. Notulae Nat. 171: 9. ♀, ♂.

excavatus banksi (Rohwer). Md. to Ga., Ind., Kans., Mo., Tex. south to Mexico (Yucatan).
Ecology: Nests in rotten log.
Crabro banksi Rohwer, 1909. Ent. News 20: 147. ♀.
Ectemnius (*Hypocrabro*) *ravinus* Leclercq, 1968. Soc. Ent. France, Ann. (n. s.) 4 (2): 325. ♀.

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1026 (nest).

excavatus excavatus (Fox). Fla.
Crabro excavatus Fox, 1892. Ent. News 3: 10. ♀, ♂ (in part misdet.).

odyneroides (Cresson). Colo., N. Mex., Ariz.; Mexico (Guerrero, Durango).
Crabro odyneroides Cresson, 1865. Ent. Soc. Phila., Proc. 4: 481. ♂.
Crabro ariel Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 147, pl. 9, fig. 7, a, b. ♀, ♂.

paucimaculatus (Packard). N. Y. to Fla., Ill., Tex. Ecology: Nests in green *Hibiscus* stems along river bank, chewing through side of stem to reach central pith cavity, makes linear series of 1-18 cells, stores 7-31 prey per cell. Parasite: *Vidia cooremani* Baker; *Megaselia aletiae* (Comst.); *Eustalomyia vittipes* (Zett.); *Macronychia aurata* (Coq.), *Ptychoneura aristalis* (Coq.); *Tetrabaeus americanus* (Brues); *Perilampus canadensis* Cwfd.; *Diomorus zabriskiei* Cr. Prey: *Dolichopus ovatus* Lw., *D.* sp.; *Melanagromyza diantherae* (Mall.), Agromyzidae sp.; *Notiphila carinata* Lw., *N. erythrocera* Lw., *N.* sp., *Hydrellia* spp., *Scatella picea* (Wlkr.); *Eumetopiella rufipes* (Macq.), *Chaetopsis* sp., Otitidae sp.; *Camptoprosopella angulata* Shew.; *Lonchaea polita* Say; *Sepedon armipes* Lw., *S.* sp., *Dictya texensis* Curr.; *Leptocera richardsi* Sabr.; *Coenosia atrata* Wlkr., *Lispe albitarsis* Stein; preferred prey are Agromyzidae and Ephydridae. The common name is the hibiscus wasp.
Crabro paucimaculatus Packard, 1866. Ent. Soc. Phila., Proc. 6: 90. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 294-295, fig. 113 (larva).

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 1026 (nest). —Krombein, 1964. Biol. Soc. Wash., Proc. 77: 73-88, figs. 1-11 (nest, prey, egg, cocoon, life cycle, parasites).

rufipes ais Pate. Fla. Ecology: Nests in rose canes, makes linear series of up to 3 cells per nest, stores 20-30 prey per cell. Prey: *Euxesta nitidiventris* Lw.; *Aciura insecta* Lw., *Paroxyna sorocula* (Wied.); Chloropidae spp.; Otitidae and Trypetidae are the preferred prey.
Ectemnius (*Hypocrabro*) *texanus ais* Pate, 1946. Notulae Nat. 171: 12. ♀, ♂.

Biology: Morse and Kerr, 1957. Fla. Ent. 40: 77-80, 1 fig. (nest, prey).

rufipes rufipes (Lepeletier and Brulle). N. Y. to north. Fla., west to Iowa, Kans. and Tex. Ecology: Nests in twigs.
Ceratocolus rufipes Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 741. ♀.
Crabro texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 227. ♀.

satan Pate. N. Mex. to Calif.
Ectemnius (*Hypocrabro*) *satan* Pate, 1946. Notulae Nat. 171: 10. ♂.

scaber rufescens Krombein. Cent. and south Fla.
Ectemnius (*Hypocrabro*) *scaber rufescens* Krombein, 1954. Amer. Ent. Soc., Trans. 80: 24. ♂, ♀.

scaber scaber (Lepeletier and Brulle). N. J. to Fla., La., Tex., Okla. Ecology: Nests in pine.
Solenius scaber Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 715. ♂.

sonorensis (Cameron). Colo., N. Mex., Ariz., south. Calif.; Mexico (Baja California, Sonora, Guerrero).
Crabro sonorensis Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 144, pl. 9, fig. 4. ♀.
Crabro montivagus Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 145, pl. 9, figs. 5, a, b. ♀, ♂.
Crabro imbutus Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 108. ♀.
Crabro (*Solenius ?*) *ferrugineipes* Rohwer, 1908. Ent. News 19: 250. ♂.

spiniferus (Fox). Colo., Nev., Ariz., Calif. to Wash. Ecology: Nests in stems of *Sambucus*, *Foeniculum* and *Eriogonum*, makes linear series of 1-6 cells per nest, stores 2-10 prey per cell. Parasite: *Senotainia trilineata* (Wulp), *Macronychia* sp., *Amobia floridensis* (Tns.); *Megaselia* sp.; *Diomorus zabriskiei* Cr.; *Monodontomerus* sp. Prey: *Sphaerophoria* sp.; *Ogcodes eugonatus* Lw.; *Hylemya* sp.; preferred prey are Acroceridae. Predator: *Cymatodera ovipennis* LeC.

Crabro spiniferus Fox, 1895. Amer. Ent. Soc., Trans. 22: 148. ♀, ♂.

Solenius (*Pseudocrabro*) *conspiciendus* Mickel, 1918 (1917). Nebr. Univ. Studies 17: 324. ♀, ♂.

Biology: Bechtel and Schlinger, 1957. Ent. News 68: 225-232 (nest, prey, parasites, predator). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 94 (nest, parasites).

stirpicola (Packard). Canada and U. S. in Transit. and U. Austr. Zones east of 100th meridian. Ecology: Nests in pith in twigs of *Ailanthus*, blackberry, sumac, *Sambucus*, and in old railroad tie, stores 6-27 prey per cell. Parasite: *Diomorus zabriskiei* Cr.; *Habritys latro* Wall.; *Perilampus canadensis* Cwfd.; *Amobia* sp. Prey: *Simulium jenningsi* Mall.; *Solva pallipes* (Lw.); *Oxycera maculata* Oliv.; *Condylostylus sipho* (Say), *C.* sp., *Asyndetus* sp.; *Mesograpta marginata* (Say); *Euxesta notata* (Wied.); *Amphicnephes pullus* (Wied.), *Rivellia pallida* Lw., *R. steyskali* Namba; *Euaresta bella* (Lw.); *Lonchaea polita* Say ?, *L.* sp.; *Lyciella pictiventris* (Mall.), *Sapromyza umbrosa* Lw.; *Agromyza parvicornis* Lw., *A.* sp., *Melanagromyza burgessi* (Mall.), *M. virens* (Lw.), *M.* sp.; *Chyromya* sp.; *Cordilura fuscipes* Zett., *Phorbia* sp., *Anthomyia* sp.; *Coenosia* sp. near *antennalis* Stein; *Phormia regina* (Meig.), *Lucilia* sp., *Calliphora vomitoria* (L.); *Ravinia derelicta* (Wlkr.), *Sarcodexia* sp.; *Hyalomyodes triangulifer* (Lw.), *Cryptomeigenia eumyothyroides* (Tns.), *Paradidyma singularis* (Tns.), *Sitophaga calosomoides* (Tns.), *Lespesia* sp., *Elfia johnsoni* (Coq.), Tachinidae sp.; although *stirpicola* preys upon a wide range of Diptera, the preferred prey are clearly acalyptrate and calyptrate Cyclorrhapha.

Crabro stirpicola Packard, 1866. Ent. Soc. Phila., Proc. 6: 111. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 109, figs. 85-90 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 165 (larva).

Biology: Packard, 1869. Guide Study Ins., p. 158 (nest). —Cresson, 1878. Psyche 2: 189 (nest, parasite). —Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 46-52, pl. 1, fig. 5, pl. 11, figs. 6, 7 (nest, prey, cocoon, life cycle). —Rau and Rau, 1918. Wasp Studies Afield, pp. 90-94, figs. 21, 22 (nest, prey, life cycle). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 20-21 (nest, prey, life cycle, parasite). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 381-387, fig. 50 (nest, prey, life cycle). —Krombein, 1960. Ent. News 71: 63-68 (nest, prey, egg, life cycle, cocoon, parasites).

trifasciatus (Say). Chiefly Transit. Zone of Canada and U. S. east of Cascade and Sierra Nevada ranges.

Crabro trifasciatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 342.

Genus ECTEMNIUS Subgenus ECTEMNIUS Dahlbom

Crabro subg. *Ectemnius* Dahlbom, 1845. Hym. Europaea, v. 1, p. 389.
Type-species: *Crabro guttatus* of Dahlbom. Desig. by Ashmead, 1899.

Crabro subg. *Mesocrabro* Verhoeff, 1892. Ent. Nachr. 18: 70.
Type-species: *Crabro guttatus* Vander Linden. Desig. by Pate, 1937.

atriceps (Cresson). South. Canada and U. S., chiefly in Transit. Zone. Ecology: Nests in logs.

Crabro atriceps Cresson, 1865. Ent. Soc. Phila., Proc. 4: 483. ♀.

Crabro brunneipes Packard, 1866. Ent. Soc. Phila., Proc. 6: 102. ♂.

Crabro foxii Kincaid, 1900. Ent. News 11: 356. ♂.

Taxonomy: Pate, 1946. Notulae Nat. 171: 14 (synonymy). —Evans, 1957. Amer. Ent. Soc., Trans. 83: 109, figs. 91-94 (larva).

corrugatus (Packard). Canad. and Transit. Zones in Alaska, Canada, U. S.

Crabro pauper Packard, 1866. Ent. Soc. Phila., Proc. 6: 95. ♂.

Crabro corrugatus Packard, 1866. Ent. Soc. Phila., Proc. 6: 107. ♀.

Crabro (*Cuphopterus*) *operus* Rohwer, 1908. Ent. News 19: 247. ♀.

Crabro (*Xestocrabro*) *drymocallidis* Rohwer, 1908. Ent. News 19: 255. ♂.

Taxonomy: Pate, 1946. Notulae Nat. 171: 14 (synonymy).

dives (Lepeletier and Brulle). Transcont. in Canad. and Transit. Zones of Canada and U. S.; also Palaearctic. Ecology: Nests in log in U. S., in Europe in decayed or rotten logs, and soft pith of canes and stems. Prey: Syrphidae and Tachinidae in Europe. Predator: *Philanthus pulcher* D. T.

Solenius dives Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 716. ♀, ♂.
Solenius octonotatus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 719. ♂.
Solenius alatulus Dahlbom, 1838. Exam. Crabron. Scand., p. 85. ♀, ♂.
Crabro pictipes Herrich-Schaeffer, 1841. Faunae Ins. German., h. 181: pl. 5.
Solenius octavonotatus Lepeletier, 1845. Hist. Nat. Ins. Hym., p. 125. Emend.
Crabro auratus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 398. N. name for *dives*.
Crabro montanus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 484. ♀. Preocc.
Crabro cristatus Packard, 1866. Ent. Soc. Phila., Proc. 6: 101. ♂.
Crabro cubiceps Packard, 1866. Ent. Soc. Phila., Proc. 6: 105. ♀.
Crabro (*Xestocrabro*) *heraclei* Rohwer, 1908. Ent. News 19: 253. ♂.
Crabro montivagans Strand, 1917. Archiv f. Naturgesch. 82: 98. N. name for *montanus*.

Taxonomy: Pate, 1945. Brooklyn Ent. Soc., Bul. 40: 38-40 (synonymy). —Pate, 1946. Notulae Nat. 171: 14 (synonymy).

Biology: Barth, 1907. Wis. Nat. Hist. Soc., Bul. 5: 251 (nest). —Richards, 1944. Roy. Ent. Soc. London, Proc., ser. A, 9: 134 (nest, prey in Europe). —Pate, 1945. Brooklyn Ent. Soc., Bul. 40: 40 (refs. to European lit.).

proletarius (Mickel). Colo., N. Dak.

Crabro parvulus Packard, 1866. Ent. Soc. Phila., Proc. 6: 108. ♀. Preocc.
Crabro (*Xestocrabro*) *proletarius* Mickel, 1916. Amer. Ent. Soc., Trans. 42: 426. ♂.

Genus LESTICA Billberg

So far as known all species in this genus prey upon adult Lepidoptera, usually Microlepidoptera or small Noctuidae, but butterflies may be used occasionally.

Taxonomy: Pate, 1947. Notulae Nat. 185: 13 (key to subg.).

Genus LESTICA Subgenus LESTICA Billberg

Lestica Billberg, 1820. Enum. Ins., p. 107.
Type-species: *Crabro subterraneus* Fabricius. Desig. by Rohwer, 1911.
Hypothyreus Ashmead, 1899. Canad. Ent. 31: 171.
Type-species: *Crabro subterraneus* Fabricius. Orig. desig.

The typical subgenus does not occur in North America. Members of this subgenus are ground-nesting species.

Genus LESTICA Subgenus SOLENIUS Lepeletier and Brulle

Solenius Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 713.
Type-species: *Solenius interruptus* Lepeletier and Brulle. Desig. by Internatl. Comn. Zool. Nomencl., Op. 1015, 1974.

Members of this subgenus nest in decaying wood or in soft pith of plant stems.

Taxonomy: Court and Menke, 1968. Bul. Zool. Nomencl. 24: 357-358 (petition to set aside type-species designation of *Sphex vagus* Westwood, 1839, and to designate *Solenius interruptus* Lep. and Br. as type-species).

cinctella (Fox). Nev., Calif., Oreg.

Crabro cinctellus Fox, 1895. Amer. Ent. Soc., Trans. 22: 136. ♀.

Taxonomy: Leclercq, 1951, Soc. Ent. Belg., Bul. et Ann. 87: 171. ♂.

confluenta (Say). South. Canada and U. S. in Transit. and Austr. Zones; Mexico (Chihuahua).
Ecology: Nests in decaying logs, in borings in wooden posts and in pith of catalpa stem, stores 6 prey per cell. Prey: Adults of moth spp.
Solenius interruptus Lepeletier and Brulle, 1834. Soc. Ent. France, Ann. 3: 716. ♀. Preocc. in *Crabro*.
Crabro confluentus Say, 1837. Boston Jour. Nat. Hist. 1: 376. ♀, ♂.
Crabro dubius Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 417. N. name.
Crabro confluens Leconte, 1859. Ent. of N. Amer. (Thos. Say), p. 758. Lapsus.
Crabro bellus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 481. ♀.
Crabro atrifrons Cresson, 1865. Ent. Soc. Phila., Proc. 4: 483. ♂.
Crabro eburneus Taschenberg, 1875. Ztschr. Gesam. Naturw. Halle 45: 383. ♂.
Crabro cinctibellus Viereck, 1908. Amer. Ent. Soc., Trans. 33: 401. ♀, ♂.
Crabro opwana Rohwer, 1908. Ent. News 19: 248. ♂.
Crabro (*Solenius*) *townsendi* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 563. ♀.
Crabro (*Solenius*) *planaris* Mickel, 1916. Amer. Ent. Soc., Trans. 42: 427. ♂.
Solenius seamansi Carter, 1925. Canad. Ent. 57: 135. ♂.

Taxonomy: Pate, 1947. Notulae Nat. 185: 13-14 (synonymy).

Biology: Peckham and Peckham, 1905. Wasps, Social and Solitary, pp. 102-105, 1 fig. (nest, prey). —Rau, 1922. St. Louis Acad. Sci., Trans. 24: 19-20 (nest). —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 378 (nest, cocoon, life cycle).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 20, figs. O, R (male genitalia).

producticollis (Packard). Transcont. in Canada and U. S. in Transit. and U. Austr. Zones.
Crabro producticollis Packard, 1866. Ent. Soc. Phila., Proc. 6: 76. ♂.
Crabro 4-maculatus Provancher, 1882. Nat. Canad. 12: 102. ♀. Typ. err. ? Preocc.
Crabro 4-punctatus Provancher, 1883. Faune Ent. Canad., Hym., p. 653. ♂. Preocc.

Nomina Nuda in CRABRONINAE

glauconotatus Harris. Mass.
Crabro glauconotatus Harris, 1835. *In* Hitchcock, Rpt. Geol., Mineral., Bot., Zool., Mass., p. 588.

Family MELLINIDAE

This small family contains only two subfamilies, Xenosphecinae and Mellininae, which appear to be more closely related to one another than either is to any other family of Sphecoidea. The former subfamily is known only from the southwestern deserts of North America. The latter is Holarctic and Neotropical in distribution. Both subfamilies nest in the ground and prey upon Diptera.

Subfamily XENOSPHECINAE

Genus XENOSPHEX Williams

Xenosphex Williams, 1954. Wasmann Jour. Biol. 12: 97.
Type-species: *Xenosphex xerophila* Williams. Orig. desig.

Revision: Parker, 1966. Pan-Pacific Ent. 42: 190-195, 8 figs.

boharti Parker. Calif. (Inyo Co.).
Xenosphex boharti Parker, 1966. Pan-Pacific Ent. 42: 191, figs. 1, 2, 6, 7. ♂, ♀.

timberlakei Williams. Southeast. Calif., northwest. Ariz., south. Nev. Ecology: Nests in sand. Prey: *Lordotus miscellus* Coq.
Xenosphex timberlakei Williams, 1955. Wasmann Jour. Biol. 13: 313. ♀.

Biology: Parker, 1966. Pan-Pacific Ent. 42: 194-195 (nest, prey transport).

xerophilus Williams. South. Calif. and Nev., northwest. and south. Ariz.
Xenosphex xerophila Williams, 1954. Wasmann Jour. Biol. 12: 99, figs. 1-6. ♂ (♀ misdet.).

Taxonomy: Williams, 1955. Wasmann Jour. Biol. 13: 313. ♀.

Subfamily MELLININAE

Taxonomy: Maidl and Klima, 1939. Hym. Cat., Pars 8, Sphecidae, v. 1, pp. 30-43 (world catalog). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 145-147, figs. 23-30 (larva).

Genus MELLINUS Fabricius

Mellinus Fabricius, 1790. Skrivt. Naturhist. Selsk., h. 1, p. 226.
Type-species: *Vespa arvensis* Linnaeus. Desig. by Curtis, 1836.
Millimus Gimmerthal, 1836. Soc. Imp. Nat. Moscow, Bul. 9: 449. Lapsus or emend.

Nothing is known of the biology of the North American species. The European *arvensis* (L.) nests gregariously in the ground, makes multicelled nests with each cell on a branch off the main burrow, preys primarily on muscoid Diptera and stores 4-9 flies per cell.

Revision: Fox, 1894. Ent. News 5: 201-203 (N. Amer. spp.).

Taxonomy: Siri and Bohart, 1974. Pan-Pacific Ent. 50: 169-176, 16 figs. (synopsis of world spp.).

abdominalis Cresson. Nebr., Colo., Wyo., Mont.
Mellinus abdominalis Cresson, 1882 (1881). Amer. Ent. Soc., Trans. 9: Proc., p. xxxix. ♀, ♂.
Mellinus abdominalis var. *personatus* Fox, 1894. Ent. News 5: 202. ♀.

bimaculatus Packard. Maine, N. H., Mass., N. Y., Pa., N. J., Ohio, Mich.; Mexico (Jalisco, Oaxaca).
Mellinus bimaculatus Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 68. Nom. nud.
Mellinus bimaculatus Packard, 1867. Ent. Soc. Phila., Proc. 6: 419. ♀.
Mellinus wolcotti Smith, 1908. Ent. News 19: 299. ♀.

imperialis Bohart. Calif. (Imperial Co.); Mexico (Sonora).
Mellinus imperialis Bohart, 1968. Pan-Pacific Ent. 44: 235, fig. 14. ♂, ♀.

rufinodus Cresson. Mont., Colo., S. Dak., Tex., N. Mex., Ariz., Utah; Mexico (Chihuahua, Durango, Guerrero, Mexico, Aguascalientes).
Mellinus rufinodus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 475. ♀, ♂.

Family NYSSONIDAE

All members of this large cosmopolitan family nest in the ground. They are commonly called sand wasps.

Taxonomy: Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 404 (key to tribes). —Pate, 1938. Amer. Ent. Soc., Trans. 64: 119-120 (key to tribes). —Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 35-66, 13 pls. (larvae). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 149-156, figs. 36-42, 60, 62, 63, 71-73 (larvae). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 253-273, figs. 26-58 (larvae).

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, 526 pp., 215 figs., 47 tabs.

Subfamily ALYSSONINAE

Revision: Handlirsch, 1895. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 104: 830-839 (world spp.).

Genus ALYSSON Panzer

Alysson Jurine, 1801. Intell. Blatt. Litt.-Ztg. Erlangen, v. 1, p. 164. Name suppressed by Internatl. Comn. Zool. Nomencl., Op. 135, 1939.
Alysson Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 169.
Type-species: *Pompilus spinosus* Panzer. Desig. by Morice and Durrant, 1915.
Alyson Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 195.
Type-species: *Pompilus spinosus* Panzer. Monotypic.

These wasps are primarily Holarctic in distribution, but a few species occur in the Ethiopian and Oriental Regions. They nest gregariously, often in cool, moist sand, usually make multicellular nests, and prey primarily on nymphal and adult leafhoppers although spittle bugs and planthoppers are used occasionally.

Revision: Fox, 1894. Ent. News 5: 86-89 (N. Amer. spp.).

conicus Provancher. N. B., Ont., N. H., N. Y., Md., D. C., Va., Mich.
Alyson(!) *conicus* Provancher, 1889. Addit. Corr. Faune Ent. Canada Hym., p. 271. ♀.

flavomaculatus Cameron. N. Mex. (Santa Fe Mts.).
Allyson(!) *flavomaculatus* Cameron, 1901. Amer. Ent. Soc., Trans. 27: 314. ♂.

guignardi Provancher. Transcont., Que. and Ont. to N. C. and Mo., west to Mich., Iowa, Calif. and N. Mex. Predator: *Dioctria baumhaueri* Meig.
Alyson(!) *Guignardi* Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 271. ♀, ♂.
Alyson(!) *petiolatus* Cameron, 1902. Amer. Ent. Soc., Trans. 28: 374. ♂.
Alyson(!) *interstitialis* Cameron, 1902. Amer. Ent. Soc., Trans. 28: 375. ♂.

melleus Say. U. and L. Austr. Zones east of 100th meridian. Ecology: Nests in damp sand or sandy loam, makes 1-5 cells per nest, stores 3-23 prey per cell. Parasite: *Phrosinella fulvicornis* (Coq.) ? Prey: *Aceratagallia* sp., *Agallia constricta* Van D., *Agalliopsis novella* (Say), *Balclutha* sp., *Chlorotettix* sp., *Ciminius hartii* Ball, *Colladonus clitellarius* (Say), *Deltocephalus flavicosta* Stal, *Draeculacephala antica* (Wlkr.), *D. mollipes* (Say), *D. paludosa* B. and C., *D. portola* Ball, *D.* spp., *Empoasca fabae* (Harr.), *Exitianus exitiosus* Uhl., *Graminella nigrifrons* (Fbs.), *G. pallidula* Osb., *G.* sp., *Hortensia similis* (Wlkr.), *Keonolla dolobrata* (Ball), *Macrosteles fascifrons* (Stal), *Neokolla hieroglyphica* (Say), *Paraphlepsius irroratus* (Say), *Sanctanus* sp., *Scaphytopius* sp., *Tylozygus bifidus* (Say), Cicadellinae spp.; *Delphacodes basivitta* (Van D.), Delphacidae sp.; both nymphs and adults are stored; cicadellids are preferred prey and delphacids are used rarely.
Alyson(!) *melleus* Say, 1837. Boston Jour. Nat. Hist. 1: 380. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 41, figs. 1-7 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 150, fig. 60 (larva).

Biology: Hartman, 1905. Tex. Acad. Sci., Trans. 7: 56-57 (nest, prey transport). —Rau and Rau, 1918. Wasp studies afield, pp. 140-144, fig. 33 (nest, prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 17-28, figs. 9-20 (nest, prey, mating, egg, life cycle, parasite ?). —Evans, 1968. Ent. Soc. Amer., Ann. 61: 1343 (prey). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 335 (prey).

oppositus Say. Transit. and U. Austr. Zones east of Rocky Mts., N. B. and Ont. to Ga. and Tenn., west to Mich,, Iowa and Colo. Prey: *Draeculacephala mollipes* (Say).
Alyson(!) *oppositus* Say, 1837. Boston Jour. Nat. Hist. 1: 380. ♀, ♂.
Alyson(!) *oppositus* var. *a* Say, 1837. Boston Jour. Nat. Hist. 1: 380.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, p. 28 (prey).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 20, figs. F-H (male genitalia).

radiatus Fox. Colo., Nev., Calif., Wash.
Alyson(!) *radiatus* Fox, 1894. Ent. News 5: 87. ♀, ♂.

striatus Fox. D. C., N. Y.,
Alyson(!) *striatus* Fox, 1894. Ent. News 5: 88. ♂.

triangulifer shawi Bradley. Nev., B. C., Calif.
Alysson shawi Bradley, 1920. Amer. Ent. Soc., Trans. 46: 130. ♂.

triangulifer triangulifer Provancher. Ont. and Que. south to Md., Mich. and Ky. west to N. Dak. and Colo., Idaho, Alaska.
Alyson(!) *triangulifer* Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 272. ♂.

Genus DIDINEIS Wesmael

Didineis Wesmael, 1852. Acad. Roy. Belg., Bul. 19: 109.

Type-species: *Alyson*(!) *lunicornis* of Vander Linden. Monotypic.

The European *lunicornis* (F.) makes a unicellular nest in the ground and preys upon nymphal and adult Cicadellidae and Delphacidae.

Revision: Fox, 1894. Ent. News 5: 126-128 (N. Amer. spp.). —Malloch and Rohwer, 1930. U. S. Natl. Mus., Proc. 77 (14): 1-7, 8 figs. (N. Amer. spp.).

dilata Malloch and Rohwer. Wis., Nebr.
Didineis dilata Malloch and Rohwer, 1930. U. S. Natl. Mus., Proc. 77 (14): 6. ♂.

latimana Malloch and Rohwer. N. H. to Va., Ill., Iowa, Mo.
Didineis latimana Malloch and Rohwer, 1930. U. S. Natl. Mus., Proc. 77 (14): 4. ♀, ♂.

nodosa Fox. Colo., Utah, Idaho, Wash. to Calif.; Mexico (Baja california).
Didineis nodosa Fox, 1894. Ent. News 5: 127. ♂.
Didineis sanctacrucae Bradley, 1920. Amer. Ent. Soc., Trans. 46: 129. ♀.
Didineis nodosa var. *clypeata* Malloch and Rohwer, 1930. U. S. Natl. Mus., Proc. 77 (14): 6. ♂.

peculiaris Fox. Iowa, Mont., Calif.; Mexico (Baja California).
Didineis peculiaris Fox, 1894. Ent. News 5: 128. ♀, ♂.

stevensi Rohwer. N. Dak. (Sheldon).
Didineis stevensi Rohwer, 1923. Ent. Soc. Wash., Proc. 25: 98. ♀.

texana (Cresson). Mostly U. and L. Austr. Zones, Pa. and N. J. to Fla., west to Kans., Mo. and east. Ariz.; Mexico (Nuevo Leon). Prey: *Cixius stigmatus* Say.
Alyson(!) *texanus* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 226. ♂.

Biology: Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 312 (prey).

vierecki Rohwer. Kans., N. Mex.
Didineis crassicornis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 204. ♂. Preocc.
Didineis vierecki Rohwer, 1911. Ent. Soc. Wash., Proc. 13: 4. N. name.

Subfamily NYSSONINAE

The wasps of this subfamily are cleptoparasites in the nests of other ground-nesting aculeates. The more primitive genera have as their hosts wasps belonging to the closely allied Gorytinae. Two of the more highly specialized genera appear to have as hosts Larrinae (Larridae) and Cercerinae (Philanthidae), and a third may have an andrenid bee as its host.

Revision: Cresson, 1882. Amer. Ent. Soc., Trans. 9: 273-284. —Fox, 1896. N. Y. Ent. Soc., Jour. 4: 10-16. —Pate, 1938. Amer. Ent. Soc., Trans. 64: 121-127 (key to gen.).

Taxonomy: Maidl and Klima, 1939. Hym. Cat., Pars 8, Sphecidae i, pp. 115-150 (world catalog).

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 83-90, figs. 46-51 (compar. behavior and host relationships).

Genus NYSSON Latreille

Nysso Latreille, 1796. Precis Caract. Gen. Ins., p. 125. No species included. Printer's error for *Nysson?*
Nysson Latreille, 1802-1803. Hist. Nat. Crust. Ins., v. 3, p. 340.
Type-species: *Crabro spinosus* Fabricius. Desig. by Shuckard, 1837.
Nyssonus Rafinesque, 1815. Analyse Nature ou Tabl. Univers, Palermo, p. 124. Emend.

Taxonomy: Menke, Bohart and Richards, 1974. Bul. Zool. Nomencl. 30: 217-218 (petition to suppress *Nysso* Latr., 1796, designate *Sphex spinosus* Forst. as type-species, and place *Nysson* Latr., 1802-1803, and *spinosus* Forst. on Official Lists of Generic and Specific Names).

argenticus Bohart. South. Calif. and Ariz.
Nysson argenticus Bohart, 1968 (1967). Pan-Pacific Ent. 43: 315, figs. 1, 10, 13, 22. ♂, ♀.

aridulus Bohart. South. Calif.
Nysson aridulus Bohart, 1968 (1967). Pan-Pacific Ent. 43: 317, figs. 9, 26. ♂, ♀.

bakeri Bohart. South. Calif.
Nysson bakeri Bohart, 1968 (1967). Pan-Pacific Ent. 43: 318, figs. 7, 27. ♂, ♀.

chumash Pate. Calif.
Nysson (*Nysson*) *chumash* Pate, 1940. Notulae Nat. 63: 1. ♂.

compactus Cresson. Wash.
Nysson compactus Cresson, 1882. Amer. Ent. Soc., Trans. 9: 278. ♀, ♂.

daeckei Viereck. Mass., N. Y., N. J., Pa., Mich., Iowa, Alta. Host: *Gorytes canaliculatus* Pack., *Hoplisoides nebulosus* (Pack.).
Nysson daeckei Viereck, 1904. Amer. Ent. Soc., Trans. 30: 238. ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 42, figs. 8-12 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 150 (larva).

Biology: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 43 (host). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 44, 46, 64-65, fig. 36 (behavior, host, egg).

euphorbiae Bohart. South. N. Mex., Ariz., Calif.; Mexico (Sinaloa).
Nysson euphorbiae Bohart, 1968 (1967). Pan-Pacific Ent. 43: 319, figs. 2, 25. ♂, ♀.

fidelis Cresson. Wis., Colo., Mont., Wash., Oreg. Host: *Gorytes canaliculatus* Pack.
Nysson fidelis Cresson, 1882. Amer. Ent. Soc., Trans. 9: 282. ♀, ♂.

Biology: Barth, 1907. Wis. Nat. Hist. Soc., Bul. 5: 145, 147-148 (host).

gagates Bradley. B. C., N. Y., Miss.
Nysson (*Brachystegus*) *gagates* Bradley, 1920. Amer. Ent. Soc., Trans. 46: 123. ♂.

hesperus Bohart. B. C., Oreg., Calif., Nev., Idaho, Wyo.
Nysson hesperus Bohart, 1968 (1967). Pan-Pacific Ent. 43: 320, figs. 8, 14, 18, 23. ♂, ♀.

lateralis Packard. Chiefly Transit. Zone east of Rockies. Host: *Gorytes canaliculatus* Pack.?
Nysson laterale Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 68. Nom. nud.
Nysson laterale Packard, 1867. Ent. Soc. Phila., Proc. 6: 440. ♂.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, p. 65 (host ?).

neorusticus Bohart. Calif., Nev., Oreg., Wash., Utah, Wyo.
Nysson neorusticus Bohart, 1968 (1967). Pan-Pacific Ent. 43: 321, figs. 4, 12, 24. ♂, ♀.

pumilus Cresson. Nev., Calif. Host: *Hoplisoides hamatus* (Handl.)?
Nysson pumilus Cresson, 1882. Amer. Ent. Soc., Trans. 9: 283. ♂.
Nysson (*Brachystegus*) *pumilis*(!) Bradley, 1920. Amer. Ent. Soc., Trans. 46: 125. ♀.

Biology: Powell and Chemsak, 1959. Pan-Pacific Ent. 35: 200 (host ?).

recticornis Bradley. Wash., Idaho, Calif.
Nysson (*Nysson*) *recticornis* Bradley, 1920. Amer. Ent. Soc., Trans. 46: 127. ♂.

rufiventris Cresson. Colo., Mont.
Nysson rufiventris Cresson, 1882. Amer. Ent. Soc., Trans. 9: 283. ♀.
Plenoculus punctatus Ashmead, 1897. Psyche 8: 338. ♀.

rufoflavus Bohart. Calif. (Mt. Diablo).
Nysson rufoflavus Bohart, 1968 (1967). Pan-Pacific Ent. 43: 322, figs. 5, 21. ♂.

rusticus rusticus Cresson. Colo., Idaho, Wash., Oreg., Calif. Host: *Hoplisoides hamatus* (Handl.)?
Nysson rusticus Cresson, 1882. Amer. Ent. Soc., Trans. 9: 282. ♀, ♂.

Biology: Powell and Chemsak, 1959. Pan-Pacific Ent. 35: 200 (host ?). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 494 (host ?).

rusticus sphecodoides Bradley. Calif. (Claremont).
Nysson (*Nysson*) *sphecodoides* Bradley, 1920. Amer. Ent. Soc., Trans. 46: 126. ♂.

schlingeri Bohart. Calif.
Nysson schlingeri Bohart, 1968 (1967). Pan-Pacific Ent. 43: 323, figs. 6, 15, 16, 20. ♂, ♀.

simplicicornis Fox. N. Y., Pa., Md., D. C., Va., W. Va., Mich., Iowa, Nebr., Mo.
Nysson simplicicornis Fox, 1896. N. Y. Ent. Soc., Jour. 4: 15. ♂.
Brachystegus maculipes Mickel, 1916. Amer. Ent. Soc., Trans. 42: 400. ♀.

Nysson (*Nysson*) *minimus* Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 408. ♀, (♂ misdet.). Preocc.

Nysson (*Nysson*) *kaskaskia* Pate, 1938. Amer. Ent. Soc., Trans. 64: 130. N. name.

subtilis Fox. N. Y., N. J., Pa., Md., D. C., W. Va.
Nysson subtilis Fox, 1896. N. Y. Ent. Soc., Jour. 4: 14. ♂.

timberlakei Bohart. South. Calif., Nev., N. Mex.
Nysson timberlakei Bohart, 1968 (1967). Pan-Pacific Ent. 43: 324, figs. 3, 19, 28. ♂, ♀.

trichrus (Mickel). Que., N. Y., N. J., Pa., D. C., Va., Iowa, Nebr., Kans., Tex., Ala.
Nysson nigripes Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 269. "♂" = ♀. Preocc.
Brachystegus trichrus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 400. ♀.
Nysson (*Nysson*) *melanopus* Pate, 1938. Amer. Ent. Soc., Trans. 64: 130. N. name.

tristis Cresson. B. C., Wash., Oreg., Calif.
Nysson tristis Cresson, 1882. Amer. Ent. Soc., Trans. 9: 281. ♂.

Genus HYPONYSSON Cresson

Hyponysson Cresson, 1882. Amer. Ent. Soc., Trans. 9: 273.
Type-species: *Hyponysson bicolor* Cresson. Monotypic.

Revision: Pate, 1938. Amer. Ent. Soc., Trans. 64: 131-135, fig. 23. (N. Amer. spp.).

bicolor Cresson. Idaho, Wash., Oreg., Calif.
Hyponysson bicolor Cresson, 1882. Amer. Ent. Soc., Trans. 9: 284. ♀.

raui (Rohwer). Fla., Ala., Tenn., Mo., Ark., Okla., Tex. Host: *Calliopsis nebrascensis* Cwfd.?
Nysson (*Hyponysson*) *raui* Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 176. ♀.

Biology: Rau, 1922. Acad. Sci. St. Louis, Proc. 24: 18 (host ?).

Genus SYNNEVRUS Costa

Synnevrus Costa, 1859. Fauna Regn. Napoli, Imen. Acul., Nyssonid., p. 16.
Type-species: *Synnevrus procerus* Costa. Monotypic.
Synneurus Gerstaecker, 1867. Naturforsch. Gesell. Halle 10: 79. Emend.

These wasps occur in the Holarctic Region.

aequalis (Patton). Mass. south to Fla., La., Wis., Ill., Iowa, S. Dak.
Nysson aequalis Patton, 1879. Canad. Ent. 11: 212. ♂.

aurinotus (Say). Ga., Ohio, Ind., Ill., Wis., Minn., Iowa, S. Dak., Nebr., Tex., Colo.
Nysson aurinotus Say, 1837. Boston Jour. Nat. Hist. 1: 368.
Nysson Freyi-Gessneri Handlirsch, 1887. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 95: 355. ♂.
Nysson angularis Smith, 1908. Nebr. Univ. Studies 8: 340. ♂.
Nysson (*Nysson*) *marlatti* Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 408. ♀.

intermedius (Viereck). Tex., N. Mex., Ariz., Calif.
Nysson intermedius Viereck, 1907. Amer. Ent. Soc., Trans. 33: 409. ♀.
Nysson (*Nysson*) *coyotero* Pate, 1940. Notulae Nat. 63: 3. ♀, ♂.

maderae Bohart. Ariz. (Santa Rita Mts.).
Synneurus(!) *maderae* Bohart, 1968. Pan-Pacific Ent. 44: 233, fig. 13. ♂.

plagiatus (Cresson). U. S., east of Rockies. Host: *Sphex ichneumoneus* (L.)?
Nysson plagiatus Cresson, 1882. Amer. Ent. Soc., Trans. 9: 276. ♀, ♂.

Biology: Ristich, 1953. Canad. Ent. 85: 380 (host ?).

Genus EPINYSSON Pate

Nysson subg. *Epinysson* Pate, 1935. Ent. News 46: 250.
Type-species: *Nysson basilaris* Cresson. Orig. desig.

Authenticated hosts for this genus are all in the genus *Hoplisoides* (Gorytinae). *Epinysson* occurs only in the New World.

Taxonomy: Bradley, 1920. Amer. Ent. Soc., Trans. 46: 122-123 (key to spp.).

albomarginatus (Cresson). Nev.
Nysson albomarginatus Cresson, 1882. Amer. Ent. Soc., Trans. 9: 278. ♀, ♂.

arentis Bohart. South. Calif., Nev., Ariz.
Epinysson arentis Bohart, 1968. Pan-Pacific Ent. 44: 229, figs. 16-18. ♂, ♀.

basilaris basilaris (Cresson). Va., S. C., Ga., Fla.
Nysson basilaris Cresson, 1882. Amer. Ent. Soc., Trans. 9: 281. ♀.

basilaris tuberculatus (Handlirsch). N. H., Conn., N. Y., N. J., Pa., Md., D. C., Va., S. C., Wis., N. Dak. Host: *Hoplisoides nebulosus* (Pack.).
Nysson tuberculatus Handlirsch, 1887. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 95: 363. ♂.
Nysson tramosericus Viereck, 1904. Amer. Ent. Soc., Trans. 30: 237. ♂.
Nysson (*Brachystegus*) *opulentus* var. *dakotensis* Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 411. ♂.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 150-151, figs. 36-38 (larva; misdet. as *opulentus* Gerst.).

Biology: Evans, 1959. Amer. Ent. Soc., Trans. 85: 151 (host; misdet. as *opulentus* Gerst.). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 42-44, figs. 34-35 (behavior, host, egg).

bellus (Cresson). Kans., Okla., N. Dak., Colo., Mont., Tex., N. Mex., Ariz., Calif. Host: *Hoplisoides tricolor* (Cr.)?
Nysson bellus Cresson, 1882. Amer. Ent. Soc., Trans. 9: 280. ♀.
Nysson clarconis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 204. ♂.

Biology: Evans, Lin and Yoshimoto, 1954. Ent. News 65: 10 (behavior in host? nest).

desertus Bohart. South. Calif., N. Mex.; Mexico (Sinaloa).
Epinysson desertus Bohart, 1968. Pan-Pacific Ent. 44: 231, figs. 19, 20. ♂, ♀.

guatemalensis hoplisivora (Rohwer). D. C. to Fla. Host: *Hoplisoides costalis* (Cr.). Typical *guatemalensis* (Roh.) occurs in Cent. America.
Nysson (*Brachystegus*) *hoplisivora* Rohwer, 1923. Ent. Soc. Wash., Proc. 25: 96. ♀.

Biology: Reinhard, 1925. Wash. Acad. Sci., Jour. 15: 172-177 (host, egg, larval behavior, life cycle, cocoon). —Reinhard, 1929. The witchery of wasps, pp. 262-271, text fig. (host, larval behavior, cocoon).

mellipes (Cresson). N. H. to Fla., La., Minn., Iowa, N. Dak., Colo., Mont., Calif., B. C.
Nysson mellipes Cresson, 1882. Amer. Ent. Soc., Trans. 9: 279. ♀, ♂.
Nysson submellipes Viereck, 1904. Amer. Ent. Soc., Trans. 30: 237. ♂.

metathoracicus (Smith). Nebr. (Sioux Co.).
Brachystegus metathoracicus Smith, 1908. Nebr. Univ. Studies 8: 338. ♀.

moestus (Cresson). Wash., Calif. Host: *Hoplisoides hamatus* (Handl.)?
Nysson moestus Cresson, 1882. Amer. Ent. Soc., Trans. 9: 280. ♂.
Nysson (*Brachystegus*) *barberi* Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 410. ♂.

Biology: Powell and Chemsak, 1959. Pan-Pacific Ent. 35: 200 (host ?).

opulentus (Gerstaecker). Canada and U. S. in U. Austr., and Sonor. Zones; Panama?
Nysson opulentus Gerstaecker, 1867. Naturhist. Gesell. Halle, Abhandl. 10: 114. ♂.
Nysson (*Brachystegus*) *seminole* Bradley, 1920. Amer. Ent. Soc., Trans. 46: 125. ♂.
Nysson (*Brachystegus*) *foxii* Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 409. ♂.
Nysson (*Epinysson*) *maiae* Pate, 1938. Amer. Ent. Soc., Trans. 64: 137, fig. 26. ♂.

pacificus (Rohwer). Calif. (Santa Barbara).
Nysson (*Brachystegus*) *pacificus* Rohwer, 1917. U. S. Natl. Mus., Proc. 53: 249. ♂.

torridus (Bohart). South. Calif., Nev.
Epinysson torridus Bohart, 1968. Pan-Pacific Ent. 44: 232, fig. 21. ♂, ♀.

Genus ZANYSSON Rohwer

Nysson subg. *Zanysson* Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 404.
Type-species: *Nysson texanus* Cresson. Orig. desig.

The genus is known only from the New World. Circumstantial evidence suggests that species of *Tachytes* may serve as hosts.

Revision: Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 404-407 (N. Amer. spp.).

mexicanus (Cresson). Tex. (Brownsville); Mexico.
Paranysson Mexicanus Cresson, 1882. Amer. Ent. Soc., Trans. 9: 275. ♀, ♂.
Nysson longispinis Cameron, 1905. Amer. Ent. Soc., Trans. 31: 374. ♀.

plesius (Rohwer). N. Y., N. J., Md., D. C., Va., N. C., Fla., Ala., Miss., La., Mo., Kans., Tex., Ariz. Host: *Tachytes d. distinctus* Sm.?, *T. chrysocercus* Roh.?
Nysson (*Zanysson*) *plesia* Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 406. ♀, ♂.
Zanysson matinecoc Pate, 1938. Amer. Ent. Soc., Trans. 64: 163. ♀, ♂.
Zanysson tonto Pate, 1940. Notulae Nat. 63: 6. ♂.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 89-90 (hosts ?).

texanus fuscipes (Cresson). West. U. S.
Paranysson fuscipes Cresson, 1882. Amer. Ent. Soc., Trans. 9: 274. ♀, ♂.
Nysson aureobalteatus Cameron, 1901. Amer. Ent. Soc., Trans. 27: 313. ♂.

texanus texanus (Cresson). U. S. Host: *Tachytes exornatus* Fox?
Nysson texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 223. ♀, ♂.

Biology: Cockerell, 1903. Entomologist 36: 100 (host ?).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 20, figs. I-K (male genitalia).

Genus FOXIA Ashmead

Foxia Ashmead, 1898. Ent. News 9: 187.
Type-species: *Foxia pacifica* Ashmead. Monotypic.

This genus is confined to the New World. Its hosts are unknown.

Revision: Pate, 1938. Amer. Ent. Soc., Trans. 64: 143-153, figs. 1, 6, 7, 13-16, 21, 22 (N. Amer. spp.).

navajo Pate. Okla., Tex., N. Mex., Ariz., Calif.
Foxia navajo Pate, 1938. Amer. Ent. Soc., Trans. 64: 146. ♀, ♂.

pacifica Ashmead. Calif.
Foxia pacifica Ashmead, 1898. Ent. News 9: 187. ♀, ♂.

secunda (Rohwer). Ariz., Calif.
Nysson (*Foxia*) *secunda* Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 407. ♂.

Genus METANYSSON Ashmead

Metanysson Ashmead, 1899. Canad. Ent. 31: 326.
Type-species: *Nysson solani* Cockerell. Orig. desig.
Metanysson subg. *Huachuca* Pate, 1938. Amer. Ent. Soc., Trans. 64: 185.
Type-species: *Metanysson* (*Huachuca*) *arivaipa* Pate. Orig. desig.

The genus occurs only in the New World. Circumstantial evidence suggests that species of *Cerceris* may be the hosts.

Revision: Pate, 1938. Amer. Ent. Soc., Trans. 64: 170-188, figs. 2, 3, 5, 9-12, 18-20 (N. Amer. spp.).

arivaipa Pate. Ariz. Host: *Cerceris graphica* Sm.?
Metanysson (*Huachuca*) *arivaipa* Pate, 1938. Amer. Ent. Soc., Trans. 64: 186. ♂.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, p. 90 (host ?).

coahuila Pate. Calif., Ariz., Tex. Host: *Cerceris conifrons* Mick.?
Metanysson (*Metanysson*) *coahuila* Pate, 1938. Amer. Ent. Soc., Trans. 64: 183. ♀.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, p. 90 (host ?).

lipan Pate. Tex. (Hudspeth Co.).
Metanysson (*Metanysson*) *lipan* Pate, 1938. Amer. Ent. Soc., Trans. 64: 176. ♂.

solani (Cockerell). N. Mex., Ariz.
Nysson solani Cockerell, 1895. Amer. Ent. Soc., Trans. 22: 294. ♀.

yavapai Pate. Ariz.
Metanysson (*Metanysson*) *yavapai* Pate, 1938. Amer. Ent. Soc., Trans. 64: 178. ♀, ♂.

Subfamily GORYTINAE

This large subfamily of ground-nesting wasps is cosmopolitan in distribution. So far as recorded the species prey upon nymphal and adult Homoptera.

Revision: Handlirsch, 1888. Akad. Wiss. Wien, Math.-Nat. Kl, Sitzber. 97: 316-565, 3 pls. (spp. of world). —Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc., 47: 517-539 (N. Amer. spp.). —Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 412 (key to gen.).

Taxonomy: Maidl and Klima, 1939. Hym. Cat., Pars 8, Sphecidae 1, pp. 43-114 (world catalog).

Genus OCHLEROPTERA Holmberg

Ochleroptera Holmberg, 1903. Buenos Aires Mus. Nac. Hist. Nat., An. (3) 2: 487.
Type-species: *Ochleroptera oblita* Holmberg. Monotypic.
Paramellinus Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 469.
Type-species: *Gorytes bipunctatus* Say. Orig. desig.

The species of this small genus occur only in the New World.

Taxonomy: Pate, 1947. Brooklyn Ent. Soc., Bul. 42: 65-70.

bipunctata (Say). U. and L. Austr. Zones of U. S. Ecology: Nests in sandy to heavier soil, makes several cells per nest, stores 6-18 prey per cell. Parasite: Miltogrammini sp. Prey: *Aceratagallia sanguinolenta* (Prov.), *Coelidia olitoria* (Say), *Colladonus clitellarius* (Say), *Japananus hyalinus* (Osb.), *Macrosteles fascifrons* Stal, *M.* sp., *Orientus ishidae* Mats., *Paraphlepsius irroratus* (Say), *Prescottia lobata* (Van D.), *Scaphytopius* sp., *Strongania apicalis* Osb. and Ball; *Clastoptera obtusa* Say, *Philaenus leucophthalmus* L., *P. lineatus* L.; *Cyrtolobus acutus* Van D.; *Haplaxius radicis* Osb.; *Psylla annulata* F.; adults are stored more commonly than nymphs.
Gorytes bipunctatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 338.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 47, figs. 23-29 (larva). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 152 (larva).

Biology: Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 312 (nest, prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 75-77, fig. 42 (nest, prey transport, life cycle, cocoon, parasite). —Evans, 1968. Ent. Soc. Amer., Ann. 61: 1344 (prey). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 335 (prey).

Genus ARGOGORYTES Ashmead

Argogorytes Ashmead, 1899. Canad. Ent. 31: 324.
Type-species: *Gorytes carbonarius* Smith. Orig. desig.
Argogorytes subg. *Archarpactus* Pate, 1937. Amer. Ent. Soc., Mem. 9: 4, 10.
Type-species: *Sphex mystacea* Linnaeus. Orig. desig. Replacement name proposed unnecessarily for *Arpactus* Jurine which was suppressed in Op. 135, 1939, Internatl. Comn. Zool. Nomencl.

Two Palaearctic species nest in the ground, make 6-9 cells per nest, and store 19-27 nymphal spittlebugs (*Aphrophora*) per cell.

nigrifrons (Smith). N. S., south to Ga., Wis., Iowa, Kans., Tex.
Gorytes nigrifrons Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 368. ♀.
Gorytes Bollii Cresson, 1872. Amer. Ent. Soc., Trans. 4: 225. ♀.
Gorytes (*Gorytes*) *neglectus* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 567. ♀.

sapellonis (Baker). N. Mex. (Sapello Canyon).
Gorytes sapellonis Baker, 1907. Invertebrata Pacifica 1: 161. ♀.

Genus DIENOPLUS Fox

Arpactus Jurine, 1807. Nouv. Meth. Class. Hym. Dipt., p. 192. Preocc.
Type-species: *Arpactus formosus* Jurine. Desig. by Shuckard, 1837.
Harpactus Shuckard, 1837. Essay on Indig. Fossor. Hym., p. 221. Emend.
Harpactes Dahlbom, 1843. Hym. Europaea, v. 1, p. 147. Emend. Preocc.
Dienoplus Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc., 45: 548.
Type-species: *Dienoplus pictifrons* Fox. Orig. desig.

Most species occur in the Holarctic Region, but a few have been recorded from the Ethiopian and Oriental Regions. A European species makes 2-15 cells per nest in sandy soil. Recorded prey are leafhoppers and spittlebugs, both nymphs and adults.

citipes Krombein. Fla., (Orlando, Arcadia). Ecology: Nests in flat sandy areas.
Dienoplus citipes Krombein, 1954. Amer. Ent. Soc., Trans. 80: 20, figs. 9, 11, 13. ♂, ♀.

gyponae (Williams). Kans., N. Mex., Alta. Ecology: Nests in sand, makes more than 2 cells per nest, stores 4 prey per cell. Prey: *Prairiana cinerea* (Uhl.) adults and nymph.
Harpactus gyponae Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 223. ♀.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 225-226, pl. 33, fig. 5 (nest, prey transport).

mendicus (Handlirsch). B. C., Idaho.
Gorytes mendicus Handlirsch, 1893. K. K. Naturhist. Hofmus., Ann. 8: 278. ♀.

pictifrons Fox. Idaho, Wash., Calif. Predator: *Philanthus pulcher* D. T.
Dienoplus pictifrons Fox, 1894 (1893). Acad. Nat. Sci. Phila., Proc., 45: 549. ♀, ♂.
Harpactus howardi Ashmead, 1899. Ent. News 10: 9. ♀.

Genus HAPALOMELLINUS Ashmead

Hapalomellinus Ashmead, 1899. Canad. Ent. 31: 300.
Type-species: *Gorytes eximius* Provancher. Orig. desig.

This small genus occurs only in the desert areas of southwestern North America.

Taxonomy: Bohart, 1971. Biol. Soc. Wash., Proc. 83: 452 (key to spp.).

albitomentosus (Bradley). Tex., N. Mex., Ariz., Calif. Ecology: Nests in level, dry sandy soil, makes 1-2 cells per nest, one of which may be just a storage cell, and stores 14-15 leafhoppers per cell. Parasite: *Senotainia* sp. in *trilineata* (Wulp) complex? Prey: *Stragania robusta* Uhl., mostly adults, but a few nymphs.
Gorytes eximius Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 274. ♀. Preocc.
Gorytes (*Arpactus*) *albitomentosus* Bradley, 1920. Amer. Ent. Soc., Trans. 46: 121. ♀, ♂.

Biology: Cazier and Mortenson, 1965. Wasmann Jour. Biol. 22: 261-276 (nest, prey, parasite ?).

pulvis Bohart. South. N. Mex., Ariz. and Calif.
Hapalomellinus pulvis Bohart, 1971. Biol. Soc. Wash., Proc. 83: 451. ♀, ♂.

teren Pate. Ariz., Calif.
Hapalomellinus teren Pate, 1946. Ent. News 57: 237. ♀.

Genus TRICHOGORYTES Rohwer

Trichogorytes Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 469.
Type-species: *Trichogorytes argenteopilosus* Rohwer. Orig. desig.

The two known species occur in the southwestern deserts.

Revision: Pate, 1946. Brooklyn Ent. Soc., Bul. 41: 15-17.

argenteopilosus Rohwer. Ariz., Calif.
Trichogorytes argenteopilosus Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 470. ♀.

cockerelli (Ashmead). N. Mex. (Mesilla). Ecology: Makes up to 2 cells per nest in fine-grained sand in dunes, stores 8-10 prey per cell. Prey: *Exitianus exitiosus* (Uhl.), *Circulifer tenellus* (Baker), *Norvellina* sp.; stores mostly adults.
Harpactus cockerelli Ashmead, 1899. Ent. News 10: 10. ♀.

Biology: Evans, 1976. Ent. News 87: 33-37, 4 figs. (nest, prey).

Genus GORYTES Latreille

Gorytes Latreille, 1804. Nouv. Dict. Hist. Nat., v. 24, Tabl. Meth., p. 180.
Type-species: *Mellinus quinquecinctus* Fabricius. Monotypic.
Arpactus Panzer, 1805. Faunae Ins. German., heft 98, No. 17.
Type-species: *Mellinus quadrifasciatus* Fabricius. Monotypic.
Arpactus Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, p. 164. Preocc.
Type-species: *Mellinus quadrifasciatus* Fabricius. Desig. by Pate, 1937.
Euzonia Stephens, 1829. System. Cat. Brit. Ins., p. 363.
Type-species: *Mellinus quinquecinctus* Fabricius. Desig. by Pate, 1937.
Hoplisus Lepeletier, 1832. Soc. Ent. France, Ann. 1: 61.
Type-species: *Hoplisus quinquecinctus* of Lepeletier. Desig. by Westwood, 1839.
Euspongus Lepeletier, 1832. Soc. Ent. France, Ann. 1: 66.
Type-species: *Euspongus laticinctus* Lepeletier. Desig. by Westwood, 1839.

This genus occurs in the Holarctic and Ethiopian Regions. Prey records include Cicadellidae, Fulgoridae, Cercopidae and Membracidae. The multicellular nests may contain up to four cells, and 4-19 prey may be stored per cell.

albosignatus Fox. N. Dak., S. Dak., Nebr., Colo., Mont., Idaho.
Gorytes albosignatus Fox, 1892. Canad. Ent. 24: 152. ♀, ♂.

angustus (Provancher). Nev., Calif., Wash., B. C.
Hoplisus angustus Provancher, 1895. Nat. Canad. 22: 141. "♀" = ♂.
Hoplisus angustatus(!) Ashmead, 1899. Canad. Ent. 31: 328.

atricornis Packard. Transcont. in Transit. and U. Austr. Zones. Prey: *Aphrophora parallela* (Say); *Cyrtolobus tuberosus* (Fairm.); adults.
Odynerus(?) *atricornis* Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 68. Nom. nud.
Gorytes atricornis Packard, 1867. Ent. Soc. Phila., Proc. 6: 428. ♀, ♂.
Gorytes rugosus Packard, 1867. Ent. Soc. Phila., Proc. 6: 427. ♂.
Gorytes decorus Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc., 45: 535. ♀, ♂.
Hoplisus elegantulus Smith, 1908. Nebr. Univ. Studies 8: 346. ♂.

Biology: Pate, 1946. Brooklyn Ent. Soc., Bul. 41: 99 (prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, p. 67 (prey).

atrifrons Fox. Colo., Nev., Calif.
Gorytes atrifrons Fox, 1892. Canad. Ent. 24: 151. ♀, ♂.

canaliculatus Packard. Transcont. in Transit. and U. Austr. and Sonor. Zones. Ecology: Nests both in sand and compacted soil, makes 1-4 cells per nest, stores 6-26 prey per cell. Parasite: *Metopia argyrocephala* (Meig.), *Senotainia trilineata* (Wulp)?, *Phrosinella fulvicornis* (Coq.)?, *P. fumosa* Allen?; *Timulla leona* (Bl.)?; *Nysson fidelis* Cr., *N. daeckei* Vier., *N. lateralis* Pack. Prey: *Idiocerus apache* Ball and Prkr., *I. cinctus* DeLong and Caldw., *I. lachrymalis* Fitch, *I. pallidus* Fitch, *I. perplexus* Gill. and Baker, *I. populi suturalis* Fitch, *I. snowi* Gill. and Baker, *I. stigmaticalis* Lewis, *I*, spp., *Macropsis viridis* (Fitch), *M.* sp., *Norvellina helenae* Ball, *Oncopsis* sp., *Orientus ishidae* Mats., *Paraphlepsius* sp., *Stragania alabamensis* Baker; *Haplaxius pictifrons* Stal; nymphs and adults.
Gorytes canaliculatus Packard, 1867. Ent. Soc. Phila., Proc. 6: 428. ♀.
Gorytes geminus Handlirsch, 1888. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 97: 478. ♀, ♂.
Gorytes asperatus Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc., 45: 534. ♀, ♂.
Hoplisus corrugis Mickel, 1918 (1917). Nebr. Univ. Studies 17: 319. ♂.
Gorytes (*Hoplisus*) *carrugis*(!) Maidl and Klima, 1939. Hym. Cat., Pars 8, Sphecidae, v. 1, p. 101.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 43-44, figs. 13-22 (larva).

Biology: Barth, 1907. Wis. Nat. Hist. Soc., Bul. 5: 141-149, 3 figs. (nest, prey, parasite; observations probably based on both *canaliculatus* and *Hoplisoides nebulosus* (Pack.)). —Krombein, 1964 (1963). Brooklyn Ent. Soc., Bul. 58: 119 (nest, prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 58-66, figs. 38, 39 (nest, prey, egg, life cycle, parasites). —Evans, 1968. Ent. Soc. Amer., Ann. 61: 1344 (prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 494 (nest, prey, parasites). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 335-336 (prey). —Alcock, 1973. Wasmann Jour. Biol. 31: 332-333, figs. 6, 10 (nest, prey transport). —Powell, 1974. Kans. Ent. Soc., Jour. 47: 1-7, 3 figs. (nest, prey transport, life cycle).

cochisensis Bohart. South. Ariz.
Gorytes cochisensis Bohart, 1971. Biol. Soc. Wash., Proc. 83: 450. ♀, ♂.

deceptor Krombein. N. H. south to Va., west to Ont., Minn., Nebr., Kans. Prey: *Spissistylus constans* (Wlk.) adult.
Gorytes (*Gorytes*) *deceptor* Krombein, 1958. Ent. Soc. Wash., Proc. 60: 62. ♀, ♂.

Biology: Krombein, 1958. Ent. Soc. Wash., Proc. 60: 64 (prey).

dorothyae dorothyae Krombein. Md., N. C., La.
Gorytes (*Gorytes*) *dorothyae* Krombein, 1950 (1949). Elisha Mitchell Sci. Soc., Jour. 65: 269. ♂.

Taxonomy: Krombein, 1953. Wasmann Jour. Biol. 10: 335. ♀.

dorothyae russeolus Krombein. Fla.
Gorytes (*Gorytes*) *dorothyae russeolus* Krombein, 1954. Amer. Ent. Soc., Trans. 80: 23. ♂, ♀.

flagellatus Bohart. Calif., Nev., Wash., B. C. Idaho, Wyo.
Gorytes flagellatus Bohart, 1971. Biol. Soc. Wash., Proc. 83: 448. ♂, ♀.

limbellus Bohart. Calif.
Gorytes limbellus Bohart, 1971. Biol. Soc. Wash., Proc. 83: 447. ♂, ♀.

mcateei Krombein and Bohart. N. Y., Pa., Md., D. C., Va.
Gorytes (*Gorytes*) *mcateei* Krombein and Bohart, 1962. Biol. Soc. Wash., Proc. 75: 15. ♀.

nevadensis Fox. Nev., Colo., Idaho.
Gorytes nevadensis Fox, 1892. Canad. Ent. 24: 150. ♀, ♂.

prosopis Bohart. Calif., Oreg.
Gorytes prosopis Bohart, 1971. Biol. Soc. Wash., Proc. 83: 449. ♀.

provancheri Handlirsch. Wash., Oreg., Calif., Nev., Utah.
Gorytes laticinctus Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 274. ♂. Preocc.
Gorytes Provancheri Handlirsch, 1895. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 104: 945. N. name.

simillimus Smith. N. S. to B. C. south to Ga., Ill., Kans. and Colo. Ecology: Nests in sand. Prey: *Gyponana flavolineata* (Fitch), *G. melanota* Spang., *G. octolineata* (Say), *G.* spp., *Scaphoideus productus* Osb.; mostly adults but a few nymphs.
Gorytes simillimus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 367. ♀.
Gorytes ephippiatus Packard, 1867. Ent. Soc. Phila., Proc. 6: 426. ♂.
Gorytes (*Pseudoplisus*) *gyponacinus* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 568. ♀, ♂.

Biology: Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 568 (prey). —Krombein, 1936. Ent. News 47: 93-94 (prey transport). —Krombein, 1952. Amer. Ent. Soc., Trans. 78: 95 (nest, prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, p. 66 (nest, prey). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 336 (prey).

umatillae Bohart. West. U. S.
Gorytes vicinus Handlirsch, 1893. K. K. Naturhist. Hofmus., Ann. 8: 279. ♀. Preocc.
Gorytes umatillae Bohart, 1971. Biol. Soc. Wash., Proc. 83: 450. N. name.

Genus PSEUDOPLISUS Ashmead

Pseudoplisus Ashmead, 1899. Canad. Ent. 31: 323.

Type-species: *Gorytes floridanus* Fox. Orig. desig.

Laevigorytes Zavadil, 1948. *In* Zavadil and Snoflak, Ent. Prirucky Ent. Listu, no. 13, p. 66.
Type-species: *Gorytes kohlii* Handlirsch. Monotypic.

Most of the species are Nearctic but a few have been described from the Ethiopian and Palaearctic Regions. The only known prey record is of a spittlebug for one of the Ethiopian species.

Taxonomy: Bohart, 1969 (1968). Kans. Ent. Soc., Jour. 41: 494-496 (key to spp. of Phaleratus Group). —Bohart, 1969. Kans. Ent. Soc., Jour. 42: 392-394 (key to spp. of Montanus, Abdominalis, Fasciatus, Venustus and Smithii Groups).

abdominalis (Cresson). Colo., Tex.
Gorytes abdominalis Cresson, 1865. Ent. Soc. Phila., Proc. 4: 474. ♀, ♂.

apicalis (Smith). N. J., S. C., Tex., N. Mex., Nebr.
Gorytes apicalis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 369. ♂.
Gorytes propinquus Cresson, 1868. Amer. Ent. Soc., Trans. 1: 379. "♀" = ♂.

butleri Bohart. Ariz.
Pseudoplisus butleri Bohart, 1969. Kans. Ent. Soc., Jour. 42: 397, figs. 1, 7. ♂.

californicus Bohart. Calif.
Pseudoplisus californicus Bohart, 1969. Kans. Ent. Soc., Jour. 42: 401, figs. 11, 12. ♂, ♀.

catalinae Bohart. Ariz. (Santa Catalina Mts.).
Pseudoplisus catalinae Bohart, 1969. Kans. Ent. Soc., Jour. 42: 395, figs. 13, 17. ♂, ♀.

claripennis Bohart. Ariz. (Santa Rita Mts.).
Pseudoplisus claripennis Bohart, 1969. Kans. Ent. Soc., Jour. 42: 403. ♂.

divisus (Smith). Va. to Ga., La., Tex., Nebr.
Gorytes divisus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 370. ♂.
Gorytes bipartitus Handlirsch, 1888. Akad. Wiss. Wien Math.-Nat. Kl., Sitzber. 97: 521. ♀, ♂.
Pseudoplisus varipunctus Smith, 1908. Nebr. Univ. Studies 8: 348. ♀.

fasciatus (Fox). Colo., Ariz.
Gorytes fasciatus Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc., 45: 539. ♂.

flavidulus Bohart. South. Calif.
Pseudoplisus flavidulus Bohart, 1969. Kans. Ent. Soc., Jour. 42: 402. ♂.

imperialis Bohart. Calif. (Imperial Co.).
Pseudoplisus imperialis Bohart, 1969. Kans. Ent. Soc., Jour. 42: 403. ♂.

nigricomus Bohart. South. Ariz.
Pseudoplisus nigricomus Bohart, 1969. Kans. Ent. Soc., Jour. 42: 398, figs. 5, 10. ♂, ♀.

ocellatus Bohart. South. Calif.; Mexico (Baja California).
Pseudoplisus ocellatus Bohart, 1969. Kans. Ent. Soc., Jour. 42: 401. ♂, ♀.

oraclensis Bohart. South. Ariz.
Pseudoplisus oraclensis Bohart, 1969 (1968). Kans. Ent. Soc., Jour. 41: 498, figs. 4, 8. ♂, ♀.

phaleratus (Say). Canada and U. S. in Transit. and Austr. Zones; P. E. I. west to N. Dak. and Colo., south to Fla. and Ariz., south in Mexico to Guerrero.
Odynerus(?) *flavicornis* Harris, 1835. *In* Hitchcock, Rpt. Geol. Mineral. Bot. Zool. Mass., p. 68. Nom. nud.
Gorytes phaleratus Say, 1837. Boston Jour. Nat. Hist. 1: 367.
Gorytes fulvipennis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 367. ♀.
Gorytes modestus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 473. ♂.
Gorytes rufo-luteus Packard, 1867. Ent. Soc. Phila., Proc. 6: 425. ♀, ♂.
Gorytes flavicornis Packard, 1867. Ent. Soc. Phila., Proc. 6: 429. ♀, ♂.
Gorytes alticola Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 81, pl. 5, fig. 21. ♂, ♀.
Gorytes alpestris Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 83, pl. 5, fig. 22. ♂, ♀.
Gorytes subaustralis Viereck, 1908 (1907). Amer. Ent. Soc., Trans. 33: 398. ♀.
Gorytes papagorum Viereck, 1908 (1907). Amer. Ent. Soc., Trans. 33: 400. ♀, ♂.

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 21, figs. H-K (male genitalia).

rufomaculatus (Fox). Nebr., Kans., Colo., Mont.
Gorytes rufomaculatus Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc., 45: 538. ♀, ♂.

smithii floridanus (Fox). Fla.
Hoplisus foveolata Fox, 1890. Ent. News 1: 106. ♀. Preocc.
Gorytes floridanus Fox, 1891. Ent. News 2: 196. N. name.

smithii smithii (Cresson). Md., N. C., Fla., Ill., Nebr., Kans., Okla., La.
Gorytes Smithii Cresson, 1880. Amer. Ent. Soc., Trans. 8: Proc., p. xviii. "♀" = ♂.
Pseudoplisus infumatus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 402. ♂.

tanythrix Bohart. Okla., Tex.
Pseudoplisus tanythrix Bohart, 1969. Kans. Ent. Soc., Jour. 42: 399, figs. 6, 8, 14. ♂.

venustus (Cresson). Tex., N. Mex., Ariz., Utah, Colo.; Mexico (Chihuahua).
Gorytes venustus Cresson, 1865. Ent. Soc. Phila., Proc. 4: 472. ♀, ♂.
Gorytes (*Pseudoplisus*) *venustiformis* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 568. ♂.

werneri Bohart. Ariz., Colo.
Pseudoplisus werneri Bohart, 1969 (1968). Kans. Ent. Soc., Jour. 41: 500, figs. 3, 11, 14. ♀, ♂.

Genus LESTIPHORUS Lepeletier

Lestiphorus Lepeletier, 1832. Soc. Ent. France, Ann. 1: 70.
Type-species: *Crabro bicinctus* Rossi. Desig. by Internatl. Comn. Zool. Nomencl., Op. 675, 1963.
Lestophorus Agassiz, 1847. Nomencl. Zool., p. 208. Emend.
Hypomellinus Ashmead, 1899. Canad. Ent. 31: 299.
Type-species: *Gorytes rufocinctus* Fox. Orig. desig.
Mellinogastra Ashmead, 1899. Canad. Ent. 31: 300.
Type-species: *Gorytes mellinoides* Fox. Orig. desig.

Most species are Holarctic but one each is known from the Neotropical and Ethiopian Regions. One European species is reported to prey upon spittlebugs.

Revision: Pate, 1946 (1945). Canad. Ent. 77: 210-213 (N. Amer. spp.).

Taxonomy: van der Vecht, 1961. Bul. Zool. Nomencl. 18: 340-341 (request to suppress *Crabro bicinctus* F. and to place *Lestiphorus* Lep. and *Crabro bicinctus* Rossi on Official Lists of Generic and Specific Names).

cockerelli (Rohwer). Mass., N. Y., Mich., S. Dak., Colo.
Gorytes cockerelli Rohwer, 1909. Ent. News 20: 371. ♂.
Mellinogastra williamsi Mickel, 1916. Amer. Ent. Soc., Trans. 42: 402. ♂.

mellinoides (Fox). Tex. (? Bosque Co.).
Gorytes mellinoides Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc. 45: 524. ♀.

piceus (Handlirsch). N. Dak., Idaho, Wash., B. C.
Gorytes piceus Handlirsch, 1888. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 97: 455. ♂.
Gorytes rufocinctus Fox, 1892. Canad. Ent. 24: 153. ♀.

Genus ORYTTUS Spinola

Oryttus Spinola, 1836. Soc. Ent. France, Bul. 5: xxiii.
Type-species: *Arpactus concinnus* (Rossi). Monotypic.
Agraptus Wesmael, 1852. Acad. Roy. Sci. Belg., Bul. 19: 108.
Type-species: *Gorytes concinnus* of Vander Linden. Monotypic.
Harpactostigma Ashmead, 1899. Canad. Ent. 31: 299.
Type-species: *Hoplisus velutinus* Spinola. Orig. desig.
Harpactostigma subg. *Arcesilas* Pate, 1938. Amer. Ent. Soc., Trans. 64: 60.
Type-species: *Gorytes mirandus* Fox. Orig. desig.

Most species of this small genus occur in the Holarctic Region, but a few are Ethiopian and Neotropical. Several prey records are of Fulgoridae, but one European species also uses Cicadellidae.

Revision: Pate, 1938. Amer. Ent. Soc., Trans. 64: 57-77 (New World spp.).

Taxonomy: Bohart, 1968. Biol. Soc. Wash., Proc. 81: 431-438, 17 figs. (synopsis of New World taxa).

gracilis arapaho (Pate). Colo., Kans., Tex.
Harpactostigma (*Arcesilas*) *arapaho* Pate, 1938. Amer. Ent. Soc., Trans. 64: 67. ♀.
Harpactostigma (*Arcesilas*) *rutilum* Pate, 1938. Amer. Ent. Soc., Trans. 64: 69. ♂.

gracilis gracilis (Patton). U. S. in U. and L. Austr. Zones, east of 100th meridian.
Hoplisus gracilis Patton, 1879. Canad. Ent. 11: 210. ♀, ♂.

laminiferus (Fox). Calif., Wash., Idaho, Utah. Ecology: Nests in vertical clay bank, stores at least 5 prey per cell. Prey: *Scolops hesperius* Uhl. ?, nymphs and adults.
Gorytes ruficornis Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 273. ♀, ♂. Preocc.
Gorytes laminiferus Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc. 45: 532. ♂.
Hypomellinus flavicornis Baker, 1907. Invertebrata Pacifica 1: 162. ♂.
Gorytes (*Hoplisus*) *rufulicornis* Maidl and Klima, 1939. Hym. Cat., Pars 8, Sphecidae, v. 1, p. 102. N. name.

Biology: Gittins, 1958. Pan-Pacific Ent. 34: 142 (nest, prey).

mirandus (Fox). Nev., Calif., Wash.
Gorytes mirandus Fox, 1892. Canad. Ent. 24: 152. ♂.
Hoplisoides mirandas(!) Ashmead, 1899. Canad. Ent. 31: 328.

umbonatus (Baker). Calif.
Hoplisoides umbonatus Baker, 1907. Invertebrata Pacifica 1: 163. ♂.
Gorytes (*Hoplisoides*) *femoratus* Bradley, 1920. Amer. Ent. Soc., Trans. 46: 119. ♂.

yumae Bohart. South. Ariz.
Oryttus yumae Bohart, 1968. Biol. Soc. Wash., Proc. 81: 436, figs. 4, 9, 13, 17. ♂, ♀.

Genus PSAMMALETES Pate

Hoplisoides subg. *Psammaletes* Pate, 1936. Amer. Ent. Soc., Trans. 62: 49.
Type-species: *Gorytes bigeloviae* Cockerell and Fox. Orig. desig.

This small genus occurs only in the Nearctic Region.

Revision: Pate, 1936. Amer. Ent. Soc., Trans. 62: 49-56.

bigeloviae (Cockerell). N. Mex., Ariz.; Mexico.
Gorytes bigeloviae Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 139. ♂.

crucis (Cockerell). Iowa, Nebr., N. Mex.; north. Mexico.
Gorytes crucis Cockerell, 1897. *In* Cockerell and Fox, Acad. Nat. Sci. Phila., Proc. 49: 140. ♀.
Hypomellinus venustus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 403. ♂.
Hypomellinus tricinctus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 404. ♀.

mexicanus (Cameron). N. Y., N. J., Md., D. C., Va., N. C., Ga., La., Ind.; Mexico (Yucatan). Prey: *Ormenoides venusta* (Melichar).
Gorytes mexicanus Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 76, pl. 5, fig. 15. ♀.
Psammaletes pechumani Pate, 1936. Amer. Ent. Soc., Trans. 62: 53. ♀.

Biology: Pate, 1946. Brooklyn Ent. Soc., Bul. 41: 99 (prey).

Genus SPHECIUS Dahlbom

Taxonomy: Pate, 1936. Brooklyn Ent. Soc., Bul. 31: 198-200 (key to subg.).

Genus SPHECIUS Subgenus SPHECIUS Dahlbom

Sphecius Dahlbom, 1843. Hym. Europaea, v. 1, p. 154.
Type-species: *Sphecius speciosus* Dahlbom. Monotypic.
Hogardia Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 288.
Type-species: *Hogardia rufescens* Lepeletier. Type by tautonymy (=*Stizus hogardii* Latreille).

The typical subgenus occurs only in the New World. These large wasps are commonly called cicada killers. They frequently nest gregariously and dig burrows which may be as long as 4 feet, have a number of branches each of which may terminate in a cluster of 3 cells. One to as many as 4 prey may be stored per cell depending upon the size of the prey and the sex to be provided for.

Revision: Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 264-266 (N. Amer. spp.).

convallis Patton. U. S. west of 100th meridian; Mexico (Baja California). Prey: *Diceroprocta apache* (Davis), *Tibicen pruinosa* (Say).

Sphecius speciosus var. *convallis* Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 343. ♀, ♂.

Sphecius raptor Handlirsch, 1889. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 98: 461. ♀, ♂. N. name.

Biology: Krombein, 1951. U. S. Dept. Agr., Monog. 2: 987 (prey). —Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1, p. 193 (prey).

grandis (Say). Tenn., Mo., Ark., Tex., Kans., N. Mex., Ariz., Utah, Nev., Wash., Calif., south to Central America. Parasite: *Dasymutilla klugii* (Gray)? Prey: *Tibicen dealbata* (Davis).

Stizus grandis Say, 1823. West. Quart. Rptr. 2: 77.

Stizus fervidus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 223. ♀.

Stizus nevadensis Cresson, 1874. Amer. Ent. Soc., Trans. 5: 99. ♂.

Biology: Bradley, 1908. Ent. Soc. Amer., Ann. 1: 129 (sleeping aggregation). —Bradley, 1920. Ent. News 31: 112-113 (nest, parasite ?). —Evans, 1966. Compar. ethology and evolution of sand wasps, p. 110 (prey transport). —Alcock, 1975. Jour. Nat. Hist. 9: 561-566, 3 figs. (male territorial and mating behavior).

hogardii hogardii (Latreille). South Fla.; West Indies. Another subspecies occurs in the Bahamas.

Stizus Hogardii Latreille, 1809. Gen. Crust. Ins., v. 4, p. 100, pl. 13. ♀.

Hogardia rufescens Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 289. ♀. N. name.

speciosus (Drury). U. S. in U. and L. Austr. Zones east of Rockies, south into Mexico. Ecology: Nests gregariously in light clay to sandy soil, the tunnel with several branches each with one or more cells and with an average of 15.8 cells per nest, usually stores 1-2 prey per cell. Parasite: *Senotainia trilineata* (Wulp), *Metopia argyrocephala* (Meigen). Prey: *Tibicen canicularis* Harr., *T. chloromera* Wlkr., *T. dorsata* Say, *T. linnei* Sm. and Grossb., *T. lyricen* DeG., *T. marginalis* Wlkr., *T. pruinosa* Say, *T. robinsoniana* Davis, *T. sayi* (Grossb.), *T. vitripennis* Say. This is commonly known as the cicada killer.

Sphex speciosus Drury, 1773. Illus. Nat. Hist., v. 2, p. 71. ♀.

Vespa tricincta Fabricius, 1775. Systema Ent., p. 363.

Stizus vespiformis Latreille, 1818. Tabl. Encycl. et Meth., pt. 24, pl. 382, fig. 6.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 46, figs. 30-36 (larva).

Biology: Riley, 1892. Insect Life 4: 248-252 (nest, prey). —Davis, 1920. Brooklyn Ent. Soc., Bul. 15: 128-129 (mating, prey transport). —Reinhard, 1929. The witchery of wasps, pp. 18-60, 4 pls. (nest, prey, cocoon, life cycle, mating, parasite). —Dow, 1942. Ent. Soc. Amer., Ann. 35: 310-317 (nest, prey). —Dambach and Good, 1943. Ohio Jour. Sci. 43: 32-41, figs. 1-6 (nest, prey, life history). —Lin, 1963. Behavior 20: 115-133, 6 figs. (territoriality of males). —Lin, 1964 (1963). Brooklyn Ent. Soc., Bul. 58: 121-123 (fighting of nesting females). —Lin, 1966. Anim. Behaviour 14: 130-131, pl. 6 (mating). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 92-110, figs. 52-58 (nest, prey, egg, life cycle, parasites). —Lin, 1967. Science 157: 1334-1335, 1 fig. (sex roles in mating). —Lin, 1972. *In* Michener and Lin, Quart. Rev. Biol. 47: 139-140 (communal nest possession by several females).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 18, figs. E-O (male genitalia).

Genus TANYOPRYMNUS Cameron

Tanyoprymnus Cameron, 1905. Amer. Ent. Soc., Trans. 31: 375.
Type-species: *Tanyoprymnus longitarsis* Cameron. Monotypic.

Ceratostizus Rohwer, 1921. U. S. Natl. Mus., Proc. 59: 412.

Type-species: *Gorytes moneduloides* Packard. Orig. desig.

Taxonomy: Pate, 1935. Ent. News 46: 249-250.

moneduloides (Packard). U. S. south into Mexico. Ecology: Nests in vertical sand banks. Prey: *Rhynchomitra microrhina* (Wlkr.) nymphs and adult; *Scolops sulcipes* (Say) adults, *S.* sp.? nymph.
Gorytes moneduloides Packard, 1867. Ent. Soc. Phila., Proc. 6: 431. ♂.
Gorytes Belfragei Cresson, 1872. Amer. Ent. Soc., Trans. 4: 224. ♀.
Tanyoprymnus longitarsis Cameron, 1905. Amer. Ent. Soc., Trans. 31: 376. ♂.

Biology: Krombein, 1959. Ent. Soc. Wash., Proc. 61: 195 (nest, prey transport). —Evans, 1966. Compar. ethology and evolution of sand wasps, p. 80 (prey).

Genus ARIGORYTES Rohwer

Arigorytes Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 469.
Type-species: *Gorytes Coquillettii* Fox. Orig. desig.

This is a small genus occurring only in the deserts of western North America. Nothing is known of the biology.

Revision: Pate, 1947. Canad. Ent. 79: 51-56.

Taxonomy: Bohart, 1971. Biol. Soc. Wash., Proc. 83: 447 (key to N. Amer. spp.).

coachellae Bohart. Calif., Ariz., Nev., Colo.; Mexico (Baja California).
Arigorytes coachellae Bohart, 1971. Biol. Soc. Wash., Proc. 83: 445. ♂, ♀.

coquillettii (Fox). Calif.
Gorytes Coquillettii Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc. 47: 531. ♀.

insolitus (Fox). Nev., Calif., Oreg.
Gorytes insolitus Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc. 47: 532. ♂.
Hoplisoides clavatus Baker, 1907. Invertebrata Pacifica 1: 165. ♂.

ruficrus Bohart. Calif. at 5000-7000 ft. in central Sierra Mts.
Arigorytes ruficrus Bohart, 1971. Biol. Soc. Wash., Proc. 83: 446. ♂, ♀.

smohalla Pate. Idaho, Wash., Calif.
Arigorytes smohalla Pate, 1947. Canad. Ent. 79: 54. ♀, ♂.

Genus XEROGORYTES Bohart

Xerogorytes Bohart, 1976. *In* Bohart and Menke, Sphecid wasps of the world, p. 517.
Type-species: *Arigorytes anaetis* Pate. Orig. desig.

This is a monotypic genus occurring only in the southwestern United States. The biology is unknown.

anaetis (Pate). Ariz., southwest. N. Mex.
Arigorytes anaetis Pate, 1947. Canad. Ent. 79: 55. ♀.

Genus HOPLISOIDES Gribodo

Hoplisoides Gribodo, 1884. Ent. Soc. Ital., Bol. 16: 276.
Type-species: *Hoplisoides intricans* Gribodo. Monotypic.
Icuma Cameron, 1905. Entomologist 38: 21.
Type-species: *Icuma sericea* Cameron. Monotypic.

This large genus occurs in all of the major zoogeographic regions except the Australian. The species prefer to nest in sandy soil and make relatively short burrows ending in one or several cells. The recorded prey are all Homoptera belonging to the Membracidae, Cicadellidae or Fulgoridae; each species prefers prey of a single family usually.

carinatus Bohart. Ariz.; Mexico (Sonora).
Hoplisoides carinatus Bohart, 1968. Ent. Soc. Wash., Proc. 70: 287. ♂, ♀.

cazieri Bohart. South. Ariz.
Hoplisoides cazieri Bohart, 1968. Ent. Soc. Wash., Proc. 70: 288. ♂, ♀.

confertus (Fox). Western North America.
Gorytes confertus Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc. 47: 525. ♀, ♂.
Gorytes (Hoplisoides) imperialensis Bradley, 1920. Amer. Ent. Soc., Trans. 46: 117. ♂.

costalis costalis (Cresson). Alaska, U. S. east of 100th meridian. Ecology: Nests in sand, 1-2 cells per nest, 3-9 prey per cell. Parasite: *Amobia aurifrons* (Tns.); *Nysson hoplisivora* Roh.; *Notozus viridicyaneus* (Nort.). Prey: *Archasia galeata* (F.), *Ceresa bubalus* F., *C. palmeri* Van D., *Thelia bimaculata* F., *T.* sp., *Telamona monticola* F., *T. tristis* Fitch, *T. unicolor* Fitch, *Glossonota crataegi* Fitch, *Cyrtolobus arcuatus* Emm.?, *Vanduzea arcuata* (Say), *Platycotis vittata* F., *Campylenchia latipes* Say, *Stictocephala borealis* (Fairm.); only adults are used as prey.
Gorytes costalis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 225. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 151, figs. 39, 62 (larva).

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 19 (nest, prey). —Reinhard, 1925. Wash. Acad. Sci., Jour. 15: 172-177 (nest, prey transport, egg, life cycle, cocoon, parasite (misdet. as *Pachyophthalmus signatus* Meig.)). —Reinhard, 1929. The witchery of wasps, pp. 235-260, 3 figs. (nest, prey transport, life cycle, cocoon, parasite (misdet. as *Pachyophthalmus signatus* (Meig.)). —Krombein, 1953 (1952). Wasmann Jour. Biol. 10: 286 (nest, prey). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 196 (nest, prey, egg, life cycle). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 49-53, fig. 37 (nest, prey).

costalis pygidialis (Fox). Western U. S. in U. and L. Sonor. Zones; Mexico. Prey: *Ceresa* sp.
Gorytes pygidialis Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc. 47: 528. ♀, ♂.

Biology: Mickel, 1918 (1917). Nebr. Univ. Studies 17: 36 (prey).

dentatus (Fox). N. Mex., Ariz., Calif.
Gorytes dentatus Fox, 1893. Canad. Ent. 25: 116. ♂.

denticulatus denticulatus (Packard). Widely distributed in North America including Mexico. Ecology: Nests in sand. Prey: Deltocephalinae sp. nymph. Another subsp. occurs in Central and South America.
Gorytes denticulatus Packard, 1867. Ent. Soc. Phila., Proc. 6: 430. ♀.
Gorytes barbatulus Handlirsch, 1888. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 97: 408. ♂.

Biology: Krombein, 1959. Ent. Soc. Wash., Proc. 61: 196 (prey, nest).

diversus (Fox). Calif.
Gorytes diversus Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc. 47: 527. ♀, ♂.

floridicus Bohart. Fla.
Hoplisoides floridicus Bohart, 1968. Ent. Soc. Wash., Proc. 70: 289. ♂, ♀.

glabratus Bohart. Ariz., N. Mex., Colo., Tex. Ecology: Nests in sandy soil, stores as many as 98 prey per cell. Prey: *Aceratagallia uhleri* (Van D.), mostly nymphs and a few adults.
Hoplisoides glabratus Bohart, 1968. Ent. Soc. Wash., Proc. 70: 291. ♂, ♀.

Biology: Bohart and Menke, 1976. Sphecid wasps of world, p. 520 (nest, prey, egg).

hamatus (Handlirsch). Western North America. Ecology: Nests, sometimes gregariously, in soil varying from heavy clay-loam, to sandy clay to sand, makes 1 cell per nest, stores 7-14 prey per cell. Parasite: *Senotainia trilineata* (Wulp)?, *S. rubriventris* Macq.?; *Nysson rusticus* Cr.?, *Epinysson moestus* (Cr.), *E. pumilis* (Cr.)? Prey: *Stictocephala?* sp., Ceresini sp. probably *Stictocephala* sp., Telamonini sp., Membracidae sp.; preys upon nymphs only.
Gorytes hamatus Handlirsch, 1888. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 97: 403. ♂.
Gorytes spilographus Handlirsch, 1895. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 104: 895. ♀.
Hoplisoides arizonensis Baker, 1907. Invertebrata Pacifica 1: 164. ♀.
Gorytes (Hoplisoides) adornata Bradley, 1920. Amer. Ent. Soc., Trans. 46: 115. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 151-152, fig. 40 (larva).

Biology: Powell and Chemsak, 1959. Pan-Pacific Ent. 35: 195-201 (nest, prey transport, egg, parasites ?). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 46-49 (nest,

prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 494 (nest, prey, parasites). —Bohart and Menke, 1976. Sphecid wasps of world, p. 520 (parasite).

placidus birkmanni Baker. Southwestern U. S.
Hoplisoides Birkmanni Baker, 1907. Invertebrata Pacifica 1: 166. ♀.
Hoplisoides pruinosus Baker, 1907. Invertebrata Pacifica 1: 166. ♀.

placidus nebulosus (Packard). Eastern U. S. Ecology: Nests in sand, makes 1-3 cells per nest, stores 4-20 prey per cell. Parasite: *Senotainia trilineata* (Wulp)?; *Dasymutilla v. vesta* (Cr.)?; *Nysson opulentus* Gerst.?, *N. tuberculatus* Handl., *N. daeckei* Vier. Prey: *Microcentrus* spp., *Palonica virida* Ball, *P.* sp., *Ceresa palmeri* Van D.?, Ceresini spp., *Campylenchia latipes* Say, *Enchenopa binotata* Say, *Entylia concisa* Wlkr., *E. sinuata* F., *Publilia concava* Say, *Spissistilus festinus* Say, *Telamona decorata* Ball, *Tylopelta brevis* Van D., *Vanduzea arcuata* (Say), *V. triguttata* Burm.; both adults and nymphs are used.
Gorytes nebulosus Packard, 1867. Ent. Soc. Phila., Proc. 6: 424. ♀.
Gorytes armatus Provancher, 1887. Addit. Corr. Faune Ent. Canada Hym., p. 272. "♀" = ♂.
Gorytes microcephalus Handlirsch, 1888. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 97: 405. ♂.
Gorytes Pergandei Handlirsch, 1888. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 97: 407. ♂.
Philanthus Harringtonii Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 278.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 45, figs. 43, 44 (larva).

Biology: Pate, 1946. Brooklyn Ent. Soc., Bul. 41: 99 (prey). —Krombein, 1953. Wasmann Jour. Biol. 10: 286-287 (nest, prey carriage, parasites ?). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 196 (prey, nest). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 34-46, figs. 28-33, 35 (nest, prey, life cycle, cocoon, parasites). —Bohart and Menke, 1976. Sphecid wasps of world, p. 520 (nest, prey).

placidus placidus (Smith). Fla.
Gorytes placidus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 368. ♀, ♂.
Gorytes rufipes Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 369. ♀.

projectus Bohart. Calif. (San Joaquin Valley).
Hoplisoides projectus Bohart, 1968. Ent. Soc. Wash., Proc. 70: 290. ♂, ♀.

punctifrons (Cameron). Western U. S.; Mexico (Sinaloa).
Gorytes punctifrons Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 74, pl. 5, figs. 13, 13a. ♀.
Gorytes gulielmi Viereck, 1907. Amer. Ent. Soc., Trans. 33: 408. ♀.

semipunctatus (Taschenberg). Southern U. S.; Argentina. Probably adventive in U. S.
Hoplisus semipunctatus Taschenberg, 1875. Ztschr. Gesell. Naturwiss. Berlin 45: 367. ♀.

spilopterus (Handlirsch). Western U. S. Ecology: Nests in damp sand. Prey: *Stictocephala wickhami* Van D., *Spissistylus festinus* (Say), *Campylenchia latipes* (Say); preys upon adults and nymphs.
Gorytes spilopterus Handlirsch, 1888. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 97: 414. ♀.
Gorytes maculatus Provancher, 1895. Nat. Canad. 22: 140. ♀.
Gorytes (*Hoplisoides*) *pogonodes* Bradley, 1920. Amer. Ent. Soc., Trans. 46: 114. ♂.

Biology: Pate, 1946. Brooklyn Ent. Soc., Bul. 41: 99 (prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 55-56 (nest, prey).

splendidulus (Bradley). Western U. S.
Gorytes (*Hoplisoides*) *splendidula* Bradley, 1920. Amer. Ent. Soc., Trans. 46: 113. ♀, ♂.

tricolor (Cresson). Widely distributed in U. S.; Mexico (Sinaloa). Ecology: Nests in aggregations in sand, makes 2-4 cells per nest, stores 7-19 prey per cell. Parasite: *Nysson bellus* Cr.? Prey: *Parabolocratus brunneus* Ball, adult females and a few nymphs.
Gorytes tricolor Cresson, 1868. Amer. Ent. Soc., Trans. 1: 380. "♀" = ♂.
Gorytes (*Hoplisus*) *helianthi* Rohwer, 1911. U. S. Natl. Mus., Proc. 40: 569 ♀.
Hoplisus rufocaudatus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 401. ♂.

Biology: Evans, Lin and Yoshimoto, 1954. Ent. News 65: 5-11 (nest, prey transport, parasite ?).

Subfamily STIZINAE

All species nest in the ground.

Revision: Handlirsch, 1892. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 101: 25-181, 3 pls. (spp. of world). —Fox, 1896 (1895). Acad. Nat. Sci. Phila., Proc. 47: 266-268 (N. Amer. spp.). —Parker, 1929. U. S. Natl. Mus., Proc. 75 (5): 7-11, figs. 1-6 (N. Amer. genera).

Genus STIZUS Latreille

Stizus Latreille, 1802-1803. Hist. Nat. Crust. Ins., v. 3, p. 344.
Type-species: *Stizus ruficornis* Fabricius. Desig. by Blanchard, 1846 (=*Larra ruficornis* Fabricius).
Megastizus Patton, 1879. U. S. Geol. Geog. Survey, Bul. 5: 344.
Type-species: *Stizus brevipennis* Walsh. Orig. desig.
Stizolarra Saussure, 1887. Soc. Ent. 2: 9.
Type-species: *Sphex vespiformis* Fabricius. Desig. by Pate, 1937.
Megalostizus Schulz, 1906. Spolia Hym., p. 199. Emend.

This very large genus occurs in the Holarctic and Ethiopian Regions; it is also present in parts of the Oriental Region, though apparently absent from Southeast Asia. Several species have been reported to prey upon grasshoppers, katydids, and, rarely, mantids.

Revision: Dow, 1941. Psyche 48: 171-181, 7 figs. (N. Amer. spp.).

brevipennis Walsh. U. S. east of 100th meridian. Prey: *Conocephalus* sp. adult.
Stizus brevipennis Walsh, 1869. Amer. Ent. 1: 162. ♂.
Larra Brendeli Taschenberg, 1875. Ztschr. Gesam. Naturw. Halle 45: 361. ♂.

Biology: Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 198 (prey).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 19, figs. A-G (male genitalia).

iridis Dow. Utah, Calif. Ecology: Makes a unicellular cell in talus slope, stores at least 8 prey per cell. Prey: *Trimerotropis pallidipennis* (Burm.), *T. sparsa* (Thom.); adults.
Stizus iridis Dow, 1942 (1941). Psyche 48: 171. ♂.

occidentalis Parker. Calif., Ariz.
Stizus occidentalis Parker, 1929. U. S. Natl. Mus., Proc. 75 (5): 9. ♀, ♂.

texanus Cresson. Tex., Ariz.; Mexico (Chihuahua).
Stizus texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 222. ♀, ♂.

Genus STIZOIDES Guerin

Revision: Gillaspy, 1963. Mus. Compar. Zool., Bul. 128: 369-391, 1 pl. (N. Amer. spp.).

Genus STIZOIDES Subgenus STIZOIDES Guerin

Stizus subg. *Stizoides* Guerin, 1844. Iconogr. Regn. Anim. 7, Ins., p. 438.
Type-species: *Larra fasciata* Fabricius. Desig. by Parker, 1929.

The typical subgenus does not occur in North America.

Genus STIZOIDES Subgenus TACHYSTIZUS Pate

Tachystizus Pate, 1937. Amer. Ent. Soc., Mem. 9: 63.
Type-species: *Crabro tridentatus* Fabricius. Orig. desig.

Two species of this subgenus are known to be cleptoparasites of other sphecoid wasps.

foxi Gillaspy. Ariz.; Mexico (Baja California).
Stizoides (Tachystizus) foxi Gillaspy, 1963. Mus. Compar. Zool., Bul. 128: 378, figs. 1, 2, 5, 7, 9, 11. ♀, ♂.

renicinctus (Say). Mich., Wis., Ill. south to Tex., west to Alta., B. C. and Calif., D. C., N. C.; Mexico (Zacatecas). Host: *Prionyx atratus* (lep.), *P. thomae* (F.).
Stizus renicinctus Say, 1823. West. Quart. Rptr. 2: 77.
Stizus unicinctus Say, 1824. Amer. Ent. 1: 4. ♂. Emend.

Biology: Bradley, 1908. Ent. Soc. Amer., Ann. 1: 129 (sleeping aggregation). —Williams, 1914 (1913). Kans. Univ. Sci. Bul. 8: 230 (host). —Smith, 1915. U. S. Dept. Agr., Bul. 293: 10-11 (host). —Rau and Rau, 1918. Wasp studies afield, pp. 180-193 (host). —Evans, 1966. Compar. ethology and evolution of sand wasps, p. 129 (host).

Genus BEMBECINUS Costa

Bembecinus Costa, 1859. Fauna Regn. Napoli, Imen. Acul., Nyssonid., p. 4.
Type-species: *Bembecinus meridionalis* Costa. Monotypic.
Stizomorphus Costa, 1859. Fauna Regn. Napoli, Imen. Acul., Nyssonid., p. 7.
Type-species: *Vespa tridens* Fabricius. Monotypic.
Gorystizus Pate, 1937. Amer. Ent. Soc., Mem. 9: 29.
Type-species: *Vespa tridens* Fabricius. Orig. desig.
Lavia Rayment, 1953. Victorian Nat. 70: 123. Nom. nudum.

The genus occurs in all major zoogeographic regions and on many islands. Five species groups are recognized but the few North American taxa are all assigned to the Tridens Group. Many species nest in sandy soil in compact colonies, frequently made up of many individuals. All species whose biology is known prey upon leafhoppers and some other Homoptera, and practice progressive provisioning.

Revision: Krombein and Willink, 1951 (1950). Amer. Midland Nat. 44: 699-713 (N. Amer. spp.).

Biology: Evans, 1955. Behaviour 7: 295-302 (comparative behavior).

bishoppi Krombein and Willink. Tex.
Bembecinus bishoppi Krombein and Willink, 1951 (1950). Amer. Midland Nat. 44: 710. ♀, ♂.

moneduloides (Smith). Fla. (St. Johns Bluff).
Larra moneduloides Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 346. ♀, (♂ misdet.).

Taxonomy: Willink, 1957. Ann. and Mag. Nat. Hist. (12) 9: 702-704.

nanus floridanus Krombein and Willink. S. Fla.
Bembecinus nanus floridanus Krombein and Willink, 1951 (1950). Amer. Midland Nat. 44: 706. ♂.

nanus nanus (Handlirsch). N. J. to north. Fla., west to Tex., Iowa, east. Nebr. Prey: *Graphocephala versula* (Say), Fulgoridae spp.
Stizus nanus Handlirsch, 1892. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 101: 61. ♀, ♂.

Biology: Shappirio, 1946. Ent. News 57: 229-230 (prey).

nanus strenuus (Mickel). Nebr., S. Dak., Wyo., Tex.
Stizus strenuus Mickel, 1918 (1917). Nebr. Univ. Studies 17: 331. ♀, ♂.

neglectus (Cresson). Nebr., Kans., Tex., La., Miss. Ecology: Colony nests in hard-packed sand containing pebbles, makes 1-2 cells per nest, stores 10-15 prey per cell, practices progressive provisioning. Prey: *Gyponana octolineata* (Say), *Texananus excultus* (Uhl.), *Xerophloea majesta* Laws., all adults; *Scolops* sp. nymphs; preys principally upon adult Cicadellidae.
Monedula neglecta Cresson, 1872. Amer. Ent. Soc., Trans. 4: 222. ♀.
Stizus xanthochrous Handlirsch, 1892. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 101: 69. ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 47, figs. 37-42 (larva).

Biology: Evans, 1955. Behaviour 7: 287-295, 4 figs. (mating, nest, prey, egg, cocoon, life cycle).

quinquespinosus (Say). Nebr., Colo. and south. Calif. to Panama. Ecology: Nests in large colonies in sand, makes unicellular nest. Prey: *Ciminius hartii* (Ball), *Stirellus bicolor* (Van D.), *Exitianus* sp., *Cuerna lateralis* (F.), *C.* sp., *Draeculacephala noveboracensis* (Fitch), *Carneocephala sagittifera* (Uhl.), *Acinopterus angulatus* Laws., Cicadellidae sp.; adults and a few nymphs.

Nysson 5-spinosus Say, 1823. West. Quart. Rptr. 2: 78.
Stizus godmani Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, pl. 5, fig. 8. ♀, ♂.
Stizus lineatus Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 102. ♂.
Stizus flavus Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 103. ♂.
Stizus flavus var. *subalpinus* Cockerell, 1898. Davenport Acad. Nat. Sci., Proc. 7: 142. ♂.
Nysson cressoni Cameron, 1904. Amer. Ent. Soc., Trans. 30: 95. ♀.

Taxonomy: Willink, 1957. Ann. and Mag. Nat. Hist. (12) 9: 702-704. —Evans, 1959. Amer. Ent. Soc., Trans. 85: 152-153, figs. 71-73 (larva).

Biology: Rohwer, 1909. Colo. Univ. Studies 6: 246-247 (colony; prey misdet.). —Rodeck, 1931. Colo.-Wyo. Acad. Sci., Jour. 1: 61 (prey, nest). —Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 312-313 (nest, prey transport). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 134-141, fig. 76 (nest, prey). —Evans, 1968. Ent. Soc. Amer., Ann. 61: 1344 (prey).

wheeleri Krombein and Willink. Ariz.
Bembecinus wheeleri Krombein and Willink, 1951 (1950). Amer. Midland Nat. 44: 709. ♀, ♂.

Subfamily BEMBICINAE

All species nest in the ground, usually in quite friable soil. The more primitive species are solitary nesters, practice mass provisioning and prey upon Hemimetabola, whereas the more specialized species nest in large aggregations, have developed progressive provisioning behavior independently in some genera and prey largely upon advanced Holometabola.

This subfamily has undergone considerable evolution in the New World where a number of genera occur. *Bembix* is the only genus of worldwide distribution and it occurs in all major zoogeographic regions.

Revision: Parker, 1917. U. S. Natl. Mus., Proc. 52: 1-155. —Parker, 1929. U. S. Natl. Mus. Proc. 75 (5): 11-181.

Taxonomy: Bohart and Horning, 1971. Calif. Ins. Survey, Bul. 13: 1-49, 74 figs., 18 maps (Calif. spp.).

Genus BICYRTES Lepeletier

Bicyrtes Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 53.
Type-species: *Bicyrtes Servillii* Lepeletier. Monotypic.
Bembidula Burmeister, 1874. Acad. Nac. Cien. Cordoba, Bol. 1: 122.
Type-species: *Monedula discisa* Taschenberg. Desig. by Parker, 1917.
Dumonela Reed, 1894. Univ. Chile, An. 85: 608.
Type-species: *Monedula sericea* Spinola. Orig. desig.

Wasps of this genus make uni- or multicellular nests, usually in fine- to coarse-grained sand. They prey upon Heteroptera, chiefly Pentatomidae and Coreidae, although Pyrrhocoridae, Scutelleridae, Cydnidae, Lygaeidae and Reduviidae may be used occasionally; nymphs are preferred to adults. The egg is laid on the first bug placed in the cell.

affinis (Cameron). South. Ariz.; Mexico (Guerrero).
Bembidula affinis Cameron, 1897. Ann. and Mag. Nat. Hist. (6) 19: 371. ♀.

capnoptera (Handlirsch). Ga., Fla., La., Tex., Kans., N. Mex., Ariz., Calif.; Mexico (Baja California). Ecology: Nests in soil, stores 5-7 prey per cell. Prey: *Thyanta pallidovirens accerra* (McAtee) nymphs and adults.

Bembidula capnoptera Handlirsch, 1889. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 98: 497. ♂, ♀.
Bembidula capnoptera var. *mesillensis* Cockerell, 1898. Davenport Acad. Nat. Sci., Proc. 7: 142. ♂.

Bicyrtes annulata Parker, 1917. U. S. Natl. Mus., Proc. 52: 67. ♂, ♀.
Bicyrtes tristis Fox, 1923. Calif. Acad. Sci., Proc. (4) 12: 435. ♂.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 157-158, fig. 5 (sleeping aggregation). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 171-172 (nest, prey).

fodiens (Handlirsch). Southeast. to southwest. U. S.; Mexico, Central America. Ecology: Nests in fine sand or sandy clay, makes 4-5 cells per completed nest and stores 10-23 prey per cell. Parasite: *Metopia argyrocephala* (Meig.); *Holopyga ventralis* (Say). Prey: *Solubea pugnax* F. adults, *Mormidea lugens* (F.) adults; *Homaemus aeneifrons* Say nymphs.
Bembidula fodiens Handlirsch, 1889. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 98: 499. ♂, ♀.
Bembidula Burmeisteri Handlirsch, 1889. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 98: 500. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 50, figs. 53-55 (larva).

Biology: Rau, 1922. St. Louis Acad. Sci., Trans. 24 (7): 28 (nest). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 167-170, 173 (nest, prey transport, egg, cocoon, life cycle, parasites).

insidiatrix (Handlirsch). Mass., N. J., Fla., Ky., Tex., N. Mex.
Bembidula insidiatrix Handlirsch, 1889. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 98: 494. ♂, ♀.

quadrifasciata (Say). U. S. east of Rocky Mts. in Transit. and Austr. Zones. Ecology: Nests in sand or heavier soil, usually makes a unicellular nest but occasionally one with 2-3 cells, stores 4-14 prey per cell. Parasite: *Senotainia rubriventris* Macq., *S. trilineata* (Wulp), *S. vigilans* Allen, *S.* sp.; *Holopyga ventralis* (Say). Prey: *Aplomerus* sp., *Zelus* sp.; Lygaeidae sp.; *Acanthocephala femorata* (F.), *Anasa tristis* (DeG.), *Archimerus alternatus* (Say), *A. calcarator* (F.), *Chariestrus antennator* (F.), *Leptoglossus clypealis* Heid., *L. oppositus* Say, *L. phyllopus* (L.); *Acrosternum hilare* (Say), *A.* sp., *Banasa dimidiata* (Say), *Brochymena arborea* Say, *B. cariosa* Stal, *B. carolinensis* Westw., *B. quadripustulata* (F.), *Chlorochroa uhleri* Stal, *Dendrocoris humeralis* Uhl., *Edessa florida* Barb., *Euschistus tristigmus* Say, *E.* spp., *Menecles incertus* Say, *Murgantia histrionica* Hahn, *Nezara viridula* (L.), *N.* sp., *Podisus* sp., *Stethaulax marmoratus* Say, *Thyanta custator* F., *T.* sp.; *Homaemus aeneifrons* Say, *Tetyra bipunctata* H.-S.; *Cyrtomenus* sp.; Pentatomidae and Coreidae are preferred prey and only nymphs are used.
Monedula quadrifasciata Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, app., p. 336. ♂, ♀.
Monedula sallei Guerin, 1844. Iconogr. Regne Anim., v. 7, p. 437.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 49, figs. 45-52 (larva). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 265 (larva).

Biology: Hartman, 1905. Tex. Univ., Bul. 65: 32-36, fig. 14 (nest, prey, parasites). —Parker, 1917. U. S. Natl. Mus., Proc. 52: 134 (nest, prey). —Rau and Rau, 1918. Wasp studies afield, pp. 41-43 (nest, prey). —Smith, 1923. Ent. Soc. Amer., Ann. 16: 238-246 (nest, prey, parasite). —Davis, 1926. N. Y. Ent. Soc., Jour. 34: 89-90 (nest, prey). —Rau, 1934. Canad. Ent. 66: 260 (prey transport). —Krombein, 1953 (1952). Wasmann Jour. Biol. 10: 287-288 (nest, prey). —Krombein, 1955. Ent. Soc. Wash., Proc. 57: 152-157, 4 figs. (nest, prey transport, egg, cocoon, life cycle, parasite). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 105-106 (nest, prey). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 196 (nest, prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 146-160, figs. 80-90 (nest, mating, prey transport, life cycle, egg, cocoon, parasites). —Kurczewski and Kurczewski, 1971. Kans. Ent. Soc., Jour. 44: 336 (prey).

variegata (Olivier). Tex.; Mexico to Argentina, West Indies.
Bembex variegata Olivier, 1789. Encycl. Meth., Ins., v. 4, p. 292.
Monedula sericea Spinola, 1851. *In* Gay, Hist. Fis. Pol. Chile, Zool., v. 6, p. 315.
Bembex guiana Cameron, 1912. Timehri (3) 2: 431. ♀.

ventralis (Say). South. Canada, U. S.; north. Mexico. Ecology: Nests in sand or sandy gravel, sometimes in small aggregations, usually makes a unicellular cell but occasionally one with 2-3 cells, stores 3-18 prey per cell. Parasite: *Senotainia vigilans* Allen, *S. trilineata* (Wulp). Prey: Anasa *tristis* (DeG.); *Banasa dimidiata* Say, *Cosmopepla bimaculata* Thom., *Elasmostethus cruciatus* Say, *Euschistus euschistoides* Voll., *E. tristigmus* Say, *E. variolarius* Beauv., *Menecles incertus* Say, *Mormidia lugens* F., *Thyanta pallidovirens accerra* McAtee, *Trichopepla semivittata* Say; only nymphs are used and Pentatomidae are the preferred prey.
Monedula ventralis Say, 1824. *In* Keating, Narr. Long's 2nd Exped. v. 2, app., p. 337. ♂.
Bicyrtes Servillii Lepeletier, 1845. Hist. Nat. Ins., Hym., v. 3, p. 53. ♀.
Monedula parata Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 416. ♀.
Bembidula meliloti Rohwer, 1908. Ent. News 19: 376. ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 50, figs. 56-58 (larva).

Biology: Hartman, 1905. Tex. Univ., Bul. 65: 36-39 (nest, prey). —Parker, 1917. U. S. Natl. Mus., Proc. 52: 132-133 (nest, prey, life cycle). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 160-167, figs. 91-93 (nest, prey transport, egg, life cycle).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 19, figs. I-L (male genitalia).

viduata (Handlirsch). Utah, Ariz., Tex.; north. Mexico. Ecology: Nests in coarse gravel. Prey: Coreidae nymphs.
Bembidula viduata Handlirsch, 1889. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 98: 491. ♀.
Bicyrtes gracilis Parker, 1917. U. S. Natl. Mus., Proc. 52: 68. ♂.

Biology: Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 160 (nest, prey).

Genus MICROBEMBEX Patton

Microbembex Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 364.
Type-species: *Bembex monodonta* Say. Orig. desig.

The North American species are scavengers, bringing in as food for their larvae a wide variety of dead arthropods. Two South American species have been reported as paralyzing live beetles and other insects, but these observations need confirmation. The egg is laid in the empty cell and progressive provisioning is practiced.

argyropleura Bohart. South. Calif., Ariz., Nev., Utah; Mexico (Baja California). Ecology: Nests in dense aggregations in sand dune blowouts, lays egg in empty cell, practices progressive provisioning. Parasite: *Senotainia* sp. near *rufiventris* (Coq.)? Prey: Dead arthropods including Diptera, Hymenoptera, Coleoptera, Heteroptera, Araneae.
Microbembex argyropleura Bohart, 1970. Pan-Pacific Ent. 46: 203. ♂, ♀.

Biology: Alcock, 1975. Southwest. Nat. 20: 337-339, figs. 1, 2 (nest, prey, parasite).

aurata Parker. West. Tex. to south. Calif.
Microbembex aurata Parker, 1917. U. S. Natl. Mus., Proc. 52: 121. ♂, ♀.

Taxonomy: Gillaspy, 1963. Proc. Ent. Soc. Wash. 65: 230.

californica Bohart. Cent. Calif. to Wyo., Utah and N. Mex.; Mexico (Baja California). Prey: Dead arthropods.
Microbembex californica Bohart, 1970. Pan-Pacific Ent. 46: 202. ♂, ♀.

Biology: Goodman, 1970. Pan-Pacific Ent. 46: 207-209 (nest, "prey").

hirsuta Parker. N. Mex., Tex.
Microbembex hirsuta Parker, 1917. U. S. Natl. Mus., Proc. 52: 122. ♂, ♀.

monodonta (Say). South. Canada and U. S. east of Rocky Mts.; Mexico, Central America. Ecology: Nests in large aggregations in loose dry to moist firm sand, makes a unicellular nest, places egg upright in empty cell, practices progressive provisioning. Parasite: *Senotainia trilineata* (Wulp), *S. rufiventris* (Coq.)?; *Exoprosopa fascipennis* (Say); *Dasymutilla bioculata* (Cr.), *D.* sp.; *Parnopes f. fulvicornis* Cam.?, *P. f. atlanticus* Krom.? Prey: Dead arthropods belonging to Phalangida, Araneida, Ephemeroptera,

Orthoptera, Psocoptera, Hemiptera, Neuroptera, Trichoptera, Lepidoptera, Coleoptera, Diptera, Hymenoptera; live paralyzed prey of other wasps may be stolen. Predator: Small red ants.

Bembex monodonta Say, 1824. *In* Keating, Narr. Long's 2nd. Exped., v. 2, app., p. 335. ♂.
Microbembex monodonta occidentalis Johnson and Rohwer, 1908. Ent. News 19: 375.
Microbembex tarsalis Rohwer, 1914. U. S. Natl. Mus., Proc. 47: 516. ♂, ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 55, figs. 79-84 (larva). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 266 (larva).

Biology: Hartman, 1905. Tex. Univ., Bul. 65: 21-26 (nest, prey). —Parker, 1917. U. S. Natl. Mus., Proc. 52: 134-141 (mating, nest, prey, life cycle, cocoon, parasite, predator). —Stoehr, 1917. Nat. Canad. 43: 113-119 (mating, nest, prey). —Rau and Rau, 1918. Wasp studies afield, pp. 39-41, fig. 7 (nest, prey). —Mickel, 1924. Ent. News 35: 236-242 (parasite). —Krombein, 1953 (1952). Wasmann Jour. Biol. 10: 288 (prey, life cycle). —Krombein, 1958. Amer. Ent. Soc., Trans. 84: 166 (parasite ?). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 361-388, figs. 177-190 (sleeping burrows, nest, prey, egg, life cycle, parasites ?).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 19, figs. H, Q, R, pl. 20, figs. A, B (male genitalia).

nigrifrons (Provancher). U. S. and Mexico west of 100th meridian. Ecology: Nests in sand. Parasite: *Dasymutilla cassandra* Mick., *D. gloriosa* (Sauss.); *Parnopes f. fulvicornis* Cam. Prey: Many kinds of dead arthropods.

Bembex nigrifrons Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 415. ♂, ♀.
Microbembex monodonta neomexicana Johnson and Rohwer, 1908. Ent. News 19: 375.
Microbembex monodonta deltaensis Johnson and Rohwer, 1908. Ent. News 19: 375. ♂.

Biology: Bohart and MacSwain, 1940. Pan-Pacific Ent. 16: 92-93 (parasite; misdet. as *aurata* Prkr.). —Alcock and Ryan, 1973. Pan-Pacific Ent. 49: 144-148, 1 fig. (prey, mating behavior). —Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 161-162 (nesting behavior).

rufiventris Bohart. Calif.

Microbembex rufiventris Bohart, 1970. Pan-Pacific Ent. 46: 204. ♂, ♀.

Genus STICTIA Illiger

Monedula Latreille, 1802-1803. Hist. Nat. Crust. Ins., v. 3, p. 345. Preocc.
Type-species: *Vespa signata* Linnaeus. Desig. by Latreille, 1810.
Stictia Illiger, 1807. *In* Rossi, Fauna Etrusca, Ed. 2, v. 2, p. 131. N. name for *Monedula* Latreille.

These wasps occur only in the New World where most species are restricted to the tropical areas. They occasionally nest in large aggregations in sandy soil. The nest is unicellular. They practice progressive provisioning and prefer horseflies (Tabanidae) as prey. The egg is placed in the empty cell in *carolina* (F.) and on the first fly brought into the cell in our other species.

carolina (Fabricius). N. J. and Pa. south to Fla., west to Ill., Kans., and N. Mex. Ecology: Occasionally nests in very large aggregations in sand; the egg is placed in the empty cell; as many as 63 prey may be supplied. Parasite: *Senotainia trilineata* (Wulp), Miltogrammini spp.; *Dohrniphora cornuta* (Big.). Prey: *Psorophora ciliata* (F.); *Chrysops dimmocki* Hine, *Chlorotabanus crepuscularis* Beq., *Hybomitra hinei wrighti* Whit., *Tabanus abdominalis* F., *T. americanus* Forst., *T. atratus* F., *T. a.* var. *nantuckensis* Hine, *T. bishoppi* Stone, *T. cheliopterus* Rond., *T. coarctatus* Stone, *T. endymion* O. S., *T. fumipennis* Wied., *T. i. imitans* Wlkr., *T. lineola* F., *T. melanocerus lacustris* Stone, *T. mularis* Stone, *T. nigripes* Wied., *T. nigrescens* Beauv., *T. petiolatus* Hine, *T. sparus* Whit., *T. stygius* Say, *T. sulcifrons* Macq., *T. trijunctus* Wlkr., *T. vittiger schwardti* Phil., *T.* spp.; *Odontomyia cincta* Oliv.; *Volucella mexicana* Macq., *V. nigra* Greene; *Graphomya maculata* Scop., *Musca domestica* L., *Orthellia caesarion* Meig., *Stomoxys calcitrans* L.; *Amobia erythrura* (Wulp), *Sarcophaga bullata* Prkr., *S. ochracea* Ald., *S. sarracenioides* Ald., *S.* spp.; *Calliphora vomitoria* L., *Cochliomyia*

macellaria F.; Tachinidae spp.; *Melampsalta calliope* (Wlkr.); *Atalopedes campestris* Boisd.; the last two prey species (cicada and skipper) were stored only in a large aggregation where there was considerable competition for prey. Predator: *Solenopsis geminata* F. This wasp is commonly called the "horse guard" because it preys so commonly on horseflies.

Bembex carolina Fabricius, 1793. Ent. System., v. 2, p. 249.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 53, figs. 72-78 (larva). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 268, fig. 55 (larva).

Biology: Bryant, 1870. Amer. Ent. 2: 87 (prey capture). —Ashmead, 1894. Psyche 7: 61 (prey capture). —Hartman, 1905. Tex. Univ., Bul. 65: 27-29, figs. 7, 15 (nest, prey capture, egg, life cycle, cocoon). —Hine, 1906. La. State Crop Pest Comn. Cir. 6: 20-27 (nest, prey). —Hine, 1907. La. Agr. Expt. Sta., Bul. 93: 13-15 (nest, prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 106-107 (nest, prey, parasite). —Krombein, 1959. Ent. Soc. Wash., Proc. 61: 196-197 (nest, prey, life cycle, cocoon). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 223-243, figs. 119-133 (mating, nest, egg, prey capture and transport, life cycle, parasites). —Lin, 1971. Tex. Jour. Sci. 23: 275-283, 3 figs. (mating, nest, egg, prey, life cycle, cocoon).

signata signata (Linnaeus). South. Fla., south. Calif.; West Indies, tropical Mexico, Central and South America. Ecology: Nests in large aggregations in sand along coasts and rivers; the egg is placed on the first fly brought into the cell. Parasite: *Villa* sp.? Prey: *Tabanus truquii* Bell., *T.* sp., *Diachlorus curvipes* (F.), *Lepiselaga crassipes* F., *Chrysops costatus* F.; *Hedriodiscus dorsalis* (F.); *Allograpta* sp., *Eristalis* sp., *Volucella* sp.; *Musca domestica* L., *Morellia scapulata* (Big.); *Cochliomyia macellaria* (F.), *Phaenicia cluvia* (Wlkr.); *Sitophaga* sp., Tachinidae sp.; *Sarcophaga* spp.; Tabanidae are the preferred prey. Another subsp. occurs in Peru.

Vespa signata Linnaeus, 1758. Syst. Nat., Ed. 10, v. 1, p. 574.

Apis vespiformis DeGeer, 1773. Mem. Hist. Ins., v. 3, p. 570, pl. 28, figs. 3, 4.

Monedula insularis Dahlbom, 1845. Hym. Europaea, v. 1, pp. 186, 494. ♀.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 243-247 (nest, prey, egg, scavengers).

vivida (Handlirsch). Tex. (Cameron Co.); Mexico (Tamaulipas, Veracruz, Yucatan). Ecology: Nests in hard-packed beach sand in small aggregations; the egg is placed on the first fly brought into the cell. Parasite: Miltogrammini sp. Prey: *Tabanus texanus* Hine, *T. s. schwardti* Phil., *T. vittiger guatemalensis* Hine, *T.* spp., *Leucotabanus itzarum* Beq.; *Cochliomyia macellaria* (F.); *Sarcophaga effrenata* Wlkr.

Monedula vivida Handlirsch, 1890. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 99: 101. ♀.

Taxonomy: Evans, 1957. Ent. News 68: 77. ♂. —Evans, 1959. Amer. Ent. Soc., Trans. 85: 153 (larva). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 268-269 (larva).

Biology: Evans, 1957. Ent. News 68: 76-77 (nest, prey transport). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 247-252, figs. 134-137 (male territoriality, nest, prey, egg, parasite).

Genus BEMBIX Fabricius

Bembix Fabricius, 1775. Systema Ent., Char. Gen., p. xxiii. No species.
Type-species: *Bembex rostrata* of Fabricius. Desig. by Latreille, 1810.

Bembyx Fabricius, 1775. Systema Ent., p. 361. Lapsus.

Bembex Fabricius, 1776. Gen. Ins., p. 122. Emend.

Apobembex Pate, 1937. Amer. Ent. Soc., Mem. 9: 9.
Type-species: *Bembex oculata* of Latreille. Orig. desig.

Epibembex Pate, 1937. Amer. Ent. Soc., Mem. 9: 26.
Type-species: *Apis rostrata* Linnaeus. Orig. desig.

This large genus occurs in all major zoogeographic regions and is the only representative of the subfamily in the Old World. These wasps nest in a variety of soils ranging from loose sand subject to blowing to hard-packed soil, and almost all species practice progressive provisioning.

The more primitive species lay the egg on the first prey brought into the cell and the most advanced species place the egg in the empty cell. The nest may have a simple unicellular structure or it may contain up to 5 cells; accessory burrows are made by some of the more advanced species.

Taxonomy: Evans and Matthews, 1968. Ent. Soc. Amer., Ann. 61: 1284-1299, 26 figs. (synopsis of N. Amer. spp., keys, characters of species groups).

Biology: Evans, 1957. Studies on compar. ethology *Bembix*, 248 pp., 52 figs., 29 tables.

Species Group Belfragei

These primitive species nest in a variety of soil types, make multicellular nests, and place the egg on the first fly brought into the cell.

belfragei Cresson. South cent. U. S. Ecology: Nests in large aggregations in coarse to fine sand, makes a 2-celled nest with each cell at the end of a branch off the main burrow, each with an accessory branch, provides 20-28 prey per cell. Parasite: *Senotainia* sp. in *trilineata* (Wulp) complex; *Dasymutilla pyrrhus* (Fox)? Prey: Tabanidae spp.; *Systoechus vulgaris* Lw.; *Eristalis agrorum* F., *E. latifrons* Lw., *E. tenax* L., *Volucella fasciata* Macq.; *Orthellia caesarion* Meig., *Stomozys calcitrans* L.; *Cochliomyia macellaria* (F.), *Phaenicia caeruleiviridis* Macq., *Phormia regina* Meig.; *Sarcophaga bullata* Prkr., *S. cimbicis* Tns., *S. therminieri* R.-Desv., *S. prohibita* Ald., *S. querula* Wlkr., *S. uncata* Wulp, *S. ventricosa* Wulp, *S.* spp.; *Acroglossa hesperidarum* Will., *Archytas apicifera* Wlkr., *A. aterrima* R.-Desv., *Belvosia semiflava* Ald., *Biomya neomexicana* Tns.?, *Bonnetia comta* Fall., *Ceracia dentata* Coq., *Copecrypta nitens* Wied., *Euphorocera floridensis* Tns., *Gonia sequax* Will., *Microphthalma disjuncta* Wied., *Peleteria* sp., *Phorocera claripennis* Macq., *Prosenoides* sp., *Sturmia* sp., *Winthemia quadripustulata* F., Tachinidae sp.

Bembex(!) *Belfragei* Cresson, 1873. Amer. Ent. Soc., Trans. 4: 220. ♂.

Bembex(!) *cressonis* Handlirsch, 1893. Akad. Wiss. Wien, Math.-Nat. Kl, Sitzber. 102: 792. ♂, ♀.

Bembex(!) *insignis* Handlirsch, 1893. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 102: 793. ♂, ♀.

Bembix cressonii Dalla Torre, 1897. Cat. Hym., v. 8, p. 503. Lapsus.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 61, figs. 98-101 (larva).

Biology: Evans, 1957. Studies on compar. ethology *Bembix*, pp. 59-78, figs. 13-18 (mating, nest, prey, egg, life cycle). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 315-317, fig. 161 (nest, prey, parasite).

frommeri Bohart. Calif. (Inyo Co.).

Bembix frommeri Bohart, 1970. Pan-Pacific Ent. 46: 201. ♂.

gillaspyi Evans and Matthews. South. Calif. deserts.

Bembix gillaspyi Evans and Matthews, 1968. Ent. Soc. Amer., Ann. 61: 1290, figs. 8-9. ♂, ♀.

rugosa Parker. Ariz.

Bembix rugosa Parker, 1917. U. S. Natl. Mus., Proc. 52: 95. ♀.

stenobdoma Parker. West. Tex. to south. Calif.

Bembix stenebdoma(!) Parker, 1917. U. S. Natl. Mus., Proc. 52: 79. In key.

Bembix stenobdoma Parker, 1917. U. S. Natl. Mus., Proc. 52: 94. ♂.

U-scripta Fox. Tex. to south. Calif.; Mexico, Guerrero and Morelos to Baja California. Ecology: Nests occasionally in large aggregations in soil varying from loose sand to coarse, compact sandy gravel, makes 2-5 cells per nest, places egg on first prey brought into nest, hunts prey and stores nest only at dusk, provides up to 40 prey per cell. Prey: *Hermetia aurata* Bell; *Tabanus texanus* Hine; *Chromolepida pruinosa* (Coq.); *Apiocera haruspex* O. S.; *Efferia* sp., *Erax cressoni* Hine, *E. tuberculatus* Coq., *Psilocurus nudisculus* Lw., *P. modestus* Will., *P. puellus* Brom., *Saropogon* sp., *Stenopogon ebyi* Brom., Asilidae spp.; *Aphoebantus* sp. near *hirsutus* Coq., *A.* spp., *Desmatoneura argentifrons* Will., *Lordotus g. gibbus* Lw., *L. g. striatus* Paint., *Phthiria sulphurea* Lw., *P.* sp., *Poecilanthrax lucifera* F., *Villa flavipilosa* Cole, *V. parvicornis* Lw., *V.*

salebrosus Paint., *V.* sp.; *Volucella fraudulenta* Will., *V. mexicana* Macq., *V. unipuncta* Curr., *V.* spp., *Syrphidae* spp.; *Acrosticta mexicana* Cole, *A.* sp.; *Limnophora* sp., *Mydaea* sp., *Phyllogaster cordyluroides* Stein; *Sarcophaga johnsoni* Ald., *S.* spp., *Senotainia kansensis* Tns.; *Archytas marmoratus* Tns., *Chaetogaedia* sp. near *analis* Wulp, *Goniochaeta plagioides* Tns., *Olenochaeta kansensis* Tns., *Phorocera tachinomoides* Tns., *P.* sp., *Promasiphya confusa* Ald., *Ptilodexia* sp., *Tachinophyto* sp. near *vanderwulpi* Tns., *Xenoppia monela* Reinh.

Bembix dentilabris Handlirsch, 1893. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 102: 794. ♀. A nomen oblitum.

Bembex(!) *U-scripta* Fox, 1895. Acad. Nat. Sci. Phila., Proc., p. 362. ♂, ♀. The valid name for this taxon chosen by the first revisers.

Bembix arcuata Parker, 1917. U. S. Natl. Mus., Proc. 52: 81. ♂, ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 155, figs. 41, 63 (larva). —Evans, 1961 (1960). Psyche 67: 45-61 (possible syn. of *arcuata*).

Biology: Evans, 1957. Studies on compar. ethology *Bembix*, pp. 104-108, figs. 27-28 (nest, prey). —Evans, 1961 (1960). Psyche 67: 45-61, 2 figs. (male sun dance, mating, nest, prey, egg, life cycle). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 317-321, figs. 162-164 (nest, prey).

Species Group Amoena

Members of this group make simple nests with one or more accessory (false) burrows, place the egg on the first prey brought into the cell, and do not level the mound of excavated earth at the nest entrance.

amoena Handlirsch. West. Canada and U. S. Ecology: Nests in colonies in soil varying from sandy loam to coarse sandy gravel, makes 1- or 2-celled nest provided with 1-2 accessory burrows, probably stores more than 30 large prey per cell. Parasite: *Dasymutilla creusa* var. *bellona* (Cr.); *Parnopes edwardsii* Cr. ?; *Physocephala texana* Will. ?; Miltogrammini sp.; *Exoprosopa dorcadion* O. S., *Villa melasoma* (Wulp). Prey: *Anoplodonta nigrirostris* Lw., *Hedriodiscus varipes* Lw.; *Hybomitra captonis* Mart., *H. fulvilateralis* Macq., *H. liorhina* Phil., *H. opaca* Coq., *H. osburni* Hine, *H. phaenops* O. S.; *Poecilanthrax sackeni* Coq., *Systoechus fumipennis* Paint., *Villa alternata* Say, *V. eumenes* (O. S.), *V. fulviana nigricauda* Lw., *V. harveyi* Hine, *V. lateralis* Say, *V. sinuosa jaennickeana* O. S.; *Thereva* sp.; *Asilus* sp., *Cyrtopogon glarealis* Mel., *Promachus* sp.; *Chrysotoxum ypsilon* Will., *Eristalis anthophorinus* Fall., *E. barda* Say, *E. latifrons* Lw., *Eupeodes volucris* O. S., *Helophilus hybridus* Lw., *Metasyrphus lapponicus* Zett., *M. meadii* Jones, *Scaeva pyrastri* L., *Stenosyrphus pullulus* Snow, *Syrphus jonesi* Fluke, *S. opinator* O. S., *S. ribesii* L., *S. vitripennis* Meig., *Volucella esuriens* (F.); *Tetanocera vicina* Meig.; *Helina punctata* R.-Desv., *Limnophora magnipunctata* Mall., *Lispe brevipes* Ald., *Mydaea persimilis* Mall., *Phaonia monticola* Mall., *Pyrellia cyanicolor* Zett.; *Calliphora vicina* R.-Desv., *C. vomitoria* L., *Cynomyopsis cadaverina* R.-Desv., *Eucalliphora lilaea* Wlkr., *Lucilia illustris* Meig., *Melanodexiopsis* sp., *Phormia regina* Meig., *Protophormia terraenovae* R.-Desv.; *Sarcofahrtia montanensis* Prkr., *Sarcophaga* spp., *Macronychia* sp.; *Acroglossa hesperidarum* Will., *Arctophyto* sp., *Argenteopalpus signiferus* Wlkr., *Bonellimyia subpolita* Brks., *Eumegaparia flaveola* Coq., *Fabriciella brevirostris* Tot., *F. rostrata* Tot., *Gonia porca* Will., *G.* spp., *Melanodexia* sp., *Melinocera flavicornis* Br., *Mericia alberta* Curr., *M. ampela* Wlkr., *M. arcuata* Tot., *M. bicarina* Tot., *Microphthalma disjuncta* Wied., *Paramuscopteryx* sp., *Peleteria iterans* Wlkr., *P. neotexensis* Brks., *Ptilodexia* sp., *Rhachogaster algens* Wied., *Siphosturmiopsis* sp., *Spallanzania* sp., *Trochilodes skinneri* Coq.

Bembex(!) *amoena* Handlirsch, 1893. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 102: 769. ♂, ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 270-271, fig. 53 (larva).

Biology: Evans, 1957. Studies on compar. ethology *Bembix*, p. 59 (nesting site, prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 269-288, figs. 149-154 (mating, nest, prey, egg, life cycle, parasite).

sayi Cresson. Gulf Coast, Miss. Valley, and Great Plains States west to Colo. and N. Mex.; north. Mexico. Ecology: Nests in small numbers (3-10) in loose to compacted sand, makes a 1-3 celled nest with an accessory burrow, stores 14 or more flies per cell. Parasite: *Amobiopsis confundens* Tns., *Senotainia rubriventris* Macq., *S. opiparis* Reinh., *S.* sp. in *trilineata* (Wulp) complex. Prey: Stratiomyidae sp.; *Chlorotabanus crepuscularis* Beq., *Chrysops flavida* Wied., *C.* spp., *Hybomitra hinei wrighti* Whit., *Silvius quadrivittatus* Say, *Tabanus cheliopterus fronto* O. S., *T. fratellus* Will., *T. lineola* F., *T. melanocerus lacustris* Stone, *T. nigripes* Wied., *T. quinquevittatus* Wied.; *Exoprosopa fasciata* Macq., *E. fascipennis noctula* Wied., *Geron* sp., *Phthiria* sp., *Poecilanthrax lucifer* F., *Systoechus solitus* Wlkr., *S. vulgaris* Lw., *Villa cypris* Meig., *V. flavicostalis* Paint., *V. lateralis* Say, *V. molitor* Lw.; *Furcifera punctipennis* Wied.; *Ablautus nigronotum* Wilcox, *Erax tabascens* Bks., *E.* sp., *Mallophorina laphroides* Wied., Asilidae sp.; *Allograpta obliqua* Say, *Eristalis agrorum* F., *E. albifrons* Wied., *E. tenax* L., *Microdon rufipes* Macq., *Syrphus* sp., *Volucella pusilla* Macq., *V.* sp.; *Musca domestica* L., *Orthellia caesarion* Meig.; *Phaenicia caeruleiviridis* Macq.; *Sarcophaga ventricosa* Wulp; *Archytas analis* F., *Belvosia slossonae* Coq., *Fabriciella actinosa* Reinh., *F. egula* Reinh., *F. latigena* Tot., *Gonia sequax* Will., *Juriniopsis* sp., *Paradidyma singularis* Tns., *Phorocera claripennis* Macq., *Prosenoides flavipes* Coq., Tachinidae sp.

Bembex(!) *sayi* Cresson, 1865. Ent. Soc. Phila., Proc. 4: 467. ♀.

Bembix latifrons Parker, 1917. U. S. Natl. Mus., Proc. 52: 116. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 60, figs. 94-97 (larva).

Biology: Rohwer, 1909. Univ. Colo. Studies 6: 245 (nest, prey). —Hungerford and Williams, 1912. Ent. News 23: 247 (nest, prey). —Evans, 1957. Studies on compar. ethology *Bembix*, pp. 48-59, figs. 11-12 (mating, nest, prey, egg, life cycle, parasite). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 288-298, figs. 155-158 (nest, prey, parasites). —Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 154, fig. 1 (nest).

Species Group Cinerea

These species nest in soil with a high saline content, make simple multicellular nests, and place the egg on the first fly brought into the cell.

cinerea Handlirsch. N. J. to Fla. west to Tex. Ecology: Nests in very large aggregations on salt flats in heavy black soil with high salt content, makes 1-2 cells per nest, stores 11-17 medium sized prey per cell. Parasite: *Dasymutilla cypris* (Bl.), *D. vesta sappho* (Fox). Prey: *Eulalia evansi* James, *Hedriodiscus dorsalis* F.; *Tabanus lineola* F., *T. nigrovittatus* Macq., *T. vittiger bellardii* Szil., *T.* spp.; *Anthrax anale* Say; *Eristalis albifrons* Wied.; *Dimecoenia austrina* Coq.; *Lispe* sp. near *sordida* Ald., *Phyllogaster* sp.; *Phaenicia cluvia* Wlkr.; *Gymnopsoa texana* Tns.; *Cistogaster* sp.

Bembex(!) *cinerea* Handlirsch, 1893. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 102: 837. ♂, ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 59, fig. 109 (larva).

Biology: Krombein and Evans, 1954. Ent. Soc. Wash., Proc. 56: 235 (nest). —Krombein and Evans, 1955. Ent. Soc. Wash., Proc. 57: 233-234 (nest, prey, parasite). —Evans, 1957. Studies on compar. ethology *Bembix*, pp. 78-94, figs. 19-23 (male sun dance, mating, nest, prey, egg, life cycle, parasite).

hinei Parker. La., Tex., coastal only. Ecology: Nests in hard packed sand beach above high-tide mark, occasionally in large aggregations, makes at least 5 cells per nest, stores 7-13 prey per cell. Prey: *Eulalia cincta* Latr.; *Tabanus lineola* F., *T. nigrovittatus* Macq.; *Eristalis albifrons* Wied.

Bembix hinei Parker, 1917. U. S. Natl. Mus., Proc. 52: 86. ♂, ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 156 (larva).

Biology: Hine, 1906. La. State Crop Pest Comn., Cir. 6: 27 (nesting site, prey; misdet. as *belfragei* Cr.). —Strandtmann, 1953. Kans. Ent. Soc., Jour. 26: 48-49 (nest, prey). —Evans, 1957. Studies on compar. ethology *Bembix*, pp. 94-104, figs. 24-26 (nest, prey transport, egg, life cycle).

Species Group Americana

These species make simple multicellular nests, place the egg on the first prey brought into the nest, and, so far as known, level the mound of excavated earth at the nest entrance.

americana comata Parker. Pacific Coast of N. Amer. to Mexico. Ecology: Nests in sand or powdery soil, makes 1-3 cells per nest, provides 16-44 prey per cell. Parasite: *Parnopes edwardsii* (Cr.); *Physocephala affinis* Will. Prey: *Apatolestes hera* O. S.; *Thereva niveipennis* Kroeb.; *Hydrophorus gratiosus* Ald., *H.* sp.; *Eristalis arbustorum* L., *E. latifrons* Lw., *E. tenax* L., *Heliophilus* sp., *Melanostoma* sp., *Mesograpta geminata* Say, *M. marginata* Say, *Metasyrphus subsimis* Fluke, *Sphaerophoria cylindrica* Say, *S. sulphuripes* (Thom.), *Syrphus* sp., *Toxomerus* sp.; *Ceroxys latiuscula* Lw.; *Coenosia tigrina* F., *Helina bispinosa* Mall., *H. procedens* Wlkr., *Hylemya cilicrura* Rond., *Lispa tentaculata* DeG., *Muscina assimilis* Fall., *Musca domestica* L., *Ophyra leucostoma* Weid., *Pegomyia duplicata* Mall.; *Spaziphora cincta* (Lw.).; *Calliphora terraenovae* Macq., *Phaenicia sericata* Meig., *Phormia regina* Meig., *Pollenia rudis* F.; *Sarcophaga rapax* Wlkr., *S.* spp., *Senotainia trilineata* (Wulp); *Bonnetia comta* (Fall.), *Dexodes cinerea* Tns., *Tachinomyia similis* Will. Typical *americana* F. occurs in the West Indies.
Bembix comata Parker, 1917. U. S. Natl. Mus., Proc. 52: 100. ♂, ♀.
Bembix comata var. *nevadensis* Rodeck, 1934. Amer. Mus. Novitates 692: 1. ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 59 (larva).

Biology: Parker, 1925. Ent. Soc. Wash., Proc. 27: 189-195 (nest, prey capture and transport, cocoon). —Bohart and MacSwain, 1940. Pan-Pacific Ent. 16: 16 (parasite). —Evans, 1957. Studies on compar. ethology *Bembix*, pp. 36-48, figs. 8-10 (mating, nest, prey transport, egg, parasite). —Alcock, 1973 (1972). Psyche 79: 158-164 (nest construction). —Alcock, 1973. Wasmann Jour. Biol. 31: 331-332 (prey).

americana hamata Fox. Calif., Santa Cruz to San Miguel Islands only.
Bembix hamata Fox, 1923. Psyche 30: 6. ♂.
Bembix hamata lucida Fox, 1923. Psyche 30: 7. ♂.
Bembix sanctae-rosae Cockerell, 1940. South. Calif. Acad. Sci., Bul. 38: 135.

americana nicolai Cockerell. Calif., San Nicolas Island only.
Bembex(!) *nicolai* Cockerell, 1938. Pan-Pacific Ent. 14: 150. ♂, ♀.

americana spinolae Lepeletier. N. Amer. except Pacific Coast States. Ecology: Nests in soil varying from open sand to coarse soil, makes a unicellular nest, stores 16-24 prey per cell. Parasite: *Physocephala texana* Will.; *Phrosinella fulvicornis* (Coq.)?, *Opsidia gonioides* Coq., *Senotainia vigilans* Allen, *S. trilineata* (Wulp), Miltogrammini spp.; *Exoprosopa fascipennis* (Say); *Parnopes chrysoprasinus* Sm.?, *P. edwardsii* (Cr.)?; *Dasymutilla bioculata* (Cr.)?; *Macrosiagon flavipenne* LeC. Prey: *Eulalia cincta* Oliv., *Odontomyia hoodiana* Big., *O. virgo* Wied.; *Chrysops aestuans abaestuans* Phil., *C. flavida* Wied., *C. furcatus* Wlkr., *C. lugens* Wied., *C. mitis* O. S., *C. niger* Macq., *C. noctifer pertinax* Will., *C. pudicus* O. S., *Hybomitra osburni* Hine, *H. phaenops* O. S., *Silvius quadrivittatus* Say, *Tabanus atratus* L., *T. coffeatus* Macq., *T. daeckei* Hine, *T. insuetus* O. S., *T. lasiopthalmus* Macq., *T. phaenops* O. S., *T. pumilus* Macq., *T. quinquevittatus* Wied., *T. vittiger schwardti* Phil.; *Conophorus painteri* Prid., *Exoprosopa pueblensis* Jaen., *Phthiria sulfurea* Lw., *Sparnopolius brevirostris* Macq., *S. fulvus* Wied., *Systoechus fumipennis* Paint., *S. vulgaris* Lw., *Villa agrippina* O. S., *V. alternata* Say, *V. fulviana* Say, *V. lateralis* Say, *V. sinuosa jaennickiana* O. S.; *Furcifera rufiventris* Lw., *Psilocephala haemorrhoidalis* Macq., *Thereva cingulata* Kroeb.; *Asilus* sp., *Atomosia melanopogon* Herm., *Lasiopogon cinereus* Cole, *Tolmerus callidus* Will.; *Chrysotoxum ventricosum* Lw., *Dasysyrphus amalopsis* O. S., *Eristalis arbustorum* L., *E.* sp., *Eupeodes volucris* O. S., *Helophilus latifrons* Lw., *H. obscurus* Lw., *Melanostoma* sp., *Metasyrphus astutus* Fluke, *M. palliventris* Curr., *Microdon lanceolatus* Adams, *Paragus bicolor* F., *Scaeva pyrastri* L., *Sphaerophoria* sp., *Syrphus opinator* O. S., *S. ribesii* L., *Xylota bigelowi* Curr.; *Rivellia* sp., *Penocera quadrilineata* Mel., *Sepedon fuscipennis* Lw., *Tetanocera plumosa* Lw.; *Cordilura latifrons* Lw., *Hydrophoria divisa* Meig., *Hylemya* sp.; *Calythea separata* Mall., *Helina cinerella* Wulp, *H. latifrons* Zett., *H. troene* Wlkr., *Musca domestica* L., *Phaonia deleta* Stein,

Pyrellia serena Meig., *Quadrularia annosa* Zett., *Siphona irritans* L., *Spilogona* sp., *Stomoxys calcitrans* L.; *Eucalliphora lilaea* Wlkr., *Lucilia illustris* Meig., *L.* sp., *Phaenicia sericata* Meig., *Phormia regina* Meig., *Pollenia rudis* F.; *Eumacronychia* sp., *Sarcophaga derelicta* Wlkr., *S. importuna* Wlkr., *S. planifrons* Ald., *S. querula* Wlkr., *Senotainia flavicornis* Tns., *S. trilineata* (Wulp); *Bonellimyia glauca* Brooks, *Cuphocera stricklandi* Curr., *Dinera* sp., *Microphthalma disjuncta* Wied., *Nearchus duplaris* Reinh., *Paradidyma singularis* Tns., *Peleteria confusa* Curr., *Ptilodexia* sp., *Siphoplagia spinulosa* Big., *Trochilodes skinneri* Coq., *Winthemia quadripustulata* F.

Bembex(!) *spinolae* Lepeletier, 1845. Hist. Nat. Ins. Hym., v. 3, p. 227. ♂.

Bembex(!) *similans* Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 358. ♂, ♀.

Bembex(!) *connexus* Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 360. ♂, ♀.

Bembex(!) *primaaestate* Johnson and Rohwer, 1908. Ent. News 19: 378. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 58, fig. 108 (larva).

Biology: Walsh and Riley, 1869. Amer. Ent. 1: 126 (nest, prey). —Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 58-76 (nest, prey, parasite, life cycle). —Barber, 1915. Ent. Soc. Wash., Proc. 17: 187-188 (parasite). —Parker, 1917. U. S. Natl. Mus., Proc. 52: 127-131 (mating, nest, prey transport, life cycle, cocoon). —Rau and Rau, 1918. Wasp studies afield, pp. 37-38 (nest, prey, parasite ?). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 29, fig. 8 (nest). —Krombein, 1936. Ent. News 47: 95 (prey, parasite). —Evans, 1957. Studies on compar. ethology *Bembix*, pp. 17-36, figs. 6-7 (mating, nest, prey capture and transport, egg, life cycle, parasites). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 311-315, fig. 160 (nest, prey, parasites).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 21, figs. M-P (male genitalia).

cameroni Rohwer. Southwest. U. S.; centr. Mexico. Ecology: Nests in alluvial soil with sand on surface and frequently silt or loam beneath surface. Prey: *Esenbeckia delta* Hine; *Geron* sp., *Phthiria sulphurea* Lw.; *Eristalis latifrons* Lw.; *Musca domestica* L., *Orthellia caesarion* Meig.; *Peleteria* sp., *Plagioprospherysa parvipalpis* Wulp.

Bembyx(!) *cameroni* Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 467. ♂.

Bembix festiva Parker, 1929. U. S. Natl. Mus., Proc. 75 (5): 118. ♂.

Bembix rohweri Maidl and Klima, 1948 (1944). *In* Lohrmann, Muenchen. Ent. Gesell., Mitt. 34: 424. N. name for *cameroni* Roh. which is not preoce.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 310-311 (nest, prey).

nubilipennis Cresson. Miss. Valley, Great Plains and southwest. States; Mexico (San Luis Potosi). Ecology: Nests in large aggregations in hard-packed soil, makes 1-5 cells per nest, stores up to 48 prey per cell. Parasite: *Parnopes chrysoprasinus* Sm.; Miltogrammini spp. Prey: *Hedriodiscus truquii* (Bell.), *Nemotelus trinotatus* Mel., *Stratiomys jamesi* Steysk., *S. meigenii* Wied., *S. nigriventris* Lw.; *Tabanus sulcifrons* Macq., *T. trimaculatus* Beauv.; *Anthrax anale* Say, *A. irrorata* Say, *Bombylius io* Will., *Exoprosopa emarginata* Macq., *E. fasciata* Macq., *Poecilanthrax lucifera* (F.), *Sparnopolius brevirostris* Macq., *Villa* spp.; *Neorhynchocephalus sackenii* (Will.); *Atomosia puella* (Wied.), *Diogmites misellus* Lw., *D. umbrinus* Lw., *Erax* sp. near *tuberculatus* Coq., *Proctacanthella cacopiloga* (Hine); *Eristalis arbustorum* (L.), *E. tenax* (L.); *Chrysomyza demandata* (F.), *Tetanops luridipennis* Lw.; *Paracantha culta* (Wied.); *Musca domestica* L., *Orthellia caesarion* (Meig.), *Stomoxys calcitrans* (L.); *Bufolucilia silvarum* (Meig.), *Lucilia illustris* (Meig.), *Phaenicia caeruleiviridis* (Macq.), *P. sericata* (Meig.), *Pollenia rudis* (F.); *Sarcophaga assidua* Wlkr., *S. derelicta* Wlkr., *S. helicis* Tns., *S. lherminieri* R.-Desv., *S. rapax* Wlkr., *S. sinuata* Meig., *S. ventricosa* Wulp, *S.* sp.; *Aplomya theclarum* (Scud.), *Archytas apiciferus* Wlkr., *A. metallicus* (R.-Desv.), *Gymnoclytia occidua* (Wlkr.), *Hyalomyodes triangulifera* (Lw.), *Phorocera claripennis* Macq., *P. tachinomoides* Tns., *Trichopoda pennipes* (F.).

Bembex(!) *nubilipennis* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 218. ♂, ♀.

Bembix nubilosa Parker, 1929. U. S. Natl. Mus., Proc. 75 (5): 140. ♀.

Taxonomy: Evans, 1959. Amer. Ent. Soc., Trans. 85: 42 (larva).

Biology: Parker, 1910. Ohio Nat. 10: 163-165 (nest, prey, parasite ?). —Rau and Rau, 1918. Wasp studies afield, pp. 9-37, figs. 2-6 (sun dance, nest, prey, life cycle, cocoon). —Rau, 1922. St. Louis Acad. Sci., Trans. 24 (7): 29-30 (sun dance, nest). —Rau, 1935. Psyche 41: 243-244 (nesting site). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 298-308, fig. 159 (sun dance, mating, nest, prey, egg, life cycle, parasites).

Species Group Texana

These species make unicellular nests and place the egg in an erect position in the empty cell. False burrows are frequently constructed, and one species removes the prey remains before bringing in fresh prey.

melanaspis Parker. Southwest. U. S.; Mexico (Baja California). Ecology: Makes unicellular nest in sand; lays egg in empty cell. Prey: Tabanidae, Therevidae, Syrphidae, Conopidae, Calliphoridae; Coenagrionidae.

Bembix melanaspis Parker, 1917. U. S. Natl. Mus., Proc. 52: 109. ♂, ♀.

Biology: Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 160-161, fig. 2 (nest, prey).

texana Cresson. Southeast. and south. States. Ecology: Nests in loose to hard-packed sand, sometimes in large aggregations, makes a unicellular nest sometimes with one or two accessory burrows, places egg in empty cell, usually removes old prey remains from cell before bringing in fresh prey. Parasite: *Dasymutilla pyrrhus* (Fox)? Prey: *Hedriodiscus trivittatus* Say, *Odontomyia* sp., Stratiomyidae sp.; *Chlorotabanus crepuscularis* Beq., *Chrysops dimmocki* Hine, *C. pudica* O. S., *Hybomitra hinei wrighti* Whit., *Tabanus abdominalis* F., *T. bishoppi* Stone, *T. coarctatus* Stone, *T. endymion* O. S., *T. fuscicostatus* Hine, *T. gracilis* Wied., *T. lineola* F., *T. melanocerus lacustris* Stone, *T. mularis* Stone, *T. nigripes* Wied., *T. quinquevittatus* Hine, *T. sparus milleri* Whit., *T. trijunctus* Wlkr.; *Villa* sp.; *Meromacrus acutus* F., *Microdon fulgens* Wied., *Tubifera* sp.; Micropezidae sp.; *Cochliomyia macellaria* F., *Phaenicia caeruleiviridis* Macq.; *Exorista larvarum* L., Tachinidae spp.

Bembix fasciata Fabricius, 1804. Systema Piezatorum, p. 224. Preocc. This is a questionable synonym.

Bembex(!) *texana* Cresson, 1872. Amer. Ent. Soc., Trans. 4: 219. ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 62, figs. 105-107 (larva).

Biology: Evans, 1957. Studies on compar. ethology *Bembix*, pp. 135-141, fig. 37 (nest, egg, prey, life cycle). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 107-110 (nest, prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 323-335, figs. 165-170 (male sun dance, nest, prey, parasite ?).

troglodytes Handlirsch. Southwest. States north to Kans.; north. Mexico. Ecology: Nests in fine-grained damp sand along watercourse, not markedly gregarious, makes unicellular nest frequently with an accessory burrow, places egg in empty cell, stores 21-26 prey per cell. Parasite: *Timulla leona* (Bl.)?; *Exoprosopa fascipennis* (Say)? Prey: *Eulalia communis* James, *Hedriodiscus truquii* (Bell.), *Hoplitimyia constans* Lw., *Stratiomys meigenii* Wied.; *Chrysops sequax* Will., *C. wiedemanni* Kroeb., *Tabanus* sp.; *Exoprosopa fascipennis* (Say), *E. iota* (O. S.), *Sparnopolius* sp., *Systoechus vulgaris* Lw., *Villa chimaera* (O. S.). *V. salebrosa* Paint.; *Chrysogaster nitida* Wied., *Eristalis tenax* L.; *Musca domestica* L.; *Orthellia caesarion* Meig., *Stomoxys calcitrans* L.; *Callitroga macellaria* F., *Phormia regina* Meig.; *Amobia* sp., *Amobiopsis aurata* Coq., *Sarcophaga derelicta* Wlkr., *S. lherminieri* R.-Desv., *S. opifera* Coq., *S. rapax* Wlkr., *S. ventricosa* Wulp, *Senotainia flavicornis* Tns., *S. litoralis* Allen, *S. trilineata* (Wulp), *S.* sp.; *Achaetoneura* sp., *Copecrypta nitens* Wied., *Gymnoclytia occidua* Wlkr., *Phorocera claripennis* Macq.

Bembex(!) *troglodytes* Handlirsch, 1893. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 102: 829. ♂, ♀.

Bembix helianthopolis Parker, 1917. U. S. Natl. Mus., Proc. 52: 113. ♂, ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 61, figs. 102-104 (larva).

Biology: Evans, 1957. Studies on compar. ethology *Bembix*, pp. 116-135, figs. 29-36 (male sun dance, mating, nest, egg, prey, life cycle, parasites?). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 335-337 (nest, prey).

Species Group Pruinosa

The two species of this group make deep, complex unicellular nests, place the egg flat in the empty cell, and remove prey remains from the cell.

occidentalis Fox. West. and southwest. U. S.; north. Mexico. Ecology: Makes complex unicellular nest in sand dunes, sometimes in large aggregations, lays egg in empty cell, cleans nest frequently so number of prey provided is unknown. Parasite: *Dasymutilla sackenii* (Cr.); *Villa atrata* (Coq.), *V. melasoma* Wulp, *Exoprosopa eremita* O. S.; *Physocephala affinis* Will. Prey: *Stratiomys laticeps* Lw.; *Apatolestes villosulus* Big., *Chrysops* sp., *Tabanus punctifer* O. S.; *Aphoebantus tardus* Coq., *A.* sp., *Villa sinuosa* Wied., *V.* sp. near *agrippina* O. S.; *Psilocephala costalis* Lw.; *Apiocera haruspex* O. S., *A.* sp.; *Eristalis latifrons* Lw., *Helophilus latifrons* Lw., *Lejops lululatus* Meig., *Melanostoma rostratum* Big., *Metasyrphus meadii* Jones; *Anacampta latiuscula* Lw.; *Musca domestica* L., *Paregle cinerella* Fall.; *Calliphora erythrocephala* Meig., *Lucilia illustris* Meig., *Phaenicia sericata* Meig., *Phormia regina* Meig.; *Sarcophaga bullata* Prkr., *S.* sp.; *Aphria ocypterata* Tns. Predator: *Proctacanthus occidentalis* Hine.

Bembex(!) *occidentalis* Fox, 1893. Calif. Acad. Sci., Proc. (2) 4: 10. ♂, ♀.
Bembex(!) *beutenmuelleri* Fox, 1901. N. Y. Ent. Soc., Jour. 9: 83. ♂.
Bembex(!) *obsoleta* Howard, 1901. Insect Book, pl. 4, fig. 36.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 58, figs. 85-87 (larva).

Biology: Coquillett, 1895. Ent. Soc. Wash., Proc. 3: 236-237 (nest, prey; misdet. as *cinerea* Handl.). —Bohart and MacSwain, 1939. South. Calif. Acad. Sci., Bul. 38: 84-98 (mating, nest, prey, parasites). —Ross, 1953. Insects close up, pp. 42-43, 5 figs. (nest, prey, cocoon, parasites). —Evans, 1957. Studies on compar. ethology *Bembix*, pp. 167-181, figs. 47-49 (mating, nest, prey).

pruinosa Fox. U. S.; Mexico. Ecology: Nests in large aggregations in loose sand, frequently in dunes, makes a long unicellular nest sometimes with an accessory burrow, places egg in empty cell, provides 20-30 prey per cell, placing later flies in a long single file. Parasite: *Dasymutilla bioculata* (Cr.); *Parnopes edwardsii* (Cr.)?; *Physocephala texana* Will.; *Exoprosopa fascipennis* (Say), *E. arenicola* Johns. and Johns., *Villa atrata* (Coq.); *Senotainia inyoensis* Reinh.? Prey: *Anoplodonta nigrirostris* Lw., *Eulalia cincta* Oliv., *Odontomyia tumida* Bks., *Stratiomys jamesi* Steysk., *S. norma* Wied.; *Chrysops flavida* Wied., *Tabanus equalis* Hine, *T. fulvulus* Wied., *T. lineola* F., *T. productus* Hine, *T. quinquevittatus* Wied., *T. sulcifrons* Macq., *T. trispilus* Wied., *T. vittiger schwardti* Phil.; *Anastoechus barbatus* O. S., *Aphoebantus* sp., *Bombylius medorae* Paint., *Exoprosopa fascipennis* (Say), *E. divisa* Coq., *Heterostylum robustum* O. S., *Lepidanthrax proboscidea* Lw., *Poecilanthrax lucifera* F., *P. sackenii* Coq., *P. willistoni* Coq., *Villa alternata* Say, *V. cypris* Meig., *V. faustina* O. S., *V. fulviana nigricauda* Lw., *V. lateralis* Say, *V. molitor* Lw.; *Psilocephala aldrichii* Coq., *P. haemorrhoidalis* Macq.; *Plagioneurus univittatus* Lw.; *Asemosyrphus polygrammus* Lw., *Eristalis albifrons* Wied., *E. arbustorum* L., *E. brousii* Will., *E. latifrons* Lw., *E. tenax* L., *E. vinetorum* F., *Eupeodes volucris* O. S., *Helophilus latifrons* Lw., *Platycheirus erraticus* Curr., *Rhingia nasica* Say, *Sericomyia chrysotoxoides* Macq., *Sphaerophoria robusta* Curr., *Syrphus rectus* O. S., *S. torvus* O. S., *Xylota metallica* Wied.; *Ceroxys latiusculus* Lw.; *Hydrophoria divisa* Meig.; *Limnophora narona* Wlkr., *Lispe cotidiana* Snyd., *L. nasoni* Stein, *Musca autumnalis* DeG., *M. domestica* L., *Muscina assimilis* Fall., *M. dorsilinea* Wulp, *Orthellia caesarion* Meig., *Pyrellia cyanicolor* Zett., *Stomoxys calcitrans* L.; *Bufolucilia silvarum* Meig., *Callitroga macellaria* F., *Eucalliphora lilaea* Wlkr., *Lucilia illustris* Meig., *Phaenicia sericata* Meig., *Phormia regina* Meig., *Pollenia rudis* F.; *Amobia floridensis* (Tns.), *Sarathromyia femoralis* Sch., *Sarcophaga derelicta* Wlkr., *S. errabunda* Wulp, *S. lherminieri* R.-Desv., *S. querula* Wlkr.; *Achaetoneura archippivora* Riley, *Admontia* sp., *Archytas apicifera* Wlkr., *Paradidyma affinis* Reinh., *Peleteria eronis* Curr., *Spallanzania* sp., *Sitophaga* sp., *Winthemia rufopicta* Big.

Bembex(!) *pruinosa* Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 361. ♂, ♀.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 57, figs. 88-93 (larva).

Biology: Mickel, 1924. Ent. News 35: 236-242 (parasite). —Evans, 1957. Studies on compar. ethology *Bembix*, pp. 142-167, figs. 38-46 (hopping dance, mating, nest, prey, egg, life cycle, parasites). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 345-349 (hopping dance, nest, prey capture, parasites).

Genus STICTIELLA Parker

Stictiella Parker, 1917. U. S. Natl. Mus., Proc. 52: 21.
Type-species: *Monedula formosa* Cresson. Orig. desig.
Microstictia Gillaspy, 1963. Ent. News 74: 196.
Type-species: *Monedula femorata* Fox. Orig. desig.

The genus is restricted to the Nearctic Region and all but one species occur in America north of Mexico. The species whose biology is known use adult Lepidoptera as prey and usually practice mass provisioning, although there is one record suggestive of progressive provisioning in *serrata*, a species also known to practice mass provisioning.

Taxonomy: Gillaspy, 1959. Pan-Pacific Ent. 35: 193 (species groups). —Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 559-566, 1 fig. (partition into *Stictiella* and *Xerostictia* on morph. characters).

Biology: Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 559-563, fig. 1 (ethology).

callista Parker. Ariz., N. Mex. Ecology: Nests in sand. Prey: *Melipotis indomita* (Wlkr.); *Strymon melinus pudica* Edw.; Hesperiidae sp.
Stictiella callista Parker, 1917. U. S. Natl. Mus., Proc. 52: 34. ♂, ♀.

Biology: Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 562 (prey). —Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 160 (nest, prey).

corniculata Mickel. Wyo. to Calif.
Stictiella corniculata Mickel, 1918 (1917). Nebr. Univ. Studies 17: 332. ♂.

Taxonomy: Gillaspy, 1963. Ent. News 74: 251-252.

divergens Parker. Kans.
Stictiella divergens Parker, 1917. U. S. Natl. Mus., Proc. 52: 55. ♂.

emarginata (Cresson). Generally distributed throughout the U. S. and south. Canada. Prey: *Euxoa quinquelinea incallida* (Sm.).
Monedula emarginata Cresson, 1865. Ent. Soc. Phila., Proc. 4: 468. ♂, ♀.
Monedula mamillata Handlirsch, 1890. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 99: 146. ♂, ♀.

Biology: Bradley, 1908. Ent. Soc. Amer., Ann. 1: 129 (sleeping aggregation). —Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 562 (prey).

exigua (Fox). Mont.
Monedula exigua Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 370. ♀.

femorata (Fox). Fla., Tex.
Monedula femorata Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 368. ♂.

formosa (Cresson). Kans., Okla., Tex. Ecology: Nests in sand, makes 5-17 cells per nest, stores 6-11 butterflies per cell, practices mass provisioning. Parasite: Acarina sp.; Diptera sp. Prey: *Polites* sp., *Hylephila phyleus* Dru., *Atalopedes campestris* Boisd., *Pyrgus communis* Grt., *Thanaos zarucco* Luc.; *Phyciodes phaon* Edw., *Libythea larvata* Streck., *L.* sp.; *Strymon melinus* Hbn.
Monedula formosa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 221. ♂, ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 260, figs. 37-41 (larva).

Biology: Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 559-561 (nest, prey, parasite).

minutula (Handlirsch). Tex.
Monedula minutula Handlirsch, 1890. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 99: 148. ♀.

nubilosa Gillaspy. Calif. (Los Angeles).
Stictiella nubilosa Gillaspy, 1963. Ent. News 74: 252. ♀.

plana (Fox). Great Plains States.
Monedula plana Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 367. ♂.

pulchella (Cresson). Colo. to Calif. Ecology: Usually makes unicellular nest in sand but rarely 2 cells, stores as many as 19 moths in a completed cell. Prey: *Leptotes marina* Reak.; *Loxostege similalis* Guen.; *Characoma proteella* Dyar.
Monedula pulchella Cresson, 1865. Ent. Soc. Phila., Proc. 4: 471. ♂, ♀.
Stictiella melanosterna Parker, 1917. U. S. Natl. Mus., Proc. 52: 30. ♂, ♀.

Taxonomy: Gillaspy, 1963. Ent. News 74: 252 (synonymy). —Evans, 1964. Amer. Ent. Soc., Trans. 90: 260-261, fig. 42 (larva).

Biology: Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 560, 562-563 (nest, prey, sleeping aggregation).

serrata (Handlirsch). Fla., Ga., N. C. Ecology: Nests in fine-grained sand, makes unicellular nest, stores 12 to more than 21 moths per cell, practices both mass and progressive provisioning. Parasite: *Senotainia* sp. near *rubriventris* Macq. Prey: *Elasmopalpus lignosellus* (Zell.); *Hellula rogatilis* (Hulst); *Bactra verutana* Zell., Eucosminae sp.; *Crambus satrapellus* Zink. *C. quinquareatus* Zell., *C.* sp., *Argynia argentana* Martyn; *Jocara* sp.
Monedula serrata Handlirsch, 1890. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 99: 143. ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 51, figs. 59-62 (larva).

Biology: Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 561-562, fig. 1 (nest, prey transport, egg, life cycle). —Krombein, 1964. Amer. Mus. Novitates 2201: 19-20 (nest, prey transport, life cycle, cocoon).

speciosa (Cresson). Alta., Ariz., Sask., Colo., N. Mex., Nebr., Kans.
Monedula speciosa Cresson, 1865. Ent. Soc. Phila., Proc. 4: 470. ♀.

spinifera (Mickel). Alta., Kans., Nebr.
Stictia spinifera Mickel, 1916. Amer. Ent. Soc., Trans. 42: 418. ♂.
Stictiella melampous Parker, 1917. U. S. Natl. Mus., Proc. 52: 43. ♂.

tuberculata (Fox). Idaho, Nev., Wash.
Monedula tuberculata Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 366. ♂.

Genus GLENOSTICTIA Gillaspy

Glenostictia Gillaspy, 1962. *In* Gillaspy, Evans and Lin, Ent. Soc. Amer., Ann. 55: 563.
Type-species: *Monedula pulla* Handlirsch. Orig. desig.

This genus occurs only in the Nearctic Region and all species are found in America north of Mexico. So far as known the members of the genus practice progressive provisioning and prey upon adult Hymenoptera, Diptera and Hemiptera.

Biology: Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 563-566 (ethology).

argentata (Fox). Calif.; Mexico. Ecology: Nests in sand dune, practices progressive provisioning. Prey: Primarily Bombyliidae.
Stictiella argentata Fox, 1923. Calif. Acad. Sci., Proc. (4) 12: 434. ♂, ♀.

Biology: Alcock, 1975. Southwest. Nat. 20: 339 (nest, prey).

bifurcata (Fox). South. Calif.; Mexico (Baja California, Sonora).
Stictiella bifurcata Fox, 1923. Calif. Acad. Sci., Proc. (4) 12: 431. ♂.
Stictiella bifurcata var. *albicera* Fox, 1923. Calif. Acad. Sci., Proc. (4) 12: 432. ♂.
Stictiella directa Fox, 1923. Calif. Acad. Sci., Proc. (4) 12: 433. ♂, ♀.

bituberculata (Parker). Ariz., Calif., N. Mex.
Stictiella bituberculata Parker, 1917. U. S. Natl. Mus., Proc. 52: 36. ♂, ♀.

clypeata (Gillaspy). West. Tex. to south. Calif.; Mexico (Chihuahua, Coahuila, Guerrero). Prey: *Apiocera augur* O. S.; *Tubifera latifrons* (Lw.).
Stictiella clypeata Gillaspy, 1959. Pan-Pacific Ent. 35: 187. ♂, ♀.

Biology: Painter, 1936. Kans. Univ. Sci. Bul. 24: 192 (prey; misdet. as *tenuicornis* (Fox)). —Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 563 (prey).

gilva Gillaspy. Ariz., Calif. Ecology: Nests in dry sand, provisions progressively. Prey: *Aphoebantus interruptus* Coq., *A.* sp.
Glenostictia gilva Gillaspy, 1963. Ent. News 74: 198. ♂, ♀.

Biology: Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 188-189 (nest, prey). —Alcock, 1975. Southwest. Nat. 20: 339 (nest, prey).

megacera (Parker). Colo., Utah, Wash.; Mexico.
Stictiella megacera Parker, 1917. U. S. Natl. Mus., Proc. 52: 49. ♂, ♀.

pictifrons (Smith). Generally distributed from Pa. and Ga. west to Colo., Tex., and Calif. Prey: *Villa* sp. in *lateralis* Say group.
Monedula pictifrons Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 335. ♀.
Monedula inermis Handlirsch, 1890. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 99: 144. ♂.
Monedula denverensis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 235. ♀.

Biology: Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 563-564 (prey). —Alcock, 1975. Southwest. Nat. 20: 339-340 (prey-hunting behavior).

pulla (Handlirsch). Western U. S. Ecology: Nests in sand, practices progressive provisioning. Parasite: Miltogrammini sp. Prey: *Lepidanthrax* sp., *Geron* sp., *Aphoebantus* sp.; *Psilocephala aldrichi* Coq.; *Eupeodes volucris* O. S., *Helophilus latifrons* O. S.; *Hylemya cilicrura* (Rond.); *Senotainia rubriventris* (Macq.), *Sarcophaga opifera* Coq., *S. tuberosa* Pand., *S.* sp.; *Stomatomyia parvipalpis* (Wulp).
Monedula pulla Handlirsch, 1890. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 99: 149. ♀.
Monedula usitata Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 371. ♂ (♀ misdet.).

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 52, figs. 63-65 (larva).

Biology: LaRivers, 1942. Pan-Pacific Ent. 18: 4-8 (nest, prey, parasite). —Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 564 (nest, prey, sleeping aggregation). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 186-188, fig. 105 (nest, prey).

scitula (Fox). Ariz., Calif., N. Mex., Tex. Ecology: Nests in sandy loam or heavier stony soil, makes 5 or more cells per nest, may store as many as 40 prey per cell, provisions progressively. Parasite: *Parnopes concinnus* Vier.?; *Senotainia* sp.? Prey: Cicadellidae sp.; *Heteropsylla texana* Cwfd.; *Neurocolpus arizonae* Knight, *Psallus* sp.; *Procladius* sp. near *bellus* Lw.; *Dicyphoma schaefferi* Coq., *Zabrachia* sp.; *Silvius quadrivittatus* Say; *Mythicomyia intermedia* Mel., *Oligodranes* sp., *Phthiria* sp.; *Brevitrichia griseola* Coq., *Scenopinus* sp.; *Holopogon phaeonotus* Lw., Asilidae sp.; *Allograpta obliqua* Say, *Mesograpta marginata* Say; *Euxesta magdalenae* Cr., *E. nitidiventris* Lw.; *Trupanea bisetosa* Coq.; *Conioscinella* sp.; *Melanagromyza* sp.; *Astiosoma* sp.; *Milichia aethiops* Mall.; *Calythea micropteryx* Thom., *Hylemya platura* Meig., *Pegomya longimana* Pok.; *Haematobia irritans* L., *Musca domestica* L.; *Eumacronychia* sp.; *Siphophyto setigera* Coq.; *Apanteles* sp.; *Torymus* sp.; *Iridomyrmex pruinosus* Rog.; *Lindenius* sp.; *Tachysphex* sp.; *Colletes* sp.; *Perdita exclamans* Ckll., *P. knulli* Timb., *P. marcialis* Ckll., *P. mentzeliarum* Ckll., *P. larreae* Ckll., *P. n. numerata* Ckll., *P.* spp.; *Dufourea* sp., *Lasioglossum* sp.; preferred prey are *Perdita* bees, but other small Hymenoptera, Diptera and Hemiptera are also used.
Monedula scitula Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 369. ♀.
Monedula villosa Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 370. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 262, figs. 48-52 (larva).

Biology: Gillaspy, Evans and Lin, 1962. Ent. Soc. Amer., Ann. 55: 564-566 (nest, prey, sleeping aggregation). —Evans, 1966. Compar. ethology and evolution of sand wasps, pp. 189-205, figs. 106-109 (nest, prey transport, egg, cocoon, life cycle, parasite).

tenuicornis (Fox). Calif., Ariz., Tex.
Monedula tenuicornis Fox, 1895. Acad. Nat. Sci. Phila., Proc. 47: 368. ♀, ♂.

terlinguae Fox. Tex.
Stictiella terlinguae Fox, 1928. Pan-Pacific Ent. 4: 103. ♂, ♀.

Genus XEROSTICTIA Gillaspy

Xerostictia Gillaspy, 1963. Ent. News 74: 187.

Type-species: *Xerostictia longilabris* Gillaspy. Orig. desig.

The genus contains only one polytypic species occurring in the southwestern deserts of the Nearctic Region.

longilabris longilabris Gillaspy. Ariz., Calif. Ecology: Makes a multicelled nest in sand dunes, practices progressive provisioning. Prey: *Brachynemurus longipalpis* Hag. adults; *Ormenis saucia* Van D. adults. Another subspecies occurs in Baja California.
Xerostictia longilabris longilabris Gillaspy, 1963. Ent. News 74: 187, figs. 1-7. ♀, ♂.

Biology: Alcock, 1975. Southwest. Nat. 20: 340-341, figs. 3-5 (nest, prey).

Genus STENIOLIA Say

Steniolia Say, 1837. Boston Jour. Nat. Hist. 1: 367.
Type-species: *Bembex*(!) *longirostra* Say. Monotypic.

All but three species occur in western America north of Mexico; two of the extralimital species range as far south as Venezuela or Ecuador. The wasps nest in small aggregations, construct shallow unicellular nests and practice progressive provisioning. Preferred prey of most species are bee-flies (Bombyliidae). The egg is laid on the first prey brought into the nest. Adults of both sexes form large sleeping aggregations on shrubs or plants, often at some distance from the nesting site.

Revision: Gillaspy, 1964. Amer. Ent. Soc., Trans. 89: 1-117, 6 pls.

Biology: Evans and Gillaspy, 1964. Amer. Midland Nat. 72: 257-280, 14 figs. (comparative ethology).

californiensis Gillaspy. Calif.; Mexico (Baja California).
Steniolia californiensis Gillaspy, 1964. Amer. Ent. Soc., Trans. 89: 52, figs. 5, 10, 25, 29, 34, 50. ♂, ♀.

dissimilis Fox. Southern Ariz.; Mexico (Sonora, Sinaloa).
Steniolia dissimilis Fox, 1923. Calif. Acad. Sci. Proc. (4) 12: 429. ♂, ♀.

duplicata Provancher. Western Tex. to Calif., Nev.; Mexico (Baja California, Chihuahua, Coahuila). Ecology: Nests in moderately sandy soil. Parasite: *Parnopes concinnus* Vier.? Prey: *Villa* sp. near *alternata* Say, *V. pallida* (Coq.), *V.* spp., *Aphoebantus* sp. near *hirsutus* Coq.; *Paragus tibialis* Fall., *Mesogramma marginata* Lw., *Eupeodes volucris* O. S.; Syrphidae spp.; *Faunia* sp.; *Sarcophaga* sp.; Calliphoridae sp.; Syrphidae appear to be the preferred prey.
Steniolia duplicata Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 414. ♂, ♀.
Steniolia edwardsii Patton, 1894. Ent. Soc. Wash., Proc. 3: 45. Nom. nud.
Steniolia meridionalis Fox, 1923. Calif. Acad. Sci., Proc. (4) 12: 430. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 263-264, figs. 34-36 (larva).

Biology: Bradley, 1908. Ent. Soc. Amer., Ann. 1: 129 (sleeping aggregation). —Evans and Gillaspy, 1964. Amer. Midland Nat. 72: 274-276 (clustering, nest, prey). —Evans, 1966. Compar. ethology and evolution of sand wasps, p. 205 (parasite).

elegans Parker. Wyo. to Wash., south to western Tex. and southern Calif.; Mexico (Baja California, Sonora, Coahuila, Aguascalientes, San Luis Potosi, Hidalgo). Ecology: Nests in powdery, rocky soil. Prey: *Anthrax irroratus* Say, *Poecilanthrax signatipennis* (Cole), *Systoechus vulgaris* Lw., *Villa sinuosa* Wied., *V.* spp.; *Holopogon atripennis* Back; *Eupeodes volucris* O. S., *Microdon coarctatus* Lw., *Volucella* sp.; Bombyliidae are the preferred prey.
Steniolia elegans Parker, 1929. U. S. Natl. Mus., Proc. 75 (5): 50. ♂.

Taxonomy: Evans and Lin, 1956 Amer. Ent. Soc., Trans. 82: 52, figs. 66-71 (larva).

Biology: Evans and Gillaspy, 1964. Amer. Midland Nat. 72: 276 (clustering, nest, prey capture). —Evans, 1973. Great Basin Nat. 33: 29-30 (nest, prey transport).

eremica Gillaspy. Southern Calif., Ariz., Nev. Prey: *Efferia texana* (Bks.).
Steniolia eremica Gillaspy, 1964. Amer. Ent. Soc., Trans. 89: 67, figs. 14, 38, 54, 84. ♂, ♀.

Biology: Evans and Gillaspy, 1964. Amer. Midland Nat. 72: 276-277 (prey).

nigripes Parker. Calif.; Mexico (Baja California). Ecology: Nests in bare desert soil. Prey: *Aphoebantus* sp. near *tardus* Coq., *A. hirsutus* Coq.
Steniolia nigripes Parker, 1917. U. S. Natl. Mus., Proc. 52: 8. ♂.

Taxonomy: Evans and Lin, 1956. Amer. Ent. Soc., Trans. 82: 53 (larva).

Biology: Gillaspy, 1951. Pan-Pacific Ent. 27: 167-168 (nest, prey, cocoon).

obliqua (Cresson). Mont. to N. Mex., west to B. C. and Calif. Ecology: Nests in fine-grained, powdery sandy loam. Parasite: *Parnopes chrysoprasinus* Sm.?, *P. edwardsii* (Cr.); Mutillidae sp.; *Taxigramma heteroneura* (Meig.)?, *Hilarella hilarella* (Zett.)? Prey: *Villa sinuosa jaennickeana* O. S., *V. l. lateralis* Say, *V. a. alternata* (Say), *V. a. nigropecta* Cr., *V. concessor* Coq., *Geron* sp., *Bombylius* sp.; *Pipiza calcarata* Lw.; *Lucilia* sp.; Bombyliidae are the preferred prey.
Monedula obliqua Cresson, 1865. Ent. Soc. Phila., Proc. 4: 469. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 265, fig. 45 (larva).

Biology: Evans and Gillaspy, 1964. Amer. Midland Nat. 72: 266-272, figs. 1-10, 13, 14 (clustering, mating, nest, prey capture and transport, life cycle, cocoon, parasites). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 494-495 (nest, prey, parasites).

scolopacea albicantia Parker. B. C. to northern Calif., Idaho.
Steniolia albicantia Parker, 1917. U. S. Natl. Mus., Proc. 52: 12. ♂.

Biology: Evans and Gillaspy, 1964. Amer. Midland Nat. 72: 261 (clustering).

scolopacea scolopacea Handlirsch. Calif., Nev.; Mexico (Baja California).
Steniolia scolopacea Handlirsch, 1889. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 98: 510. ♂, ♀.

sulfurea Fox. Calif.
Steniolia sulfurea Fox, 1901. N. Y. Ent. Soc., Jour. 9: 84. ♂.

tibialis Handlirsch. Wash. to Calif., Nev., Idaho. Prey: *Conophorus nigripennis* (Lw.); *Syrphus* sp.
Steniolia tibialis Handlirsch, 1889. Akad. Wiss. Wien, Math.-Nat. Kl., Sitzber. 98: 513. ♂, ♀.

Biology: Evans and Gillaspy, 1964. Amer. Midland Nat. 72: 276 (prey).

vanduzeei Gillaspy. Calif., Nev.
Steniolia vanduzeei Gillaspy, 1964. Amer. Ent. Soc., Trans. 89: 62, figs. 13, 37, 53, 83. ♂, ♀.

Family PHILANTHIDAE

So far as known all members of this family are ground-nesters.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 79-89, figs. 1-35 (larvae). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 156-157 (larvae).—Menke, 1967. Pan-Pacific Ent. 43: 147-148 (key to genera). —Bohart and Grissell, 1975. Calif. Ins. Survey, Bul. 19: 1-92, 151 figs., 46 maps (Calif. spp. with keys to North American Philanthinae).

Biology: Alcock, 1975. Kans. Ent. Soc., Jour. 48: 532-545, 7 figs. (male mating strategy).

Subfamily PHILANTHINAE

Genus PHILANTHUS Fabricius

Philanthus Fabricius, 1790. Skrivt. Natur. Hist. Selsk., v. 1, p. 224.
Type-species: *Philanthus coronatus* Fabricius. Desig. by Shuckard, 1837.
Symblephilus Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 171.
Type-species: *Philanthus pictus* Panzer. Desig. by Pate, 1937.
Simblephilus Jurine, 1807. Nouv. Method. Class. Hym. Dipt., p. 185.
Type-species: *Vespa triangulum* Fabricius. Desig. by Morice and Durrant, 1914.
Cheilopogonus Westwood, 1834. Zool. Jour. 5: 441.
Type-species: *Cheilopogonus punctiger* Westwood. Monotypic.
Philianthus Guerin, 1835. Iconogr. Regne Anim., Ins., pl. 71, fig. 8. Lapsus.
Anthophilus Dahlbom, 1844. Hym. Europaea, v. 1, p. 190.

Type-species: *Philanthus politus* Say. Desig. by Ashmead, 1899.

Chilopogon Kohl, 1896. K. K. Naturhist. Hofmus., Ann. 11: 329. Emend. of *Cheilopogonus* Westwood.

Epiphilanthus Ashmead, 1899. Canad. Ent. 31: 294.
Type-species: *Philanthus solivagus* Say. Orig. desig.

Pseudanthophilus Ashmead, 1899. Canad. Ent. 31: 294.
Type-species: *Philanthus ventilabris* Fabricius. Orig. desig.

Ocloclетes Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 423.
Type-species: *Philanthus sanbornii* Cresson. Orig. desig.

Ococlетes Mickel, 1916. Amer. Ent. Soc., Trans. 42: 407. Emend. or lapsus.

This genus occurs in all major zoogeographic regions except The Neotropical and Australian. The preferred prey are bees, sometimes honeybees, but occasionally wasps or even Parasitica may be used, perhaps when there is a shortage of bees.

Revision: Strandtmann, 1946. A Rev. of the N. Amer. Spp. of *Philanthus*, 126 pp., 8 pls.

albopilosus Cresson. Rocky Mtn. States east to Tex., Ohio, and Ont.; Mexico (Chihuahua).
Ecology: Makes up to 4 cells per nest with 1-6 accessory burrows per nest, stores 6-10 prey per cell. Parasite: *Phrosinella fulvicornis* Coq. Prey: *Ancistrocerus c. catskill* (Sauss.); *Aphilanthops frigidus* (Sm.); *Mimumesa fuscipes* (Pack.); *Oxybelus bipunctatus* Oliv.; *Colletes hyalinus* Prov., *C. simulans armatus* Patt., *C. willistoni* Robt.?; *Andrena robertsonii* D. T.; *Agapostemon angelicus* Ckll., *Dialictus imitatus* (Sm.), *D. lineatulus* (Cwfd.), *D. pilosus* (Sm.), *Halictus confusus* Sm., *H. ligatus* Say, *H. rubicundus* Chr., *Lasioglossum leucozonium* (Schr.).
Philanthus albopilosus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 91. ♂.
Philanthus simillimus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 95. ♀.

Biology: Evans, 1975. Ent. Soc. Amer., Ann. 68: 888-892, 6 figs. (male behavior, nest, prey, parasite).

arizonicus Bohart. Ariz. (Maricopa Co.).
Philanthus arizonicus Bohart, 1972. Ent. Soc. Wash., Proc. 74: 397, fig. 1. ♂.

barbatus Smith. Idaho and Oreg. to Colo. and N. Mex.; Mexico (Chihuahua to Puebla). Ecology: Nests in sand dune. Prey: *Agapostemon melliventris* Cr.; *Exomalopsis sidae* Ckll.
Philanthus barbatus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 473. ♂.
Philanthus albifrons Cresson, 1865. Ent. Soc. Phila., Proc. 5: 101. ♂, ♀.
Philanthus henricus Dunning, 1898. Canad. Ent. 30: 153. ♀.

Biology: Evans and Lin, 1959. Wasmann Jour. Biol. 17: 128 (nest, prey).

barbiger Mickel. Colo., Nebr.
Philanthus barbiger Mickel, 1916. Amer. Ent. Soc., Trans. 42: 405. ♂, ♀.

bicinctus (Mickel). Colo., Utah, Wyo. Ecology: Nests in aggregations, makes very deep nest in friable, clay-silt soil, stores 5 prey per cell. Parasite: *Metopia argyrocephala* (Meig.) ? Prey: *Bombus bifarius* Cr., *B. occidentalis* Gr., *B. fervidus* (F.), *B. melanopygus* Nyl., *B. flavifrons* Cr., *B. mixtus* Cr., *B. rufocinctus* Cr., *B. centralis* Cr.; preys on bumblebee workers and males.
Ococlетes bicinctus Mickel, 1916. Amer. Ent. Soc., Trans. 42: 407. ♀.
Ococlетes hirticulus Mickel, 1918 (1917). Nebr. Univ. Studies 17: 326. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 275-276, figs. 65-67 (larva).

Biology: Armitage, 1965. Kans. Ent. Soc., Jour. 38: 89-100, 4 figs. (nest, prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 500 (nest, prey, parasite ?).

bilunatus Cresson. East. U. S. west to N. Dak., Colo., and N. Mex., east. Canad. provinces west to Alta. Ecology: Nests in flat sand or vertical sand banks, makes 3 or more cells per nest, stores 7-8 small bees per cell. Prey: *Hylaeus m. modestus* Say; *Halictus ligatus* Say, *H. confusus* Sm., *Lasioglossum leucozonium* (Schr.), *Dialictus inconspicuus* (Sm.), *Augochlora striata* Prov.
Philanthus bilunatus Cresson, 1865. Ent. Soc. Phil., Proc. 5: 97. ♂.
Philanthus scelestus Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxxiii. ♀.
Philanthus assimilis Banks, 1915. Canad. Ent. 47: 404. ♂. Preocc.
Philanthus consimilis Banks, 1923. Canad. Ent. 55: 21. N. name. Preocc.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 83, fig. 19 (larva).

Biology: Evans and Lin, 1959. Amer. Midland Nat. 17: 126-127, figs. 4, 5, 9 (nest, prey, egg, life cycle).

crabroniformis Smith. Rocky Mt. and Pacific Coast States, N. Dak., Alta., B. C. Ecology: Nests in rather diffuse aggregations in hard stony soil, usually makes only one nest during lifetime of an individual female containing up to 15 cells, stores 12-24 small prey per cell. Parasite: *Senotainia trilineata* (Wulp), *Phrosinella pilosifrons* Allen, *Metopia argyrocephala* (Meig.) ? Prey: *Astata bakeri* Parker, *A. nubecula* Cr.; *Plenoculus davisi* Fox.; *Ectemnius* sp.; *Hylaeus affinis* (Sm.), *H.* sp.; *Andrena albosellata* Ckll., *A.* spp., *Perdita fallax* Ckll.; *Agapostemon texanus* Cr., *Dialictus incompletus* (Cwfd.), *D. laevissimus* (Sm.), *D.* spp., *Evylaeus cooleyi* (Cwfd.), *E. niger* (Vier.), *E. peraltus* (Ckll.), *E. synthridis* (Ckll.), *Halictus confusus* (Sm.), *H. farinosus* (Sm.), *H. rubicundus* Chr., *H. tripartitus* Ckll., *Sphecodes patruelis* Ckll., *S. sulcatulus* Ckll., *S.* spp.; *Apis mellifera* L.; small bees are the preferred prey.

Philanthus crabroniformis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 474. ♂.

Philanthus flavifrons Cresson, 1865. Ent. Soc. Phila., Proc. 5: 102. ♀.

Philanthus sublimis Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxxii. ♂.

Philanthus californicus Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxxii. ♂.

Liris magnifica Provancher, 1895. Nat. Canad. 22: 130. ♂.

Biology: Bohart, 1954. Ent. Soc. Wash., Proc. 56: 26-27 (prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 489-499 (nest, prey). —Alcock, 1974. Jour. Zool. 173: 233-246, 2 figs., 3 pls. (nest, prey capture and transport, mating, parasite, competition with *P. gibbosus* (F.)).

crotoniphilus Viereck and Cockerell. Calif., N. Mex., Tex.; Mexico (Coahuila).

Philanthus crotoniphilus Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 145. ♂.

gibbosus (Fabricius). Transcont. in south. Canada and U. S.; Mexico to El Salvador. Ecology: Nests in flat or vertical soil of types varying from sandy loam to compacted heavy soil, makes 7-15 or more cells per nest, stores 8-16 small prey per cell; rarely 2 females may utilize a joint burrow; 1 female may nest in parental burrow; males frequently occupy parental burrow for life. Parasite: *Metopia argyrocephala* (Meig.), *Hilarella hilarella* (Zett.), *Senotainia trilineata* (wulp) complex; *Dasymutilla nigripes* (F.) ?, *Sphaeropthalma* sp. Prey: *Crossocerus sulcus* (Fox); *Colletes tucsonensis* Ckll.; *Agapostemon virescens* (F.), *Augochlora pura* (Say), *Augochlorella striata* (Prov.), *A.* sp., *Augochloropsis cuprea* (Sm.), *A. m. metallica* (F.), *Dialictus euryceps* (Ellis), *D. incompletus* (Cwfd.), *D. imitatus* (Sm.), *D. laevissimus* (Sm.), *D. lineatulus* (Cwfd.), *D. microlepoides* (Ellis), *D. obscurus* (Robt.), *D. pilosus* (Sm.), *D. rohweri* (Ellis), *D. zephyrus* (Sm.), *D.* spp., *Halictus confusus* Sm., *H. ligatus* Say, *H. tripartitus* Ckll., *Lasioglossum coriaceum* (Sm.), *L. zonulum* (Sm.), *Sphecodes arvensis* Patt., *S.* spp. Predator: *Diogmites discolor* Lw.; *Misumena calycina* (L.).

Vespa gibbosus Fabricius, 1775. Systema Ent., p. 370.

Philanthus punctatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, app., p. 342. ♂.

Cheilopogonus punctiger Westwood, 1835. Zool. Jour. 5: 441. ♂, ♀.

Anthophilus gibbosus Dahlbom, 1844. Hym. Europaea, v. 1, pp. 192, 497. ♂, ♀. Preocc.

Anthophilus nodosus Klug, 1846. Akad. Wiss. Berlin. Ber. Verh., p. 42. Lapsus.

Philanthus xanthostigma Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 131, pl. 8, fig. 12. ♀, ♂.

Philanthus maculifrons Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 132, pl. 8, fig. 13. ♂.

Philanthus punctatus var. *cockerelli* Dunning, 1897. Ent. News 8: 69. ♂.

E. punctatus var. *chilopsidis* Cockerell, 1898. Davenport Acad. Nat. Sci., Proc. 7: 141. ♀. The *E.* presumably refers to *Epiphilanthus* inasmuch as this new var. was mentioned in a list of Philanthidae.

Anthophilus melanaspis Cameron, 1905. Amer. Ent. Soc., Trans. 31: 377. ♀.

Anthophilus maculiventris Cameron, 1905. Amer. Ent. Soc., Trans. 31: 377. ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 82, figs. 11-15 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 117-124 (nest, prey). —Rau and Rau, 1918. Wasp studies afield, pp. 109-116 (nest, prey). —Reinhard, 1924. Smithsn. Inst., Ann. Rpt. for 1922, pp. 363-376. —Reinhard, 1929. Witchery of wasps, pp. 92-140, 2 pls., 5 figs. (nest, prey capture, cocoon, life cycle, parasite, predators). —Evans and Lin, 1959. Amer. Midland Nat. 17: 124-125, fig. 3 (nest, prey). —Cazier and Mortenson, 1965. So. Calif. Acad. Sci., Bul. 64: 174-197, figs. 1-4 (nest, prey). —Lin, 1968. Ent. Soc. Wash., Proc. 70: 10-12 (sleeping behavior). —Evans 1973. Anim. Behaviour 21: 302-308, 3 figs. (burrow sharing, nest transfer). —Barrows and Snyder, 1974 (1973). Ent. News 84: 314-316 (prey, parasite). —Alcock, 1974. Jour. Zool. 173: 241-246 (nest, prey transport, competition with *P. crabroniformis*).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 20, figs. C-E (male genitalia).

gloriosus Cresson. Alta., Ariz., Kans., Nebr., N. Dak., N. Mex., Tex.; Mexico (Chihuahua).
Philanthus gloriosus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 86. ♀.
Philanthus insignatus Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 421. ♀.

inversus Patton. Great Plains, Iowa, and Kans., north to Alta. and N. Dak., Calif.
Philanthus inversus Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 355. ♀.

lepidus Cresson. East. U. S. west to Tex. and Colo. Ecology: Nests in large aggregations in sand banks, makes 1-5 false burrows and 2 or more cells per nest, stores 9-11 small bees per cell. Parasite: *Senotainia trilineata* (Wulp) complex? Prey: *Pseudopanurgus andrenoides* (Sm.), *Augochlora pura* (Say), *Augochlorella striata* (Prov.), *Dialictus apertus* (Sandh.), *D. cressonii* (Robt.), *D. inconspicuus* (Sm.), *D. laevissimus* (Sm.), *D. tegularis* (Robt.), *D. versans* (Lov.), *D.* spp., *Evylaeus divergenoides* Mitch., *E. macoupinensis* (Robt.), *Halictus ligatus* Say.
Philanthus lepidus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 92. ♂.
Philanthus carolinensis Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 422. ♀.
Philanthus carolinensis var. *reductus* Banks, 1921. Ent. Soc. Amer., Ann. 14: 18. ♂, ♀.

Biology: Evans, 1964. Psyche 71: 142-149, 4 figs. (nest, prey, parasite ?).

levini Bohart. South. Calif.
Philanthus levini Bohart, 1972. Ent. Soc. Wash., Proc. 74: 398, fig. 2. ♂, ♀.

multimaculatus Cameron. Rocky Mt. States, Alta., B. C.; Mexico (Veracruz). Ecology: Nests in slopes or vertical banks of dry sandy soil or mixture of sand, earth and clay, makes up to 5 cells per nest, stores up to 8 small bees per cell. Parasite: *Dasymutilla dilucida* Mick.?; *Senotainia trilineata* (Wulp) complex? Prey: *Dialictus clematisellus* (Ellis), *D. microlepoides* (Ellis), *D. perparvus* (Ellis), *D. pruinosiformis* (Cwfd.), *D.* sp., *Sphecodes* spp.
Philanthus multimaculatus Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 133, pl. 8, fig. 14. ♂.
Philanthus anna Dunning, 1897. Ent. News 8: 68. ♂.
Philanthus multiannulatus Dalla Torre, 1897. Cat. Hym., v. 8, p. 488. Lapsus.
Philanthus cleomae Dunning, 1898. Canad. Ent. 30: 152. ♀.
Philanthus annae(!) Dunning, 1898. Canad. Ent. 30: 154.
Philanthus subversus Banks, 1915. Canad. Ent. 47: 405. ♀.
Philanthus yakima Banks, 1919. Canad. Ent. 51: 85. ♀.

Biology: Cazier and Mortenson, 1965. So. Calif. Acad. Sci., Bul. 64: 197-202, fig. 1 (nest, prey, parasites ?). —Alcock, 1975. Amer. Midland Nat. 93: 222-226, 2 figs. (nesting behavior). —Alcock, 1975. Anim. Behaviour 23: 889-895, 4 figs. (male territoriality and mating).

nasalis Bohart. Calif. (Contra Costa Co.).
Philanthus nasalis Bohart, 1972. Ent. Soc. Wash., Proc. 74: 401, figs. 5, 6. ♂, ♀.

neomexicanus Strandtmann. Calif., Ariz., N. Mex.
Philanthus neomexicanus Strandtmann, 1946. A Rev. of the N. Amer. Spp. of *Philanthus*, p. 51. ♂, ♀.

occidentalis Strandtmann. Calif.
Philanthus occidentalis Strandtmann, 1946. A Rev. of the N. Amer. Spp. of *Philanthus*, p. 64. ♂, ♀.

pacificus arizonae Dunning. Wyo. to Ariz. and Calif.; Mexico. Ecology: Nests in fine-grained alluvial sand, usually in a colony of only a few individuals, makes up to 3 cells per nest, and stores 8-15 quite small prey per nest. Parasite: *Senotainia trilineata* (Wulp)?, Prey: *Diplazon laetatorius* (F.); *Chelonus texanus* Cr.; Chrysididae sp.; *Stenodynerus valliceps* Boh.; *Diodontus ater* (Mick.), *D. gillettei* Fox. *D.* sp., *Passaloecus relativus* Fox, Pseninae sp.; *Solierella blaisdelli* (Bridw.); *Lindenius columbianus* (Kohl); *Hylaeus* sp.; *Perdita fallax* Ckll., *P. interserta ciliata* Timb.; *Dialictus incompletus* (Cwfd.), *D. laevissimus* (Sm.), *D. ruidosensis* (Ckll.), *D. tegulariformis* (Cwfd.), *D.* spp., *Dufourea scabricornis* Boh., *Evylaeus niger* (Vier.), *E. synthridis* (Ckll.), *E.* sp., *Halictus confusus* Sm., *H. ligatus* Say, *H. tripartitus* Ckll., *Sphecodes* spp.
Philanthus arizonae Dunning, 1898. Canad. Ent. 30: 155. ♂.
Anthophilus hirticeps Cameron, 1905. Amer. Ent. Soc., Trans. 31: 376. ♂.
Philanthus assimilis Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 422. ♀.

Biology: Powell and Chemsak, 1959. Kans. Ent. Soc., Jour. 32: 115-120 (nest, prey; misdet. as *politus pacificus* Cr.). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 501 (nest, prey, parasite ?; misdet. as *pacificus* Cr.).

pacificus pacificus Cresson. Nev.
Philanthus pacificus Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxxii. ♂.

politus Say. East. U. S. and southeast. Canada. Ecology: Nests in flat or slightly sloping, bare sandy soil, makes up to 4 cells per nest, stores 9-18 small bees per cell. Prey: *Hylaeus m. modestus* Say, *H. verticalis* (Cr.), *H. ziziae* (Robt.), *H.* sp.; *Calliopsis andreniformis* Sm.,; *Augochlorella aurata* (Sm.), *A. striata* (Prov.), *Dialictus albipennis* (Robt.), *D. cressoni* (Robt.), *D. imitatus* (Sm.), *D. lineatulus* (Cwfd.), *D. p. pilosus* (Sm.), *D.* spp., *Evylaeus macoupinensis* (Robt.), *Halictus c. confusus* Sm.
Philanthus politus Say, 1824. *In* Keating Narr. Long's 2nd Exped., v. 2, app., p. 343.
Philanthus dubius Cresson, 1865. Ent. Soc. Phila., Proc. 5: 96. ♂.
Philanthus texanus Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 422. ♀, ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 84, fig. 20 (larva).

Biology: Evans and Lin, 1959. Amer. Midland Nat. 17: 116-120, figs. 1, 2 (nest, prey transport).

psyche Dunning. Iowa to Tex., west to N. Mex., Utah, and Mont., Alta.; Mexico (Chihuahua).
Philanthus psyche Dunning, 1896. Ent. News 7: 287. ♀.
Philanthus punctinudus Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 144. ♂.
Philanthus hermosus Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 421. ♀.

pulcher Dalla Torre. Southwest. States, Wyo., Calif., Alta. Ecology: Nests in large, dense aggregations in hard-packed clay-loam, makes up to 6 cells per nest, stores 6-14 small to medium-sized prey per cell. Parasite: *Senotainia trilineata* (Wulp), *Phrosinella fulvicornis* Allen. Prey: *Scelio* sp.; *Chrysura pacifica* (Say), *Elampus viridicyaneus* Nort., *Hedychridium fletcheri* Bod., *Holopyga ventralis* (Say), *Omalus aeneus* (F.); *Ancistrocerus c. catskill* (Sauss.), *Stenodynerus papagorum* (Vier.), *Symmorphus canadensis* (Sauss.); *Diodontus argentinae* Roh., *D. gillettei* Fox, *D.* sp., *Mimesa unicincta* Cr., *Mimumesa mixta* (Fox), *Passaloecus cuspidatus* Sm., *P. relativus* Fox, *P.* sp.; *Plenoculus davisi* Fox, *Tachysphex aethiops* Cr., *T. nigrior* Fox, *T. tarsatus* (Say), *T.* sp., *Trypoxylon aldrichi* Sandh.; *Belomicrus forbesii* Robt., *Crabro florissantensis* Roh., *Ectemnius dives* (Lep. and Br.), *Lindenius columbianus* (Kohl), *Oxybelus uniglumis* (L.); *Dienoplus pictifrons* Fox; *Colletes nigrifrons* Tit., *Hylaeus basalis* (Sm.), *H. conspicuus* (Metz), *H. ellipticus* (Kby.); *Andrena melanochroa* Ckll., *Panurginus atriceps* (Cr.), *P. cressoniellus* Ckll., *Perdita wyomingensis* Ckll.; *Dialictus laevissimus* (Sm.), *D. ruidosensis* (Ckll.), *D.* spp., *Dufourea maura* (Cr.), *D. scabricornis* Boh., *Evylaeus niger* (Vier.), *Halictus confusus* Sm., *H. tripartitus* Ckll., *Sphecodes* spp.; *Formicapis clypeata* Slad., *Hoplitis producta* (Cr.), *Osmia pentstemonis* Ckll., *O.* spp., *Stelis lateralis* Cr.; *Nomada* spp.
Philanthus pulchellus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 93. ♂. Preocc.
Philanthus pulcher Dalla Torre, 1897. Cat. Hym., v. 8, p. 489. N. name.
Philanthus clarconis Viereck, 1906. Amer. Ent. Soc., Trans. 32: 206. ♀.

Biology: Evans, 1966. Great Basin Nat. 26: 35-38 (nest, prey, parasite). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 496-498 (nest, prey, parasites).

sanbornii Cresson. Ont., New England States south to N. J. and west to Man. and N. Mex. Ecology: Nests in small aggregations in flat sand covered with grass. Prey: *Agapostemon radiatus* (Say), *Lasioglossum forbesii* (Robt.); *Apis mellifera* L.; worker honeybees are the preferred prey.

Philanthus sanbornii Cresson, 1865. Ent. Soc. Phila., Proc. 5: 89. ♂, ♀.
Philanthus scutellaris Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxxiv. ♂.
Philanthus eurynome Fox, 1890. Ent. News 1: 107. ♀.
Philanthus trumani Dunning, 1897. Ent. News 8: 70. ♀.
Philanthus magdalenae Strandtmann, 1946. A Rev. of the N. Amer. Spp. of *Philanthus*, p. 39. ♀.

Biology: Evans, 1955. Brooklyn Ent. Soc. Bul. 50: 47 (nest, prey). —Evans and Lin, 1959. Amer. Midland Nat. 17: 128-129 (nest, prey).

schusteri Bohart. South. Calif.

Philanthus schusteri Bohart, 1972. Ent. Soc. Wash., Proc. 74: 402, fig. 4. ♂, ♀.

serrulatae Dunning. Southwest. States; Mexico (Sonora).

Philanthus serrulatae Dunning, 1898. Canad. Ent. 30: 154. ♀.

siouxensis Mickel. Great Plains and Rocky Mt. States; Mexico (Chihuahua, Coahuila).

Philanthus siouxensis Mickel, 1916. Amer. Ent. Soc., Trans. 42: 406. ♀.

solivagus Say. Northeast. States south to Va. and west to Wis., southeast. Canada. Ecology: Nests in flat to slightly sloping sand, makes up to 6 or more cells per nest, stores 6-14 prey per cell. Parasite: *Senotainia trilineata* (Wulp), *Phrosinella fulvicornis* Coq.? Prey: *Ancistrocerus c. catskill* (Sauss.), *A. c. albophaleratus* (Sauss.), *A. a. adiabatus* (Sauss.); *Ectemnius continuus* (F.), *E. lapidarius* (Panz.), *Lestica i. interrupta* (Lep. and Br.); *Colletes americanus* Cr.; *Andrena asteris* Robt., *A. nubecula* Sm., *A. solidaginis* Robt., *A. subaustralis* Ckll., *A.* spp.; *Agapostemon virescens* (F.), *Augochlora pura* (Say), *Augochlorella aurata* (Sm.), *A. striata* (Prov.), *Augochloropsis cuprea* (Sm.), *Dialictus euryceps* (Ellis), *D. lineatulus* (Cwfd.), *D. oblongus* (Lov.), *D. versans* (Lov.), *Halictus c. confusus* Sm., *H. ligatus* Say, *H. rubicundus* (Chr.), *Lasioglossum coriaceum* (Sm.), *L. leucozonium* (Schr.), *Sphecodes davisii* Robt.; bees are the preferred prey.

Philanthus solivagus Say, 1837. Boston Jour. Nat. Hist. 1: 383. ♂.
Philanthus solidagus(!) Howard, 1901. Insect Book, pl. 3, fig. 31.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 83, figs. 16-18 (larva).

Biology: Ristich, 1956. Ohio Jour. Sci. 56: 271-274 (parasite). —Evans and Lin, 1959. Amer. Midland Nat. 17: 120-124, figs. 6-8 (nest, prey, parasite).

tarsatus Smith. Colo., Nebr., Tex.

Philanthus tarsatus Smith, 1908. Nebr. Univ. Studies 8: 356. ♀.

ventilabris Fabricius. Generally distributed throughout the U. S. and south. Canada. Ecology: Nests in flat sand, makes accessory burrow, stores up to 8 bees per cell. Prey: *Perdita albipennis* Cr., *P.* sp.; *Dialictus inconspicuus* (Sm.), *D. microlepoides* (Ellis), *D. pruinosus* (Robt.), *D. versatus* (Robt.), *D.* spp., *Halictus ligatus* Say, *Lasioglossum sisymbrii* Ckll., *Nomia nevadensis arizonensis* Ckll.

Philanthus ventilabris Fabricius, 1798. Sup. Ent. System., p. 268.
Philanthus vertilabris(!) Fabricius, 1804. Systema Piezatorum, p. 303.
Philanthus frontalis Cresson, 1865. Ent. Soc. Phila., Proc. 5: 99. ♂. Preocc.
Liris rugosa Provancher, 1895. Nat. Canad. 22: 130. ♂.
Epiphilanthus ventralis(!) Ashmead, 1899. Canad. Ent. 31: 296.
Philanthus ventralis(!) Howard, 1901. Insect Book, pl. 3, fig. 33.
Philanthus vertilabris(!) var. *completus* Banks, 1915. Canad. Ent. 47: 406. ♂.

Biology: Peckham and Peckham, 1905. Wasps, social and solitary, pp. 166-167 (nest, prey). —Rau and Rau, 1918. Wasp studies afield, pp. 116-117 (nest, prey). —Evans and Lin, 1959. Amer. Midland Nat. 17: 127 (nest, prey). —Alcock, 1975. Kans. Ent. Soc., Jour. 48: 541, figs. 6-7 (male mating strategy). —Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 163-164, fig. 4 (nest, prey).

ventralis (Mickel). Pacific Coast States.
Ococlетes ventralis Mickel, 1918 (1917). Nebr. Univ. Studies 17: 328. ♀.
Philanthus strandtmanni Burks, 1951. *In* Muesebeck, U. S. Dept. Agr., Agr. Monog. 2: 1002. N. name proposed unnecessarily.

zebratus Cresson. N. Dak., Nebr. and Colo. west to B. C. and Calif. Ecology: Nests in coarse sandy loam, occasionally makes only one nest during a lifetime which may contain up to 17 cells, stores 3-9 large prey per cell. Parasite: *Senotainia trilineata* (Wulp), *Phrosinella pilosifrons* Allen. Prey: *Diphyus* sp., *Dusona* sp., *Eutanyacra* sp., *Ichneumon* sp., *Spilichneumon* sp.; *Ancistrocerus a. adiabatus* (Sauss.), *Euodynerus castigatus* (Sauss.), *Stenodynerus taos* (Cr.), *Symmorphus meridionalis* Vier.; *Pseudomasaris vespoides* Cr.; *Ammophila azteca* Cam., *A. dysmica* Menke, *A. mediata* Cr., *Palmodes carbo* Boh. and Menke, *Podalonia communis* (Cr.), *P. luctuosa* (Sm.); *Astata nubecula* Cr.; *Larropsis capax* (Fox), *Tachysphex aethiops* (Cr.), *T.* sp.; *Crabro latipes* Sm., *C. pleuralis* Fox, *Ectemnius* sp.; *Aphilanthops subfrigidus* Dunn., *Cerceris aequalis idahoensis* Scul., *Eucerceris fulvipes* Cr.
Philanthus zebratus Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxxiii. ♂.
Philanthus basilaris Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxxiii. ♂, ♀.
Ococlетes nitens Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 423. ♀.
Ococlетes(!) *illustris* Mickel, 1918 (1917). Nebr. Univ. Studies 17: 327. ♀.

Biology: Evans, 1966. Great Basin Nat. 26: 38-39, fig. 2 (nest, prey, parasites). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 499-500 (nest, prey, parasites).

Genus TRACHYPUS Klug

Trachypus Klug, 1810. Mag. Gesell. Naturf. Freunde Berlin 4: 41.
Type-species: *Trachypus Gomesii* Klug. Monotypic.
Simblephilus Dahlbom. 1844. Hym. Europaea, v. 1, p. 190.
Type-species: *Philanthus petiolatus* Spinola. Monotypic.
Philanthocephalus Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 86.
Type-species: *Philanthocephalus gracilis* Cameron. Desig. by Pate, 1937.

This small genus is essentially Neotropical, but one Mexican species occurs in southern Texas. These wasps also prey upon bees.

mexicanus Saussure. South. Tex.; Mexico to Costa Rica. Ecology: Nests in flat sand or limestone rubble, makes multicellular nest, stores up to 6 prey per cell. Prey: *Augochlora* sp., *Halictus hesperus* Sm.; *Exomalopsis* sp., *Melissodes* sp.
Trachypus Mexicanus Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 86. ♀.
Philanthocephalus mexicanus Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 89, pl. 6, figs. 5, 6. ♀, ♂. Preocc.
Trachypus annulitarsis Cameron, 1908. Amer. Ent. Soc., Trans. 34: 232. ♀.

Biology: Evans, 1964. Kans. Ent. Soc., Jour. 37: 303-304 (nest, prey).

Subfamily APHILANTHOPSINAE

Tribe APHILANTHOPSINI

This tribe occurs only in the Nearctic Region. Its members prey only upon ants, the more primitive *Aphilanthops* on winged queen ants. The other two genera prey upon harvester ant workers and have developed a complex mechanism at the apex of the abdomen which is used in prey transport.

Taxonomy: Bohart, 1966. Ent. Soc. Wash., Proc. 68: 158-167 (review of Nearctic spp.).

Biology: Evans, 1962. Behaviour 19: 239-260, 5 figs. (nesting behavior, prey carriage).

Genus APHILANTHOPS Patton

Aphilanthops Patton, 1881. Boston Soc. Nat. Hist., Proc. 20: 401.
Type-species: *Philanthus frigidus* Smith. Orig. desig.

Winged queen ants of the genus *Formica* are used as prey. The wasps dealate the queens before placing them in the brood cell.

Revision: Dunning, 1898. Amer. Ent. Soc. Trans. 25: 19-26.

foxi Dunning. South. Calif. deserts.
Aphilanthops foxi Dunning, 1898. Amer. Ent. Soc., Trans. 25: 21. ♂.

frigidus (Smith). Transcont., N. S., Que., Wyo. and Wash. south to Va., Mich., N. Mex., Utah and Calif. Ecology: Nests gregariously in pebbly sand, makes up to 4 or more cells per nest, stores 2-3 dealated queen ants per cell. Parasite: *Senotainia trilineata* (Wulp), *Euaraba tergata* (Coq.)? Prey: Winged queens of *Formica fusca* L., *F. pallidefulva nitidiventris* Em., *F. neogagates* Em.
Philanthus frigidus Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 475. ♂.
Aphilanthops bakeri Dunning, 1896. Canad. Ent. 28: 203. ♂.
Nomada (*Holonomada*) *dawsoni* Swenk, 1912. Nebr. Univ. Studies 12: 83. ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 81, figs. 1-10 (larva).

Biology: Peckham and Peckham, 1905. Wasps, social and solitary, pp. 167-177, 1 fig. (nest, prey). —Wheeler, 1913. Jour. Anim. Behavior 3: 374-387 (nest, prey). —Ristich, 1956. Ohio Jour. Sci. 56: 271-274 (parasite). —Evans, 1962. Behaviour 19: 240-245, fig. 1a (nest, prey carriage, parasite ?).

hispidus Fox. Ariz., south. Calif.; Mexico (Baja California).
Aphilanthops hispidus Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 106. ♂.

subfrigidus Dunning. N. Y., Colo., Wyo., Mont., Idaho, B. C., Wash., Oreg., Calif., Nev. Ecology: Nests in compacted soil. Parasite: *Senotainia trilineata* (Wulp)?, *Metopia argyrocephala* (Meig.)? Prey: Winged queens of *Formica neogagates* Em., *F. fusca* L. group. Predator: *Philanthus zebratus* Cr.
Aphilanthops subfrigidus Dunning, 1898. Amer. Ent. Soc., Trans. 25: 21. ♂, ♀.
Aphilanthops elsiae Dunning, 1898. Amer. Ent. Soc., Trans. 25: 23. ♀.

Biology: Evans, 1962. Behaviour 19: 245 (prey). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 496 (nest, prey, parasites ?).

Genus CLYPEADON Patton

Clypeadon Patton, 1897. Ent. News 8: 13.
Type-species: *Aphilanthops quadrinotatus* Ashmead. Orig. desig.

The eight known species occur in the western deserts of the Nearctic Region. Worker harvester ants of the genus *Pogonomyrmex* are used as prey, and each species apparently preys upon only one species of ant. The ant is transported to the nest in a special ant clamp formed by modification of the apex of the abdomen.

californicus (Bohart). Calif., Oreg.
Aphilanthops (*Clypeadon*) *californica* Bohart, 1959. Ent. Soc. Amer., Ann. 52: 108. ♂, ♀.

dreisbachi (Bohart). Tex., Okla., Colo.; Mexico (Zacatecas, Jalisco, Nayarit, Queretaro, San Luis Potosi). Prey: Worker ants, *Pogonomyrmex barbatus rugosus* Em.
Aphilanthops (*Clypeadon*) *dreisbachi* Bohart, 1959. Ent. Soc. Amer., Ann. 52: 107. ♂, ♀.

Biology: Evans, 1962. Behaviour 19: 249 (prey).

evansi Bohart. N. Mex., Ariz., Calif. Ecology: Nests in sand dune, makes up to 5 or more cells per nest, stores about 7-12 prey per cell. Parasite: *Senotainia trilineata* (Wulp). Prey: *Pogonomyrmex barbatus rugosus* Em. workers.
Clypeadon evansi Bohart, 1966. Ent. Soc. Wash., Proc. 68: 163. ♂, ♀.

Biology: Evans, 1962. Behaviour 19: 248-249, fig. 2 (nest, prey, parasite; det. as *Aphilanthops* (*Clypeadon*) sp. A). —Alcock and Gamboa, 1975. Ariz. Acad. Sci., Jour. 10: 162-163, fig. 3 (prey capture, nest).

haigi (Bohart). Ariz. to west. Tex. Ecology: Nests in small aggregations in sand dunes, makes up to 3 cells per nest, stores up to 14 prey per cell. Parasite: Miltogrammini sp.? Prey: *Pogonomyrmex barbatus rugosus* Em. workers.
Aphilanthops (*Clypeadon*) *haigi* Bohart, 1959. Ent. Soc. Amer., Ann. 52: 106. ♂, ♀.

Biology: Evans, 1962. Behaviour 19: 245-248, figs. 1b, 2, 3, 4b (nest, prey carriage, parasite ?).

laticinctus (Cresson). West. Tex. to east. and south. Calif., north to Colo., Idaho and Oreg.
Ecology: Nests in bare level sand, makes up to 3 cells per nest, stores 15-26 prey per cell. Parasite: *Senotainia* sp. near *trilineata* (Wulp). Prey: *Pogonomyrmex occidentalis* Cr. workers.
Philanthus laticinctus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 91. ♂.
Aphilanthops quadrinotatus Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 7. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 274-275, figs. 63-64 (larva).

Biology: Hicks, 1927. Canad. Ent. 59: 51-55 (nest, prey carriage, cocoon). —Hicks, 1933. Canad. Ent. 65: 141-144 (nest, prey). —Evans, 1962. Behaviour 19: 250-253 (nest, prey carriage, parasite).

sculleni (Bohart). Ariz., Colo., N. Mex., Tex.; Mexico (Chihuahua). Prey: Worker ants, *Pogonomyrmex maricopa barnesi* Sm.
Aphilanthops (*Clypeadon*) *sculleni* Bohart, 1959. Ent. Soc. Amer., Ann. 52: 107. ♂, ♀.

Biology: Evans, 1962. Behaviour 19: 250 (prey).

taurulus (Cockerell). Ariz., N. Mex., west. Tex. Prey: Workers of *Pogonomyrmex barbatus rugosus* Em.
Aphilanthops taurulus Cockerell, 1895. Amer. Ent. Soc., Trans. 22: 293. ♂.
Aphilanthops (*Clypeadon*) *phoenix* Pate, 1947. Pan-Pacific Ent. 23: 66. ♀.

Biology: Ainslie, 1909. Canad. Ent. 41: 99-100 (prey capture). —Alcock, 1975. Kans. Ent. Soc., Jour. 48: 538-541, fig. 5 (male mating strategy).

utahensis (Baker). Southwest. Tex., N. Mex., Ariz., Nev., Utah and south. Calif. in deserts; Mexico (Sonora, Queretaro). Prey: *Pogonomyrmex barbatus* (Sm.) workers.
Aphilanthops utahensis Baker, 1895. Canad. Ent 27: 335. ♂.
Aphilanthops concinnulus Cockerell, 1896. Canad. Ent. 28: 221. ♂.

Biology: Evans, 1962. Behaviour 19: 250, fig. 4c (prey).

Genus LISTROPYGIA Bohart

Aphilanthops subg. *Listropygia* Bohart, 1959. Ent. Soc. Amer., Ann. 52: 106.
Type-species: *Aphilanthops* (*Listropygia*) *bechteli* Bohart. Orig. desig.

Only one species is known in this genus. It has an ant clamp at the apex of the abdomen and preys upon worker harvester ants.

bechteli (Bohart). South. Calif., Ariz. Prey: Workers of *Pogonomyrmex californicus* Buck.
Aphilanthops (*Listropygia*) *bechteli* Bohart, 1959. Ent. Soc. Amer., Ann. 52: 106. ♂, ♀.

Biology: Evans, 1962. Behaviour 19: 253, figs. 4c, 5 (prey).

Subfamily CERCERINAE

This subfamily contains only two genera, *Cerceris* and *Eucerceris*. The former contains numerous species and occurs in all major zoogeographic regions. The latter genus has comparatively few species, occurs in the New World only as far south as Panama, and the majority of species are Nearctic. So far as known the New World species prey upon Coleoptera only as do most of the Old World species, but a few of the latter are known to prey upon bees, wasps and chalcidoids.

Biology: Scullen and Wold, 1969. Ent. Soc. Amer., Ann. 62: 209-214 (prey records of spp. in America north of Mexico). —Evans, 1971. Kans. Ent. Soc., Jour. 44: 518, 520-522 (notes on comparative behavior).

Genus CERCERIS Latreille

Cerceris Latreille, 1802-1803. Hist. Nat. Crust. Ins., v. 3, p. 367.
Type-species: *Philanthus ornatus* Fabricius. Desig. by Latreille, 1810 (=*Sphex rybyensis* Linnaeus).
Nectanebus Spinola, 1838. Soc. Ent. France, Ann. 7: 489.

Type-species: *Nectanebus Fischeri* Spinola. Orig. desig.

Diamma Dahlbom, 1844. Hym. Europaea. v. 1, p. 225. Preocc.
Type-species: *Diamma Spinolae* Dahlbom. Monotypic (=*Cerceris binodis* Spinola).

Didesmus Dahlbom, 1845. Hym. Europaea, v. 1, p. 502. N. name.

Apiraptrix Shestakov, 1923. Sbornik Jaroslav Gosudarst. Universitet., p. 101.
Type-species: *Sphex rybyensis* Linnaeus. Orig. desig.

Paracerceris Brethes, 1913. Mus. Nac. Hist. Nat. Buenos Aires, An. 24: 127.
Type-species: *Paracerceris tridentifera* Brethes. Monotypic.

Bucerceris Minkiewicz, 1934. Polski Pismo Ent. 12: 253.
Type-species: *Cerceris bupresticida* Dufour. Monotypic.

Stercobata Gussakovskij, 1935. Acad. Sci. U. R. S. S., Tadjikistan, Trav. 5: 445.
Type-species: *Cerceris bupresticida* Dufour. Monotypic.

Apicerceris Pate, 1937. Amer. Ent. Soc., Mem. 9: 8.
Type-species: *Sphex rybyensis* Linnaeus. Orig. desig.

Revision: Scullen, 1965. U. S. Natl. Mus., Proc. 116: 333-548, 182 figs. (spp. of America north of Mexico). —Scullen, 1972. Smithsn. Contrib. Zool. 110: 1-121, 173 figs. (Mexican and Central American spp.).

Taxonomy: Cresson, 1865. Ent. Soc. Phila., Proc. 5: 122-132 (spp. of N. Amer. north of Mexico). —Banks, 1912. Ent. Soc. Amer., Ann. 5: 11-30 (spp. of east. N. Amer.). —Banks, 1947. Psyche 54: 1-35 (West Coast spp.).

acanthophila Cockerell. Southwest. U. S.; Mexico (Baja California to Nuevo Leon, south to Hidalgo).
Cerceris acanthophila Cockerell, 1897. Entomologist 30: 135. ♂.
Cerceris cockerelli Viereck, 1903 (1902). Acad. Nat. Sci. Phila., Proc. 54: 731. ♂.
Cerceris (*Apiratrix*(!)) *huachuca* Banks, 1947. Psyche 54: 29. ♂.

aequalis aequalis Provancher. Principally Calif. and Oreg., but scattered records in Wash., Wyo., Utah, Ariz., N. Mex., Tex.
Cerceris aequalis Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 417. ♀.
Cerceris vicinoides Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 140. "♂" = ♀.
Cerceris psamathe Banks, 1912. Ent. Soc. Amer., Ann. 5: 21. ♀.

aequalis bolingeri Scullen. Oreg., Nev.
Cerceris aequalis bolingeri Scullen, 1965. U. S. Natl. Mus., Proc. 116: 453, figs. 64, 146a, b, c. ♀.

aequalis idahoensis Scullen. B. C. to Oreg., Idaho, Wyo., Colo. Predator: *Philanthus zebratus* Cr.
Cerceris aequalis idahoensis Scullen, 1965. U. S. Natl. Mus., Proc. 116: 454, figs. 65, 147a, b, c. ♀.

alceste Mickel. Nebr. (Mitchell).
Cerceris alceste Mickel, 1918 (1917). Nebr. Univ. Studies 17: 333. ♀.

argia Mickel. La., Tex. north to Kans. and Colo., west to Ariz.; Mexico (Chihuahua, Nuevo Leon, Jalisco).
Cerceris argia Mickel, 1916. Amer. Ent. Soc., Trans. 42: 412. ♀.

Taxonomy: Scullen, 1968. Ent. News 79: 158, figs. 5, 6. ♂.

arizonella Banks. Ariz. (Tempe).
Cerceris arizonella Banks, 1947. Psyche 54: 32. ♂.

astarte Banks. N. H. to N. C. west to Wis., Ill. and northeast. Tex.
Cerceris astarte Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 424. ♀.

atramontensis Banks. Que. to N. C. west to N. Dak. and centr. Tex. Ecology: Nests in woods in stony soil. Prey: *Conotrachelus anaglypticus* Say, *C. naso* LeC., *C. nenuphar* Hbst., *C. posticatus* Boh., *Hyperodes sparsus* Say.
Cerceris atramontensis Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 425. ♀.
Cerceris arbuscula Mickel, 1916. Amer. Ent. Soc., Trans. 42: 410. ♀.

Biology: Krombein, 1956. Brooklyn Ent. Soc., Bul. 51: 43 (nest, prey). —Evans, 1971. Kans. Ent. Soc., Jour. 44: 512-513 (nest, prey).

azteca Saussure. Ariz.; Mexico to Argentina.
Cerceris azteca Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 97. ♀.
Cerceris (Apiratrix(!)) seminigra Banks, 1947. Psyche 54: 33. ♂. Preocc.

banksi Scullen. Mass. to N. C., Ill., Mo., Kans.
Cerceris banksi Scullen, 1965. U. S. Natl. Mus., Proc. 116: 461, figs. 70, 152a, b, c. ♀.

bicornuta Guerin. Transcont. in U. S., Mass., Mich., S. Dak. and Oreg. south into Mexico (Coahuila, Chihuahua, Sonora, Baja California, Durango). Ecology: Nests in flat stony soil or sand, makes its own burrow or extends a pre-existing burrow. Parasite: *Senotainia kansensis* Tns.?; *Hedychrum violaceum* Br.? Prey: *Eupagoderes* sp., *Sphenophorus aequalis* Gyll., *S. criosus* (Oliv.), *S. cultellatus* (Horn), *S. maidis* (Chitt.), *S. marinus* (Chitt.), *S. parvulus* (Gyll.), *S. pertinax* (Oliv.), *S. venatus* (Say), *S. vestitus* (Chitt.), *S. zeae* (Walsh).
Cerceris bicornuta Guerin, 1844. Iconogr. Regne Anim., Ins., v. 7, p. 443. ♀.
Cerceris dufourii Guerin, 1844. Iconogr. Regne Anim., Ins., v. 7, p. 444. ♂.
Cerceris venator Cresson, 1865. Ent. Soc. Phila., Proc. 5: 116. ♂.
Cerceris curvicornis Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 124, pl. 8, fig. 3. ♂.
Cerceris fidelis Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 132. ♀.
Cerceris venatrix Schulz, 1906. Spolia Hym., p. 195. Emend.

Biology: Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 337-341, figs. 35, 36 (nest, prey, parasite ?). —Cartwright, 1929. S. C. Agr. Expt. Sta., Bul. 257: 31 (prey). —Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 311, fig. 8 (nest, prey). —Krombein, 1953. Ent. Soc. Wash., Proc. 55: 118-119 (nest, prey). —Krombein, 1960. Brooklyn Ent. Soc., Bul. 55: 75-76 (nest, prey, parasite ?). —Evans, 1971. Kans. Ent. Soc., Jour. 44: 513 (prey).

blakei Cresson. N. J. to Fla., west to east. Tex., Ill., Kans. Ecology: Makes vertical burrow in flat bare sand, makes 3 or more cells in a completed nest, stores 42-69 very small beetles, mostly weevils, per cell. Parasite: Miltogrammini sp. Prey: *Derolomus basalis* LeC. the most common prey, *Limnobaris confusa* (Boh.), *Anthonomus sexguttatus* Dietz, *Hyperodes* sp.; *Graphops floridana* Bl.; *Blapstinus interruptus* (Say).
Cerceris elegans Smith, 1856. Cat. Hym. Brit. Mus., v. 5, p. 467. ♂. Preocc.
Cerceris blakei Cresson, 1865. Ent. Soc. Phila., Proc. 5: 121. ♀.
Cerceris elegantissima Schletterer, 1887. Zool. Jahrb., Ztschr. f. System. 2: 490. N. name.

Biology: Krombein, 1963. Brooklyn Ent. Soc., Bul. 58: 72-79 (nest, prey capture and transport, parasite).

boharti Scullen. Ariz., N. Mex.; Mexico (Coahuila).
Cerceris boharti Scullen, 1965. U. S. Natl. Mus., Proc. 116: 466, figs. 73, 154a, b, c. ♀.

bolingeriana Krombein, n. name. Ariz. (Herford); Mexico (Durango).
Cerceris bolingeri Scullen, 1972. Smithsn. Contrib. Zool. 110: 72, figs. 68, 146a, b. ♀. Preocc.

bridwelli Scullen. South. Calif. and Ariz.; Mexico (Baja California, Sonora).
Cerceris bridwelli Scullen, 1965. U. S. Natl. Mus., Proc. 116: 361, figs. 5, 111a, b, c. ♀, ♂.

butleri Scullen. South. Ariz., southwest. Tex.; Mexico (Sonora).
Cerceris butleri Scullen, 1965. U. S. Natl. Mus., Proc. 116: 363, figs. 6, 112a, b, c. ♀.

californica Cresson. B. C. and Idaho south to Calif. and Ariz., N. Mex., west. Tex.; Mexico (Baja California to Nuevo Leon south to Queretaro). Parasite: *Dasymutilla coccineohirta* (Bl.); *Metopia argyrocephala* (Meig.), *Amobia floridensis* (Tns.) ?, *Senotainia trilineata* (Wulp) ? Prey: *Acmaeodera acuta* LeC., *A. adenostomae* Caz., *A. angelica* Fall, *A. coquilletti* Fall, *A. dohrni* Horn, *A. dolorosa* Fall, *A. fenyesi* Fall, *A. gemina* Horn, *A. hepburni* LeC., *A. holsteni* White, *A. jocosa* Fall, *A. nexa* Fall, *A. perlanosa* Timb., *A. plagiaticauda* Horn, *A. prorsa* Fall, *A. quadriseriata* Fall, *A. sinuata* Van Dyke, *Agrilus angelicus* Horn, *A. blandus* Horn, *A. politus* (Say), *Anthaxia aeneogaster* Cast., *Chrysobothris deleta* LeC., *C. lucana* Horn, *C. femorata* (Oliv.).
Cerceris californica Cresson, 1865. Ent. Soc. Phila., Proc. 5: 128. ♂.
Cerceris ferruginior Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 134. ♂.
Cerceris populorum Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 135. ♂.
Cerceris garciana Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 135. ♂.
Cerceris argyrotricha Rohwer, 1908. Canad. Ent. 40: 324. ♀.

Cerceris cognata Mickel, 1916. Amer. Ent. Soc., Trans. 42: 408. ♀.
Cerceris denticularis Banks, 1917. Mus. Comp. Zool., Bul. 61: 113. ♀, ♂.
Cerceris interjecta Banks, 1919. Canad. Ent. 51: 84. ♂.
Cerceris arno Banks, 1947. Psyche 54: 19. ♀.
Cerceris calodera Banks, 1947. Psyche 54: 22. ♂.
Cerceris illota Banks, 1947. Psyche 54: 23. ♂.
Cerceris isolde Banks, 1947. Psyche 54: 24. ♂.

Biology: Linsley and MacSwain, 1956. Ent. Soc. Amer., Ann. 49: 71-84, 3 figs. (nest, prey selection, parasites).

calochorti calochorti Rohwer. East slope of Rocky Mts., Alta. south to N. Mex. and Tex. Predator: *Philanthus zebratus* Cr.
Cerceris calochorti Rohwer, 1908. Canad. Ent. 40: 322. ♀.

calochorti hidalgo Scullen. Ariz. (Pima Co.); Mexico (Higher elevations south to Mexico City).
Cerceris calochorti hidalgo Scullen, 1972. Smithsn. Contrib. Zool. 110: 75, figs. 71, 149a-e. ♀, ♂.

carrizonensis Banks. Tex., (Uvalde).
Cerceris carrizonensis Banks, 1915. Canad. Ent. 47: 403. ♂.

chilopsidis Viereck and Cockerell. Southwest. desert area.
Cerceris chilopsidis Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 136. ♀.

cleomae Rohwer. Colo. (Denver).
Cerceris cleomae Rohwer, 1908. Canad. Ent. 40: 325. ♂.

clypeata clypeata Dahlbom. Maine and Ont. to N. Dak. south to north. Fla. and east Tex. Ecology: Nests in gravelly soil. Parasite: *Dasymutilla scaevola* (Bl.) ? Prey: *Chalepus dorsalis* Thunb., *Lema trilineata* (Oliv.); *Curculio nasicus* (Say), *Pissodes strobi* (Peck), *Tanymecus confusus* (Say).
Cerceris clypeata Dahlbom, 1844. Hym. Europaea, v. 1, pp. 221, 500. ♂, ♀.
Cerceris imitator Cresson, 1865. Ent. Soc. Phila., Proc. 5: 125. ♂. Preocc.
Cerceris imitatoria Schletterer, 1887. Zool. Jahrb., Ztschr. f. System. 2: 494. N. name.
Cerceris chryssipe Banks, 1912. Ent. Soc. Amer., Ann. 5: 18. ♀, ♂.
Cerceris clymene Banks, 1912. Ent. Soc. Amer., Ann. 5: 20. ♂, ♀.
Cerceris zobeide Brimley, 1929. Ent. News 40: 194. ♂.
Cerceris zosma Brimley, 1929. Ent. News 40: 195. ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 86, fig. 31 (larva).

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Surv., Bul. 2: 109-114 (nest, prey). —Krombein, 1954. Brooklyn Ent. Soc., Bul. 49: 6-7 (nest, prey). —Scullen, 1965. U. S. Natl. Mus., Proc. 116: 471 (prey).

clypeata dakotensis Banks. North cent. States.
Cerceris dakotensis Banks, 1915. Canad. Ent. 47: 402. ♀, ♂.

clypeata gnarina Banks. Cent. States.
Cerceris gnarina Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 237. ♀.

clypeata prominens Banks. East. States.
Cerceris prominens Banks, 1912. Ent. Soc. Amer., Ann. 5: 19. ♀, ♂.
Cerceris alaope Banks, 1912. Ent. Soc. Amer., Ann. 5: 22. ♂, ♀.

cochisi Scullen. South. Calif., Ariz., N. Mex., Tex.; Mexico (Baja California, Sonora, Zacatecas, San Luis Potosi, Nayarit).
Cerceris cochisi Scullen, 1965. U. S. Natl. Mus., Proc. 116: 416, fig. 39. ♀, ♂.
Cerceris cochise (!) Scullen, 1972. Smithsn. Contrib. Zool. 110: 42.

compacta Cresson. East. and cent. States southwest to south. Calif.; Mexico south to Veracruz and Oaxaca. Prey: *Colaspis brunnea* (F.).
Cerceris compacta Cresson, 1865. Ent. Soc. Phila., Proc. 5: 127. ♂, ♀.
Cerceris aureo-facialis Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 112. ♂.
Cerceris solidaginis Rohwer, 1908. Canad. Ent. 40: 323. ♂.
Cerceris belfragei Banks, 1917. Mus. Compar. Zool., Bul. 61: 114. ♀, ♂.

Biology: Scullen, 1965. U. S. Natl. Mus., Proc. 116: 420 (prey).

compar albinota Scullen. Southwest. Tex., south. Ariz.; Mexico (Chihuahua, Durango).
Cerceris compar albinota Scullen, 1972. Smithsn. Contrib. Zool. 110: 60, figs. 53, 137a-e. ♀, ♂.

compar compar Cresson. Maine to S. Dak., south to Fla. and N. Mex.; Mexico (Guanajuato).
Cerceris compar Cresson, 1865. Ent. Soc. Phila., Proc. 5: 126. ♂.
Cerceris jucunda Cresson, 1872. Amer. Ent. Soc., Trans. 4: 231. ♂.
Cerceris catawba Banks, 1912. Ent. Soc. Amer., Ann. 5: 25. ♀, ♂.
Cerceris jucunda var. *carolina* Banks, 1912. Ent. Soc. Amer., Ann. 5: 26. ♂.

compar geniculata Cameron. South. Ariz. to north. Guatemala.
Cerceris geniculata Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 113, pl. 7, fig. 7. ♀.
Cerceris feralis Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 113. ♂.

compar orestes Banks. South. Ariz. to cent. Mexico.
Cerceris orestes Banks, 1947. Psyche 54: 13. ♀, ♂.

completa Banks. Calif. and south. Oreg.
Cerceris completa Banks, 1919. Canad. Ent. 51: 83. ♂.
Cerceris grandis perena Scullen, 1965. U. S. Natl Mus., Proc. 116: 415, fig. 38. ♀.

conifrons Mickel. Alta., Nebr., Wyo., Utah, Nev., Calif. south to Ariz. and Tex.; Mexico (south to Zacatecas at higher elevations).
Cerceris conifrons Mickel, 1916. Amer. Ent. Soc., Trans. 42: 410. ♀.

convergens Viereck and Cockerell. B. C., Wash., Mont. and S. Dak. south to Calif. and Tex.; Mexico south to Morelos, Veracruz and Baja California.
Cerceris convergens Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 136. ♀.
Cerceris rinconis Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 137. ♀.
Cerceris hesperina Banks, 1917. Mus. Compar. Zool., Bul. 61: 115. ♀, ♂.
Cerceris pudorosa Mickel, 1918 (1917). Nebr. Univ. Studies 17: 338. ♀, ♂.
Cerceris snowi Banks, 1919. Canad. Ent. 51: 84. ♂.

crandalli Scullen. South. Ariz. to west. Tex.; Mexico (Baja California, Sinaloa, Chihuahua).
Cerceris crandalli Scullen, 1965. U. S. Natl. Mus., Proc. 116: 372, figs. 13, 116a, b, c. ♀, ♂.

Taxonomy: Scullen, 1968. Ent. News 79: 158, figs. 7, 8. ♂.

crotonella Viereck and Cockerell. N. Dak., Idaho and north. Calif. south to Ariz. and Tex.; Mexico (Chihuahua, Sonora). Prey: *Carpophilus pallipennis* (Say).
Cerceris crotonella Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 139. ♀.

Biology: Evans, 1971. Kans. Ent. Soc., Jour. 44: 510-511 (prey).

dentifrons Cresson. Maine to N. C., Ont., Mich., Wis., Minn., Iowa, S. Dak.
Cerceris dentifrons Cresson, 1865. Ent. Soc. Phila., Proc. 5: 124. ♀.

deserta Say. Northeast. and centr. States and Provinces, N. B. and Maine west to Alta. and Mont. south to N. C. and Colo. Prey: *Conotrachelus posticatus* Boh.
Cerceris deserta Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, app., p. 343. ♂.
Cerceris fulvipes Cresson, 1865. Ent. Soc. Phila., Proc. 5: 126. ♀. Preocc.
Cerceris fulvipediculata Schletterer, 1887. Zool. Jahrb., Ztschr. f. System. 2: 492. ♀. N. name.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Survey, Bul. 2: 115-116 (nest, prey transport).

dilatata chisosensis Scullen. South. Ariz., southwest. Tex.; Mexico (Chihuahua, Coahuila, Durango, Zacatecas).
Cerceris dilatata chisosensis Scullen, 1965. U. S. Natl. Mus., Proc. 116: 409, fig. 35. ♀, ♂.

dilatata dilatata Spinola. Ariz. to Argentina.
Cerceris dilatata Spinola, 1841. Soc. Ent. France, Ann. 10: 118. ♂.
Cerceris maximiliani Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 94. ♀.
Cerceris contracta Taschenberg, 1875. Ztschr. Gesam. Naturw. 45: 396. ♀.
Cerceris Caridei Holmberg, 1903. Mus. Nac. Buenos Aires, An. 9 (3): 478. ♀.
Cerceris Vigilii Brethes, 1910. Mus. Nac. Buenos Aires, An. 20 (3): 270. ♀.
Cerceris divisa Brethes, 1910. Mus. Nac. Buenos Aires, An. 20 (3): 270. ♂.
Cerceris olymponis Strand, 1910. Zool. Jahrb. 29: 140. ♀.
Cerceris semiatra Banks, 1947. Psyche 54: 25. ♂.

echo atrata Scullen. Maine, Mass., N. Y., N. J., Va., N. C., Ga., Wis., Ill., Kans. Ecology: Makes multicellular nest in flat, fine-grained sand, stores up to 30 prey per cell. Prey: *Olibrus neglectus* Casey, *O.* sp., *Phalacrus* sp.
Cerceris echo atrata Scullen, 1965. U. S. Natl. Mus., Proc. 116: 377, fig. 16. ♀.

Biology: Evans, 1971. Kans. Ent. Soc., Jour. 44: 509, figs. 6-7 (nest, prey).

echo echo Mickel. Iowa, N. Dak. to Tex., west to Idaho, north. Calif. and Ariz.; Mexico (Chihuahua, Coahuila, Durango, Zacatecas, Aguascalientes). Ecology: Nests in open sand. Prey: *Phalacrus* sp.
Cerceris echo Mickel, 1916. Amer. Ent. Soc., Trans. 42: 412. ♀.

Biology: Evans, 1971. Kans. Ent. Soc., Jour. 44: 509-510 (nest, prey).

femurrubrum Viereck and Cockerell. Colo. and west. Tex. to south. Calif.; Mexico (Baja California and Coahuila south to Puebla). Ecology: Nests in moist sand. Prey: *Eurymetopon rufipes* Esch., *Steriphanus* sp.
Cerceris femur-rubrum Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 135. ♂.
Cerceris thione Banks, 1947. Psyche 54: 18. ♂.
Cerceris athene Banks, 1947. Psyche 54: 20. ♀.
Cerceris femurrubra rossi Scullen, 1972. Smithsn. Contrib. Zool. 110: 56, fig. 50. ♀, ♂.

Biology: Wasbauer, 1957. Pan-Pacific Ent. 33: 131 (prey transport). —Alcock, 1974. Jour. Nat. Hist. 8: 650-651 (nest, prey).

finitima Cresson. Sask., transcont. in U. S., N. Y. to Fla. west to N. Dak., Wyo., Utah and Calif. south to Guatemala. Parasite: *Dasymutilla scaevola* (Bl.)? Prey: *Chaetocnema pulicaria* Melsh.
Cerceris finitima Cresson, 1865. Ent. Soc. Phila., Proc. 5: 122. ♀.
Cerceris finitima var. *nigroris* Banks, 1912. Ent. Soc. Amer., Ann. 5: 27. ♂.
Cerceris (*Apiatrix*(?)) *vierecki* Banks, 1947. Psyche 54: 30. ♀.
Cerceris finitima citrina Scullen, 1965. U. S. Natl. Mus., Proc. 116: 380, fig. 18. ♀, ♂.
Cerceris finitima morelos Scullen, 1972. Smithsn. Contrib. Zool. 110: 25, fig. 13. ♀, ♂.

Biology: Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 312, fig. 10 (nest, prey).

flavofasciata flavofasciata Smith. N. J. to N. C., Ill., Minn. and S. Dak. to Okla. Ecology: Nests in vertical sand banks. Parasite: *Dasymutilla nigripes* (F.). Prey: *Chlamisus* sp. probably *plicata* (F.), *Cryptocephalus mutabilis* Melsh., *C. notatus* F., *C. fulvipennis* Hald., *C. guttulatus* Oliv., *C.* sp. probably *quadrimaculatus* Say, *Bassareus clathratus* Melsh., *B.* sp. probably *sellatus* Suffr.
Cerceris flavofasciata Smith, 1908. Nebr. Univ. Studies 8: 364. ♀.
Cerceris natallenus Brimley, 1927. Ent. News 38: 238. ♀.

Biology: Krombein, 1959. Ent. Soc. Wash., Proc. 61: 197-198 (nest, prey, cocoon, parasite). —Scullen, 1965. U. S. Natl. Mus., Proc. 116: 422 (prey).

flavofasciata floridensis Banks. N. C. to Fla., Ala. Ecology: Nests in vertical face of sand pit, makes more than 2 cells per nest, stores 9-11 prey per cell. Prey: *Cryptocephalus bivius* Newm., *C. binominis* Newm., *C. guttulatus* Suffr., *Chlamisus* sp. probably *nodulosa* Blatch., *Coscinoptera dominicana* (F.).
Cerceris floridensis Banks, 1915. Canad. Ent. 47: 403. ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 276, figs. 68-70 (larva).

Biology: Krombein, 1964. Amer. Mus. Novitates 2201: 20-22 (nest, prey, life cycle).

frontata Say. Ill. and Iowa west to Calif., south to Tex. and Ariz.; Mexico (Baja California, Chihuahua, Coahuila, Durango). Ecology: Nests in flat, hard-packed sometimes stony soil, makes 3 or more cells per nest, stores 6 prey per cell. Parasite: *Parametopia* sp.?; *Exoprosopa fasciata* Macq.; *Hedychrum violaceum* Br.? Prey: *Cleonus pulvereus* (LeC.), *Eupagoderes* sp., *Lixus concavus* Say, *L. mucidus* LeC., *Thecesternus humeralis* (Say).
Cerceris frontata Say, 1823. West. Quart. Rptr. 2: 80. ♀.
Cerceis Texensis Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 89. ♀.
Cerceris occidentalis Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 100. ♀.
Cerceris raui Rohwer, 1920. U. S. Natl. Mus., Proc. 57: 230. ♀, ♂.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 277-278 (larva).

Biology: Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 325-337, figs. 30-34 (nest, prey, parasites ?). —Krombein, 1960. Brooklyn Ent. Soc., Bul. 55: 76-77 (nest, prey). —Scullen, 1965. U. S. Natl. Mus., Proc. 116: 482, pl. 1 (prey, mating).

fumipennis Say. U. S. east of Rocky Mts., Wyo., Minn., Mich. and N. H. south to N. Mex. and Fla. Ecology: Nests in hard-packed sand. Parasite: *Vidia* (*Crabrovidia*) sp.; *Phrosinella fumosa* Allen, *Senotainia trilineata* (Wulp)? Prey: *Acmaeodera pulchella* (Herbst), *Actenodes acoruis* (Say), *Agrilus abjectus* Horn, *A. anxius* Gory, *A. a. arcuatus* (Say), *A. a. fulgens* LeC., *A. a. torquatus* LeC., *A. b. bilineatus* (Weber), *A. b. carpini* Knull, *A. obsoletoguttatus* Gory, *A. politus* Say, *A. ruficollis* (F.), *A.* spp., *Brachus ovatus* Weber, *Buprestis consularis* Gory, *B. fasciata* F., *B. intricata* Casey, *B. lineata* F., *B. maculipennis* Gory, *B. rufipes* (Oliv.), *B. striata* F., *Chrysobothris adelpha* Germ., *C. azurea* LeC., *C. blanchardi* Horn, *C. breviloba* Fall, *C. dentipes* (Germ.), *C. femorata* (Oliv.), *C. floricola* Gory, *C. monticola* Fall, *C. purpureovittata* Horn, *C. sexsignata* (Say), *C. trinervia* (Kby.), *C. verdigripennis* Frost, *Cinyra gracilipes* (Melsh.), *Dicerca americana* (Hbst.), *D. caudata* LeC., *D. divaricata* (Say), *D. lurida* (F.), *D. obscura* (F.), *D. punctulata* (Schon.), *D. spreta* (Gory), *D. tuberculata* (Cast.), *Eupristocerus cogitans* (Weber), *Melanophila fulvoguttata* (Harr.), *Poecilonotus cyanipes* (Say); *Chlamisus* sp.; *Conotrachelus* sp.

Cerceris fumipennis Say, 1837. Boston Jour. Nat. Hist. 1: 381. ♂.
Cerceris cincta Dahlbom, 1844. Hym. Europaea, v. 1, p. 204. ♂.
Cerceris unicincta Taschenberg, 1875. Ztschr. Gesam. Naturw. Berlin 11: 397. ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 84, figs. 21-26 (larva).

Biology: Peckham and Peckham, 1900. Wis. Nat. Hist. Soc., Bul. 1: 90 (nest, prey transport). —Hartman, 1905. Tex. Univ. Bul. 65: 66 (prey). —Grossbeck, 1912. N. Y. Ent. Soc., Jour. 20: 135, 299. —Cartwright, 1931. Ent. News 42: 269 (nest, prey). —Krombein, 1958. Ent. Soc. Wash., Proc. 60: 110 (nest, prey). —Scullen, 1965. U. S. Natl. Mus., Proc. 116: 412-413 (prey). —Evans, 1971. Kans. Ent. Soc., Jour. 44: 501-508, figs. 1-5 (mating, nest, prey, cocoon, parasites).

Morphology: Snodgrass, 1941. Smithsn. Inst., Misc. Collect. 99 (14): pl. 21, figs. A-E (male genitalia).

gandarai Rohwer. Tex. (Brooks Co.); Mexico (Coahuila and Sinaloa south to Puebla and Veracruz).

Cerceris gandarai Rohwer, 1912. U. S. Natl. Mus., Proc. 41: 470, fig. 9. ♂.
Cerceris gandari(!) Scullen, 1972. Smithsn. Contrib. Zool. 110: 82. ♀, ♂.

grandis Banks. South. Calif. and Ariz.; Mexico (Baja California, Sonora).

Cerceris grandis Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 423. ♀.

graphica Smith. Ill., Nebr. to Tex. west to Utah, south. Calif. and south to northwest. South America. Ecology: Makes vertical burrow and multicellular nest in soil ranging from heavy to wind-blown sand, stores 3-10 prey per cell. Parasite: *Senotainia trilineata* (Wulp) complex?; *Nysson* sp.? Prey: *Eleodes opaca* (Say), *Metapoloba pruinosa* (Horn), Tenebrionidae sp.

Cerceris graphica Smith, 1873. Ann. and Mag. Nat. Hist. (4) 12: 410. ♀.
Cerceris hebes Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 124, pl. 8, fig. 4. ♂.
Cerceris macrosticta Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 133. ♂.
Cerceris ampla Banks, 1912. Ent. Soc. Amer., Ann. 5: 16. ♀, ♂.

Biology: Scullen, 1965. U. S. Natl. Mus., Proc. 116: 440 (prey). —Lin, 1967. Ent. Soc. Wash., Proc. 69: 312-317, 3 figs. (nest, prey transport). —Alcock, 1974. Jour. Nat. Hist. 8: 645-650, 7 figs. (nest, prey transport, parasites ?). —Alcock and Gamboa, 1975 (1974). Psyche 81: 528-533, 2 figs. (home ranges of males).

halone Banks. Man., N. Dak. east to N. H. south to Tex., Ark. and S. C. Parasite: *Hedychrum confusum* Buyss. Prey: *Curculio confusor* Ham., *C. nasicus* (Say), *C. proboscideus* F., *C. rectus* Say, *C. sulcatulus* (Casey).

Cerceris halone Banks, 1912. Ent. Soc. Amer., Ann. 5: 24. ♀.
Cerceris architis Mickel, 1916. Amer. Ent. Soc., Trans. 42: 409. ♀.
Cerceris alacris Mickel, 1918 (1917). Nebr. Univ. Studies 17: 334. ♀.
Cerceris salome Banks, 1923. Canad. Ent. 55: 21. ♀.

Cerceris shermani Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 200. ♀.

Biology: Abbott, 1928. Ent. News 39: 205-206 (nesting habits). —Krombein, 1958. U. S. Dept. Agr., Monog. 2, Sup. 1, p. 197 (prey). —Byers, 1962. Kans. Ent. Soc., Jour. 35: 317-321 (nest, prey carriage, parasite (misdet. as *H. violaceum* Br.)). —Scullen, 1965. U. S. Natl. Mus., Proc. 116: 484 (prey). —Evans, 1971. Kans. Ent. Soc., Jour. 44: 511-512, fig. 9 (nest, prey).

hurdi Scullen. Ariz. (Patagonia) south through Mexico to Nicaragua.
Cerceris hurdi Scullen, 1972. Smithsn. Contrib. Zool. 110: 48, figs. 40, 128. ♀, ♂.

insolita albida Scullen. Ariz., N. Mex., west. Tex.; Mexico (Veracruz).
Cerceris insolita albida Scullen, 1965. U. S. Natl. Mus., Proc. 116: 447, fig. 59. ♀, ♂.

insolita atrafemori Scullen. Ariz.; Mexico (Sinaloa, Nayarit).
Cerceris insolita atrafemori Scullen, 1965. U. S. Natl. Mus., Proc. 116: 448, figs. 6, 143a, b, ♀.

insolita insolita Cresson. N. J. to S. Dak. south to Fla. and Ariz.; Mexico (Chihuahua, Jalisco).
Ecology: Nests in flat, coarse-grained sand. Prey: *Rhabdopterus praetextus* (Say).
Cerceris insolita Cresson, 1865. Ent. Soc. Phila., Proc. 5: 129. ♂.
Cerceris intractibilis Mickel, 1916. Amer. Ent. Soc., Trans. 42: 411. ♀.

Biology: Krombein, 1964. Brooklyn Ent. Soc., Bul. 58: 119 (nest, prey).

irene Banks. Minn., Wyo., Colo., Kans., Okla., Tex., La.; Mexico (Tamaulipas).
Cerceris irene Banks, 1912. Ent. Soc. Amer., Ann. 5: 26. ♀.

kennicottii kennicottii Cresson. Md. to Fla. west to S. Dak., Colo., Tex.; Mexico (Jalisco, Morelos, Veracruz).
Cerceris kennicottii Cresson, 1865. Ent. Soc. Phila., Proc. 5: 128. ♂.
Cerceris eriogoni Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 139. ♂.

kennicottii zapoteca Saussure. South. Ariz. to west. Tex. south to Panama.
Cerceris Zapoteca Saussure, 1867. Reise d. novara, Zool., v. 2, Hym., p. 89. ♂.
Cerceris montivaga Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 119, pl. 7, fig. 16. ♀.
Cerceris kennicottii bealí Scullen, 1965. U. S. Natl. Mus., Proc. 116: 386, fig. 22. ♀, ♂.

krombeini Scullen. South. Ariz.
Cerceris krombeini Scullen, 1965. U. S. Natl. Mus., Proc. 116: 388, figs. 23, 122a, b, c. ♀, ♂.

macswaini Scullen. South. Calif. and Ariz.
Cerceris macswaini Scullen, 1965. U. S. Natl. Mus., Proc. 116: 485, figs. 84, 164a, b, c. ♀, ♂.

mandibularis Patton. N. Y. to Ga., W. Va. to Iowa south to Tenn. and La.
Cerceris mandibularis Patton, 1881. Boston Soc. Nat. Hist., Proc. 20: 403. ♀, ♂.

melanthe Banks. Que. to N. C. west to Ill., southwest to south. Ariz.
Cerceris melanthe Banks, 1947. Psyche 54: 21. ♀.
Cerceris nitida Banks, 1913. Amer. Mus. Nat. Hist., Bul. 32: 424. ♀, ♂. Preocc.

mimica Cresson. Fla. to Ariz., Kans.; Mexico (Nuevo Leon and Chihuahua south to Oaxaca).
Cerceris mimica Cresson, 1872. Amer. Ent. Soc., Trans. 4: 228. ♀, ♂.
Cerceris esau Schletterer, 1887. Zool. Jahrb., Ztschr. f. System. 2: 458. ♀.
Cerceris minima(!) Schletterer, 1887. Zool. Jahrb., Ztschr. f. System. 2: 497.
Cerceris englehardti Banks, 1947. Psyche 54: 12. ♂.

minax Mickel. West. U. S.
Cerceris minax Mickel, 1918 (1917). Nebr. Univ. Studies 17: 339. ♀, ♂.

morata Cresson. Nebr. to Tex. west to Utah and Ariz., south in Mexico to Oaxaca. Ecology: Makes multicellular nest in heavy soil, stores 59-67 prey per cell. Prey: *Rhyssomatus parvulus* Casey, Tachiinae probably *Sibinia* sp.
Cerceris morata Cresson, 1872. Amer. Ent. Soc., Trans. 4: 230. ♀.
Cerceris nasica Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 132. ♀.

Biology: Alcock, 1974. Jour. Nat. Hist. 8: 651 (nest, prey).

neahminax Scullen. N. Mex., Ariz., Utah.
Cerceris neahminax Scullen, 1965. U. S. Natl. Mus., Proc. 116: 390, figs. 24, 123a, b, c. ♀.

nebrascensis Smith. S. Dak., Nebr., Wyo., Colo.
Cerceris nebrascensis Smith, 1908. Nebr. Univ. Studies 8: 368. ♀.

nigrescens Smith. Que. to B. C. south to N. C., Tex. and Calif. Ecology: Nests in small aggregations in hard-packed, stony or sandy loam, stores up to 25 prey per cell. Parasite: *Senotainia trilineata* (Wulp)? Prey: *Calomycterus setarius* Roelofs, *Sitona scissifrons* (Say), *S. hispidula* (F.), *Hyperodes delumbis* Gyll., *Gymnetron antirrhini* Payk., *G.* sp.

Cerceris nigrescens Smith, 1856. Cat. Hym. Brit. Mus. 4: 466. ♀.
Cerceris arelate Banks, 1912. Ent. Soc. Amer., Ann. 5: 18. ♀.
Cerceris nigritulus Banks, 1915. Canad. Ent. 47: 402. ♂.
Cerceris munda Mickel, 1918 (1917). Nebr. Univ. Studies 17: 337. ♀, ♂.
Cerceris abbreviata Banks, 1919. Canad. Ent. 51: 84. ♂.
Cerceris crawfordi Brimley, 1928. Elisha Mitchell Sci. Soc., Jour. 43: 199. ♂.

Biology: Peckham and Peckham, 1898. Wis. Geol. Nat. Hist. Surv., Bul. 2: 116-117 (nest, prey). —Krombein, 1936. Ent. News 47: 94-95 (nest, prey, parasite ?). —Krombein, 1938. Ent. News 49: 1-3 (nest, prey). —Evans, 1971. Kans. Ent. Soc., Jour. 44: 512 (nest, prey).

occipitomaculata Packard. Minn. and S. Dak. to Tex., Colo., Ariz.; Mexico (Chihuahua).

Cerceris occipitomaculata Packard, 1866. Ent. Soc. Phila., Proc. 6: 62. ♂.
Cerceris fasciola Cresson, 1872. Amer. Ent. Soc., Trans. 4: 230. ♂.
Cerceris novomexicana Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 137. ♀.

parkeri Scullen. South. Tex. and Ariz., south in Mexico to Chiapas.

Cerceris parkeri Scullen, 1972. Smithsn. Contrib. Zool. 110: 35, figs. 22, 112. ♀, ♂.

poculum Scullen. South. Ariz., west. Tex.

Cerceris poculum Scullen, 1965. U. S. Natl. Mus., Proc. 116: 391, figs. 25, 124a, b, c. ♀.

posticata Banks. N. Mex. (Jemez Mts.).

Cerceris posticata Banks, 1916. Ent. News 27: 64. ♂.

rhois Rohwer. N. Mex. (White Mts.).

Cerceris rhois Rohwer, 1908. Canad. Ent. 40: 325. ♂.

robertsonii bifida Scullen. Va., N. C., Ga., Ind.

Cerceris robertsonii bifidus Scullen, 1965. U. S. Natl. Mus., Proc. 116: 428, figs. 45, 137a, b, c. ♀.

robertsonii emmiltosa Scullen. Fla., Ga. Ecology: Nests in slightly sloping, sparsely vegetated sand, makes more than 6 cells per nest, stores 6-14 prey per cell. Prey: *Colaspis favosa* Say, *Paria* sp.

Cerceris robertsonii emmiltosus Scullen, 1964. Ent. News 75: 144. ♀.

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 277 (larva).

Biology: Krombein, 1964. Amer. Mus. Novitates 2201: 22-23 (nest, prey).

robertsonii miltosa Scullen. Fla.

Cerceris robertsonii miltosus Scullen, 1965. U. S. Natl. Mus., Proc. 116: 429, fig. 47. ♀.

robertsonii robertsonii Fox. Que., Ont. to N. C. west to S. Dak. and Kans., Tex. Ecology: Nests in small aggregations in fine, firm sand to coarse sandy gravel, stores 8-12 prey per cell. Parasite: *Metopia argyrocephala* (Meig.), Miltogrammini sp. Prey: *Cryptocephalus notatus* F., *Pachybrachis dilatatus* Suffr., *Rhabdopterus picipes* (Oliv.), *Tymnes tricolor* F.

Cerceris robertsonii Fox, 1893. N. Y. Ent. Soc., Jour. 1: 55. ♀, ♂.
Cerceris austrina Fox, 1893. Psyche 6: 556. ♀, ♂.
Cerceris pleuralis Smith, 1908. Nebr. Univ. Studies 8: 366. ♂, ♀.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 86, figs. 27-30 (larva; described both as *nigrescens* Sm. and *robertsonii*). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 156-157 (larva).

Biology: Krombein, 1953 (1952). Wasmann Jour. Biol. 10: 288-294 (nest, prey, egg, life cycle, parasite). —Krombein, 1953. Ent. Soc. Wash., Proc. 55: 119-121 (nest, prey). —Evans, 1959. Amer. Ent. Soc., Trans. 85: 157 (prey). —Evans, 1971. Kans. Ent. Soc., Jour. 44: 511, fig. 8 (nest, prey).

rozeni Scullen. Fla. (Highlands Co.).

Cerceris rozeni Scullen, 1971. N. Y. Ent. Soc., Jour. 79: 130, 4 figs. ♀, ♂.

rubrata Bohart and Menke. Fla.
Cerceris rufa Scullen, 1965. U. S. Natl. Mus., Proc. 116: 449, fig. 61. ♀, ♂. Preocc.
Cerceris rubrata Bohart and Menke, 1976. Sphecid wasps of world, p. 586. N. name.

rufinoda Cresson. Md., Va., N. C., Ohio, N. Dak. to Tex. west to B. C., Calif.; Mexico (Durango, San Luis Potosi). Prey: *Miccotrogus picirostris* (F.), *Smicronyx squalidus* Casey.
Cerceris rufinoda Cresson, 1865. Ent. Soc. Phila., Proc. 5: 121. ♂.
Cerceris rufinoda var. *crucis* Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 139. ♀.

Biology: Strandtmann, 1945. Ent. Soc. Amer., Ann. 38: 311, fig. 9 (nest, prey). —Scullen, 1951. U. S. Dept. Agr., Monog. 2: 1010 (prey).

rufopicta Smith. Fla. to N. C.
Cerceris rufo-picta Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 467. ♂.

sandiegensis Scullen. South. Calif. to southwest. N. Mex.
Cerceris sandiegensis Scullen, 1965. U. S. Natl. Mus., Proc. 116: 432, fig. 49. ♀, ♂.

serripes (Fabricius). North America.
Vespa serripes Fabricius, 1781. Spec. Ins., v. 1, p. 46. ♀.

Taxonomy: Scullen, 1965. U. S. Natl. Mus., Proc. 116: 503 (notes on type).

sexta Say. Nebr., Wyo. and Utah south to N. Mex. and Ariz.
Cerceris sexta Say, 1837. Boston Jour. Nat. Hist. 1: 382. ♂.
Cerceris biungulata Cresson, 1865. Ent. Soc. Phila., Proc. 5: 118. ♀.
Cerceris orphne Banks, 1947. Psyche 54: 15. ♂.

sextoides Banks. B. C. to south. Calif., Idaho, Utah. Prey: *Sitona californica* Fahr., *Trigonoscuta pilosa* Motsch.
Cerceris sextoides Banks, 1947. Psyche 54: 10. ♀, ♂.
Cerceris eurymele Banks, 1947. Psyche 54: 11. ♀, ♂.

Taxonomy: Scullen, 1969. Ent. News 80: 283-284 (separation of *sextoides* and *tepaneca* Sauss.).

Biology: Scullen, 1965. U. S. Natl. Mus., Proc. 116: 510 (prey).

squamulifera Mickel. N. C., Ark., Nebr. to Tex.
Cerceris squamulifera Mickel, 1916. Amer. Ent. Soc., Trans. 42: 411. ♀.

Taxonomy: Scullen, 1968. Ent. News 79: 154-156, 4 figs. ♂.

stigmosalis Banks. Alta., B. C., Minn. to Mont. south to Tex.; Mexico (Sonora, Durango, San Luis Potosi, Mexico).
Cerceris stigmosalis Banks, 1916. Ent. News 27: 64. ♂.
Cerceris fugatrix Mickel, 1918 (1917). Nebr. Univ. Studies 17: 335. ♂.
Cerceris sayi Banks, 1923. Canad. Ent. 55: 21. ♀, ♂.
Cerceris stevensi Banks, 1923. Canad. Ent. 55: 22. ♀.

texana Scullen. Tex.
Cerceris texana Scullen, 1965. U. S. Natl. Mus., Proc. 116: 511, figs. 97, 177a, b, c. ♀.

tolteca Saussure. Ga., Fla., La., Okla., Ark., Tex., Ariz.; Mexico, Honduras.
Cerceris Tolteca Saussure, 1867. Reise d. Novara, Zool., v. 2, Hym., p. 94. ♀, ♂.
Cerceris cosmiocephala Cameron, 1904. Invertebrata Pacifica 1: 67. ♂.

townsendi Viereck and Cockerell. N. Mex. (Las Cruces).
Cerceris townsendi Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 140. ♀.

truncata Cameron. South. Tex, N. Mex., Ariz., south to Costa Rica. Ecology: Nests in large aggregation in hard-packed soil, stores up to 10 prey per cell. Prey: *Algarobius prosopis* (LeC.), *Mimosestes protractus* (Horn), *M. amicus* (Horn), *Neltumius arizonensis* (Schffr.).
Cerceris truncata Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 121, pl. 7, figs. 19, 20. ♀, ♂.

Biology: Werner, 1960. Psyche 67: 43-44 (nest, male activity, prey).

vanduzeei Banks. B. C. to Calif., Idaho, Utah.
Cerceris vanduzeei Banks, 1917. Mus. Compar. Zool., Bul. 61: 114. ♀.
Cerceris complanata Mickel, 1918 (1917). Nebr. Univ. Studies 17: 340. ♂, ♀.
Cerceris vanduzeei eburnea Scullen, 1965. U. S. Natl. Mus., Proc. 116: 399, fig. 30. ♀.

varians Mickel. Calif., Nev.; Mexico (Michoacan).
Cerceris varians Mickel, 1918 (1917). Nebr. Univ. Studies 17: 336. ♀, ♂.

veracruz veracruz Scullen. Tex. south in Mexico to Campeche. Another subsp. occurs in El Salvador.
Cerceris veracruz veracruz Scullen, 1972. Smithsn. Contrib. Zool. 110: 53, figs. 45, 132a-d. ♀, ♂.

verticalis Smith. N. C. to Fla. west to Kans. and Tex.; Mexico (Coahuila, Nuevo Leon, Tamaulipas).
Cerceris verticalis Smith, 1856. Cat. Hym. Brit. Mus., v. 4, p. 466. ♀.
Cerceris gnara Cresson, 1872. Amer. Ent. Soc., Trans. 4: 229. ♂.
Cerceris firma Cresson, 1872. Amer. Ent. Soc., Trans. 4: 229. ♀.

vicina Cresson. Nebr., Wyo., Colo., Kans., Tex.
Cerceris vicina Cresson, 1865. Ent. Soc. Phila., Proc. 5: 120. ♀.
Cerceris platyrhina Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 133. ♀.

wyomingensis Scullen. N. Dak., Wyo.
Cerceris wyomingensis Scullen, 1965. U. S. Natl. Mus., Proc. 116: 519, figs. 102, 182a, b, c. ♀.

zelica Banks. N. Y., Minn. and S. Dak. to N. C. and Tex.
Cerceris zelica Banks, 1912. Ent. Soc. Amer., Ann. 5: 23. ♂, ♀.

Genus EUCERCERIS Cresson

Eucerceris Cresson, 1865. Ent. Soc. Phila., Proc. 5: 104.
Type-species: *Eucerceris fulvipes* Cresson. Desig. by Pate, 1937.

Revision: Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 1-80, figs. 1-158e. —Scullen, 1968. U. S. Natl. Mus., Bul. 268: 1-97, figs. 1-98h.

Taxonomy: Scullen, 1948. Pan-Pacific Ent. 24: 155-180 (revised key).

angulata Rohwer. N. Mex., Ariz.; Mexico (Sonora, Baja California).
Eucerceris angulata Rohwer, 1912. Amer. Mus. Nat. Hist., Bul. 31: 326. ♀.

Taxonomy: Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 57. ♂.

arenaria Scullen. Southwest. Tex. to Calif., Nev., Colo.
Eucerceris arenaria Scullen, 1948 Pan-Pacific Ent. 24: 168. ♀, ♂.

Biology: Alcock, 1975. Kans. Ent. Soc., Jour. 48: 533-536, figs. 1, 3 (male mating strategy).

bitruncata Scullen. Tex., N. Mex., Ariz. Ecology: Nests in flat, stony soil, makes a multicellular nest, stores 39-41 small prey per cell; first progeny may transform to adults before mother completes nest. Prey: *Minyomerus languidus* Horn.
Eucerceris bitruncata Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 35. ♀.
Eucerceris triciliata Scullen, 1948. Pan-Pacific Ent. 24: 172. ♂. N. syn. (R. M. Bohart).

Taxonomy: Evans, 1964. Amer. Ent. Soc., Trans. 90: 278-279, figs. 71-73 (larva).

Biology: Krombein, 1960. Brooklyn Ent. Soc., Bul. 55: 77-79 (nest, prey, cocoon).

canaliculata (Say). Ark., S. Dak. and Mont. south to Tex. and Ariz., Calif.; Mexico (Baja California and Durango south to Hidalgo).
Philanthus canaliculatus Say, 1823. West Quart. Rptr. 2: 79. ♂.
Cerceris bidentata Say, 1823. West. Quart. Rptr. 2: 80. ♀. Preocc.
Cerceris cameroni Schulz, 1906. Spolia Hym., p. 194. N. name.
Eucerceris canaliculata var. *atronitida* Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 50. ♂, ♀.
Eucerceris biconica Scullen, 1948. Pan-Pacific Ent. 24: 178. ♀.

Biology: Alcock, 1975. Kans. Ent. Soc., Jour. 48: 536-538, figs. 2, 4 (male mating strategy).

conata Scullen. Nebr., Tex.
Eucerceris conata Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 34. ♀.
Eucerceris hespera Scullen, 1948. Pan-Pacific Ent. 24: 171. ♂.

elegans elegans Cresson. Nev., Calif.; Mexico (Baja California).
Eucerceris elegans Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxiii. ♂. Preocc. in *Cerceris*.
Cerceris nevadensis Dalla Torre, 1890. Wien. Ent. Ztg. 9: 200. N. name.

elegans ferruginosa Scullen. South. Calif.
Eucerceris ferruginosa Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 45. ♀.
Eucerceris mojavensis Scullen, 1968. U. S. Natl. Mus., Bul. 268: 44, figs. 26, 80a-c. ♂.

elegans monoensis Scullen. East. centr. Calif.
Eucerceris elegans monoensis Scullen, 1968. U. S. Natl. Mus., Bul. 268: 28, figs. 14, 69a-f. ♀, ♂.

flavocincta Cresson. Man. to B. C. south to N. Mex. and Calif. Ecology: Nests in hard stony soil, provides up to 7 cells per nest, stores 6-7 prey per cell. Parasite: *Hedychrum nigropilosum* Mocs.? Prey: *Dyslobus lecontei* Casey, *D. segnis* (LeC.), *D.* sp., *Panscopus aequalis* (Horn), *Peritaxia nigricollis* Horn.
Eucerceris flavocinctus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 109. ♀.
Eucerceris cingulatus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 110. ♂.
Eucerceris striareata Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 85. ♀.
Eucerceris chapmanae Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 86. ♂.

Taxonomy: Evans, 1957. Amer. Ent. Soc., Trans. 83: 88, figs. 32-35 (larva).

Biology: Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 12-14 (nest, prey, cocoon, male behavior). —Bohart and Powell, 1956. Pan-Pacific Ent. 32 143-144 (nest, prey, parasite ?). —Evans, 1970. Mus. Compar. Zool., Bul. 140: 502 (nest, prey).

fulvipes Cresson. Alta., Mont., S. Dak. to Wyo., south to Tex., Ariz. and south. Calif. Ecology: Nests in hard stony soil, makes more than 5 cells per nest, stores 12-18 prey per cell. Parasite: *Taxigramma heteroneura* (Meig.)?; *Hedychrum parvum* Aar.? Prey: *Brachyrhinus ovatus* L., *Ceutorhynchus punctiger* Gyll., *Hyperodes* sp. Predator: *Philanthus zebratus* Cr.
Eucerceris fulvipes Cresson, 1865. Ent. Soc. Phila., Proc. 5: 111. ♀, ♂. Preocc. in *Cerceris*.
Cerceris cressoni Schletterer, 1887. Zool. Jahrb., Ztschr. f. System. 2: 489. N. name.
Eucerceris flavipes(!) Ashmead, 1899. Canad. Ent. 31: 295. ♀.
Eucerceris simulatrix Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 87. ♂.

Biology: Evans, 1970. Mus. Compar. Zool., Bul. 140: 502 (nest, prey transport, parasites ?).

insignis Provancher. Nev., Calif.; Mexico (Baja California).
Eucerceris insignis Provancher, 1889. Addit. Corr. Faune Ent. Canada Hym., p. 418. ♂. Preocc. in *Cerceris*.
Cerceris provancheri Dalla Torre, 1890. Wien. Ent. Ztg. 9: 204. N. name.

lacunosa lacunosa Scullen. South. Ariz. to southwest. Tex.; Mexico (Chihuahua, Durango).
Eucerceris lacunosa Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 19. ♂.
Eucerceris arizonensis Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 20. ♀.

lacunosa sabinasae Scullen. South. Ariz.; Mexico (Coahuila).
Eucerceris lacunosa sabinasae Scullen, 1968. U. S. Natl. Mus., Bul. 268: 36, fig. 20. ♂, ♀.

melanovittata Scullen. South. Ariz., N. Mex., west. Tex.; Mexico (Nuevo Leon).
Eucerceris melanovittata Scullen, 1948. Pan-Pacific Ent. 24: 164. ♂.

mellea Scullen. Southwest. Tex., N. Mex.; Mexico (Chihuahua).
Eucerceris mellea Scullen, 1948. Pan-Pacific Ent. 24: 165. ♀, ♂.

montana Cresson. Mont., Utah to Kans., south to Ariz. and west. Tex., south in Mexico to Jalisco and San Luis Potosi.
Eucerceris montanus Cresson, 1882. Amer. Ent. Soc., Trans. 10: Proc., p. viii. ♀, ♂.
Cerceris sonorensis Cameron, 1891. Biol. Cent.-Amer., Hym., v. 2, p. 129, pl. 8, fig. 10. ♂.

morula albarenae Scullen. South. N. Mex., southwest. Tex.
Eucerceris morula albarenae Scullen, 1968. U. S. Natl. Mus., Bul. 268: 46, fig. 29. ♀, ♂.

morula morula Scullen. South. N. Mex., southwest. Tex.; Mexico (San Luis Potosi, Aguascalientes, Zacatecas, Queretaro, Hidalgo).
Eucerceris morula morula Scullen, 1968. U. S. Natl. Mus., Bul. 268: 49, figs. 30, 82a-f. ♀, ♂.

pimarum Cockerell and Rohwer. S. Dak. through Colo., Utah, Nev. to Calif. south to west. Tex. and Ariz.; Mexico (Chihuahua, Coahuila, Durango).
Eucerceris pimarum Cockerell and Rohwer, 1908. *In* Rohwer, Canad. Ent. 40: 326. ♀.
Eucerceris apicata Banks, 1915. Canad. Ent. 47: 404. ♂.

rubripes Cresson. Rocky Mts. to east. Nebr. and Kans., north to Canada and south to Tex. Prey: *Peritaxia* sp.
Eucerceris rubripes Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxiii. ♂.
Eucerceris unicornis Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 359. ♀.
Aphilanthops marginipennis Cameron, 1890. Biol. Cent.-Amer., Hym., v. 2, p. 105. ♂.

Biology: Scullen, 1968. U. S. Natl. Mus., Bul. 268: 56 (prey). —Alcock, 1975. Kans. Ent. Soc., Jour. 48: 538 (male mating strategy).

ruficeps Scullen. Cent. Calif., Nev. Ecology: Nests in hard-packed sand in abandoned burrows of the bee *Sphecodogastra aberrans* (Cwfd.), makes up to 5 or more cells per nest, stores 6-22 prey per cell. Parasite: Miltogrammini spp. Prey: *Dysticheus rotundicollis* Van Dyke, *Sitona californicus* Fahr.
Eucerceris ruficeps Scullen, 1948. Pan-Pacific Ent. 24: 175. ♀.

Biology: Linsley and MacSwain, 1954. Pan-Pacific Ent. 30: 11-14 (nest, prey, parasites).

similis Cresson. Oreg., Calif., Nev., south. Idaho, west. Wyo., Colo.
Eucerceris similis Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxiv. ♀, ♂.
Eucerceris barri Scullen, 1968. U. S. Natl. Mus., Bul. 268: 19, figs. 7, 65a-g. ♀, ♂.

sinuata Scullen. South centr. Tex.; Mexico (Nuevo Leon, Coahuila).
Eucerceris sinuata Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 47. ♀.

superba bicolor Cresson. Alta., Mont., N. Dak., S. Dak., Wyo. Prey: *Ophryastes sulcirostris* (Say), *O.* sp. in *sulcirostris-porosus* complex.
Eucerceris bicolor Cresson, 1881. Amer. Ent. Soc., Trans. 9: Proc., p. xxxviii. ♀. Preocc. in *Cerceris*.
Cerceris dichroa Dalla Torre, 1890. Wien. Ent. Ztg. 9: 199. ♀. N. name.

Biology: Scullen, 1939. Oreg. State Monog., Studies in Ent. 1: 40 (prey). —Scullen, 1968. U. S. Natl. Mus., Bul. 268: 66 (prey).

superba superba Cresson. Rocky Mts. east to N. Dak., S. Dak., Nebr., Kans.
Eucerceris superbus Cresson, 1865. Ent. Soc. Phila., Proc. 5: 108. ♂.
Eucerceris fulviceps Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxiii. ♀.
Eucerceris fulviceps var. *rhodops* Viereck and Cockerell, 1904. N. Y. Ent. Soc., Jour. 12: 88. ♀.

tricolor Cockerell. Ariz., N. Mex., west Tex.; Mexico (Chihuahua, Coahuila, Hidalgo, Zacatecas).
Eucerceris vittatifrons var. *tricolor* Cockerell, 1897. Entomologist 30: 136. ♂.

Biology: Alcock, 1975. Kans. Ent. Soc., Jour. 48: 538 (male mating strategy).

vittatifrons Cresson. Wash., Calif., Nev., Utah, Colo., Ariz., N. Mex., Oreg., Idaho.
Eucerceris vittatifrons Cresson, 1879. Amer. Ent. Soc., Trans. 7: Proc., p. xxiv. ♂.

zonata (Say). New England States, N. Y., Ont. west to N. Dak., north. centr. States west to Wyo. and Colo., Ark., Tex. Ecology: Makes multicellular nest of as many as 9 cells in fine-grained friable sand, stores 3-7 prey per cell. Prey: *Cleonus plumbeus* LeC.
Philanthus zonata Say, 1823. West. Quart. Rptr. 2: 80. ♂.
Eucerceris laticeps Cresson, 1865. Ent. Soc. Phila., Proc. 5: 107. ♂, ♀.

Taxonomy: Evans, 1971. Kans. Ent. Soc., Jour. 44: 517-518, figs. 15-21 (larva).

Biology: Evans, 1971. Kans. Ent. Soc., Jour. 44: 514-517, figs. 11, 13, 14 (nest, prey, egg, cocoon).

Superfamily APOIDEA

By Paul D. Hurd, Jr.

This superfamily contains the bees which, like many other aculeates, visit flowers for nectar. However, unlike nearly all other aculeates, the bees and most wasps of the Masaridae provide or feed their larvae with a mixture of pollen and nectar or, in some bees, the mixture is converted into glandular substances which are then fed to their larvae as well as to certain adults. It is presumed by many specialists that bees as a group evolved from flower-visiting wasps, most likely the sphecoid wasps (but possibly also other groups of aculeate wasps), by developing a dependence for food upon pollen and nectar (and sometimes other substances, such as plant oils) and thereby have abandoned the habit of provisioning their nests with insect or spider prey. It is not known when this dependency arose, but it could not have occurred before the advent of Angiosperms which did not begin to flourish until the latter half of the Cretaceous period and which then became the dominant flora of the earth by the Tertiary. In general, the evolution of the entomophilous flower has resulted in the replacement of a shallow, flat or bowl-shaped flower by a corolla-tube. The progressive increase in the depth of the corolla-tube conceivably has resulted from coevolutionary interactions between the flowers and entomophilous insects, especially bees, with progressively more elongated mouthparts. Although the earliest known fossils of bees (Tertiary) are insufficient to establish ancestral relationships with other aculeates or to demonstrate that the evolution of mouthparts proceeded from the short to the long-tongued condition, it is probably significant that this sequence is being corroborated by studies on the systematics, morphology, biology, behavior and biogeography of the contemporary bee fauna of the world. This fauna is at present considered to consist of eight families which in most current classifications are usually arranged phylogenetically as follows: Colletidae, Oxaeidae, Andrenidae, Halictidae, Melittidae, Megachilidae (including the Fideliinae), Anthophoridae and Apidae. Even though there is some and sometimes much variation in the length of the glossa within each of these families, the first five families listed above contain the so-called short-tongued bees while the remaining families consist of the so-called long-tongued bees. Although the short-tongued bees of only three families (Colletidae, Melittidae and Halictidae) are present on all continents, only the Colletidae are exceptionally diverse and well-represented on the southern continents, especially in Australia where other presumably ancient groups of plants and animals survive today. The glossa of the Colletidae, in addition to being normally short and bilobed, is also usually truncate and bifid and therefore is more wasp-like in structure than is the glossa of any other family of bees. Thus it is believed that the initial evolution of bees resulted in the development of short-tongued bees which radiated throughout the earth and this event was subsequently followed by the coevolution of the corolla-tube and the long-tongued bees which also have spread throughout the world. Consequently, the Colletidae are regarded by most specialists as representing the most primitive group of living bees. Most, but not all, authors believe that the Apoidea represent a monophyletic assem-

blage which evolved from a sphecoid ancestor. Brothers (1975) has concluded that the sphecoid wasps and bees belong to a single superfamily, the Sphecoidea, which according to him consists of two informal groups, the Spheciformes (8 families) and the Apiformes (9 families). However, Lanham (1960) has commented upon the similarities and differences of the Sphecoidea and Apoidea and points out that the presence or absence of the strigil on the hind leg long known to European hymenopterists may be of as much phylogenetic significance as other characters of presumably phylogenetic importance. The value of the strigil in these matters was employed by Boerner (1919) who divides the aculeate Hymenoptera into the Haplocnemata (ants, scolioid wasps, and bees) and the Diplocnemata (sphecoids, pompilids, and vespids) thereby indicating that bees are more closely related to the scolioids than to the sphecoid wasps. The phylogeny of the Aculeata deserves a more thorough study and reevaluation before we can dismiss the possibility that the Apoidea is a polyphyletic assemblage having been derived from both scolioid and sphecoid ancestors.

Most species of bees construct their nests in the ground usually excavating their own tunnels and cells, although many others appropriate preexisting burrows or other cavities in the ground and sometimes modify these to accomplish their needs. Still many others make their nests above ground. Among these are species that gnaw out their nesting tunnels in wood substrates of various kinds including hollow stemmed plants, while others appropriate a wide variety of preexisting cavities, such as abandoned beetle burrows, hollow trees, old mason wasp nests, old bird nests, empty snail shells and old insect galls, while still others make their nests of wax and other materials such as mud, resin, pebbles, pieces of leaves or petals, plant down, etc., and place their nests either in the open attaching them to branches and so forth or place their nests under eaves, bridges, rocks, cow chips and so on. As a consequence of these habits, many species of the families Megachilidae and Apidae readily accept artificial nesting devices (hives, trap-nests, etc.) which not only has made possible detailed studies of their biologies, but also has made possible the manipulation and management of several species, including the common honeybee, for use in the pollination of agricultural crops or for the production of honey and other useful products of value and benefit to mankind.

In nesting behavior the vast majority of bees are solitary including all members of the families Colletidae, Oxaeidae and Melittidae. Except for a few communal species, all members of the family Andrenidae also exhibit solitary nesting behavior. Similarly most species of the family Megachilidae are solitary in habit, although some nest communally (parasocial behavior) while some are quasisocial and possibly a few are even semisocial in their nesting behavior. Among the remaining three families (Halictidae, Anthophoridae and Apidae), the Halictidae and Anthophoridae, each represented by many solitary species, contain some parasocial and eusocial (primitively social) species as well as some subsocial species in the anthophorid tribe Ceratinini. While most species of the family Apidae live in perennial, highly eusocial colonies, others exhibit solitary, parasocial or primitively social nesting behavior.

Bees are exceptionally important pollinators of both native vegetation and many agricultural crops. Unquestionably bee-plant (bee-flower) relationships reflect various strategies on the part of both sets of participants and two of the most commonly recognized behavioral modes of pollen collection by bees are oligolecty and polylecty (see reviews by Grant, 1950; Linsley, 1958; and Baker and Hurd, 1968). The intrafloral relationships of bees not only involves their own survival and evolution, but also through coevolutionary interactions with flowers insures the maintenance and evolution of much of the earth's flora that depends upon entomophilous pollination for reproduction. These interrelationships are of unusual significance to us because we in turn depend upon the earth's flora for our own livelihood and welfare.

In America north of Mexico there are about 3,500 species of bees. This area represents nearly one-sixth of the earth's land surface and, disregarding ecological diversity, this means that the world fauna of bees approximates 21,000 species. Somewhat more than 2,700 of our species are pollen-collecting bees while slightly more than 700 species (or about 21%) are cleptoparasitic species. Only about 800 species of bees occur east of the Mississippi River and thus the apifauna of the larger and more ecologically diverse western portion of America north of Mexico is more than three times richer in species. Since it is well established that the apifaunas of arid regions are consistently much richer in species than any other climatic regions, it is not surprising that most of the North American species of bees are to be found in the southwestern United States and adjacent northern Mexico. All eight recognized families of bees are present in America north of Mexico and are represented by the following numbers of species: Colletidae (153), Ox-

aeidae (4), Andrenidae (1,199), Halictidae (506), Melittidae (30), Megachilidae (607), Anthophoridae (919), and Apidae (47). Among the largest genera in our fauna are: *Andrena* (511), *Perdita* (502), *Nomada* (286), *Dialictus* (189), *Osmia* (133), *Megachile* (114), *Triepeolus* (102), *Melissodes* (99), and *Colletes* (96). In all, our fauna consists of 121 genera of which 92 contain the pollen-collecting species. Several of our species are Holarctic in distribution and eight species, including the European honeybee, are of introduced origin.

The biology of the Apoidea including their behavior, intrafloral ecology, nesting habits, life histories, communication and the like has always fascinated and attracted much interest and study by the laity, the beekeeper and the specialist. An immense literature on these and related subjects has already accumulated and continues to develop so that it is becoming almost an impossibility to accomplish an in-depth bibliography of the Apoidea. For example, there are now more than 100,000 references to the European honeybee alone. Fortunately, the task is made easier by several literature information retrieval systems and especially by the International Bee Research Association, headquartered in England, which publishes the key abstracting journal on bees, *Apicultural Abstracts*, two key research journals in English, *Bee World* and the *Journal of Apicultural Research*, as well as comprehensive bibliographies (*I. B. R. A. Bibliographies*) on selected subjects pertaining to bees.

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Bot. 57: 716-728 (pollinating spp. of *Pedicularis* in Colo.). —Hurd, Linsley and Whitaker, 1971. Evolution 25: 218-234, 4 figs., 3 tables (squash and gourd bees and origin of cultivated *Cucurbita*). —Bohart, 1971. Tall timbers Conf. Ecol. Animal Contrib. Habitat Management, Proc., pp. 253-266, 9 figs. (management of habitats for native spp.). —Michener and Brothers, 1971. Kans. Ent. Soc., Jour. 44: 236-239, 4 figs. (observation nest for burrowing spp.). —Batra, 1972. Kans. Ent. Soc., Jour. 45: 208-218 (nest-building secretions). —Osgood, 1972. Maine life Sci. Agr. Expt. Sta. Tech. Bul. 59: 1-8 (nesting sites of native spp. associated with low-bush blueberries in Maine). —Bohart, 1972. Ann. Rev. Ent. 17: 287-312, 4 tables (management of native spp. for crop pollination). —Michener, 1972. Kans. Ent. Soc., Jour. 45: 373-376 (direct food transferring behavior). —Cruden, 1972. Evolution 26: 363-389 (pollination biology of *Nemophila menziesii* with comments on evolution of oligolectic bees). —Cruden, 1973. Amer. Jour. Botany 60: 802-809 (pollination of *Mirabilis*). —Thorp, 1973. Pan-Pacific Ent. 49: 89 (robber fly predation). —Batra, Batra and Bohart, 1973. Mycopath. Mycol. Appl. 49: 13-44 (mycoflora of domesticated and wild bees). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 1-80, 3 pls., 10 figs., 18 tables (comparative behavior of *Clarkia* visiting spp.). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 1-68, 6 pls., 15 figs., 10 tables (comparative behavior of *Camissonia* and *Oenothera* visiting spp. in cismontane Calif. and Baja California). —Vogel, 1973. Umschau 73 (22): 701-702 (collection of fatty oil from plants and its incorporation into larval food.). —Macior, 1973. Amer. Jour. Bot. 60: 863-871 (pollinating spp. of *Pedicularis* on Mt. Rainier). —Torchio, 1973. Kans. Ent. Soc., Jour. 46: 446-453, 1 fig., 4 tables (relative toxicity of insecticides to honeybee, alkali bee and alfalfa leafcutting bee). —Frankie, 1973. Ent. Soc. Amer., Ann. 66: 690-691, 1 fig. (field technique for marking bees). —Macior, 1974. Melanderia 15: 1-59 (pollinating spp. of Front Range of Colorado Rocky Mts.). —Cazier and Linsley, 1974. Amer. Mus. Novitates 2546: 1-20, figs. 1-6, tables

1-2 (foraging behavior of spp. visiting flowers of *Kallstroemia grandiflora*). —Jones and Buchman, 1974. Anim. Behaviour 22: 481-485, 2 tables (u. v. floral patterns as orientation guides). —Estes and Thorp, 1974. Torrey Bot. Club, Bul. 101: 272-276 (pollinating spp. visiting flowers of *Ludwigia peploides*). —Michener, 1974. The social behavior of the bees, xii and 404 pp., The Belknap Press of Harvard Univ. Press. —Michener and Brothers, 1974. Natl. Acad. Sci. U. S. A., Proc. 71: 671-674 (queen inhibitory behavior). —Macior, 1974. Missouri Bot. Garden, Ann. 61: 760-769, 21 figs. (coadaptation between flowers and pollinating spp.). —Moldenke and Neff, 1974. The bees of California: A catalogue with special relevance to pollination and ecological research, Origin and Structure of Ecosystems (IBP) Technical Rpts. 74-1 to 74-6, Calif. Univ. Santa Cruz. —Austin and Oliver, 1974. Arnold Arboreteum Harvard Univ., Jour. 55: 291-299 (pollinators of *Sisyrinchium solstitiale*, a Fla. endemic). —Bottema, 1975. Paleohistoria 17: 17-35, 9 figs., 7 tables (contamination of pollen spectra by burrowing bees in prehistoric settlements). —Cazier and Linsley, 1975. Pan-Pacific Ent. 51: 248-253, 6 figs., 2 tables (bee and wasp visitors to the flowers of *Kallstroemia grandiflora* after two years drought). —Thorp, Briggs, Estes and Erickson, 1975. Science 189: 476-478, 1 fig. (nectar flourescense and foraging efficiency of bees). —Estes and Thorp, 1975. Amer. Jour. Bot. 62: 148-159 (pollination of *Pyrrhopappus carolinianus*). —Thorp and Estes, 1975. Kans. Ent. Soc., Jour. 48: 175-184, 6 figs. (intrafloral behavior of bees on flowers of *Cassia fasciculata*). —Heinrich, 1975. Ann. Rev. Ecol. Syst. 6: 139-170 (energetics of pollination). —Heinrich, 1975. Evolution 29: 325-334, 4 figs., 2 tables (bee flowers). —Barrows, Bell and Michener, 1975. Natl. Acad. Sci. USA, Proc. 72: 2824-2828 (odor differences and their social function). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: iii and 74 pp., 18 figs., 15 tables (principal *Larrea* visiting spp. of southwest. U. S.). —Kevan, 1975. Biol. Conservation 7: 301-309, 1 fig., 4 tables (effect of fenitrothion on pollinators of lowbush blueberries). —Macior, 1975. Amer. Jour. Bot. 62: 1009-1016, 19 figs., 17 tables (pollination of *Delphinium tricorne*). —Macior, 1975. Amer. Jour. Bot. 62: 1065-1072, 21 figs., 7 tables (pollination ecology of *Pedicularis* in the Yukon Territory). —Evans, 1975. Ent. Soc. Amer., Ann. 68: 888-892, 6 figs., 3 tables (predation by *Philanthus albopilosus* Cress.). —Linsley, 1976. Pan-Pacific Ent. 52: 177-178 (defensive behavior of males about plants not visited by their females). —Bouseman, 1976. Pan-Pacific Ent. 52: 178-179 (predation by *Apiomerus crassipes*). —Iwata, 1976. Evolution of instinct, comparative ethology of Hymenoptera, 535 pp., Washington, D. C., Smithsonian Institution (behavior). —Erickson, Enns and Werner, 1976. Ent. Soc. Amer., Ann. 69: 959-970, 4 tables (bee-associated Meloidae). —Jander, 1976. Physiol. Ent. 1: 179-194, 8 figs., 2 tables (grooming and pollen manipulation). —McGregor, 1976. U. S. Dept. Agr., Agr. Handbook 496: 1-411, 196 figs. (pollination of cultivated crop plants). —Frankie, Opler and Bawa, 1976. Jour. Ecol. 64: 1049-1057, 1 fig., 4 tables (foraging behavior). —Rust and Clement, 1977. Kans. Ent. Soc., Jour. 50: 37-48, 5 figs., 4 tables (role in pollination of *Collinsia sparsiflora*).

Morphology: Braue, 1913. Jenaische Ztschr. Naturwiss. 50: 1-96 (pollen-collecting apparatus). —Stoeckhert, 1924. Arch. Naturgesch. (A) 90 (2): 109-131 (gynandromorphism). —Kuhn, 1927. Ztschr. vergleich. Physiol. 5: 762-800 (color vision). —Pessotzkaya, 1929. Soc. Nat. Leningrad. Trav. 59: 21-46 (gland apparatus in instinctive behavior). —Beck, 1933. Utah Acad. Sci., Proc. 10: 89-137, 8 pls. (male genitalia). —Michener, 1943. Pan-Pacific Ent. 19: 96-100 (homologies between male and female appendages). —Michener, 1944. Ent. Soc. Amer., Ann. 37: 336-351 (appendages of eighth and ninth abdominal segments). —Michener, 1944. Amer. Mus. Nat. Hist., Bul. 82: 158-225 (comparative external morphology). —Auclair and Jamieson, 1948. Science 108: 357-358 (amino acids in pollen collected by bees). —Wille, 1956. Kans. Univ. Sci. Bul. 38: 439-499 (thoracic musculature). —Wille, 1958. Ent. Soc. Amer., Ann. 51: 538-546, 24 figs. (dorsal vessel). —Altenkirch, 1962. Zool. Beitrag (n. f.) 7: 161-238 (abdomen). —Michener, 1965. Amer. Mus. Nat. Hist., Bul. 130: 27-32, figs. 2-17 (morphological terminology). —Cruz-Landim, 1967. Arq. Zool. S. Paulo 15: 177-290 (glands). —Rothenbuhler, Kulincevic and Kerr, 1968. Ann. Rev. Genetics 2: 413-438 (genetics). —Graf, 1968. Bol. Univ. Federal Parana, Zool. 3: 65-78 (salivary gland). —Stephen, Bohart and Torchio, 1969. Oreg. State Univ. Agr. Expt. Sta., pp. 3-31, figs. 1-112 (external morphology). —Tanabe, Tamaki and Nakamo, 1970. Japanese Jour. Genetics 45: 425-428 (variation in esterase isozymes). —Tulloch, 1970. Lipids 5: 247-258

(composition of beeswax). —Lello, 1971. Kans. Ent. Soc., Jour. 44: 5-20, 21 figs. (adnexal glands of sting apparatus). —Lello 1971. Ciencia e Cultura 23: 253-258 (adnexal glands of sting apparatus). —Wille, 1971. Rev. Biol. Tropical 18: 33-51 (musculature of salivary syringe and neck region). —Kerr, 1972. Kans. Ent. Soc., Jour. 45: 111-122, 20 figs. (chromosome numbers). —Almeida Correia, 1973. Faculdade Cienc. Porto Univ., An. 56: 67-175 (morphological and morphometric study of mouthparts of principal genera). —Almeida Correia, 1973. Inst. Zool. "Dr. Augusto Nobre" Facul. Cienc. Porto 118: 1-117, 8 pls. (mouthparts). —Cruz-Landim, 1973. Studia Ent. 16: 209-215, 2 figs., 1 table (thoracic salivary glands). —Iuga, 1973. Mus. Hist. Nat. "Grigore Antipa", Trav. 13: 203-226, 26 figs. (apical abdominal appendages). —Michener, 1974. The social behavior of the bees, Chapter 1: 3-19 (development, structure and function). —Snyder, 1975. Evolution 28: 687-689 (allozymic variability). —Pasteels and Pasteels, 1975. Arch. Biol., Bruxelles 86: 453-466, 13 figs. (stereoscan studies of pollen collecting scopae of Fideliidae). —Lello, 1976. Kans. Ent. Soc., Jour. 49: 85-99, 22 figs., 3 tables (adnexal glands of sting apparatus). —Pasteels and Pasteels, 1976. Arch. Biol., Bruxelles 87: 79-102, 25 figs. (stereoscan studies of pollen collecting scopae of Colletidae and Oxaeidae).

Family COLLETIDAE

This family differs from all other bees in that the females line their cells with a cellophane-like substance. The glossa is short, usually truncate or bifid, and this wasp-like feature is the primary basis for considering the Colletidae to be the most primitive family of living bees. Although the Colletidae are found throughout much of the world, the family is especially abundant and diverse in the southern hemisphere being exceptionally well represented in Australia by a large fauna consisting chiefly of the subfamilies Colletinae (Paracolletini), Euryglossinae and Hylaeinae.

In North America the family is represented by four subfamilies of which the nominate tribe of the Colletinae (*Colletes*) and the Hylaeinae (*Hylaeus*) comprise the largest assemblage of the family in America north of Mexico. Only a single species of the Paracolletini (*Eulonchopria punctatissima* Michener) is known to range north of Mexico into the United States (Arizona). The other two subfamilies present in North America are the Xeromelissinae and Diphaglossinae which occur only in the New World and are chiefly centered in the Neotropical Region. Representatives of these subfamilies have been found as far north as southern Mexico (Xeromelissinae) and the southern United States (Diphaglossinae).

While most of the species in America north of Mexico depend upon a comparatively wide variety of flowers for nectar and pollen, the females of a number of species of *Colletes* are either oligoleges or exhibit narrow polylectic tendencies.

Subfamily COLLETINAE

Tribe PARACOLLETINI

Genus EULONCHOPRIA Brethes

Eulonchopria Brethes, 1909. Mus. Nac. Buenos Aires, An. 19: 247.
Type-species: *Eulonchopria psaenythioides* Brethes. Monotypic.

punctatissima Michener. Southern Ariz.; Mexico (Guerrero). Pollen: Unknown, but visits flowers of *Acacia* and *Baccharis*.
Eulonchopria punctatissima Michener, 1963. Ent. Soc. Amer., Ann. 56: 847, fig. 1-2, 7-9. ♀, ♂.

Tribe COLLETINI

Genus COLLETES Latreille

Colletes Latreille, 1802. Hist. Nat. Fourmis, p. 423.
Type-species: *Apis succincta* Linnaeus. Monotypic.
Evodia Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 207.
Type-species: *Apis succincta* Linnaeus. Monotypic. (=*Apis calendarum* Panzer).
Colletes subg. *Rhinocolletes* Cockerell, 1910. Entomologist 43: 242.

Type-species: *Colletes nasutus* Smith. Monotypic.

Colletes subg. *Ptilopoda* Friese, 1921. Stettin. Ent. Ztg. 82: 83.
Type-species: *Colletes spiloptera* Cockerell. Monotypic. (=*Colletes maculipennis* Friese).

Colletes subg. *Denticolletes* Noskiewicz, 1936. Prace Nauk. Wydawnictwo Towarzystwa Nauk. Lwowie (2) 3: 486.
Type-species: *Colletes graeffei* Alfken. Monotypic.

Colletes subg. *Puncticolletes* Noskiewicz, 1936. Prace Nauk. Wydawnictwo Towarzystwa Nauk. Lwowie (2) 3: 490. Proposed without a type-species designation and therefore invalid under article 13b of International Rules of Zoological Nomenclature.

Several of the subgenera cited in the above synonymy are doubtless valid, but as the subgeneric groupings of *Colletes* have not been properly worked out they are listed as synonyms.

Some species are polytropic, others oligotropic. Several of the principally autumnal species have small vernal broods.

Revision: Stephen, 1954. Kans. Univ. Sci. Bul. 36: 149-527, 87 figs., 8 maps (U. S. spp.). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 24-59, figs. 7-10 (eastern U. S. spp.).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 20-22, figs. 1-3 (*Larrea* visiting spp.).

Species Group Productus

arizonensis Stephen. Ariz. mts.
Colletes arizonensis Stephen, 1954. Kans. Univ. Sci. Bul. 36: 204. ♂, ♀.

cercidii Timberlake. Calif., Ariz. Pollen: Unknown, but visits flowers of *Cercidium torreyanum*.
Colletes cercidii Timberlake, 1951. Wasmann Jour. Biol. 9: 198. ♂, ♀.

gilensis Cockerell. Colo., Tex., N. Mex., Ariz.; Mexico. Pollen: Unknown, but visits flowers of *Melilotus alba*, *Petalostemon candidus*, *P. flavescens*, *P. oligophyllus*, *Potentilla thurberi*, *Solidago canadensis*.
Colletes gilensis Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 41. ♂.

perileucus Cockerell. Calif., Ariz., Tex., Mexico. Pollen: Unknown, but visits flowers of *Melilotus alba*, *Prosopis glandulosa*.
Colletes perileucus Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 535. ♀.

productus Robertson. Mass., west to Wis., south to Ga. and Ala. Pollen: Unknown, but visits flowers of *Apocynum cannabinum*, *Batodendron*, *Rhus copallina*, *R. glabra*, *Xolisma ligustrina*.
Colletes producta Robertson, 1891. Amer. Ent. Soc., Trans. 18: 62. ♂.

rudis Timberlake. Calif. (near Indio). Pollen: Unknown, but visits flowers of *Encelia farinosa*.
Colletes rudis Timberlake, 1951. Wasmann Jour. Biol. 9: 197. ♂.

skinneri Viereck. Ariz., N. Mex.
Colletes skinneri Viereck, 1903. Amer. Ent. Soc., Trans. 29: 58. ♀, ♂.

vandykei Timberlake. Ariz. (Santa Rita Mts.).
Colletes vandykei Timberlake, 1951. Wasmann Jour. Biol. 9: 200. ♂.

Species Group Compactus

compactus compactus Cresson. N. S. to Ga., west to Wis., Mo., Colo., and Ariz. Parasite: *Epeolus pusillus* Cress., *Epeolus autumnalis* Robt.? Pollen: Compositae, especially flowers of Astereae; Heliantheae; Heleniеae.
Colletes compactus Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 166. ♀, ♂.

Biology: Rau and Rau, 1916. Anim. Behavior, Jour. 6: 367. —Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 37. —Rozen and Favreau, 1968. N. Y. Ent. Soc., Jour. 76: 106-111.

compactus hesperius Swenk. B. C., and Idaho south to Calif., Ariz.; Mexico.
Colletes hesperius Swenk, 1906. Ent. News 12: 257. ♀, ♂.

Species Group Latitarsis

latitarsis Robertson. Mich. to Fla., west to Mont., Colo., Tex., Ariz. Parasite: *Epeolus bifasciatus* Cresson? Pollen: Unknown, but visits flowers of *Asclepias incarnata, A. syriaca, Campanula americana, Ceanothus americanus, Cicuta maculata, Lycopus americanus, Medicago sativa, Melilotus alba, Passiflora lutea, Physalis lanceolata, P. subglabrata, P. virginiana, Polygonum hydropiperoides, Pycnanthemum flexuosum, Solidago, Symphoricarpos occidentalis, Trifolium.*

Colletes latitarsis Robertson, 1891. Amer. Ent. Soc., Trans. 18: 60. ♀, ♂.

punctipennis maurus Stephen. Tex. (Brownsville). The typical *punctipennis* Cresson occurs only in Mexico.

Colletes punctipennis maurus Stephen, 1954. Kans. Univ. Sci. Bul. 36: 232, fig. 11. ♂.

Species Group Simulans

angelicus Cockerell. Calif. Ecology: Possibly produces two generations annually. Pollen: Unknown, but visits predominantly fall blooming composites including but not restricted to *Baccharis emoryi, Gutierrezia sarothrae, Haplopappus venetus, H. vernonioides, Hemizonia paniculata.* Males and females have also been taken at the flowers of an unidentified *Eriogonum.*

Colletes angelicus Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 32. ♂.

birkmanni Swenk. Kans., Okla., Tex., N. Mex. Pollen: Unknown, but visits flowers of *Rhus microphylla.*

Colletes birkmanni Swenk, 1906. Ent. News 17: 259. ♀, ♂.

bryanti Timberlake. Ariz., N. Mex.

Colletes bryanti Timberlake, 1951. Wasmann Jour. Biol. 9: 208. ♂, ♀.

delodontus Viereck. N. Mex. Pollen: Unknown, but visits flowers of *Rorripa nasturtium.*

Colletes delodontus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 59. ♀.

eulophi Robertson. South. half of U. S., west to Colo. and Ariz. Parasite: *Epeolus minimus* (Robt.). Pollen: Unknown, but visits flowers of *Aster, Ceanothus fendleri, C. americanus, Chrysanthemum leucanthemum, Clematis, Eupatorium perfoliatum, Melilotus, Rubus, Solidago nemoralis, Sophia obtusa.*

Colletes eulophi Robertson, 1891. Amer. Ent. Soc., Trans. 18: 61. ♀, ♂.

Colletes illinoiensis Robertson, 1891. Amer. Ent. Soc., Trans. 18: 62. ♀.

fulgidus fulgidus Swenk. B. C., Mont., Alta., S. Dak. south to Tex. and Calif. Pollen: Unknown, but visits flowers of *Aster, Baccharis emoryi, Calochortus luteus, Chaenactis sterioides, Chrysothamnus, Clarkia, Coreopsis lanceolata, Cryptantha intermedia, Encelia farinosa, Erigeron, Eriogonum fasciculatum, E. latifolium nudum, Eriophyllum confertifolium, Grindelia, Gutierrezia californica, G. sarothrae, Haplopappus arborescens, H. parishii, H. vernonioides, Medicago sativa, Melilotus alba, Rhus laurina, Solidago multiradiata, Sphenosciadium capitellatum.*

Colletes fulgidus Swenk, 1904. *In* Viereck, Canad. Ent. 36: 95. ♀, ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1018, figs. 27, 30-33, 35 (larva).

fulgidus longiplumosus Stephen. Coastal north. Calif. and San Joaquin Valley. Parasite: *Epeolus* sp. A (Rozen). Pollen: Unknown, but visits flowers of *Armeria californica, Clarkia rubicunda, Convolvulus, Eriophyllum staechadifolium, Grindelia latifolia, Haploppapus, Layia, Solidago occidentalis.*

Colletes fulgidus longiplumosus Stephen, 1954. Kans. Univ. Sci. Bul. 36: 248. ♂, ♀.

kincaidii Cockerell. N. S. south to N. C. west to B. C., Calif., Ariz. Pollen: Unknown, but visits flowers of *Chamaenerion angustifolium, Eriogonum marifolium, E. subscaposum, Heracleum, Horkelia bernardina, Medicago sativa, Melilotus alba, Mentha arvensis, Penstemon, Potentilla, Solidago californica, S. confinis, Sphenosciadium capitellatum, Symphoricarpos.*

Colletes kincaidii Cockerell, 1898. Acad. Nat. Sci. Phila., Proc. 50: 52. ♀, ♂.

Colletes sieverti Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 424. ♂.

Colletes eulophi albertensis Cockerell, 1938. Canad. Ent. 70: 70. ♀.

Colletes stricklandi Cockerell, 1938. Canad. Ent. 70: 70. ♀.

louisae Cockerell. Tex. west to south. Calif.; Mexico. Pollen: Polylectic, produces two generations annually, the spring brood visits various Compositae (e.g., *Baileya, Encelia, Geraea, Lasthenia, Malacothrix*) and desert shrubs including *Agave, Cercidium* and *Larrea*. The autumnal brood obtains pollen exclusively from Compositae (e.g., *Chrysothamnus, Haplopappus, Lepidospartum*). Predator: *Philanthus gibbosus* (Fabr.).
Colletes louisae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 46. ♂.
Colletes tucsonensis Cockerell, 1906. Canad. Ent. 38: 163. ♂.

rufocinctus Cockerell. Minn. west to Alta., south to S. Dak., Colo., Ariz. Pollen: Polylege of Compositae including *Aster paniculatus, Grindelia squarrosa, Helianthus petiolaris, Solidago canadensis, S. rigida, Taraxacum vulgare.*
Colletes rufocinctus Cockerell, 1929. Ann. and Mag. Nat. Hist. (10) 4: 298. ♂.
Colletes truncatus Timberlake, 1943. Amer. Mus. Nat. Hist., Bul. 81: 396. ♀.

simulans armatus Patton. N. S. south to N. C., west to Nebr. and Alta. Pollen: Oligolege of autumnal flowering Compositae including *Aster ericoides, Baccharis, Bidens aristosa, Eupatorium, Solidago canadensis, S. graminifolia, S. nemoralis, S. ulmifolia*, but also visits *Cicuta maculata, Polygonum hydropiperoides* for nectar. Predator: *Philanthus albopilosus* Cress.
Colletes armata Patton, 1879. Boston Soc. Nat. Hist., Proc. 20: 143. ♀, ♂.
Colletes scitula Patton, 1879. Boston Soc. Nat. Hist., Proc. 20: 144. ♂.
Colletes spinosa Robertson, 1891. Amer. Ent. Soc., Trans. 18: 60. ♀, ♂.

Biology: Evans, 1975. Ent. Soc. Amer., Ann. 68: 891 (predator).

simulans miamiensis Mitchell. Fla. (Miami). Intergrades between *Colletes s. simulans* and *C. s. miamiensis* occur in Miss. and Tex. Pollen: Presumably oligolege of autumnal flowering Compositae, but has been collected only on one occasion at flowers of *Bidens pilosa.*
Colletes simulans miamiensis Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 236. ♂.

simulans nevadensis Swenk. B. C., Wash., Oreg., Calif., Nev., Utah. Pollen: Oligolege of autumnal flowering Compositae including *Baccharis emoryi, Chrysothamnus vicidiflorus, Gutierrezia californica, G. confinis, G. sarothrae, Haplopappus acradenius, H. bernardina, H. pinifolius, H. vernonioides, Lepidospartum squamatum, Solidago lucida*, but also visits *Eriogonum* and *Melilotus alba* for nectar.
Colletes nevadensis Swenk, 1908. Nebr. Univ., Dept. Ent. Contrib. 1: 52. ♂.

simulans simulans Cresson. Nebr. west to B. C., Colo., Ariz. Pollen: Oligolege of autumnal flowering Compositae including *Aster, Bigelovia wrightii, Grindelia, Senecio.*
Colletes simulans Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 168. ♂.
Colletes bigeloviae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 40. ♀.
Colletes brevispinosus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 62. ♀.
Colletes tegularis Swenk, 1905. Canad. Ent. 37: 304. ♀.
Colletes coloradensis Cockerell, 1933. Ent. Soc. Amer., Ann. 26: 41. ♂.

slevini Cockerell. B. C. to Wyo., south to Calif. and Ariz.; Mexico (Baja California). Pollen: Polylectic, visiting a wide variety of flowers including *Adenostoma fasciculatum, A. sparsifolium, Amorpha fruticosa, Aster, Baccharis pilularis, Bigelovia, Ceanothus integerrimus, C. palmeri, Chrysanthemum, Chrysothamnus pumilis, Cirsium, Eriogonum elatum, E. elongatum, E. fasciculatum, E. latifolium nudum, E. plumatella, E. subscaposum, E. wrightii, Euphorbia albomarginata, Fremontia californica, Gutierrezia californica, G. lucida, Haplopappus palmeri, H. pinifolius, H. vernonioides, Heteromeles arbutifolia, Lepidium virginicum, Malvastrum thurberi, Melilotus, Nolina, Phacelia frigida, Rhamnus californica, Rhus trilobata, Ribes roezlii, Solidago californica, Sphenosciadium capitellatum, Stephanomeria exigua.*
Colletes slevini Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 185. ♀.
Colletes eriogoni Cockerell, 1939. Pan-Pacific Ent. 15: 188. ♂, ♀.

trigonatus Cockerell. Colo.
Colletes trigonatus Cockerell, 1933. Ent. Soc. Amer., Ann. 26: 42. ♀.

utilis Cockerell. N. Mex.
Colletes utilis Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 39. ♀.

wootoni Cockerell. Tex., N. Mex., Ariz. Pollen: Polylectic, visits flowers of *Amorpha fruticosa, Dasylirion wheeleri, Helenium autumnale, H. laciniatum, Isocoma, Larrea tridentata, Melilotus alba, Nolium microcarpa, Phacelia, Petalostemon flavescens, Sapindus drummondi, Sphaeralcea laxa, Solidago occidentalis, Wislizenia refracta.*
Colletes wootoni Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 42. ♂.
Colletes apacheorum Timberlake, 1943. Amer. Mus. Nat. Hist., Bul. 81: 401. ♀.

Species Group Aestivalis

aestivalis Patton. Mass. south to N. C. west to Tenn., Ill. Parasite: *Epeolus interruptus* Robt.? Pollen: Unknown, but visits flowers of *Apocynum cannabinum, Heracleum lanatum, Heuchera americana, H. hispida, Krigia amplexicaulis, Polytaenia nuttallii, Rhus glabra, Ribes gracile, Rubus villosus, Taenidia integerrima, Zizia aurea.*
Colletes aestivalis Patton, 1879. Boston Soc. Nat. Hist., Proc. 20: 142. ♀.
Colletes heucherae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 61. ♀, ♂.

andrewsi Cockerell. Nebr., Colo., Wis., S. Dak., Man. Pollen: Apparently an oligolege of *Heuchera.*
Colletes Andrewsi Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 311. ♀.

Species Group Robertsonii

kansensis Stephen. Kans. Pollen: Unknown, but visits flowers of *Monarda punctata occidentalis.*
Colletes kansensis Stephen, 1954. Kans. Univ. Sci. Bul. 36: 297, fig. 29. ♂.

larreae Timberlake. South. Calif., Ariz. Pollen: Oligolege of *Larrea tridentata;* males also have been collected at flowers of *Acamptopappus sphaerocephalus, Barbarea orthoceras.*
Colletes larreae Timberlake, 1951. Wasmann Jour. Biol. 9: 193. ♂, ♀.

metzi Timberlake. Colo. (Boulder).
Colletes metzi Timberlake, 1951. Wasmann Jour. Biol. 9: 192. ♂.

robertsonii Dalla Torre. Ill. and Miss., west to Man., Colo., and N. Mex. Pollen: Unknown, but visits flowers of *Amorpha canescens, Monarda punctata occidentalis, Petalostemon candidus, P. purpureum, P. violaceus.*
Colletes punctata Robertson, 1891. Amer. Ent. Soc., Trans. 18: 92. ♂. Preocc.
Colletes robertsonii Dalla Torre, 1896. Cat. Hym., v. 10, p. 44. N. name.
Colletes robustus Swenk, 1904. Ent. News 15: 251. ♀, ♂.

timberlakei Stephen. Colo., Wyo. Pollen: Unknown, but visits flowers of *Petalostemon.*
Colletes timberlakei Stephen, 1954. Kans. Univ. Sci. Bul. 36: 290, fig. 31. ♂.

turgiventris Timberlake. Calif. Pollen: Unknown, but visits flowers of *Phacelia* including *P. hispida.*
Colletes turgiventris Timberlake, 1951. Wasmann Jour. Biol. 9: 196. ♂, ♀.

Species Group Nudus

brimleyi Mitchell. N. J., N. C., Ga., Fla. Pollen: Unknown, but visits flowers of *Ilex cassine.*
Colletes brimleyi Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 231, figs. 14, 15. ♀, ♂.

nudus Robertson. Ont. south to N. C. and La., west to Wis., Colo. Pollen: Unknown, but visits flowers of *Asclepias syriaca, Ceanothus, Daucus carota, Hydrangea arborescens, Melilotus alba, Monarda mollis, Parthenocissus, Pycnanthemum flexuosum, Rhus copallina, R. glabra, Symphoricarpos orbiculatus, S. vulgaris, Verbena urticifolia.*
Colletes nudus Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 43. ♀, ♂.
Colletes Vierecki Swenk, 1905. Canad. Ent. 37: 301. ♀.
Colletes hydrophilus Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 313. ♂.

Species Group Americanus

aberrans Cockerell. Mich., west to Alta., Colo., and N. Mex. Pollen: Unknown, but visits flowers of *Melilotus, Petalostemon flavescens, P. villosum.*
Colletes aberrans Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 44. ♀.

albescens Cresson. Wis. and Ill., west to Man., Utah, and N. Mex. Pollen: Unknown, but visits flowers of *Amorpha canescens, Petalostemon purpureum.*
Colletes albescens Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 168. ♀.

americanus Cresson. Que., Man. and United States east of Rocky Mts. Parasite: *Epeolus pusillus* Cress.? Pollen: Possibly oligolege of autumnal flowering Compositae, but has been collected from these and wide range of other plants including *Aster, Boltonia asteroides, Chrysopsis microcephala, Eupatorium altissimum, Gnaphalium polycephalum, Helianthus divaricatus, Lactuca floridana, Lespedeza virginica, Lycopus americanus, Polygonum hydropiperoides, P. scandens, Rudbeckia trilobata, Sium cicutaefolium, Solidago.* Predator: *Philanthus solivagus* Say.
Colletes americana Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 167. ♀, ♂.

annae annae Cockerell. N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Baccharis, Solidago canadensis arizonica.*
Colletes annae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 48. ♂.
Colletes crucis Cockerell, 1902. Ent. News 13: 304. ♂.
Colletes cockerelli Timberlake, 1951. Wasmann Jour. Biol. 9: 221. ♀.

annae disseptus Timberlake. South Calif.; Mexico (Baja Calif.). Pollen: Possibly oligolege of autumnal flowering Compositae including *Conium maculatum, Lepidospartum squamatum, Solidago.*
Colletes disseptus Timberlake, 1951. Wasmann Jour. Biol. 9: 223. ♀, ♂.

bradleyi Mitchell. N. J. (Chatsworth and Chesilhurst).
Colletes bradleyi Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 239. ♀.

gypsicolens Cockerell. B. C. to Calif., southeast to Colo. and N. Mex. Pollen: Possibly oligolege of autumnal flowering Compositae including *Aster, Chrysothamnus nauseosus, Haplopappus vernonioides.*
Colletes gypsicolens Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 47. ♂.

howardi Swenk. N. C. (Southern Pines). Parasite: *Epeolus howardi* Mitchell? Pollen: Unknown, but visits *Kuhnistera pinnata.*
Colletes howardi Swenk, 1925. Amer. Mus. Novitates 186: 5. ♀, ♂.

laticinctus Timberlake. Nebr. west to Idaho, south to N. Mex. and Ariz. Pollen: Unknown, but visits *Gutierrezia sarothrae, Pectis papposa, Polygonum.*
Colletes laticinctus Timberlake, 1951. Wasmann Jour. Biol. 9: 220. ♀.

mandibularis Smith. B. C., N. S., U. S., east of the Rocky Mts. Pollen: Unknown, but visits flowers of *Amorpha canadensis, Amphiachyris, Berlandiera subcaulis, Cassia fasciculata, Ceanothus, Cirsium, Erigeron quercifolius, E. ramosus, Flaveria linearis, Heterotheca subaxillaris, Isopappus divaricatus, Medicago sativa, Melilotus alba, M. indica, Prionopsis ciliata, Pycnanthemum flexuosum.*
Colletes mandibularis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 5. ♂.
Colletes similis Robertson, 1904. Canad. Ent. 36: 276. ♀. Preocc.
Colletes simulator Michener, 1951. *In* Muesebeck *et al.*, U. S. Dept. Agr., Agr. Monog. 2: 1048. N. name.

micheneri Stephen. Nebr. (Halsey).
Colletes micheneri Stephen, 1954. Kans. Univ. Sci. Bul. 36: 357. ♂, ♀.

mitchelli Stephen. U. S. east of Great Plains, except New England. Pollen: Unknown, but visits flowers of *Aster, Erigeron quercifolius, Haplopappus, Melilotus alba, Penstemon, Solidago.* It has also been collected at honey dew of *Phylloxera* on *Quercus alba.*
Colletes mitchelli Stephen, 1954. Kans. Univ. Sci. Bul. 36: 325, fig. 38. ♂, ♀.

ochraceus Swenk. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Eriogonum, Haplopappus vernonioides, Wislizenia refracta.*
Colletes ochraceus Swenk, 1906. Canad. Ent. 38: 42. ♀.

saritensis Stephen. Tex. (near Sarita). Pollen: Unknown, but visits flowers of *Dalea grisea.*
Colletes saritensis Stephen, 1954. Kans. Univ. Sci. Bul. 36: 341, fig. 43. ♂, ♀.

solidaginis Swenk. Mass. to Ga., west to Minn. and Nebr. Pollen: Unknown, but visits flowers of *Solidago.*
Colletes solidaginis Swenk, 1906. Canad. Ent. 38: 40. ♀, ♂.

susannae Swenk. Wis. and Ill., west to Colo. and Alta. Pollen: Unknown, but visits flowers of *Helianthus, Kuhnistera purpurea, Petalostemon purpureum, P. violaceus.*
Colletes susannae Swenk, 1925. Amer. Mus. Novitates 186: 1. ♀, ♂.

tectiventris Timberlake. Calif. Pollen: Possibly an oligolege of autumnal flowering Compositae, visiting flowers of *Eriogonum, Gutierrezia lucida* and *Haplopappus acradenius.*
Colletes tectiventris Timberlake, 1951. Wasmann Jour. Biol. 9: 218. ♀, ♂.

thysanellae Mitchell. Fla., Ga., N. C., Va. Pollen: Unknown, but visits flowers of *Aster, Baccharis, Eupatorium, Solidago,* and possibly *Thysanella.*
Colletes thysanellae Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 238, figs. 18-20. ♀, ♂.

wilmattae Cockerell. Wis., Minn., Iowa, Man., Nebr., Tex., N. Mex. Pollen: Possibly an oligolege of *Petalostemon* having been collected only at the flowers of *Petalostemon candidum, P. flavescens, P. oligophyllum.*
Colletes wilmattae Cockerell, 1904. Canad. Ent. 36: 14. ♀.

Species Group Hyalinus

banksi Swenk. Mich. and N. Y. south to Fla. Pollen: Unknown, but visits flowers of *Batodendron, Ilex glabra.*
Colletes banksi Swenk, 1908. Nebr. Univ., Dept. Ent. Contrib. 1: 19. ♀.
Colletes ilicis Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 234, figs. 12, 13. ♀, ♂.

distinctus Cresson. N. C., Ga., Fla. Pollen: Unknown, but visits flowers of *Hypericum, Ilex cassine, Melilotus alba.*
Colletes distinctus Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 167. ♂.
Colletes nitidus Smith, 1879. Descr. New Species Hym. Coll. Brit. Mus., p. 1. ♀, ♂.
Colletes carolinus Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 233. ♀.

hyalinus gaudialis Cockerell. South. Calif. Pollen: Unknown, but visits flowers of *Asclepias eriocarpa, Baccharis emoryi, Brassica, Eriogonum latifolium, Gutierrezia sarothrae, Haplopappus vernonioides, Heliotropium curassavicum, Hemizonia corymbosa, Melilotus alba, M. indica, Oenothera, Solidago.*
Colletes gandialis Cockerell, 1905. South. Calif. Acad. Sci. Bul. 4: 32.
Colletes gaudialis Cockerell, 1905. South. Calif. Acad. Sci. Bul. 4: 106. Emend.
Colletes arenicola Cockerell, 1926. Ann. and Mag. Nat. Hist. (9) 18: 626. ♀.

hyalinus hyalinus Provancher. N. S. and Maine, west to Alta., Yukon, Colo., and N. Mex. Pollen: Unknown, but visits flowers of *Achillea, Cirsium, Epilobium, Frasera, Kalmia, Melilotus, Rhus, Solidago.* Predator: *Philanthus albopilosus* Cress.
Colletes hyalinus Provancher, 1888. Addit. Corr. Fauna Ent. Canada, Hym. p. 303. ♀, ♂.
Colletes spurcus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 58. ♀, ♂.
Colletes fraserae Swenk, 1908. Nebr. Univ., Dept. Ent. Contrib. 1: 41. ♂.
Colletes cauponarius Cockerell, 1929. Ann. and Mag. Nat. Hist. (10) 4: 297. ♀.
Colletes nitidicaudus Cockerell, 1929. Ann. and Mag. Nat. Hist. (10) 4: 299. ♂.

Biology: Evans, 1975. Ent. Soc. Amer., Ann. 68: 891 (predator).

hyalinus oregonensis Timberlake. Coastal Oreg. and Calif. Pollen: Unknown, but visits flowers of *Achillea borealis arenicola, Armeria californica, Baccharis pilularis, Cakile edentula, Erigeron glaucus, Eriogonum, Polygonum paronychium, Potentilla, Silybum marianum.*
Colletes hyalinus oregonensis Timberlake, 1951. Wasmann Jour. Biol. 9: 211. ♀, ♂.

lutzi interior Timberlake. Northeast. Calif., Nev., Oreg., Wash., Idaho. Pollen: Unknown, but visits flowers of *Melilotus alba.*
Colletes monticola interior Timberlake, 1951. Wasmann Jour. Biol. 9: 214. ♀, ♂.

lutzi lutzi Timberlake. Idaho, Wyo., Utah, Colo., N. Mex. Pollen: Unknown, but visits flowers of *Chrysothamnus, Cleome serrulata, Melilotus.*
Colletes lutzi Timberlake, 1943. Amer. Mus. Nat. Hist., Bul. 81: 390. ♀, ♂.

lutzi monticola Timberlake. Calif. (Sierra Nevada Mts.). Pollen: Unknown, but visits flowers of *Allium, Aster adscendens, Castanopsis, Chrysothamnus, Hemizonia corymbosa, Solidago elongata.*
Colletes monticola monticola Timberlake, 1951. Wasmann Jour. Biol. 9: 212. ♀, ♂.
Colletes inyoensis Timberlake, 1951. Wasmann Jour. Biol. 9: 215. ♀.

lutzi pinorum Timberlake. South Calif. (San Bernardino and San Jacinto mts.). Pollen: Unknown, but visits flowers of *Aster, Cryptantha, Eriogonum molestum* var. *davidsonii, Gnaphalium thermale, Hemizonia wheeleri, Layia platyglossa.*
Colletes monticola pinorum Timberlake, 1951. Wasmann Jour. Biol. 9: 215. ♀, ♂.

phaceliae Cockerell. B. C. to Man., south to Iowa, Kans., N. Mex., Ariz., Calif. Pollen: Unknown, but visits flowers of *Aster, Cleome serrulata, Epilobium spicatum, Grindelia, Helenium lacinatum, Malvastrum coccineum, M. cockerelli, Melilotus alba, Petalostemon, Phacelia, Psoralea tenuiflora, Ribes, Senecio douglasii, Solidago, Sphenosciadium capitellatum, Tetradymia spinosa.*
Colletes phaceliae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 315. ♀.
Colletes salicicola geranii Cockerell, 1906. Canad. Ent. 38: 163. ♂.

Species Group Inaequalis

inaequalis Say. N. S. to Ga., west to Sask., Kans., Tex., Idaho and Wash. Parasite: *Tricrania sanguinipennis* Say. Pollen: Polylectic, visits flowers of *Acer, Aesculus glabra sargentii, Anemone virginiana, Arctostaphylos, Cercis canadensis, Claytonia palustris, Dendrium buxifolium, Dentaria, Lomatium foeniculaceum, Prunus, Pyrus ioensis, Rhamnus utilis, Rhus aromatica, R. canadensis, Ribes, Rubus, Salix, Spiraea vanhouttii, S. thunbergi, Taraxacum, Viburnum acerifolium.*
Colletes inaequalis Say, 1837. Boston Jour. Nat. Hist. 1: 391. ♀, ♂.
Colletes propinqua Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 165. ♀.
Colletes canadensis Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 166. ♂.
Colletes inaequalis ferrugineus Swenk, 1908. Nebr. Univ., Dept. Ent. Contrib. 1: 32. ♀, ♂.

Biology: Smith, 1898. Ent. News 9: 157 (as *compactus*). —Smith, 1900. N. Y. Ent. Soc., Jour. 8: 208 (as *compactus*). —Smith, 1901. N. Y. Ent. Soc., Jour. 9: 30 (as *compactus*). —Smith, 1901. N. Y. Ent. Soc., Jour. 9: 134. —Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 38. —Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 219. —Stephen, 1954. Kans. Univ. Sci. Bul. 36: 155.

thoracicus Smith. Mass. to Fla., west to Okla. and Tex. Parasite: *Tricrania sanguinipennis* Say. Pollen: Polylectic, visits flowers of *Amelanchier, Aronia, Brassica, Ilex, Malus, Melilotus, Padus, Prunus angustifolia, Salix, Vaccinium.*
Colletes thoracica Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 5. ♀, ♂.
Colletes rufithorax Swenk, 1906. Canad. Ent. 38: 42. ♀, ♂.
Colletes pulcher Swenk, 1906. Canad. Ent. 38: 43. ♂.

Biology: Parker and Boving, 1924. U. S. Natl. Mus., Proc. 64: 1-40. —Stephen, 1954. Kans. Univ. Sci. Bul. 36: 156.

validus Cresson. N. B. to N. C., west to Mich. Ecology: A vernal species of wet woods and swamplands. Pollen: Unknown, but visits flowers of *Chamaedaphne calyculata, Leucothoe racemosa, Prunus, Ribes oxyacanthoides, R. rubrum, Vaccinium, V. corymbosum.*
Colletes validus Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 165. ♀, ♂.

Species Group Impunctatus

impunctatus lacustris Swenk. N. B. and N. H. west to B. C., Yukon, N. W. T., Alaska. Pollen: Unknown, but possibly visits flowers of *Gaylussacia.* Typical *impunctatus* Nylander is Palaearctic.
Colletes lacustris Swenk, 1906. Ent. News 17: 257. ♀, ♂.
Colletes vicinalis Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1: 228. ♀.

Species Group Willistoni

brevicornis Robertson. United States east of Rocky Mts. Pollen: Unknown, but visits flowers of *Asclepias, Batodendron, Callirhoe involucrata, C. leiocarpa, Campanula, Crataegus, Melilotus alba, Opuntia, Pastinaca sativa, Psoralea onobrychis, Rubus, Specularia.*
Colletes brevicornis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 315. ♂.
Colletes opuntiae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 312. ♂, ♀.
Colletes brachyceros Graenicher, 1935. Ent. Soc. Amer., Ann. 28: 301. Preocc.

Taxonomy: Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 51. ♀.

willistoni Robertson. N. S. to Utah, south to Tex. and Fla. Pollen: Unknown, but visits flowers of *Ceanothus americanus, Melilotus alba, Monarda punctata occidentalis, Physalis elliottii, P. virginiana, Psoralea tenuiflora, Pycnanthemum flexuosum, Rhus glabra, Toxicodendron.* Predator: *Philanthus albopilosus* Cress.
Colletes Willistoni Robertson, 1891. Amer. Ent. Soc., Trans. 18: 60. ♀.

Taxonomy: Robertson, 1895. Amer. Ent. Soc., Trans. 22: 116. ♂.

Biology: Evans, 1975. Ent. Soc. Amer., Ann. 68: 891 (predator).

Species Group Consors

californicus Provancher. South. and Centr. Calif. Pollen: Possibly oligolege of *Phacelia,* visiting flowers of *Baccharis, Cryptantha intermedia, Layia platyglossa, Nemophila aurita, N. menziesii, Phacelia affinis, P. distans, P. tanacetifolia.*
Colletes californica Provancher, 1895. Nat. Canad. 22: 189. ♀, ♂.

chamaesarachae Cockerell. Ariz., N. Mex. Pollen: Unknown, but visits flowers of *Chamaesaracha coronopus.*
Colletes chamaesarachae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 49. ♀.

consors consors Cresson. Mont., Idaho, Wyo., Colo., Calif. (Mono Basin). Pollen: Possibly oligolege of Hydrophyllaceae, visiting flowers of *Hydrophyllum fendleri, Penstemon virens, Phacelia leucophylla, Taraxacum.*
Colletes consors Cresson, 1868. Boston Soc. Nat. Hist., Proc. 12: 168. ♂.
Colletes zonatus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 59. ♂.
Colletes myroni Cockerell, 1908. Entomologist 41: 293. ♀.

consors mesocopus Swenk. N. S. to N. W. T. south to Alta., Mass., Mich., Wis. Pollen: Unknown, but visits flowers of *Geranium, Kalmia, Rubus.*
Colletes mesocopus Swenk, 1907. Canad. Ent. 39: 364. ♀, ♂.

consors pascoensis Cockerell. B. C. and Idaho, south to Calif. and Utah. Pollen: Unknown, but visits flowers of *Nemophila aurita, Phacelia, Physalis, Sedum obtusatum.*
Colletes pascoensis Cockerell, 1898. Acad. Nat. Sci. Phila., Proc. 50: 51. ♂, ♀.

linsleyi Timberlake. Calif. (Blythe). Pollen: Unknown, but visits flowers of the introduced *Tamarix.*
Colletes linsleyi Timberlake, 1951. Wasmann Jour. Biol. 9: 205. ♀.

nigrifrons Titus. North Que. to N. W. T. and Yukon, south into mts. of northeast Calif., Ariz., and N. Mex. Pollen: Unknown, but visits flowers of *Arenaria nuttallii, Drymocallis fissa, Eriogonum lobbii, E. latifolium nudum, E. mariifolium, Linum lewisii, Mertensia sibirica, Oxytropis, Physalis, Polemonium, Potentilla anseriana, P. fruticosa, P. glandulosa, P. hippiana, Ranunculus, Spiraea densiflora.*
Colletes nigrifrons Titus, 1900. Canad. Ent. 32: 304. ♀.
Colletes polemonii Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 425. ♂.
Colletes florissantia Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 425. ♂.

nitescens Timberlake. Calif. Pollen: Unknown, but visits flowers of *Salix.*
Colletes nitescens Timberlake, 1951. Wasmann Jour. Biol. 9: 187. ♂, ♀.

paniscus mertensiae Timberlake. Calif. (Sierra Nevada and White mts.). Pollen: Unknown, but visits flowers of *Mertensia ciliata* var. *stomatechoides.*
Colletes paniscus mertensiae Timberlake, 1951. Wasmann Jour. Biol. 9: 182. ♂, ♀.

paniscus paniscus Viereck. Mont. and Wyo. south into mts. of Ariz., and N. Mex. Pollen: Unknown, but visits flowers of *Houstonia, Iris missouriensis, Mertensia franciscana, Salix.*
Colletes paniscus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 60. ♂.
Colletes oromontis Viereck, 1903. Amer. Ent. Soc., Trans. 29: 61. ♀.
Colletes pleuralis Swenk, 1906. Ent. News 17: 259. ♀, ♂.
Colletes grisescens Cockerell, 1930. Amer. Mus. Novitates 397: 4. ♂.

paniscus sculleni Timberlake. Wash. to Mont., south to Utah, Wyo., and Calif. Pollen: Unknown, but visits flowers of *Mertensia.*
Colletes paniscus sculleni Timberlake, 1951. Wasmann Jour. Biol. 9: 183. ♂, ♀.

scopiventer Swenk. Tex., Ariz. and South. Calif. Pollen: Unknown, but visits flowers of *Baccharis emoryi, Brodiaea, Chamaesaracha conioides, Solanum rostratum.*
Colletes scopiventer Swenk, 1908. Nebr. Univ., Dept. Ent. Contrib. 1: 46. ♀ (♂ misdet.).

sphaeralceae Timberlake. Calif., Ariz., Nev., Utah. Pollen: Apparently oligolege of *Sphaeralacea*, visiting flowers of *S. alata, S. ambigua, S. orcutti, S. rosacea.*
Colletes sphaeralceae Timberlake, 1951. Wasmann Jour. Biol. 9: 189. ♂, ♀.

swenki Stephen. Tex., Kans. Pollen: Unknown, but visits flowers of *Acacia greggii, Chamaesaracha conioides, Coreopsis douglasii, Marrubium vulgare, Prosopis glandulosa, Quincula lobata, Rhus microphylla.*
Colletes swenki Stephen, 1954. Kans. Univ. Sci. Bul. 36: 450, fig. 68. ♀, ♂.

texanus crawfordi Swenk. North. Tex. Pollen: Unknown, but visits flowers of *Physalis.*
Colletes crawfordi Swenk, 1906. Ent. News 17: 257. ♀.

texanus texanus Cresson. South. Tex.
Colletes texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 249. ♀.

wickhami Timberlake. Kans., Tex., N. Mex., Ariz., South. Calif. Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus, Helenium lacinatum, Phacelia popei, Quincula lobata.*
Colletes wickhami Timberlake, 1943. Amer. Mus. Nat. Hist., Bul. 81: 394. ♂.

xerophilus cismontanus Timberlake. Calif. (Hemet). Pollen: Unknown, but visits flowers of *Salix goodingii.*
Colletes cismontanus Timberlake, 1951. Wasmann Jour. Biol. 9: 186. ♂, ♀.

xerophilus sonoranus Timberlake. N. Mex. (Pecos). Pollen: Unknown, but visits flowers of *Salix.*
Colletes xerophilus sonoranus Timberlake, 1951. Wasmann Jour. Biol. 9: 186. ♀.

xerophilus xerophilus Timberlake. South. Calif. deserts. Pollen: Unknown, but visits flowers of *Salix.*
Colletes xerophilus xerophilus Timberlake, 1951. Wasmann Jour. Biol. 9: 184. ♂, ♀.

Species Group Intermixtus

bulbotibialis Stephen. N. Mex. (Belen).
Colletes bulbotibialis Stephen, 1954. Kans. Univ. Sci. Bul. 36: 458, fig. 71. ♂.

intermixtus Swenk. Tex., N. Mex., Colo., Ariz., south. Calif. Pollen: Unknown, but visits flowers of *Cotoneaster integerrimum, Eriogonum fasciculatum, Gnaphalium beneolens, Gutierrezia sarothrae, Haplopappus palmeri, Lippia, Physalis ixocarpa, Schinus molle, Solanum douglasii.*
Colletes intermixtus Swenk, 1905. Canad. Ent. 37: 302. ♀.
Colletes lippiarum Cockerell, 1909. Canad. Ent. 41: 394. ♀.

Species Group Ciliatus

beamerorum Stephen. Tex.; Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Monarda punctata coryi.*
Colletes beamerorum Stephen, 1954. Kans. Univ. Sci. Bul. 36: 465, fig. 73. ♂.

ciliatoides Stephen. Utah, Idaho. Parasite: *Epeolus pusillus* Cress. Pollen: Unknown, but visits flowers of *Cuscuta.*
Colletes ciliatoides Stephen, 1954. Kans. Univ. Sci. Bul. 36: 463, fig. 74. ♂.

Biology: Torchio, 1965. Kans. Ent. Soc., Jour. 38: 182-187.

ciliatus Patton. Va., Ill., Iowa, Nebr., Kans., Colo. Pollen: Unknown, but visits flowers of *Cuscuta, Eryngium yuccifolium.*
Colletes ciliata Patton, 1879. U. S. Geol. Geog. Survey Bul. 5: 369. ♀.
Colletes speciosa Robertson, 1891. Amer. Ent. Soc., Trans. 18: 62. ♀.
Colletes brevihirtus Timberlake, 1943. Amer. Mus. Nat. Hist., Bul. 81: 395. ♂.

Species Group Daleae

algarobiae Cockerell. Tex., N. Mex., Utah, Ariz., south Calif.; north. Mexico; deserts. Pollen: Apparently oligolege of *Prosopis* including *P. glandulosa*, *P. pubescens*, but also visits flowers of *Cercidium torreyanum*, *Dalea*, *Eriogonum*, *Melilotus*, *Rhus*.
Colletes algarobiae Cockerell, 1900. Entomologist 33: 244. ♂, ♀.

clypeonitens Swenk. South Calif., Ariz., Nev., Utah, west. Tex. Parasite: *Epeolus mesillae* (Ckll.). Pollen: Oligolege of *Larrea tridentata*, but also visits flowers of *Cercidium floridum*, *Dalea polyadenia*.
Colletes clypeonitens Swenk, 1906. Canad. Ent. 38: 39. ♀.

covilleae Timberlake. South. Calif., Ariz.; Mexico (Baja Calif.). Pollen: Apparently oligolege of *Larrea tridentata*.
Colletes covilleae Timberlake, 1951. Wasmann Jour. Biol. 9: 231. ♂, ♀.

daleae Cockerell. Utah, Tex. to Calif.; Mexico (Baja Calif.). Pollen: Unknown, but visits flowers of *Dalea scoparia*, *Eriogonum fasciculatum*, *E. gracilentum*, *Prosopis*, *Rhus laurina*.
Colletes daleae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 43. ♂.

deserticola Timberlake. N. Mex., Ariz., Calif.; Mexico (Baja Calif.). Parasite: *Epeolus pusillus* Cress. Pollen: Apparently oligolege of *Prosopis*, including *P. glandulosa*, but also visits flowers of *Melilotus indica*.
Colletes deserticola Timberlake, 1951. Wasmann Jour. Biol. 9: 232. ♂, ♀.

petalostemonis Swenk. N. Dak. and Nebr. to Alta., Ariz., and Calif. Pollen: Unknown, but visits flowers of *Dalea polyadenia*, *Melilotus alba*, *Petalostemon flavescens*.
Colletes petalostemonis Swenk, 1906. Canad. Ent. 38: 40. ♀, ♂.

prosopidis Cockerell. Tex., N. Mex., south. Calif.; north. Mexico; deserts. Pollen: Apparently oligolege of *Prosopis*, including *P. glandulosa* var. *torreyanum*, but also visits flowers of *Melilotus indica*.
Colletes prosopidis Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 46. ♂.

salicicola Cockerell. Tex. to south. Calif., deserts. Pollen: Polylege of a wide variety of plants, including *Acacia*, *Cercidium*, *Dalea*, *Eriogonum*, *Hyptis*, *Larrea*, *Prosopis*, but also visits flowers of *Asclepias*, *Phacelia* and Salix for nectar.
Colletes salicicola Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 50. ♀.

solitarius Timberlake. Calif. (Inyo Co.).
Colletes solitarius Timberlake, 1951. Wasmann Jour. Biol. 9: 216. ♀.

stepheni Timberlake. Calif. (Riverside Co.). Pollen: Oligolege of *Larrea tridentata*, but also visits flowers of *Cercidium floridum* and *Geraea canescens* for nectar.
Colletes stepheni Timberlake, 1958. Pan-Pacific Ent. 34: 143. ♂, ♀.

Biology: Hurd and Powell, 1958. Pan-Pacific Ent. 34: 147-153, 1 fig. (nesting habits, male behavior).

Species Group Aridus

aridus Stephen. Tex., N. Mex. Pollen: Unknown, but visits flowers of *Phacelia popei*.
Colletes aridus Stephen, 1954. Kans. Univ. Sci. Bul. 36: 494, fig. 75. ♂, ♀.

Species Group Titusensis

titusensis Mitchell. Fla. (Titusville, Tampa).
Colletes titusensis Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 237, figs. 16, 17. ♂.

Species Group Longifacies

longifacies Stephen. Fla. Pollen: Unknown, but visits flowers of *Liatris laevigata*.
Colletes longifacies Stephen, 1954. Kans. Univ. Sci. Bul. 36: 500. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 43.

Species Group Unassigned

platycnema Snelling. Ariz. (Huachuca Mts.). Pollen: Unknown, but visits flowers of *Acacia angustissima*.
Colletes platycnema Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 2, figs. 5-8. ♂, ♀.

Subfamily DIPHAGLOSSINAE

This is a New World group of large to very large, robust bees which occur in the tropics, subtropics as well as the warm temperate regions of both North and South America.

Taxonomy: Michener, 1966. Kans. Univ. Sci. Bul. 46: 717-751, 48 figs.

Tribe CAUPOLICANINI

Genus PTILOGLOSSA Smith

Ptiloglossa Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 7.
Type-species: *Ptiloglossa ducalis* Smith. Monotypic.
Ptiloglossa subg. *Ptiloglossodes* Moure, 1945. Arq. do Mus. Paranaense 4: 153.
Type-species: *Megacilissa tarsata* Friese. Orig. desig.

arizonensis Timberlake. Ariz. Pollen: Polylege of *Cassia bauhinioides, Larrea tridentata, Solanum elaeagnifolium, S. rostratum;* females also visit flowers of *Cucurbita foetidissima* for nectar.
Ptiloglossa arizonensis Timberlake, 1946. Pan-Pacific Ent. 22: 157. ♀.

Biology: Linsley, 1962. Pan-Pacific Ent. 38: 75-82. —Linsley and Cazier, 1970. Kans. Ent. Soc., Jour. 43: 251-261, 3 tables. —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 19 (floral relationships).

jonesi Timberlake. Ariz. Pollen: Polylege of *Datura meteloides, Larrea tridentata, Solanum elaeagnifolium,* and *S. rostratum.*
Ptiloglossa jonesi Timberlake, 1946. Pan-Pacific Ent. 22: 158. ♀.

Biology: Linsley and Cazier, 1963. Pan-Pacific Ent. 39: 1-18. —Linsley and Cazier, 1970. Kans. Ent. Soc., Jour. 43: 251-261, 3 tables. —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 20 (floral relationships).

Genus CAUPOLICANA Spinola

Although a few species of this genus occur in tropical America, the largest numbers of species chiefly inhabit the warm temperate and subtropical regions of both continents. Most of the species have been described from Chile and only two of the five recognized subgenera are known to occur in southwestern United States.

Genus CAUPOLICANA Subgenus CAUPOLICANA Spinola

Caupolicana Spinola, 1851. *In* Gay, Hist. Fis. Pol. Chile, Zool., v. 6, p. 212.
Type-species: *Caupolicana gayi* Spinola. Desig. by Sandhouse, 1943.
Megacilissa Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 123.
Type-species: *Caupolicana fulvicollis* Spinola. Monotypic. (=*Megacilissa superba* Smith).
Megalocilissa Schulz, 1906. Spolia Hym., p. 243. Emend.

Taxonomy: Michener, 1966. Kans. Univ. Sci. Bul. 46: 732-736.

electa (Cresson). N. C., to Ga., northwest Fla., Ala. Pollen: Unknown, but visits flowers of *Gerardia* and *Trichostema dichotemum.*
Megacilissa electa Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 221. ♂.

Taxonomy: Michener, 1966. Kans. Univ. Sci. Bul. 46: 736-738.

Biology: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 24 (seasonal activity and flight period).

ocellata Michener. Kans., N. Mex., Ariz., Tex.; Mexico (Chihuahua). Pollen: Apparently an oligolege of *Dalea* including *D. lanata, D. scoparia,* but visits flowers of *Gaura coccinea* and *Petalostemon flavescens* for nectar.
Caupolicana (*Caupolicana*) *ocellata* Michener, 1966. Kans. Univ. Sci. Bul. 46: 738, figs. 12, 23-27, 29. ♂, ♀.

Biology: Michener, 1966. Kans. Univ. Sci. Bul. 46: 739-740 (nest, floral relationships).

yarrowi (Cresson). Ariz., Utah (Zion Park), N. Mex., Tex.; Mexico. Pollen: Polylege of *Cassia bauhinioides, Datura meteloides, Hofmanseggia jamesii, Larrea tridentata, Mentzelia pumila, Solanum elaeagnifolium, S. rostratum*, but visits other flowers including *Aloysia wrightii, Eysenhardtia polystacha*, and *Melilotus alba* for nectar.
Megacilissa yarrowi Cresson, 1875. Rpt. Geog. Geol. Explor. and Survey west of 100th Meridian, v. 5, p. 723. ♀.

Taxonomy: Michener, 1966. Kans. Univ. Sci. Bul. 46: 733-736, figs. 12, 13-17, 29. —Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 2 (geogr. records).

Biology: Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 403. —Linsley and Hurd, 1959. Ent. News 70: 67. —Linsley, 1960. N. Y. Ent. Soc., Jour. 68: 13. —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 158-159. —Linsley and Cazier, 1963. Pan-Pacific Ent. 39: 1-18. —Michener, 1966. Kans. Univ. Sci. Bul. 46: 734-736. —Linsley and Cazier, 1970. Kans. Ent. Soc., Jour. 43: 251-261, 3 tables. —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 18-19 (summary of habits and floral relationships).

Genus CAUPOLICANA Subgenus ZIKANAPIS Moure

Zikanapis Moure, 1945. Arq. do Mus. Paranaense, 4: 147.
Type-species: *Ptiloglossa zikani* Friese. Orig. desig.
Foersterapis Moure, 1964. Studia Ent. 7: 441.
Type-species: *Zikanapis foersteri* Moure and Seabra. Orig. desig.

Taxonomy: Michener, 1966. Kans. Univ. Sci. Bul. 46: 727-728, figs. 12, 30-34, 47.

elegans Timberlake. Ariz. (Portal); Mexico (Tehuacan and Puebla). Pollen: Unknown, but visits flowers of *Salvia*.
Caupolicana elegans Timberlake, 1965. N. Y. Ent. Soc., Jour. 73: 46. ♂.

Taxonomy: Michener, 1966. Kans. Univ. Sci. Bul. 46: 743-745, fig. 47.

Nomen Nudum in Caupolicana Spinola

Megacilissa monticola Ashmead, 1889. *In* Cockerell, Colo. Biol. Assn. 10th Rpt., [p. 2]. Probably published originally in Custer County Courant newspaper.

Subfamily HYLAEINAE

The females of this subfamily, like those of the Australian subfamily Euryglossinae and most of those in the chiefly Neotropical subfamily Xeromelissinae, lack scopal hairs and transport pollen in the crop. The subfamily Hylaeinae is represented in North America only by the genus *Hylaeus*. The species of this genus make cells of a transparent cellophane-like material in preexisting burrows, hollow stems, holes or cavities.

Revision: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 60-85 (spp. of eastern U. S.).

Taxonomy: Lovell, 1910. Psyche 17: 177 (Maine). —Metz, 1911. Amer. Ent. Soc., Trans. 37: 85 (spp.). —Meade-Waldo, 1923. Gen. Ins., v. 181, p. 29 (cat.). —Cockerell and Sumner, 1931. Amer. Mus. Novitates 490: 14 (Rocky Mt. females). —Michener, 1942. N. Y. Ent. Soc., Jour. 50: 273 (subgenera). —Snelling, 1966. South. Calif. Acad. Sci., Bul. 65: 164-175 (Nearctic subgenera). —Warncke, 1970. Rech. Agron. Gembloux, Bul. 5 (n.s.): 745-747 (status of generic names *Hylaeus* and *Prosopis*).

Genus HYLAEUS Fabricius

Genus HYLAEUS Subgenus PROSOPIS Fabricius

Prosopis Fabricius, 1804. Syst. Piezatorum, p. 293.
Type-species: *Mellinus bipunctatus* Fabricius. Desig. by Morice and Durant, 1914. (=*Sphex signata* Panzer).
Prosapis Ashmead, 1894. Psyche 7: 43. Emend.

Revision: Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 98: 1-18 (spp. of western U. S.).

aenigmus (Viereck). N. Mex. Possibly a synonym of *H. episcopalis* (Cockerell).
Prosopis aenigmus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 64. ♂.

affinis (Smith). New England and adjacent Canada west to B. C., Wash., Idaho, south to Utah, Kans., Miss., and Ga. Pollen: Unknown, but visits a wide variety of flowers including *Amorpha, Apocynum, Aruncus, Asclepias, Blephilia, Boltonia, Campanula, Ceanothus, Cephalanthus, Cicuta, Clematis, Cornus, Crataegus, Cryptotaenia, Daucus carotus, Erigeron, Eryngium, Eulophus, Eupatorium, Euphorbia, Fragaria, Geranium, Geum, Gnaphalium, Heracleum, Houstonia, Hydrangea, Hypericum, Krigia, Lactuca, Lepidium, Lycopus, Malva, Melilotus, Nelumbo, Osmorrhiza, Oxypolis, Pastinaca, Petalostemon, Philadelphicus, Polygonum, Polytaenia, Potentilla, Ptelea, Pycnanthemum, Pyracantha, Rhus, Rubus, Salix, Salvia, Sanicula, Sium, Solidago, Stellaria, Stenanthium Symphoricarpos, Taenidia, Thaspium, Valerianella, Veronica, Viburnum, Zizia.* Predator: *Philanthus crabroniformis* Sm., *P. politus* Say.

Prosopis affinis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 24. ♀ (♂ misdet.).
Prosopis ziziae Robertson, 1896. Canad. Ent. 28: 136. ♀, ♂.
Prosopis ziziae dunningi Cockerell, 1898. Entomologist 31: 188. ♂.
Hylaeus albertensis Cockerell, 1937. Canad. Ent. 69: 126. ♂, ♀.

Taxonomy: Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 98: 3.

confluens (Smith). N. J. to Fla. Pollen: Unknown, but visits flowers of *Chrysanthemum, Chrysopsis, Erigeron, Eryngium, Hypericum, Ilex, Itea, Melilotus, Oxydendrum, Oxypolis filiformis, Polygonum, Rhus, Solidago.*

Prosopis confluens Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 24. ♀.
Prosapis triangularis Cockerell, 1896. Psyche 7 (sup.): 31. ♂.

episcopalis coquilletti (Cockerell). Oreg. and Idaho south to Mexico (Baja California and Sonora) east to Texas. Pollen: Unknown, but visits flowers of *Acamptopappus, Agave deserti, Asclepias subulata, Aster abatus, Baileya pleniradiata, Chamaebatiaria millefolium Croton californicus, Dalea californica, D. fremontii, D. saundersii, D. schottii, Datura meteloides Eriodictyon californicum, Eriogonum fasciculatum, E. inflatum, Gilia davyi, Haplopappus cooperi, Hyptis emoryi, Isomeris arborea, Larrea tridentata, Lepidium fremontii, Lupinus formosus, Melilotus alba, Peucephyllum schottii, Prosopis juliflora glandulosa, Sphaeralcea orcuttii, Stanleya pinnata, Tamarix gallica.*

Prosapis coquilletti Cockerell, 1896. Psyche 7 (sup.): 439. ♂.

Taxonomy: Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 98: 10 (as *H. rugulosus episcopalis*). —Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 8 (tax. status).

episcopalis episcopalis (Cockerell). Alta., south to Calif. and N. Mex. Pollen: Unknown, but visits a wide variety of flowers including *Achillea lanulosa, A. millaefolium, Adenostoma fasciculatum, Angelica tomentosa, Anthemis cotulla, Apocynum adrosaemifolium, Asclepias fascicularis, A. mexicana, Baccharis douglasii, Calochortus venustus, Ceanothus integerrimus, Chaetopappa aurea, Chamaebatia foliolosa, Clarkia bilobata, Erigeron ramosus, Eriodictyon californicum, Eriogonum fasciculatum, E. inflatum, E. latifolium nudum, E. virgatum, Eriophyllum confertiflorum, Eryngium aristatulum, Geranium richardsonii, Gnaphalium californicum, Gutierrezia californica, G. sarothrae, Haplopappus cooperi, Heteromeles arbutifolia, Linanthus montanus, Lupinus, Oxypolis occidentalis Penstemon breviflorus, Perideridia gairdneri, Phacelia, Prunus ilicifolia, Rhamnus californica, Scrophularia californica, Solidago, Stanleya pinnata, Swertia parryi, Trichostema parishii.*

Prosapis episcopalis Cockerell, 1896. Psyche 7 (sup.): 29. ♂.
Prosopis universitatis Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 225. ♂.

Taxonomy: Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 98: 9, 10 (as. *H. rugulosus rugulosus* and *H. r. episocpalis*). —Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 8 (synonymy, tax. status).

episcopalis giffardiellus Cockerell. Calif. (Sacramento and San Joaquin Valleys). Pollen: Unknown, but visits flowers of *Melilotus alba, Raphanus sativus, Rosa californica, Rubus, Salix, Trifolium repens.*

Hylaeus giffardiellus Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 186. ♂.

Taxonomy: Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 98: 11 (as *H. rugulosus giffardiellus*). —Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 8 (tax. status).

episcopalis metzi Snelling. South. Calif. Pollen: Unknown, but visits a wide variety of flowers including *Adenostoma fasciculatum, Amorpha fruticosa, Achillea millaefolium, Apocynum androsaemifolium, Chrysopsis villosa, Cordylanthus nevinii, Encelia, Eriogonum davidsonii, E. elongatum, E. fasciculatum, E. fasciculatum* var. *polifolium, E. gracile, E. nudum, E. subscaposum, E. wrightii, Eriodictyon, Geranium richardsonii, Gilia gilioides, Haplopappus cooperi, Lupinus cytisoides, Melilotus alba, Mentzelia laevicaulis, Monardella linoides, Penstemon grinnellii, P. labrosus, P. palmeri, Phacelia ramosissima, Potentilla glandulosa, Rhamnus californica, R. crocea, Salvia carnosa, Solidago californica, S. confinis, Sphenosciadium capitellatum.*

Hylaeus (*Prosopis*) *rugulosus metzi* Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 98: 12. ♀, ♂.

Taxonomy: Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 8 (tax. status).

flammipes (Robertson). Fla. (Citrus Co.).

Prosapis flammipes Robertson, 1893. Amer. Ent. Soc., Trans. 20: 273. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 64.

gaigei (Cockerell). Mich. Possibly a synonym of *H. modestus* Say.

Prosopis gaigei Cockerell, 1916. Mich. Univ. Mus. Zool., Occas. Papers 23: 2. ♀.

Taxonomy: Snelling, 1970. Los Angeles Co. Mus., Contrib. Sci. 180: 27.

illinoisensis (Robertson). Ill. and W. Va. to N. Y., Mass., Maine. Pollen: Unknown, but visits flowers of *Apocynum cannabinum, Aruncus, Aster, Cicuta, Cornus, Crataegus, Eulophus, Gonolobus, Heracleum, Lycopus, Osmorrhiza, Pastinaca, Rhus, Salix, Solidago, Taenidia, Thaspium, Viburnum.*

Prosopis Illinoisensis Robertson, 1896. Canad. Ent. 28: 138. ♂.

Hylaeus (*Prosopis*) *certus* Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 241, figs. 4-7. ♂, ♀. Preocc.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 64.

insolitus Snelling. Ariz., Tex.; Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Cleome serrulata.*

Hylaeus (*Prosopis*) *insolitus* Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 98: 16. ♂, ♀.

modestus citrinifrons (Cockerell). B. C., Alta., Mont., Wyo., Colo., N. Mex., Calif., Nev. Pollen: Unknown, but visits a wide variety of flowers including *Adenostoma fasciculatum, Angelica arguta, A. tomentosa, Aralia californica, Baccharis douglasii, Chaenactis glabriuscula lanosa, Eriodictyon californicum, Erigonum nudum, Eriophyllum staechadifolium, Geranium dissectum, G. richardsoni, Gnaphalium californicum, Holodiscus discolor, Melilotus alba, Oxybaphis occidentalis, Perideridia gairdneri, Phacelia humilis, Potentilla glandulosa, Ranunculus, Rhamnus californica, Rubus, Salvia sonomensis, Scrophularia californica, Solidago, Sphenosciadium capitellatum, Trichostema parishii.*

Prosapis citrinifrons Cockerell, 1896. Psyche 7 (sup.): 27. ♂.

Prosapis rugosulus Cockerell, 1896. Psyche 7 (sup.): 28. ♂.

Prosapis rugosulus var. *fallax* Cockerell, 1896. Psyche 7 (sup.): 28. ♂.

Taxonomy: Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 98: 5. —Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 7-8 (synonymy, tax. status).

modestus modestus Say. East. Canada and Atlantic States to Minn., La. Parasite: *Gasteruption kirbii* Westw. Pollen: Unknown, but visits a wide variety of flowers including *Acer, Achillea, Amorpha, Angelica, Apocynum, Arabis, Aralia, Aruncus, Azalea, Cacalia, Castanea pumila, Ceanothus, Chrysanthemum, Cicuta maculata, Cornus, Crataegus, Daucus carota, Erigeron, Eulophus, Eupatorium, Gerardia, Geum, Heracleum, Houstonia purpurea, Hydrangea, Ilex, Koellia, Lepidium, Malva, Monarda, Osmorrhiza, Pastinaca, Ptelea, Pycnanthemum, Pyracantha, Rhus, Rubus, Sanicula, Sium, Solidago, Spiraea, Symphoricarpos, Taenidia, Thaspium, Zizia.* Predator: *Philanthus bilunatus* Cr., *P. politus* Say.

Hylaeus modestus Say, 1837. Boston Jour. Nat. Hist. 4: 392. ♀ (♂ misdet.).

Prosapis pennsylvanica Cockerell, 1896. Psyche 7: 439. ♂.

Prosopis nucleolus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 64. ♀.
Prosopis sayi Robertson, 1904. Canad. Ent. 36: 274, 275. ♀, ♂.
Prosopis minyra Lovell, 1909. Ent. News 20: 413. ♂.
Prosopis binghami Lovell, 1910. Psyche 17: 180. ♂.
Prosopis supracurta Swenk and Cockerell, 1910. Ent. News 21: 71. ♂.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 71. —Rau, 1930. Psyche 37: 173-175. —Krombein, 1967. Trap-nesting wasps and bees, p. 262. —Medler, 1966. Ent. Soc. Wash., Proc. 68: 131.

nelumbonis (Robertson). Ill. and Ohio to Fla., Ala., La. Pollen: Unknown, but visits flowers of *Castalia tuberosa*, *Nelumbo lutea*.
Prosopis nelumbonis Robertson, 1890. Amer. Ent. Soc., Trans. 17: 316. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 67.

ornatus Mitchell. N. C. to Fla. Pollen: Unknown, but visits flowers of *Cephalanthus*, *Hypericum*, *Melilotus*, *Parthenocissus*.
Hylaeus (*Prosopis*) *ornatus* Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 242, figs. 8-11. ♂, ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 67.

schwarzii (Cockerell). Mass. to Fla. Pollen: Unknown, but visits flowers of *Hydrocotyle umbellata*, *Medicago lupulina*, *Melilotus alba*, *Sagittaria*, *Salix*.
Prosapis Schwarzii Cockerell, 1896. Ent. Monthly Mag. 32: 218. ♀.
Prosopis fossata Metz, 1911. Amer. Ent. Soc., Trans. 37: 135. ♂ (♀ misdet.).

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 68.

transvittatus (Cockerell). South. Ariz. (mts.); Mexico (Durango, D. F. and Veracruz).
Prosopis transvittata Cockerell, 1917. Ann. and Mag. Nat. Hist. (8) 20: 437. ♀, ♂.

volusiensis Mitchell. Fla. (Dade and Volusia Cos.).
Hylaeus (*Prosopis*) *volusiensis* Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 245. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 69.

Genus HYLAEUS Subgenus PARAPROSOPIS Popov

Prosopis subg. *Paraprosopis* Popov, 1939. Acad. des Sci. U. R. S. S., Compt. Rend. (Dok.) (n. s.) 25: 169.
Type-species: *Prosopis pictipes* (Nylander). Monotypic and orig. desig.

Revision: Snelling, 1970. Los Angeles Co. Mus., Contrib. Sci. 180: 27-58, figs. 7-12 (Nearctic species).

Species Group Asininus

asininus (Cockerell and Casad). West. Tex. to South. Calif.; Mexico (Baja California). Parasite: *Authrax irroratus irroratus* Say. Pollen: Unknown, but visits flowers of *Baccharis emoryi*, *Chrysothamnus paniculatus*, *Gutierrezia lucida*, *Haplopappus acradenius*, *Eriogonum fasciculatum*, *Lepidospartum*, *Prosopis*, *Solidago californica*.
Prosopis asininus Cockerell and Casad, 1895. Amer. Ent. Soc., Trans. 22: 299. ♂.
Prosopis bipes Cockerell and Casad, 1895. Amer. Ent. Soc., Trans. 22: 300. ♀.
Prosapis asinina var. *bigeloviae* Cockerell, 1898. N. Mex. Univ., Bul. 1: 72. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, p. 261 (nest, parasite).

Species Group Calvus

calvus (Metz). South. Oreg. to Mexico (Baja California), Nev., Ariz. Pollen: Unknown, but visits flowers of *Baccharis*, *Ceanothus cordulatus*, *C. cuneatus*, *C. integerrimus*, *Collinsia heterophylla*, *Eriodictyon californicum*, *Eriogonum*, *Fremontia californica*, *Holodiscus discolor*, *Lepidium virginicum*, *Penstemon antirrhinoides*, *Photinia heteromeles*, *Prunus ilicifolia*, *Rhamnus californicus*, *R. crocea*, *Salix*.
Prosopis calvus Metz, 1911. Amer. Ent. Soc., Trans. 37: 143. ♂.

georgicus (Cockerell). N. Y., N. C., Ga., Fla., Tex. Pollen: Unknown, but visits flowers of *Crataegus, Hydrangea, Pyracantha, Salix.*

Prosapis georgica Cockerell, 1898. Psyche 7 (sup.): 438. ♂.

Prosopis georgica var. *leana* Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 27. ♂.

Hylaeus (*Metziella*) *hydrangeae* Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 244. ♀.

timberlakei Snelling. Calif. (Sierra Nevada Mts.). Pollen: Unknown, but visits flowers of *Ceanothus integerrimus, Eriodictyon californicum, Eriogonum nudum, Haplopappus arborescens, Lessingia leptoclada, Perideridia gairdneri, Solidago californica.*

Hylaeus (*Paraprosopis*) *timberlakei* Snelling, 1970. Los Angeles Co. Mus., Contrib. Sci. 180: 50. ♂, ♀.

Species Group Megalotis

megalotis (Swenk and Cockerell). Mont., Colo., Nebr., Utah, Ariz. Pollen: Unknown, but visits flowers of *Cleome serrulata, Chrysothamnus, Eriogonum aureus.*

Prosopis megalotis Swenk and Cockerell, 1910. Ent. News 21: 69. ♂, ♀.

Species Group Sonorensis

sonorensis Cockerell. Ariz., south. Calif.; Mexico (Baja California and Sonora). Pollen: Unknown, but visits flowers of *Encelia, Eriogonum inflatum, Eucnide urens, Prosopis glandulosa, Scrophularia californica, Stanleya pinnata.*

Hylaeus sonorensis Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 530. ♀.

Hylaeus sonorensis var. *melanorhinus* Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 531. ♀.

Species Group Wootoni

coloradensis (Cockerell). B. C., Wash., Idaho, Colo., N. Mex., Ariz., Utah, Nev., east. and south. Calif. Pollen: Unknown, but visits flowers of *Achillea lanulosa, A. millaefolium, Adenostoma fasciculatum, Baccharis pilularis, Barbarea orthoceras, Ceanothus cordulatus, Chrysothamnus nauseosus, C. nauseosus consimilis, Descurainia sophia, Erigeron canadensis, E. pygmaeus, Eriodictyon californicum, Eriogonum elegans, E. lobbii, E. mariifolium, E. latifolium nudum, E. subscaposum, E. umbellatum, E. virgatum, Gnaphalium thermale, Haplopappus arborescens, Holodiscus boursieri, Ivesia muirii, Lasthenia chrysostoma, Lepidospartum squamatum, Mentzelia laevicaulis, Oxypolis occidentalis, Penstemon davidsonii, P. newberryi, Potentilla glandulosa, Rhamnus californica, Rhus, Solidago californica, S. multiradiata, Sphenosciadium capitellatum.*

Prosapis coloradensis Cockerell, 1896. Psyche 7 (sup.): 30. ♂.

cookii (Metz). N. Mex., Nev. (Churchill Co.), Ariz., south. Calif. Pollen: Unknown, but visits flowers of *Asclepias tuberosa, Chrysothamnus stenophyllus, Erigeron canadensis, Eriogonum aureum, E. fasciculatum, E. inflatum, E. plumatella, Fallugia, Gutierrezia lucida, Haplopappus gracilis, H. linearifolius, Lepidospartum, Nolina parryi, Petalostemon candidum, Phacelia ramosissima, Prosopis, Rhus trilobata, Salvia dorii, S. vitosa, Solidago californica, Sphaeralcea ambigua, Tetradymia canescens.*

Prosopis cookii Metz, 1911. Amer. Ent. Soc., Trans. 37: 139. ♂ (♀ misdet.).

floridanus (Robertson). Maine, Minn., Mich., Ill., Ky., N. C., Ga., Fla. Pollen: Unknown, but visits flowers of *Aster, Cornus paniculata, Erigeron quercifolius, Eulophus americanus, Ilex, Polygonella polygama, Pyracantha, Solidago.*

Prosopis floridanus Robertson, 1893. Amer. Ent. Soc., Trans. 20: 273. ♀.

Prosopis eulophi Robertson, 1905. Canad. Ent. 37: 236. ♀, ♂.

Hylaeus (*Paraprosopis*) *packardi* Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 244. ♂.

lunicraterius Snelling. Idaho (Craters of the Moon National Monument), Calif. Pollen: Unknown, but visits flowers of *Chamaebataria millefolium, Chrysothamnus nauseosus, C. viscidiflorus, Eriogonum nudum, E. ovalifolium, Phacelia leucophylla, Populus tremuloides, Senecio serra.*

Hylaeus (*Paraprosopis*) *lunicraterius* Snelling, 1970. Los Angeles Co. Mus., Contrib. Sci. 180: 46. ♂, ♀.

nevadensis (Cockerell). B. C., Wash., Idaho, Oreg., Calif., Nev. Pollen: Unknown, but visits flowers of *Achillea lanulosa, Adenostoma fasciculatum, Angelica tomentosa, Apocynum androsaemifolium, Baccharis douglasii, Ceanothus cuneatus, C. integerrimus, C. soredatus, Centaurea melitensis, Cicuta, Collinsia, Cordylanthus rigidus, Corethrogyne filaginifolia, Eriodictyon californicum, E. crassifolium, E. trichocalyx, Erigeron heterophyllus, Eriogonum latifolium nudum, E. saxatile, E. wrightii, Eriophyllum confertiflorum, Geranium richardsonii, Gnaphalium californicum, Haplopappus arborescens, H. parishii, Holodiscus discolor, Horkelia bernardina, Monardella linoides, M. odoratissima, Penstemon labrosus, Perideridia gairdneri, Phacelia humilis, Potentilla glandulosa, Prunus ilicifolia, Rhamnus californica, R. crocea, Solidago californica, S. occidentalis, Tetradymia canescens.*

Prosapis nevadensis Cockerell, 1896. Psyche 7 (sup.): 32. ♂.

Prosopis hesperiphila Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 29. ♂.

Hylaeus oregonensis Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 160. ♀, ♂.

personatellus (Cockerell). Colo. (Corona and Ouray), Calif. (Sierra Nevada Mts.). Pollen: Unknown, but visits flowers of *Aster, Brodiaea gracilis, Chrysothamnus nauseosus, Erigeron pygmaeus, Eriogonum elatum, E. lobbii, E. mariifolium, E. nudum, E. ovalifolium, Ivesia muiri, Monardella odoratissima, Penstemon davidsonii, P. newberryi, Perideridia gairdneri, Potentilla glandulosa, Solidago multiradiata.*

Prosopis personatellus Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 16: 485. ♀.

polifolii (Cockerell). Calif. Parasite: *Eurytoma stigmi* Ashm. Pollen: Unknown, but visits flowers of *Achillea millaefolium, Adenostoma fasciculatum, Alyssum maritimum, Anaphalis margaritacea, Baccharis douglasii, B. emoryi, B. glutinosa, B. pilularis, B. viminea, Ceanothus crassifolius, C. greggii, C. integerrimus, C. leucodermis, C. soredatus, Chrysothanmus nauseosus, Coreopsis lanceolata, Cryptantha intermedia, Dendromecon rigida, Erigeron canadensis, E. stenophyllus, Eriodictyon trichocalyx lanatum, Eriogonum elongatum, E. fasciculatum, E. gracile, E. latifolium, E. latifolium nudum, E. vimineum, Eriophyllum confertiflorum, Eryngium aristatulum, Erysimum perenne, Euphorbia albomarginata, Gnaphalium beneolens, G. californicum, Gutierrezia californica, G. sarothrae, Haplopappus arborescens, H. linearifolius, H. parishii, Helenium puberulum, Heteromeles arbutifolia, Heterotheca grandiflora, Lasthenia, Malacothrix tenuifolia, Melilotus alba, Mentha, Opuntia, Penstemon antirrhinoides, Perideridia, Phacelia distans, Prunus demissa, P. ilicifolia, Pyracantha, Rhamnus californica, R. crocea, Rhus diversiloba, R. laurina, R. trilobata, Salix lasiolepis, Salvia, Sambucus caerulea, Scrophularia californica, Sedum, Senecio californica, Solidago californica, S. occidentalis, Sphenosciadium capitellatum, Swertia parryi, Tetradymia canescens, Trichostema parishii.*

Prosopis polifolii Cockerell, 1901. Canad. Ent. 33: 281. ♂.

Hylaeus polifolii catalinensis Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 150. ♂, ♀.

wootoni (Cockerell). B. C. to Calif., Ariz., N. Mex.; Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Achillea lanulosa, Apocynum androsaemifolium, Aster canescens, Calochortus paludicola, C. splendens, Ceanothus cordulatus, C. palmeri, Chrysothamnus nauseosus, C. pumilius, C. viridulus, C. viscidiflorus puberulus, Eriodictyon trichocalyx, Eriogonum davidsoni, E. fasciculatum, E. nudum, E. subscaposum, E. umbellatum, E. wrightii, E. wrightii membranaceum, Eriophyllum, Erysimum asperum, Haplopappus arborescens, H. uniflorus gossypinus, H. parishii, Horkelia fusca, Lepidium virginicum, Mentzelia albicaulis, Phacelia imbricata, Potentilla glandulosa, Ranunculus californicus, Rhamnus californicus, Solidago californica, S. confinis, Tetradymia canescens.*

Prosapis wootoni Cockerell, 1896. Psyche 7 (sup.): 26. ♂.

Prosapis divergens Cockerell, 1896. Psyche 7 (sup.): 29. ♂.

Prosopis clandestinus Viereck, 1903. Amer. Ent. Soc., Trans. 17: 65. ♂.

Prosopis excavata Swenk and Cockerell, 1910. Ent. News 21: 70. ♀.

Hylaeus perparvus Cockerell and Sumner, 1931. Amer. Mus. Novitates 490: 10. ♂.

Species Group Unassigned

seclusus Cockerell and Sumner. Colo.

Hylaeus seclusus Cockerell and Sumner, 1931. Amer. Mus. Novitates 490: 12. ♂.

Genus HYLAEUS Subgenus PROSOPELLA Snelling

Hylaeus subg. *Prosopella* Snelling, 1966. Biol. Soc. Wash., Proc. 79: 139.
Type-species: *Hylaeus hurdi* Snelling. Monotypic and orig. desig.

Revision: Snelling, 1966. Biol. Soc. Wash., Proc. 79: 139-144.

hurdi Snelling. Ariz.; Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Baccharis, Ceanothus* including *C. greggii, Melilotus alba, Penstemon campanulatus, Verbesina.*
Hylaeus (*Prosopella*) *hurdi* Snelling, 1966. Biol. Soc. Wash., Proc. 79: 140, fig. 1. ♂, ♀.

Genus HYLAEUS Subgenus HYLAEANA Michener

Hylaeus subg. *Hylaeana* Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 28.
Type-species: *Hylaeus panamensis* Michener. Monotypic and orig. desig.

panamensis Michener. Tex. west to South. Calif., south to Panama. Pollen: Unknown, but visits flowers of *Dicraurus, Hyptis emoryi, Verbesina encelioides.*
Hylaeus (*Hylaeana*) *panamensis* Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 28. ♂.

Taxonomy: Snelling, 1968. Los Angeles Co. Mus., Contrib. Sci. 144: 4 (as *H. aztecus*). —Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 8 (tax. status).

Genus HYLAEUS Subgenus HYLAEUS Fabricius

Hylaeus Fabricius, 1793. Ent. system., v. 2, p. 302.
Type-species: *Apis annulata* Linnaeus. Desig. by Latreille, 1810 (=*Prosopis annulata* Fabricius).

Revision: Snelling, 1970. Los Angeles Co. Mus., Contrib. Sci. 180: 1-27, figs. 1-6.

Species Group Bisinuatus

bisinuatus Forster. Holarctic; Transcont. south. Canada and north. U. S., south to Ga. and Calif. (Central Valley); introduced into Hawaii; Europe. Possibly introduced from Europe into the area around Fargo N. D. prior to 1912. Pollen: Exhibits a pronounced tendency toward oligolecty on flowers of the family Leguminosae, especially the introduced species of *Melilotus*, but also visits the flowers of other, mostly introduced, plants including those of the Amaranthaceae, Asclepiadaceae, Compositae, Cruciferaceae, Polygonaceae, Salicaceae, Tamaricaceae, Umbelliferae.
Hylaeus bisinuatus Forster, 1871. Zool.-Bot. Gesell. Wien, Verhandl. 21: 935. ♀, ♂.
Prosopis leptocephala Morawitz, 1871. Soc. Ent. Ross., Horae 7: 324. ♀, ♂.
Prosopis (*Hylaeus*) *discrepans* Schenck, 1875. Deut. Ent. Ztschr. 19: 326. ♂.
Prosopis stevensi Crawford, 1913. Canad. Ent. 45: 155. ♂, ♀.
Prosopis incompleta Alfken, 1937. Ist. Ent. Bologna, Bol. 9: 104. ♀.

Taxonomy: Snelling, 1970. Los Angeles Co. Mus., Contrib. Sci. 180: 26-27 (as *H. stevensi*). —Snelling, 1975. Los Angeles Co. Mus., Contrib. Sci. 267: 8-9 (synonymy).

Biology: Barrows, 1975. Psyche 82: 74-75 (nest).

Species Group Conspicuus

conspicuus (Metz). Wash., Oreg., Idaho, Calif., Nev., Wyo. Pollen: Unknown, but visits flowers of *Anthemis cotula, Asclepias, Baccharis, Calochortus luteus, Ceanothus soredatus, Centaurea solstitialis, Eriodictyon californicum, Eriogonum fasciculatum, Eryngium aristatulum, Foeniculum vulgare, Frankenia grandiflora, Gnaphalium californicum, Grindelia, Hemizonia pungens, Lasthenia, Medicago sativa, Melilotus, Phacelia distans, Prunus ilicifolia, Salix, Salsola kali, Solidago elongata, Trichostema.* Predator: *Philanthus pulcher* Dalla Torre.
Prosopis conspicua Metz, 1911. Amer. Ent. Soc., Trans. 37: 114. ♂, ♀.

maritimus Bridwell. Calif. (coastal sand dunes). Pollen: Unknown, but visits flowers of *Achillea borealis arenicola, Agoseris aparagoides, Eriogonum, Grindelia robusta platyphylla, Hemizonia corymbosa* var. *barclayi, Phacelia distans, Polygonum paronychia.*
Hylaeus maritimus Bridwell, 1910. Hawaii. Ent. Soc., Proc. 4: 159. ♀, ♂.

Species Group Mesillae

fedorica (Cockerell). Mich. to Minn., south to Tex. and east to N. C. Pollen: Unknown, but visits flowers of *Crataegus*, *Daucus*, *Pyracantha*.
Prosopis digitata var. *fedorica* Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 27. ♂.
Prosopis grossicornis Swenk and Cockerell, 1910. Ent. News 21: 67. ♂.

granulatus (Metz). Nev., Calif., ?Colo.
Prosopis rudbeckiae var. *granulatus* Metz, 1911. Amer. Ent. Soc., Trans. 37: 114. ♂.

labiatifrons (Cockerell). Ga. Possibly a synonym of *H. cressoni cressoni* (Cockerell).
Prosopis labiatifrons Cockerell, 1896. Psyche 7 (sup.): 437. ♂.

mesillae cressoni (Cockerell). Transcont. from south. Canada to north. Mexico. Ecology: Nests in twigs of *Symphoricarpos*. Parasite: *Rhydinofoenus floridanus bradleyi* Townes, *R. visaliae* Bradley. Pollen: Polylectic, visits a wide variety of flowers including *Achillea millaefolium*, *A. lanulosa*, *Adenostoma fasciculatum*, *Alyssum maritimum*, *Amorpha*, *Anethum*, *Anthemis cotula*, *Apium graveolens*, *Apocynum*, *Aruncus*, *Asclepias fascicularis*, *A. mexicana*, *A. parishii*, *Aster adscendens delectabilis*, *Atriplex semibaccata*, *Baccharis douglasii*, *B. emoryi*, *B. glutinosa*, *B. pilularis*, *Blephilia*, *Boltonia*, *Brassica oleracea*, *Cacalia*, *Capsella*, *Cardamine*, *Castanea*, *Castanopsis*, *Ceanothus crassifolius*, *C. cuneatus*, *C. integerrimus*, *Cerastium*, *Chamaebatia foliolosa*, *Chrysothamnus consimilis*, *C. nauseosus speciosus*, *Cicuta*, *Cirsium vulgare*, *Cleome*, *Cleomella obtusifolia*, *Cornus*, *Crataegus*, *Cryptantha angustifolia*, *Cryptotaenia*, *Datura meteloides*, *Daucus carota*, *Descurainia sophia*, *Encelia farinosa*, *Epilobium*, *Eremocarpus setigerus*, *Erigeron canadensis*, *Eriodictyon californicum*, *Eriogonum elongatum*, *E. gracile*, *E. fasciculatum*, *E. nodosum*, *E. nudum*, *E. saxatile*, *E. subscaposum*, *E. vimineum*, *E. wrightii*, *Eriophyllum confertiflorum*, *Eryngium aristatulum*, *Eschscholzia caespitosa*, *E. californica*, *Eulophus*, *Eupatorium*, *Euphorbia albomarginata*, *Evonymus*, *Foeniculum vulgare*, *Fragaria*, *Galium*, *Geum*, *Gnaphalium californicum*, *Gutierrezia californica*, *G sarothrae*, *Haplopappus arborescens*, *H. palmeri*, *Heliotropium curvassavicum*, *Heracleum*, *Heteromeles arbutifolia*, *Holodiscus discolor*, *Hydrangea*, *Krigia*, *Lasthenia chrysostoma*, *L. gracilis*, *Lepidium*, *Lepidospartum*, *Lotus americanus*, *Lupinus paynei*, *Lycopus*, *Malus*, *Malva*, *Maytenus boaria*, *Melilotus alba*, *Mentha pulegium*, *Monardella lanceolata*, *Nemophila menziesii*, *Oenothera tanacetifolia*, *Osmorrhiza*, *Oxypolis*, *Parthenium*, *Pastinaca*, *Perideridia gairdneri*, *Phacelia distans*, *P. ramosissima*, *Philibertia heterophylla*, *Polygonum*, *Polytaenia*, *Potentilla glandulosa*, *Prosopis*, *Prunus ilicifolia*, *Pycnanthemum*, *Pyracantha*, *Rhamnus californica*, *R. crocea*, *Rhus diversiloba*, *Rosa*, *Rubus*, *Salix exigua*, *S. goodingii*, *S. laevigata*, *S. lasiolepis*, *S. nigra*, *Salvia apiana*, *S. mellifera*, *S. officinalis*, *S. stachyoides*, *Sanicula*, *Schinus molle*, *Scrophularia californica*, *Sedum*, *Sisymbrium irio*, *Sium*, *Solidago californica*, *S. occidentalis*, *Stanleya pinnata*, *Swertia parryi*, *Taenidia*, *Tamarix gallica*, *Tetradymia canescens*, *Thaspium*, *Trichostema lanceolatum*, *T. parishii*, *Valerianella*, *Verbena lasiostachys*, *Veronica*, *Viburnum*, *Zizia*.
Prosopis pygmaea Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 272. ♂. Preocc.
Prosopis cressoni Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 131. N. name.
Prosopis pasadenae Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 30. ♂, ♀.
Prosopis telepora Lovell, 1911. Ent. News 22: 213. ♀, ♂.
Hylaeus laciniatus Cockerell and Sumner, 1931. Amer. Mus. Novitates 490: 9. ♂.
Hylaeus repolitus Cockerell and Sumner, 1931. Amer. Mus. Novitates 490: 13. ♀.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 36 (as *pygmaeus* and *cressoni*). —Hicks, 1926. Colo. Univ., Studies 15: 221.

Morphology: Blum and Bohart, 1972. Ent. Soc. Amer., Ann. 65: 274 (mandibular gland pheromones).

mesillae mesillae (Cockerell). Nebr., Kans., Tex. west to Nev., Calif.; Mexico (Baja California, Chihuahua, Coahuila, Nuevo Leon and Sonora). Populations in Colo. and Utah are largely sympatric with those of the nominate subspecies and hybridization occurs in these areas. Pollen: Unknown, but visits flowers of *Croton californicus*, *Datura*

meteloides, Encelia farinosa, Eriogonum fasciculatum, E. heermannii, Melilotus alba, Prosopis, Sphaeralcea ambigua.

Prosopis subtilis Cockerell, 1895. Amer. Ent. Soc., Trans. 22: 295. ♀. Preocc.

Prosopis mesillae Cockerell, 1896. Canad. Ent. 28: 42. N. name.

Prosopis cressoni var. *magniclavis* Swenk and Cockerell, 1910. Ent. News 21: 68. ♂, ♀.

rudbeckiae (Cockerell and Casad). Canada (Ontario), transcont. U. S. from Conn.,? N. J., ?Ala. to Rocky Mts. and Pacific Coast. Pollen: Unknown, but in California visits flowers of *Achillea millaefolium, Alyssum maritimum, Angelica arguta, Anthemis cotula, Asclepias, Baccharis douglasii, B. emoryi, B. glutinosa, B. viminea, Calochortus venustus, Calyptridium umbellatum, Chrysothamnus, Cirsium, Ceanothus crassifolius, Descurainia sophia, Eriodictyon californicum, Eriogonum elatum, E. fasciculatum, E. latifolium nudum, E. vimineum, Foeniculum vulgare, Horkelia fusca, Lasthenia chrysostoma, Mimulus, Phacelia distans, Potentilla glandulosa, Ranunculus californicus, Rhus diversiloba, Salix goodingii, Sedum, Sisymbrium, Solidago, Symphoricarpos Trichostema lanatum, Veronica americana.*

Prosopis rudbeckiae Cockerell and Casad, 1895. Amer. Ent. Soc., Trans. 22: 380. ♂.

Prosapis bakeri Cockerell, 1896. Psyche 7 (sup.): 26. ♂.

Prosapis digitatus Cockerell, 1896. Psyche 7 (sup.): 30. ♂.

Prosapis rudbeckiae ruidosensis Cockerell, 1896. Psyche 7 (sup.): 30. ♂.

Prosapis rudbeckiae subdigitata Cockerell, 1896. Psyche 7 (sup.): 31. ♂.

saniculae (Robertson). Canada (Ontario, Nova Scotia), and New England States west to Minn., south to Tenn., Ga. Pollen: Unknown, but visits flowers of *Achillea, Amorpha fruticosa, Apocynum cannabinum, Aruncus sylvester, Cicuta maculata, Crataegus crus-galla, Cryptotaenia canadensis, Eulophus americanus, Heracleum lanatum, Polygonum scandens, Sanicula canadensis, S. marilandica, Taenidia integerrima, Thaspium aureum trifoliatum.*

Prosopis saniculae Robertson, 1896. Canad. Ent. 28: 137. ♂, ♀.

sejunctus Snelling. Ariz. (Yuma), Nev. (Searchlight), south. Calif. deserts; Mexico (Mexicali). Pollen: Unknown, but visits flowers of *Croton californicus, Cryptantha barbigera, Heliotropium curassavicum, Hyptis emoryi, Isomeris arborea Melilotus, Phacelia, Prosopis glandulosa* var. *torreyanum, Salix, Tamarix gallica.*

Hylaeus (*Hylaeus*) *sejunctus* Snelling, 1970. Los Angeles Co. Mus., Contrib. Sci. 180: 18, figs. ♂, ♀.

Species Group Ellipticus

ellipticus (Kirby). Alaska to Nova Scotia and Newfoundland, New England States south to Ga., west to Pacific Coast States. Parasite: *Aetroxys analis* Ashm., *Chrysis parvula* Fabr., *Coelopencyrtus hylaeoleter* Burks, *Encyrtus* sp., *Gasteruption assectator* (L.). Pollen: Unknown, but visits flowers of *Acer apicatum, Arenaria, Aruncus, Ceanothus, Chrysanthemum, Eriogonum mariifolium, Houstonia purpurea, Hydrangea, Malus, Oxypolis, Penstemon heterodoxus, P. newberryi, Potentilla glandulosa, Rhus, Rosa, Rubus, Solidago multiradiata, Sphenosciadium capitellatum, Taraxacum.* Predator: *Philanthus pulcher* Dalla Torre.

Prosopis elliptica Kirby, 1837. Fauna Bor.-Amer., v. 4, p. 266. ♀.

Prosopis antennata Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 271. ♂.

Prosopis varifrons Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 270. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 71.

Biology: Davidson, 1895. Psyche 7: 315-316. —Fye, 1965. Canad. Ent. 97: 864-865, fig. 1, table 1 (nest). —Medler, 1966. Ent. Soc. Wash., Proc. 68: 131.

Species Group Verticalis

verticalis (Cresson). Southeast Canada and transcont. U. S. Pollen: Unknown, but visits flowers of *Allium haematochiton, Apocynum androsaemifolium, Arctostaphylos patula, Asclepias, Baccharis, Ceanothus cordulatus, C. integerrimus, C. soredatus, Chamaebatia foliolosa, Collinsia heterophylla, Cryptantha intermedia, Diplacus auriantiacus, Eriodictyon californicum, E. trichocalyx, Eriogonum, Eriophyllum multicaule,*

Erysimum, Euphorbia crenulata, Heracleum lanatum, Horkelia parryi, Lomatium dasycarpum, Lupinus, Malus, Microseris nutans, Nemophila aurita, Penstemon grinnelli, P. palmeri, Phacelia distans, P. humilis, Potentilla glandulosa, Prunus subcordata, Rhamnus californicus, R. crocea, R. rubra, Ribes, Rosa californica, Rubus leucodermis, Salix, Scrophularia californica, S. laciniata, Solidago canadensis, S. multiradiata, Tamarix. Predator: *Philanthus politus* Say.

Prosopis verticalis Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 271. ♂.
Prosapis tridentulus Cockerell, 1896. Psyche 7 (sup.): 27. ♂.
Prosopis tridens Cockerell, 1896. Psyche 7 (sup.): 28. ♂.
Prosopis subtristis Swenk and Cockerell, 1910. Ent. News 21: 70. ♀.
Prosopis melitina Lovell, 1911. Ent. News 22: 214. ♀.

Biology: Fye, 1965. Canad. Ent. 97: 867, table 1 (nest).

Genus HYLAEUS Subgenus CEPHALYLAEUS Michener

Hylaeus subg. *Cephalylaeus* Michener, 1942. N. Y. Ent. Soc., Jour. 50: 273.
Type-species: *Prosopis basalis* Smith. Orig. desig.

Revision: Snelling, 1968. Los Angeles Co. Mus., Contrib. Sci. 144: 1-3.

basalis (Smith). Transcont. in U. S., south. Canada (montane areas, alpine in southern distribution). Pollen: Unknown, but exhibits a decided preference for flowers of the Rosaceae; visits a wide variety of flowers including *Arctostaphylos patula, Calochortus leichtlinii, Ceanothus, Chamaebatia foliolosa, Cymopterus terebinthus, Erigeron coulteri, Eriogonum mariifolium, Horkelia fusca, Oxypolis occidentalis, Phyllodoce breweri, Potentilla fruticosa, P. glandulosa, Rhamnus californica, Rubus, Sphenosciadium capitellatum, Veronica americana.* Predator: *Philanthus pulcher* Dalla Torre.

Prosopis basalis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 22. ♀, ♂.

Biology: Fye, 1965. Canad. Ent. 97: 864, table 1 (nest).

nunenmacheri Bridwell. Calif. (sea level to moderate elevations in the Coast Ranges and Sierra Nevada). Pollen: Unknown, but exhibits a decided preference for the flowers of the Rosaceae; visits a wide variety of flowers including *Arctostaphylos patula, Baccharis, Ceanothus cordulatus, C. cuneatus, C. greggii, C. integerrimus, C. soredatus, Chamaebatia foliolosa, Cryptantha, Eriodictyon angustifolium, E. californicum, Phacelia distans, Prunus emarginata, Ranunculus occidentalis, Rhamnus californicus, R. crocea, Rhus diversiloba, Salix lasiolepis, Solidago californica, Thysanocarpus curvipes.*

Hylaeus Nunemacheri Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 157. ♀.

Genus HYLAEUS Subgenus METZIELLA Michener

Hylaeus subg. *Metziella* Michener, 1942. N. Y. Ent. Soc., Jour. 50: 273.
Type-species: *Prosopis potens* Metz. Monotypic and orig. desig. (=*Prosopis sparsa* Cresson).

Revision: Snelling, 1968. Los Angeles Co. Mus., Contrib. Sci. 144: 3-4.

sparsus (Cresson). Canada (Quebec), eastern U. S. (Mich. to N. Y. south to Ga.) west to Tex. Pollen: Unknown, but visits flowers of *Eulophus americanus, Osmorrhiza longistylis, Thaspium aureum trifoliatum.*

Prosopis sparsa Cresson, 1869. Boston Soc. Nat. Hist., Proc. 12: 271. ♀.
Prosopis thaspii Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 43. ♀.
Prosopis potens Metz, 1911. Amer. Ent. Soc., Trans. 37: 103. ♂.

Genus HYLAEUS Subgenus Unassigned

formosus Krombein. Fla. (Key Largo, Stock Is.); West Indies (Bahamas). Pollen: Unknown, but visits flowers of *Metopium toxiferum.*

Hylaeus formosus Krombein, 1953. Amer. Mus. Novitates 1633: 19. ♀.
Hylaeus metopii Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 80. ♀.

Taxonomy: Krombein, 1967. U. S. Dept. Agr., Agr. Monog. 2, Sup. 2, p. 423.

graenicheri Mitchell. Fla. (Miami, Key Largo, Plantation Key, and Saddlebunch Keys). Pollen: Unknown, but visits flowers of *Metopium toxiferum*, *Flaveria linearis*.
Hylaeus graenicheri Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 240. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 79. —Snelling, 1966. South. Calif. Acad. Sci., Bul. 65: 174.

suffusus (Cockerell). Nev. Possibly a *Paraprosopis*.
Prosapis suffusa Cockerell, 1896. Psyche 7 (sup.): 32. ♂.

Taxonomy: Snelling, 1966. South. Calif. Acad. Sci., Bul. 65: 174. —Snelling, 1970. Los Angeles Co., Mus., Contrib. Sci. 180: 58.

tuertonis (Cockerell). N. Mex. (Tuerto Mts. near Santa Fe), Colo. (Florissant). Possibly a *Paraprosopis* and may be a synonym of *H. wootoni* (Cockerell).
Prosopis tuertonis Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 423. ♀.

Family OXAEIDAE

This small family of moderately large-sized bees occurs only in the Western Hemisphere. Although as a group the Oxaeidae are primarily centered in the tropics, a few species are present in the warm temperate areas of both North and South America. Some of the species commence flight activity about sunrise and at least the males of one species, *Protoxaea gloriosa* (Fox), cluster in large aggregations on selected plants where they spend the night.

The known intrafloral relationships of these bees suggest a rather narrow dependence upon relatively few sources of pollen. These include only certain genera within the plant families Leguminosae, Solanaceae, and Zygophyllaceae. However, the males and females seek nectar from a comparatively wide variety of plants since the flowers of some of the preferred pollen sources produce little or no nectar and large quantities of nectar are required to meet the bioenergetic needs of these fast-flying bees.

Revision: Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 1-75, 68 figs., 3 pls., 2 maps, 2 tables (included genera and spp., behavior, intrafloral ecology, summary of biological literature).

Taxonomy: Friese, 1898. K. K. Naturhist. Hofmus., Ann. 13: 59-86 (tax. characters, tax. position). —Schrottky, 1913. Soc. Cient. Argentina, An. 75: 114-115, 180-286 (tax. position). —Michener, 1944. Amer. Mus. Nat. Hist., Bul. 82: 246 (tax. characters, tax. status). —Moure, 1946. Bol. Agr. 4: 12-13 (tax. characters). —Moure, 1950. Dusenia 1: 303-306 (tax. characters, tax. status). —Rozen, 1964. N. Y. Ent. Soc., Jour. 72: 223-230, 7 figs. (tax. characters, tax. status). —Rozen, 1965. Amer. mus. Novitates 2224: 1-18 (immature stages, tax. status). —Michener, 1965. Amer. Mus. Nat. Hist., Bul. 130: 10 (tax. status). —Graf, 1966. Ciencia e Cultura 18: 137-138 (tax. characters, tax. status). —Linsley and Cazier, 1972. Amer. Mus. Novitates 2509: 1-25, 4 tables (tax. status). —Roberts, 1973. Kans. Ent. Soc., Jour. 46: 437-446 (tax. status).

Biology: Linsley and Cazier, 1972. Amer. Mus. Novitates 2509: 1-25, 4 tables (behavior). —Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 5-16, 2 tables (flower preferences, territoriality of males, sleeping aggregations of males, nest sites, nest architecture, female aggressiveness at nest site, parasites, immature stages).

Morphology: Popov, 1941. Acad. Sci. USSR, Compt. Rend. 30: 82-85, 4 figs. (male genitalia). —popov, 1945. Zool. Zhur. 24: 329-336, 3 figs. (male genitalia). —Rozen, 1951. Kans. Ent. Soc., Jour. 24: 142-150, 17 figs. (male genitalia).

Genus PROTOXAEA Cockerell and Porter

Protoxaea Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 410.
Type-species: *Megacilissa gloriosa* Fox. Monotypic and orig. desig.

This genus is composed of three species, two of which (*P. australis* Hurd and Linsley and *P. micheneri* Hurd and Linsley) occur in Mexico below the elevation of Mexico City and well to the south of *P. gloriosa* (Fox) which ranges over much of northern Mexico and adjacent southwestern United States.

Revision: Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 23-40, figs. 2-4, 17-40, map 1, plates 1-2 (included spp. with summary of biological literature).

Biology: Linsley and Michener, 1962. Kans. Ent. Soc., Jour. 35: 385-389 (habits).

gloriosa (Fox). Tex. west to Ariz.; Mexico (Baja California, Chihuahua, Coahuila, Durango, Nuevo leon, Sinaloa, Sonora and Tamaulipas). Parasite: *Triepeolus* sp. Pollen: Narrowly polylectic, obtains pollen chiefly from the flowers of *Acacia angustissima, Cassia bauhinioides, C. leptocarpa, C. wislizenii, Desmanthus cooleyi, Kallstroemia grandiflora, Larrea tridentata, Prosopis glandulosa* var. *torreyanum, Solanum elaeagnifolium, S. rostratum*, but visits some of these and a wide variety of other flowers for nectar including *Aloysia gratissima, A. wrightii, Asclepias subverticillata, Baccharis glutinosa, Baileya multiradiata, Caesalpinia jamesii, Casuarina, Cevallia sinuata, Conyza coulteri, Croton pottsii, Dalea scoparia, Gaillardia pulchella, Gossypium, Guardiola tulocarpa, Helianthus annuus, Hoffmanseggia glauca, Koeberlinia spinosa, Lepidium lasiocarpum, L. montanum, Lygodesmia juncea, Medicago sativa, Melilotus alba, Menodora scabra, Mentzelia, Mimosa, Parkinsonia aculeata, Psilostrophe tagetina, Salvia azurea, Solidago occidentalis, Sphaeralcea, Tamarix gallica, T. ramosissima, Verbesina encelioides.*
Megacilissa gloriosa Fox, 1893. Psyche 6: 421. ♀.
Oxaea Tristis Gribodo, 1894. Soc. Ent. Ital., Bol. 26: 278. ♂.
Protoxaea gloriosa pallida Cockerell, 1934. Canad. Ent. 66: 153. ♀, ♂.

Taxonomy: Rozen, 1964. N. Y. Ent. Soc., Jour. 72: 223-230, 7 figs. (larva and taxonomic significance, parasite). —Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 29-38, figs. 2, 3, 25-36, map 1, plates 1-3 (redescription, synonymy, geogr. and floral records).

Biology: Linsley and Michener, 1962. Kans. Ent. Soc., Jour. 35: 385-389 (habits). —Cazier and Linsley, 1963. Canad. Ent. 95: 547-556, 2 figs. (male territorial behavior). —Linsley and Cazier, 1963. Pan-Pacific Ent. 39: 1-18, 6 figs., 2 tables (floral relationships, diurnal activity). —Linsley and Cazier, 1972. Amer. Mus. Novitates 2509: 1-25, 4 tables (adult behavior). —Cazier and Linsley, 1974. Amer. Mus. Novitates 2546: 1-20, figs. 1-6, tables 1-2 (foraging behavior). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 27 (floral relationships, territorial behavior). —Cazier and Linsley, 1975. Pan-Pacific Ent. 51: 248-253, 6 figs., 2 tables (visitation to flowers of *Kallstroemia grandiflora* after two years drought). —Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 14-16 (adult behavioral characteristics).

Genus MESOXAEA Hurd and Linsley

Mesoxaea Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 41.
Type-species: *Oxaea nigerrima* Friese. Orig. desig.

As presently understood this genus contains seven species which occupy much of the Mexican mainland to the northeast, south, and west of the Mexican Plateau although one species inhabits the Valley of Mexico.

arizonica (Cockerell). South. Ariz.; Mexico (Nayarit, Sinaloa and Sonora). Pollen: Collects pollen of *Kallstroemia grandiflora*, but also visits other flowers for nectar including *Acacia angustissima, Buddleja sessiliflora, Tephrosia leiocarpa, Turnera diffusa.*
Protoxaea nigerrima arizonica Cockerell, 1936. Amer. Mus. Novitates 831: 6. ♀.

Taxonomy: Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 61-64, figs. 61-64, map 3, table 2 (redescription, geogr. records and floral preferences).

rufescens Hurd and Linsley. South. Ariz.; Mexico (Nayarit, Sinaloa and Sonora). Pollen: Collects pollen from the flowers of *Mimosa polyantha, Solanum*, but visits other flowers for nectar including *Acacia angustissima, Buddleja sessiliflora, Croton culiacanensis, Kallstroemia grandiflora, Turnera diffusa, Verbesina encelioides.*
Mesoxaea rufescens Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 47, figs. 45-48, map 2, table 2. ♂, ♀.

texana (Friese). La., Tex.; Mexico (Nuevo Leon). Ecology: Nests in large aggregations in areas of sparse vegetation. Pollen: Collects pollen from flowers of *Solanum rostratum*, but

visits other flowers for nectar including *Aloysia gratissima, Croton, Eupatorium serotinum, Gossypium, Monarda punctata, Polygonum, Sesamum indicum, Verbena halei, Vernonia texana.*

Oxaea texana Friese, 1898. K. K. Naturhist. Hofmus., Ann. 13: 85. ♂.

Taxonomy: Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 6: 275. ♂, ♀. —Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 54-58, figs. 53-56, map 2, table 2 (redescription, geogr. and floral records).

Biology: Birkmann, 1932. Giddings News, 2 September 1932: 9, p. 7, columns 6 and 7 (habits). —Cockerell, 1933. Amer. Nat. 67: 286-288 (nest site, habits). —Hurd and Linsley, 1976. Smithsn. Contrib. Zool. 220: 57-58 (summary of literature).

Family ANDRENIDAE

This is a large family of pollen-collecting bees which is present on all the continents except Australia. Nearly all of the species excavate their nests in the ground and most are solitary although a few species in each of the two subfamilies live in colonies. Their intrafloral relationships are varied and range from numerous examples of oligolecty in varying degrees to broad patterns of polylecty.

Even though both subfamilies are well represented in America north of Mexico by a great many species, the majority of our fauna consists of the chiefly Holarctic genus *Andrena* and the Nearctic genus *Perdita.*

Taxonomy: Rozen, 1951. Kans. Ent. Soc., Jour. 24: 142-150, 17 figs. (male genitalia). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 86-330, figs. 1, 2, 4, 15-79, tables 3-9 (eastern U. S. spp.). --Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 1-13, 18 figs. (pupae).

Subfamily ANDRENINAE

Taxonomy: Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 5-6 (pupae).

Genus ANDRENA Fabricius

Since studies of the relationships of the numerous subgenera within the genus *Andrena* are incomplete, the subgenera are arranged alphabetically in this catalog. Those species currently not assigned to any subgenus are placed after the recognized subgenera.

Taxonomy: Cockerell, 1898. N. Mex. Univ., Bul. 1: 48 (N. Mex. spp.) (reprint: Denison Univ. Sci. Labs., Bul. 11: 48). —Cockerell, 1899. Ent. News. 10: 253 (misc.). —Cockerell, 1901. Ent. News 12: 74 (misc.). —Cockerell, 1901. N. Y. Ent. Soc., Jour. 9: 132 (N. J. spp.). —Robertson, 1902. Amer. Ent. Soc., Trans. 28: 187 (Ill. spp.). —Bruner, 1903. Amer. Ent. Soc., Trans. 29: 240 (N. Amer. spp.). —Viereck, 1904. Canad. Ent. 36: 157, 189, 221 (Pacific Northwest spp.). —Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 429-437 (Colo. spp.). —Viereck, 1907. Ent. News 18: 280 (Conn. spp.). —Cockerell, 1907. Colo. Univ., Studies 4: 244 (Colo. spp.). —Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 10 (Colo. spp.). —Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 1 (Rocky Mts. spp.). —Viereck, 1917 (1916). Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 709-720 (Conn. spp.). —Viereck, 1924. Canad. Ent. 56: 20 (subgenera). —Cockerell, 1930. Pan-Pacific Ent. 7: 7 (misc.). —Cockerell, 1931. Amer. Mus. Novitates 458: 1-20 (Rocky Mts. spp.). —Cockerell, 1932. Canad. Ent. 64: 155-158 (*Micrandrena*). —Cockerell, 1932. Pan-Pacific Ent. 8: 173-177 (misc. Calif. spp.). —Cockerell, 1932. Canad. Ent. 64: 285-288 (*sladeni* group). —Atwood, 1934. Canad. Jour. Res. 10 (2): 206-214, figs. 31-91 (Nova Scotia spp.). —Cockerell, 1937. Amer. Mus. Novitates 948: 15 (*Diandrena*, pars). —Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 263-282 (black spp.). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 702-713 (Colo. spp.). —Lanham, 1949. Pan-Pacific Ent. 25: 33-35 (females of *carlini* group). —Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 183-238 (subgenera). —Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 373-414 (misc. Calif. spp.). —Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 163-172 (N. Amer. spp. of *Melandrena*). —Linsley and MacSwain, 1956. Pan-Pacific Ent. 32: 111-121 (*Oenothera* visiting spp.). —Mitchell, 1960. N. C. Agr.

Expt. Sta. Tech. Bul. 141: 86-257, figs. 2, 4, 6-57, tables 3-7 (eastern U. S. spp.). —Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 31-41 (*Diandrena* spp. associated with flowers of *Oenothera*). —Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 117-130 (*Onagrandrena* spp. associated with the flowers of *Clarkia* and *Oenothera*). —Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 49-52 (N. spp. of *Onagrandrena*). —Linsley and MacSwain, 1963. Pan-Pacific Ent. 39: 189-198 (N. spp. of *Onagrandrena*). —Knerer and Atwood, 1964. Ent. Soc. Ontario, Proc. 94: 41-56 (Ontario spp.). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 279-316 (N. Amer. subgenera). —Ribble, 1967. Nebr. Univ. State Mus., Bul. 6: 27-42, figs. 1-5, 1 table, 1 map (subg. *Larandrena*). —LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 1-316, 340 figs., 4 tables, 14 maps (subg. *Callandrena*). —Warncke, 1968. Coimbra Univ. Est. Mus. Zool., Mem. 307: 1-110 (west. Palaearctic subgenera). —Ribble, 1968. Kans. Ent. Soc., Jour. 41: 220-236, 15 figs., 1 map, 1 table (subg. *Belandrena*). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 237-394, 124 figs., 18 maps (subgenera *Derandrena* and *Micrandrena*). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 1-46, 88 figs., 5 tables, 13 maps (subg. *Diandrena*). —LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 1-47, 38 figs., 3 tables (subgenera *Aporandrena, Charitandrena, Plastandrena*). —LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 543-605, 75 figs., 5 maps (subg. *Tylandrena*). —Warncke, 1970. Bayerischen Ent. Nachr. 19: 28-32 (lectotypic designations). —LaBerge, 1971. Pan-Pacific Ent. 47: 47-57, 15 figs. (subg. *Nemandrena*). —LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 441-520, 68 figs., 1 table (subgenera *Rhaphandrena, Scrapteropsis, Xiphandrena*). —LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 27-358, 76 figs. (subgenera *Geissandrena, Gonandrena, Parandrena, Pelicandrena*). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 235-371, 69 figs., 2 tables, 15 maps (subg. *Trachandrena*). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 101-189, 99 figs., 5 tables (subg. *Scaphandrena*). —LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 371-446, 74 figs. (subg. *Euandrena*). —Donovan, 1977. Calif. Univ. Pubs. Ent. 81: 1-107, 130 figs., 17 maps (subg. *Cnemidandrena;* received too late for inclusion in this catalog). —LaBerge, 1977. Amer. Ent. Soc., Trans. 103: 1-143, 128 figs., 3 tables (subgenera *Dasyandrena, Euandrena, Oxyandrena, Psammandrena, Rhacandrena, Thysandrena;* received too late for inclusion in this catalog).

Biology: Graenicher, 1905. Wis. Acad. Sci., Arts and Letters 15: 89-97 (floral relationships). —Linsley, 1937. Brooklyn Ent. Soc., Bul. 32: 125-127 (occurrence of double broods in N. Amer. spp.). —Linsley, MacSwain and Smith, 1955. Pan-Pacific Ent. 31: 173-185 (floral relationships of *Melandrena*). —Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 1-46, 9 plates, 6 textfigs. (*Ranunculus* visiting spp.). —Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 1-58, 6 plates, 6 textfigs. (comparative behavior of spp. visiting flowers of Onagraceae in the Colorado Desert and Great Basin). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 59-98, 3 plates, 17 tables (comparative behavior of spp. visiting flowers of Onagraceae in the Mojave Desert). —Stephen, 1966. Kans. Ent. Soc., Jour. 39: 42-50, 2 figs. (comparative bionomics). —Youssef and Bohart, 1968. Kans. Ent. Soc., Jour. 41: 442-444 (literature references to nesting habits). —Cruden, 1972. Madrono 21: 505-515, 1 fig., 2 tables (*Nemophila* visiting spp.). —Cruden, 1972. Evolution 26: 373-389, 8 figs., 9 tables (oligolectic spp. of *Nemophila menziesii*, evolution of oligolectic bees). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 1-80, 3 plates, 10 textfigs., 18 tables (comparative behavior of *Clarkia* visiting spp.). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 1-68, 6 plates, 15 textfigs., 10 tables (comparative behavior of *Camissonia* and *Oenothera* visiting spp.). —Davis and LaBerge, 1975. Ill. Nat. Hist. Survey, Biol. Notes 95: 2 (literature references to nesting habits).

Genus ANDRENA Subgenus ANDRENA Fabricius

Andrena Fabricius, 1775. Systema Ent., p. 376.
Type-species: *Apis helvola* Linnaeus. Desig. by Viereck, 1912.
Anthrena Illiger, 1801. Mag. Insektenk. 1: 127. Emend.
Anthocharessa Gistel, 1850. Isis (Encycl. Ztschr.) 6: 82.
Type-species: *Apis helvola* Linnaeus. Autobasic; proposed unnecessarily for *Andrena* Fabricius which Gistel considered to be preoccupied by *Anthrenus* Geoffroy, 1764.

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 205 (tax. characters). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 104-110, figs. 15-16, 20-22, table 3 (eastern U. S. spp.). —Lanham, 1965. Kans. Ent. Soc., Jour. 38: 198-201 (*Salix* visiting spp. of the Colorado Front Range).

advarians Viereck. B. C.
Andrena advarians Viereck, 1904. Canad. Ent. 36: 192, 224. ♀, ♂.

albihirta (Ashmead). Rocky Mts. and Pacific Coast. Pollen: Collects pollen from *Salix*, including *S. laevigata, S. lasiolepis.*
Cilissa albihirta Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 5. ♀.
Andrena bebbiana Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 39. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 8 (tax. characters). —Lanham, 1941. Ent. Soc. Amer. Ann. 34: 705, 708. (tax characters, as *bebbiana*) female, male (key). —Lanham, 1965. Kans. Ent. Soc., Jour. 38: 199-200 (tax. status, synonymy).

Biology: Lanham, 1974. Kans. Ent. Soc., Jour. 47: 373-377, 1 fig., 1 table (effect of melanism on adult behavior, floral relationships, stylopization).

albosellata Cockerell. Wyo., Colo. Predator: *Philanthus crabroniformis* Sm.
Andrena albosellata Cockerell, 1931. Amer. Mus. Novitates 458: 7. ♀.

asmi Viereck. Wash.
Andrena asmi Viereck, 1904. Canad. Ent. 36: 192, 225. ♀, ♂.

banffensis Viereck. Alta.
Andrena (*Andrena*) *banffensis* Viereck, 1924. Canad. Ent. 56: 32. ♀.

bella Viereck. B. C.
Andrena (*Andrena*) *bella* Viereck, 1924. Canad. Ent. 56: 22. ♀.

birtwelli Cockerell. N. Mex., Colo., Calif. Pollen: Unknown, but visits flowers of *Antennaria, Eriogonum, Potentilla, Solidago.*
Andrena birtwelli Cockerell, 1901. Psyche 9: 283. ♀.
Andrena birtwelli subatrata Cockerell, 1931. Amer. Mus. Novitates 458: 8. ♀.

Taxonomy: Viereck, 1903. Amer. Ent. Soc., Trans. 29: 54. ♂. —Lanham, 1941, Ent. Soc. Amer., Ann. 34: 705. ♀ (key).

buckelli Viereck. B. C.
Andrena (*Andrena*) *buckelli* Viereck, 1924. Canad. Ent. 56: 22. ♀, ♂.

carrikeri Viereck and Cockerell. Nebr.
Andrena carrikeri Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 14. ♂.

ceanothifloris Linsley. South. Calif. Pollen: Possibly an oligolege of *Ceanothus* including *C. cordulatus, C. integerrimus, C. leucodermis,* but visits other flowers including *Arctostaphylos patula, Eriodictyon californicum, Horkelia, Ribes.*
Andrena ceanothifloris Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 270. ♀, ♂.

clarkella (Kirby). Holarctic; Alaska to Ont., Que., Mass. and Maine, south to Colo., Minn. and N. Y.; Europe. Pollen: Apparently an oligolege of *Salix.*
Melitta Clarkella Kirby, 1802. Monog. Apum Angliae, v. 2, p. 130. ♀.

Taxonomy: Sladen, 1919. Canad. Ent. 51: 124. ♀, ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 104-105, figs. 15-16, 21, table 3 (redescription). —Lanham, 1963. Pan-Pacific Ent. 40: 9 (geogr. records). —Lanham, 1965. Kans. Ent. Soc., Jour. 38: 199 (floral and geogr. records).

clypeoporaria Viereck. Wash., Oreg.
Andrena clypeoporaria Viereck, 1904. Canad. Ent. 36: 192. ♀.

cristata Viereck. Nev.
Andrena (*Andrena*) *cristata* Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 556. ♀.

diversicolor Viereck. Alta.
Andrena (*Andrena*) *diversicolor* Viereck, 1924. Canad. Ent. 56: 76. ♀.

edwardsi Viereck. Idaho.
Andrena edwardsi Viereck, 1916. Amer. Mus. Nat. Hist., Bul. 35: 731. ♀.

edwiniae Cockerell. Colo.
Andrena edwiniae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 310. ♀.

Biology: Clements and Long, 1923. Carnegie Inst. Wash., Pub. 326: 249 (ecology).

enigmatica Viereck and Cockerell. Nebr.
Andrena enigmatica Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 33. ♂.

erecta Viereck. B. C. to Calif. Pollen: Unknown, but visits flowers of *Chamaebatia foliolosa, Clarkia dudleyana, Erigeron glaucus, Paeonia browni, Phacelia imbricata, Rubus, Thysanocarpus curvipes.*
Andrena (*Andrena*) *erecta* Viereck, 1924. Canad. Ent. 56: 28. ♀, ♂.

excellens Viereck. B. C.
Andrena (*Andrena*) *excellens* Viereck. 1924. Canad. Ent. 56: 76. ♀.

frigida Smith. Alaska to N. S., south to Va., Ill., Wis., Minn., Wash. and Oreg. Pollen: Unknown, but visits flowers of *Cornus, Prunus, Salix discolor.*
Andrena frigida Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 115. ♀.
Andrena moesta Smith, 1879. Desc. New Species Hym. Brit. Mus. p. 54. ♀, ♂.
Andrena cockerelli Graenicher, 1903. Canad. Ent. 35: 163. ♀, ♂.
Andrena hirticeps Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 116. ♂. Preocc.
Andrena hirtignatha Linsley, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1068. N. name.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 149. ♀ (type). —Cockerell, 1906. Psyche 13: 33 (type). —Atwood, 1934. Canad. Jour. Res. 10: 207, 209. ♀, ♂ (key). —Morice and Cockerell, 1901. Canad. Ent. 33: 149 (type of *hirticeps*). —Morice and Cockerell, 1901. Canad. Ent. 33: 153 (type of *moesta*). —Cockerell. 1906. Psyche 13: 26 (type of *hirticeps*) —Cockerell, 1906. Psyche 13: 34 (type of *moesta*). —Viereck, 1907. Ent. News 18: 283, 285. ♀, ♂ (key, *as cockerelli*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 105-106, figs. 15-16, table 3 (redescription, synonymy).

fulvicrista Viereck. B. C.
Andrena (*Andrena*) *fulvicrista* Viereck, 1924. Canad. Ent. 56: 30. ♀, ♂.

harveyi Viereck. B. C., Oreg.
Andrena harveyi Viereck, 1904. Canad. Ent. 36: 192, 194. ♀, ♂.

hemileuca Viereck. Wash.
Andrena hemileuca Viereck, 1904. Canad. Ent. 36: 192, 193. ♀, ♂.

hitei Cockerell. Colo.
Andrena hitei Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 369. ♀.

Taxonomy: Nelson, 1930. Ent. News 41: 322, fig. ♀, ♂. —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705. ♀ (key).

impuncta Kirby. Maine, N. Y.
Andrena impuncta Kirby, 1837. Faun. Bor.-Amer., v. 4, p. 268. ♀.

irana Cockerell. Colo. Parasite: *Nomada morrisoni* Cress., *N. vallesina* Ckll.?
Andrena irana Cockerell, 1931. Ann. and Mag. Nat. Hist. (10) 3: 392. ♀.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 265. ♀ (key). —Lanham 1941. Ent. Soc. Amer., Ann. 34: 705. ♀ (key).

Biology: Hicks, 1934. Colo. Univ., Studies 21: 267 (nest, parasite).

laminibucca Viereck and Cockerell. Colo.
Andrena laminibucca Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 37. ♂.

lewisii Cockerell. Colo. Pollen: Unknown, but visits flowers of *Rubus.*
Andrena lewisii Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 435. ♀.

Taxonomy: Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 57. ♀ (var.). —Cockerell, 1927. Ent. Soc. Amer., Ann. 20: 397. ♀.

Biology: Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 249 (ecology).

lillooetensis Viereck. B. C.
Andrena (*Andrena*) *lillooetensis* Viereck, 1924. Canad. Ent. 56: 237. ♂.

lummiorum Viereck. B. C.
Andrena (*Andrena*) *lummiorum* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 564. ♀.

macoupinensis Robertson. Ill., Mass., N. C. Pollen: Unknown, but visits flowers of *Prunus, Salix, Vicia.*
Andrena macoupinensis Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 48. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 191. ♀ (key). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 141: 106, figs. 15-16, 21, table 3 (redescription).

magnifica Viereck. B. C.
Andrena (*Andrena*) *magnifica* Viereck, 1924. Canad. Ent. 56: 77. ♀.

mandibularis Robertson. N. S. and Ont., south to Ga., west to Ill. and Minn. Pollen: Unknown, but visits flowers of *Amelanchier, Claytonia, Cornus, Crataegus, Hepatica, Kalmia, Malus, Prunus, Pyrus, Rhamnus, Rhus, Salix, Staphylea, Uvularia, Viburnum, Zanthoxylum.*
Andrena mandibularis Robertson, 1892. Amer. Nat. 26: 272. ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 191, 192. ♀, ♂ (key). —Atwood, 1934. Canad. Jour. Res. 10: 209. ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 106-107, figs. 15, 22, table 3 (redescription).

Biology: Salt, 1927. Jour. Expt. Zool. 48: 252 (stylopization).

mesoleuca Cockerell. Calif.
Andrena mesoleuca Cockerell, 1924. Pan-Pacific Ent. 1: 60. ♀.

metea Cockerell. Wyo.
Andrena metea Cockerell, 1924. Ent. News 35: 350. ♂.

milwaukeensis Graenicher. N. S. to Ga., west to Minn. Pollen: Unknown, but visits flowers of *Aruncus, Cornus, Ilex, Pyrus malus, Rubus, Viburnum.*
Andrena milwaukeensis Graenicher, 1903. Canad. Ent. 35: 164. ♀, ♂.

Taxonomy: Viereck, 1907. Ent. News 18: 283, 285. ♀, ♂ (key). —Atwood, 1934. Canad. Jour. Res. 10: 207, 209. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 107-108, figs. 15-16, 20, table 3 (redescription).

Biology: Brittain, 1933. Canad. Dept. Agr., Bul. 162: 94, figs. (ecology).

moesticolor Viereck and Cockerell. Colo.
Andrena moesticolor Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 43: 31. ♀, ♂.

monogonoparia Viereck. Nev.
Andrena (*Andrena*) *monogonoparia* Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 566. ♂.

nitidarum Viereck. Alta.
Andrena (*Andrena*) *nitidarum* Viereck, 1924. Canad. Ent. 56: 78. ♀.

nodosa Viereck. Alta.
Andrena (*Andrena*) *nodosa* Viereck, 1924. Canad. Ent. 56: 238. ♀.

paenefulva Viereck and Cockerell. Colo.
Andrena paenefulva Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 51. ♀.

pallida Viereck. Alta.
Andrena (*Andrena*) *pallida* Viereck, 1924. Canad. Ent. 56: 78. ♀.

palpalis Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Calandrinia menziesii, Cryptantha barbigera, Larrea tridentata, Phacelia affinis, P. distans, Salix gooddingii.*
Andrena (*Andrena*) *palpalis* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 400. ♀, ♂.

perarmata Cockerell. B. C. to Calif. Pollen: Oligolege of *Salix* including *S. lasiolepis*, but visits other flowers for nectar including *Baccharis.*
Andrena perarmata Cockerell, 1898. Entomologist 31: 88. ♂.

Taxonomy: Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 7: 232. ♂. —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705, 708. ♀, ♂ (key). —Lanham, 1965. Kans. Ent. Soc., Jour. 38: 199-200 (tax. status, geogr. range).

pyrrhacita mosina Cockerell. Colo. Pollen: Oligolege of *Salix.*
Andrena pyrrhacita var. *mosina* Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 2: 330. ♀.

Taxonomy: Lanham, 1965. Kans. Ent. Soc., Jour. 38: 201 (tax. status).

pyrrhacita pyrrhacita Cockerell. B. C. to Colo., Utah, Calif. Pollen: Oligolege of *Salix*.
Andrena pyrrhacita Cockerell, 1917. Ann. and Mag. Nat. Hist. (7) 19: 536. ♀.
Andrena pyrrhacita var. *coloradensis* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 39. ♀.

Taxonomy: Lanham, 1965. Kans. Ent. Soc., Jour. 38: 200-201 (tax. status).

revelstokensis Viereck. B. C.
Andrena (*Andrena*) *revelstokensis* Viereck, 1924. Canad. Ent. 56: 239. ♀.

rhodotricha Linsley. Calif.
Andrena rhodotricha Linsley, 1939. Pan-Pacific Ent. 15: 157. ♀, ♂.

Taxonomy: MacSwain, 1945. Pan-Pacific Ent. 21: 134 (nesting habits).

ribesina Cockerell. Colo. Pollen: Unknown, but visits flowers of *Ribes*.
Andrena ribesina Cockerell, 1906 Amer. Mus. Nat. Hist., Bul. 22: 433. ♀.
Andrena jacobaea Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 15: 267. ♀.

Taxonomy: Linsley, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1079 (synonymy).

ribifloris Viereck and Cockerell. Colo. Pollen: Unknown, but visits flowers of *Ribes*.
Andrena ribifloris Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 32. ♂ (♀ misdet.).

saccata Viereck. Wash. to Calif. Pollen: Unknown, but visits flowers of *Eriogonum*.
Andrena saccata Viereck, 1904. Canad. Ent. 36: 192, 195. ♀, ♂.

Taxonomy: Cockerell, 1937. Amer. Mus. Novitates 899: 3 (tax. characters).

salicicola Viereck and Cockerell. Colo. Pollen: Unknown, but visits flowers of *Salix*.
Andrena salicicola Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 52. ♀.

semifulva Viereck. Calif.
Andrena (*Andrena*) *semifulva* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 575. ♀.

singularis Viereck. B. C.
Andrena (*Andrena*) *singularis* Viereck, 1924. Canad. Ent. 56: 80. ♀.

thaspii Graenicher. N. S. to N. J. west to Ind., Wis. and Minn. Pollen: Unknown, but visits flowers of *Angelica atropurpurea, Brassica, Chrysanthemum, Diervilla, Ledum, Pyrus malus, Raphanus, Rosa, Rubus, Solidago, Stellaria, Taraxacum, Thaspium trifoliatum aureum, Trifolium, Vaccinium*.
Andrena thaspii Graenicher, 1903. Canad. Ent. 35: 162. ♀, ♂.

Taxonomy: Cockerell, 1912. Ann. and Mag. Nat. Hist. (8) 9: 382. ♀ (var.). —Atwood, 1934. Canad. Jour. Res. 10: 208, 209. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 108-109, table 3 (redescription).

thaspiiformis Viereck. Calif. Pollen: Oligolege of *Salix* including *S. gooddingii, S. hindsiana, S. laevigata, S. lasiolepis, S. nigra*, but visits other flowers presumably for nectar including *Sambucus caerulea, Spiraea prunifolia*.
Andrena (*Andrena*) *perezana thaspiiformis* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 386. ♀.

tincta Viereck. Colo.
Andrena (*Andrena*) *tincta* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 387. ♀.

topazana Cockerell. Colo., Idaho, Wyo.
Andrena topazana Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 434. ♀.

Taxonomy: Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 44, 45. ♀. —Cockerell, 1927. Ent. Soc. Amer., Ann. 20: 397. ♀.

tridens Robertson. New England States, south to Tenn. and Ga., west to Mich. and Ill. Pollen: Unknown, but visits flowers of *Azalea, Dentaria, Hepatica, Hydrangea, Rhododendron, Rhus*.
Andrena tridens Robertson, 1902. Amer. Ent. Soc., Trans. 28: 192. ♂.
Andrena cornelli Viereck, 1907. Ent. News 18: 282. ♀.

Taxonomy: Mitchell, 1958. *In* Krombein, U. S. Dept. Agr., Agr. Monog. 2, First Suppl. pp. 213, 216 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 109-110, figs. 15-16, 20-21, table 3 (redescription).

washingtoni Cockerell. B. C. to Wash. and Colo.
Andrena washingtoni Cockerell, 1901. Psyche 9: 284. ♀, ♂.

Taxonomy: Viereck, 1904. Canad. Ent. 36: 192, 195. ♀, ♂ (key).

Biology: Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 249 (ecology).

Genus ANDRENA Subgenus APORANDRENA Lanham

Andrena subg. *Aporandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 201.
Type-species: *Andrena coactipostica* Viereck. Monotypic and orig. desig.

Revision: LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 34-40, figs. 29-33 (N. Amer. spp.).

coactipostica Viereck. Calif. Pollen: Polylectic, apparently prefers flowers of the families Papaveraceae and Boraginaceae in that order, but visits a variety of flowers including *Calandrinia menziesii, Capsella bursa-pastoris, Cryptantha intermedia, Encelia farinosa, Eschscholzia californica, Lasthenia gracilis, Phacelia distans, Plagiobothrys californicus, P. nothofulvus, Platystemon californicus.*
Andrena (Andrena) coactipostica Viereck, 1917. Amer. Ent. Soc., Trans. 43: 372. ♀.

Genus ANDRENA Subgenus BELANDRENA Ribble

Andrena subg. *Belandrena* Ribble, 1968. Kans. Ent. Soc., Jour. 41: 221.
Type-species: *Andrena nemophilae* Ribble. Orig. desig.

The species of this subgenus exhibit a strong preference for the flowers of the families Hydrophyllaceae and Malvaceae.

Revision: Ribble, 1968. Kans. Ent. Soc., Jour. 41: 220-236, 15 figs., 1 map, 1 table (N. Amer. spp.).

Biology: Cruden, 1972. Madrono 21: 505-515, 1 fig., 2 tables (floral relationships). —Cruden, 1972. Evolution 26: 373-389, 8figs., 9 tables (floral relationships).

nemophilae Ribble. Calif. Parasite: *Caloglyphus* sp., *Meloe* sp. Pollen: Oligolectic on flowers of *Nemophila* including *N. maculata, N. menziesii atomeria, N. m. integrifolia, N. m. menziesii, N. pulchella,* but visits other flowers for nectar including *Arctostaphylos, Ceanothus, Gilia, Montia, Pholistoma auritum.*
Andrena (Belandrena) nemophilae Ribble, 1968. Kans. Ent. Soc., Jour. 41: 223, figs. 1-5, map 1, table 1. ♀, ♂.

sagittagalea Ribble. Tex. Parasite: *Vidia* sp. Pollen: Apparently oligolectic on flowers of *Phacelia,* but also visits flowers of *Salix.*
Andrena (Belandrena) sagittagalea Ribble, 1968. Kans. Ent. Soc., Jour. 41: 230, figs. 6-10, map 1, table 1. ♀, ♂.

sphaeralceae Linsley. Ariz. west to south. Calif. and south. Nev. Pollen: Apparently oligolectic on flowers of *Sphaeralcea* including *S. ambigua, S. laxa, S. orcutti, S. subhastata,* but visits other flowers presumably for nectar including *Koeberlinia, Phacelia distans.*
Andrena (Opandrena) sphaeralceae Linsley, 1939. Pan-Pacific Ent. 15: 160. ♀, ♂.

Genus ANDRENA Subgenus CALLANDRENA Cockerell

Callandrena Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 186.
Type-species: *Panurgus manifestus* Fox. Monotypic.
Pterandrena Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193.
Type-species: *Andrena pulchella* Robertson. Orig. desig.

Most species of this subgenus obtain pollen from the flowers of the Compositae.

Revision: LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 1-316, 340 figs., 4 tables, 14 maps (N. Amer. spp.).

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 198 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 294 (tax. characters).

accepta Viereck. N. J. to S. C., west to Alta., Oreg., east. Calif. (Big Pine), and Ariz.; Mexico (Chihuahua). Parasite: *Myopa?* or *Zodion obliquefasciatum* (Macq.). Pollen: Oligolege of Compositae, especially *Helianthus* including *H. angustifolius, H. annuus, H. divaricatus, H. giganteus, H. grosseserratus, H. maximilliani, H. petiolaris, H. salicifolius, H. scabberimus, H. strumosus, H. tuberosus,* but visits other flowers including *Aster ericoides villosus, Bidens aristosa, Cassia chamaecrista, Chrysothamnus, Coreopsis tripteris, Gaillardia pulchella, Grindelia squarrosa, Gutierrezia sarothrae, Haplopappus, Machaeranthera, Medicago sativa, Prionopsis ciliata, Silphium integrifolium, S. perfoliatum, S. speciosum, Solidago nemoralis, Verbesina occidentalis, V. oreophila.*

Andrena pulchella Robertson, 1891. Amer. Ent. Soc., Trans. 18: 57. ♀. Preocc.

Andrena accepta Viereck, 1916. Biol. Soc. Wash., Proc. 29: 127. N. name.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193, 194. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 137-138, figs. 24-26, 28, table 4 (redescription). —Rozen, 1973. N. Y. Ent. Soc., Jour. 81: 58-61, figs. 3-10 (mature larva).

Biology: Rozen, 1973. N. Y. Ent. Soc., Jour. 81: 54-58, 2 figs. (nest architecture, life history, parasite).

afimbriata LaBerge. Tex. Pollen: Unknown, but visits flowers of *Berlandiera, Polygala alba, Pyrrhopappus carolinianus.*

Andrena (*Callandrena*) *afimbriata* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 165, figs. 169-172. ♀, ♂.

aliciae Robertson. N. Y. to Ga., west to Minn. Nebr. and Kans. Pollen: Oligolege of Compositae, especially *Helianthus* including *H. angustifolius, H. divaricatus, H. giganteus, H. microcephalus, H. strumosus, H. tuberosus,* but visits other flowers including *Aster azurella, Bidens aristosa, B. chrysanthemoides, B. laevis, B. trichosperma, Cucurbita, Heliopsis helianthoides, Rudbeckia fulgida, R. laciniata, R. lanceolata, R. triloba, Silphium perfoliatum, Solidago occidentale.*

Andrena aliciae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 57. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 138-139, figs. 24-25, table 4 (redescription).

aliciarum Cockerell. N. Mex., Ariz.; Mexico (Sonora). Pollen: Unknown, but visits flowers of *Eriogonum, Pectis papposa.*

Andrena aliciarum Cockerell, 1897. Entomologist 30: 138. ♀.

Taxonomy: Cockerell, 1899. Ent. News 10: 254. ♂.

aridis LaBerge. Colo., Nebr., N. Mex., Tex. Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus, Gutierrezia microcephala, G. sarothrae.*

Andrena (*Callandrena*) *aridis* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 249, figs. 277-281. ♀, ♂.

asteris Robertson. Que. to Ga., west to Man., N. Dak., Nebr., and Mo. Pollen: Oligolege of Compositae, especially flowers of *Aster* including *A. ericoides, A. paniculatus,* but visits other flowers including *Echinacea, Eupatorium altissimum, Polygonum pennsylvanicum, Solidago nemoralis, S. puberula, S. rigida, S. ulmifolia.* Predator: *Philanthus solivagus* Say.

Andrena asteris Robertson, 1891. Amer. Ent. Soc., Trans. 18: 56. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 194. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 139-140, figs. 24-26, 28, table 4 (redescription).

Biology: Salt, 1927. Expt. Zool., Jour. 48: 251 (stylopization). —Britton, 1937. Conn. (State) Agr. Expt. Sta., Bul. 408: 261 (economic).

asteroides Mitchell. N. J. and Pa., south to S. C. and Miss. Pollen: Apparently an oligolege of *Aster* including *A. ericoides, A. dumosus, A. paniculatus,* but visits other flowers including *Chrysopsis, Haplopappus.*

Andrena (*Pterandrena*) *asteroides* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 140, figs. 24, 25. ♀, ♂.

auripes LaBerge. Ariz. (Graham Mts.); Mexico (Distrito Federal and Mexico).
Andrena (*Callandrena*) *auripes* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 204, figs. 219-223. ♀, ♂.

balsamorhizae LaBerge. Nev. (Lake Mead, Overton Beach and Rodgers Springs). Pollen: Unknown, but visits flowers of *Balsamorhiza*.
Andrena (*Callandrena*) *balsamorhizae* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 252, figs. 282-286. ♀, ♂.

barberi Cockerell. N. Mex. (Eagle Creek and Ruidoso Forks, White Mts.); Mexico (Durango, Guadalajara, Guanajuato, Hidalgo, Mexico, Puebla, Tlaxcala and Vera Cruz). Pollen: Apparently an oligolege of Compositae, including *Bidens triplinervia* var. *macrantha*, *Heterotheca*, *Rudbeckia laciniata*, *Solidago trinervata*, but visits other flowers including *Argemone*, *Prunus*.
Andrena barberi Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 448. ♀, ♂.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 14. ♀ (key).

beameri LaBerge. Ark., Kans. Pollen: Unknown, but visits flowers of *Coreopsis grandiflora*, *Echinacea angustifolia*, *Helenium nudiflora*.
Andrena (*Callandrena*) *beameri* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 135. ♀.

berkeleyi Viereck and Cockerell. Colo., Okla., Tex. Pollen: Unknown, but visits flowers of *Actinea*, *Engelmannia pinnatifida*.
Andrena berkeleyi Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 19. ♂.

Taxonomy: Cockerell, 1933. Pan-Pacific Ent. 9: 153. ♂.

biscutellata Viereck. Colo., Kans., N. Mex., Tex. Pollen: Unknown, but visits flowers of *Gaillardia*, *Monarda*.
Andrena (*Ptilandrena*) *biscutellata* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 393. ♀.

braccata Viereck. New England States to Va. Pollen: Apparently an oligolege of *Solidago* including *S. altissima*, *S. nemoralis*, but also visits flowers of *Aster*.
Andrena braccata Viereck, 1907. Ent. News 18: 284, 286. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 141-142, figs. 24-25, table 4 (redescription).

Biology: Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 249 (ecology).

bullata LaBerge. Tex. (Brazos and Lee Counties). Pollen: Unknown, but visits flowers of *Gutierrezia texana*, *Heterotheca subaxillaris*.
Andrena (*Callandrena*) *bullata* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 154, figs. 154-158. ♀, ♂.

calvata LaBerge. Ariz. (22 miles west of Springerville). Pollen: Unknown, but visits flowers of *Viguiera annua*.
Andrena (*Callandrena*) *calvata* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 74, figs. 60-64. ♂.

crawfordi Viereck. Kans., Okla., Tex. Pollen: Oligolege of Compositae, tribe Cichoriae, visits flowers of *Berlandiera*, *Coreopsis*, *Engelmannia bipinnatifida*, *Lindheimeria texana*, *Polygala alba*, *Pyrrhopappus carolinianus*, *P. geiseri*, *P. grandiflora*, *P. multicaulis*, *Serinea oppositifolia*, *Sitilias*.
Andrena crawfordi Viereck, 1909. Ent. Soc. Wash., Proc. 11: 143. ♀, ♂.

duplicata Mitchell. N. J., N. C., Ohio, Ill., Mo. Pollen: Apparently an oligolege of Compositae, visits flowers of *Bidens coronata*, *Helianthus divaricatus*, *H. grosseserratus*, *Solidago*.
Andrena (*Pterandrena*) *duplicata* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 144, figs. 24-26, 28. ♀, ♂.

fulvipennis Smith. N. J. to Fla. on coastal plain, also east. Tex. Pollen: Apparently an oligolege of Compositae, visits flowers of *Aster*, *Chrysopsis mariana*, *Coreopsis*, *Haplopappus*, *Heterotheca latifolia*, *H. subaxillaris*, *Gutierrezia texana*.
Andrena fulvipennis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 117. ♀.

Taxonomy: Viereck, 1902. Ent. News 13: 237. ♀. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 145-146, figs. 24-25, table 4 (redescription).

gardineri Cockerell. Md. to Ga., west to S. Dak., Colo. and Tex. Pollen: Apparently an oligolege of early summer flowering Compositae, especially *Senecio* including *S. aureus, S. pauperculus* var. *balsamitae, S. smallii, S. multilobatus, S. triangularis*, but visits other flowers including *Aster, Astragalus striatus, Baileya multiradiata, Crepis runcinata, Geraea, Hymenoxys glabra, Lesquerella ovalifolia, Penstemon, Rubus.*

Andrena (*Pterandrena*) *gardineri* Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 307. ♀.

Andrena ashmeadi Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 45. ♀.

Andrena (*Opandrena*) *lamellicauda* Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 629. ♂.

Andrena campbelli Cockerell, 1933. Pan-Pacific Ent. 9: 153. ♂.

Taxonomy: Lanham, 1941. Ent. Soc. Amer., Ann. 34: 711 (tax. characters). —Lanham, 1951. *In* Linsley *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1066 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 146-147, figs. 24-26, table 4 (redescription).

Biology: Clements and Long, 1923. Carnegie Inst. Wash., Pub. 366: 249 (ecology).

haynesi Viereck and Cockerell. Alta. and N. Dak., south to Tex. Pollen: Oligolege of *Helianthus*, mostly *H. petiolaris*, but also visits other flowers presumably for nectar including *Campanula, Echinacea pallida, Solidago rigida.*

Andrena haynesi Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 26. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 14. ♀ (key).

helianthi Robertson. Que. south to Va., west to Alta., Oreg., Calif. and Ariz. Pollen: Oligolege of Compositae, apparently preferring the flowers of *Helianthus* including *H. annuus, H. coloradinus, H. coronatus, H. divaricatus, H. giganteus, H. grosseserratus, H. maximilliani, H. petiolaris, H. rigidus, H. subrhomboideus, H. tuberosus*, but also visits other flowers including *Aster novaeangliae, Bidens aristosa, Chrysothamnus nauseosus, Cirsium undulatum, Cleome serrulata, Gilia, Gutierrezia sarothrae, Medicago sativa, Rudbeckia laciniata, Silphium perfoliatum, Solidago canadensis, S. rigida, Verbesina encelioides, V. oreophila.*

Andrena helianthi Robertson, 1891. Amer. Ent. Soc., Trans. 18: 55. ♀, ♂.

Andrena nitidior Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 406. ♀.

Andrena graenicheri Cockerell, 1902. Ann. and Mag. Nat. Hist. (7) 9: 104. ♀.

Andrena lincolnella Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 46. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 194. ♀, ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 147-148, figs. 24-25 (redescription). —LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 94-101, figs. 8, 94-98, table 3 (redescription, synonymy).

Biology: Hicks, 1926. Colo. Univ., Studies 15: 222 (nesting habits).

helianthiformis Viereck and Cockerell. Mont. and N. Dak., south to Kans. Pollen: Apparently an oligolege of *Echinacea* including *E. angustifolia, E. pallida*, but also visits other flowers including *Amorpha canescens, Gaillardia, Heliopsis helianthioides, Melilotus officinalis.*

Andrena helianthiformis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 26. ♀.

humeralis LaBerge. Tex. Pollen: Unknown, but visits flowers of *Aster, Baccharis.*

Andrena (*Callandrena*) *humeralis* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 76. ♀, ♂.

ignota LaBerge. S. C. (Florence).

Andrena (*Callandrena*) *ignota* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 83. ♀.

irrasus LaBerge. Ill., Nebr., Kans., Wyo., N. Mex. Pollen: Unknown, but visits flowers of *Amphiachyris dracunculoides, Aster, Chrysothamnus.*

Andrena (*Callandrena*) *irrasus* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 131, figs. 129-133. ♀, ♂.

isocomae Timberlake. Calif. Pollen: Oligolege of Compositae, visits flowers of *Chrysothamnus, Eriogonum, Gaillardia, Gutierrezia californica, G. lucida, G. sarothrae, Haplopappus bernardinus, H. vernonioides, Heterotheca grandiflora, Senecio douglasii, Solidago.*

Andrena (*Pterandrena*) *isocomae* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 378. ♀, ♂.

krigiana Robertson. Conn. to Fla., west to Minn., Okla. and Tex. Pollen: Oligolege of *Krigia* including *K. biflora*, *K. virginia*, but visits other flowers presumably for nectar including *Cornus*, *Hieraceum venosum*, *Ranunculus acris*.
Andrena krigiana Robertson, 1901. Canad. Ent. 33: 229. ♀, ♂.
Andrena (*Ptilandrena*) *parakrigiana* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 157. ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 194. ♀, ♂. —Viereck, 1917 (1916). Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 777. ♀, ♂. —LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 157-162, figs. 12, 159-163 (redescription, synonymy).

levipes LaBerge. Oreg., Calif. Pollen: Collects pollen from the flowers of *Lasthenia chrysostoma* and *Linanthus aureus*, but visits other flowers including *Arenaria*, *Coreopsis bigelovii*, *Cryptantha*, *Gilia*, *Phacelia distans*.
Andrena (*Callandrena*) *levipes* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 289, figs. 336-340. ♀, ♂.

melliventris Cresson. Kans. to Tex., Ariz.? Pollen: Unknown, but visits flowers of *Aster tanacetifolium*, *Coreopsis cardaminefolia*, *Gaillardia pulchella*, *Monarda punctata*.
Andrena melliventris Cresson, 1872. Amer. Ent. Soc., Trans. 4: 257. ♀.

monticola LaBerge. Ariz. (Chiricahua Mts.); Mexico (Chihuahua, Durango, Guanajuato and Mexico). Pollen: Unknown, but visits flowers of *Aster*, *Cirsium*, *Heliopsis*, *Solidago*.
Andrena (*Callandrena*) *monticola* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 125, figs. 119-123. ♀, ♂.

neomexicana LaBerge. Ariz., N. Mex. Pollen: Unknown, but visits flowers of *Baileya pleniradiata*, *Erigeron*.
Andrena (*Callandrena*) *neomexicana* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 246, figs. 272-276. ♀, ♂.

ofella LaBerge. Tex., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Aplopappus gracilis*, *Chrysothamnus*, *Gutierrezia microcephala*, *G. sarothrae*.
Andrena (*Callandrena*) *ofella* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 267, figs. 307-311. ♀, ♂.

pecosana Cockerell. N. Mex., Colo., Utah, Ariz.; Mexico (Chihuahua, Hidalgo, Jalisco and Zacatecas). Pollen: Unknown, but presumably an oligolege of Compositae, visits flowers of *Grindelia*, *Gutierrezia sarothrae*, *Helianthus*, *Heliopsis Viguiera annua*.
Andrena pecosana Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 12: 104. ♀.
Andrena townsendi Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 49. ♀.
Andrena colletoides Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 27. ♂.

Taxonomy: LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 112-116, figs. 9, 84-88 (redescription, synonymy, floral relationships).

pectidis (Cockerell). N. Mex., Tex. Pollen: Unknown, but visits flowers of *Pectis papposa*.
Panurgus pectidis Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 148. ♀.

Taxonomy: Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 418 (tax. characters).

perpunctata LaBerge. Ariz. (Chiricahua Mts.); Mexico (Guerrero, Mexico and Morelos). Pollen: Unknown, but visits flowers of *Heterotheca subaxillaris*.
Andrena (*Callandrena*) *perpunctata* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 222, figs. 243-247. ♀, ♂.

placata Mitchell. Que. and Ont., south to N. C. west to Minn. and Ill. Pollen: Oligolege of *Solidago*, but visits other flowers including *Aster lateriflorum*, *A. macrophyllum*, *Eupatorium serotinum*, *Fagopyrum esculentum*. This species evidently hybridizes occasionally throughout its range with the closely related *A. simplex* Smith.
Andrena (*Pterandrena*) *placata* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 148, figs. 24, 25. ♂.

reflexa Cresson. Tex.; Mexico (Chihuahua, Jalisco and Michoacan). Pollen: Unknown, but visits flowers of *Crotalaria longirostrata*.
Andrena reflexa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 256. ♂.
Andrena permitis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 257. ♀.

Taxonomy: LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 70-74, figs. 55-59 (redescription, synonymy).

rudbeckiae Robertson. N. C. to Mich., Wis., Minn. and Colo., south to Tex. in the Great Plains States. Pollen: Oligolege of Compositae, especially *Ratibida* including *R. columnaris, R. columnifera, R. pinnata* and *Rudbeckia* including *R. hirta, R. lanceolata, R. triloba,* but visits other flowers including *Centaurea americana, Chrysopsis, Coreopsis, Echinacea angustifolia, Gaillardia pulchella, Lepachys, Verbesina helianthioides.*

Andrena rudbeckiae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 56. ♀, ♂.

Taxonomy: Cockerell, 1899. Ent. News 10: 255. ♂ (key). —Robertson, 1902. Amer. Ent. Soc., Trans. 28: 194. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 149, 151, figs. 25-28, table 4 (redescription). —LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 90-94, figs. 7 (redescription).

senticulosa LaBerge. Tex. Pollen: Unknown, but visits flowers of *Berlandiera, Engelmannia bipinnatifida, Pyrrhopappus, Serinia oppositifolia.*

Andrena (*Callandrena*) *senticulosa* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 177, 189-193. ♀, ♂.

simplex Smith. N. H. to N. C., west to Minn., Nebr. and Kans. Pollen: Oligolege of Compositae, especially *Aster* and *Solidago,* visits flowers of *Amphiachyris dracunculoides, Aster anomalus, A. azureus, A. commutatus, A. ericoides, A. e. vilosus, A. laterifolius, A. multiflorus, A. novaeangeliae, A. paniculatus, A. praelatus, Boltonia asteroides, Eupatorium perfoliatum, Euthamia graminifolia, Gnaphalium polycephalum, Grindelia, Helianthus tuberosus, Polygonum hydropiperoides, P. scandens, Solidago altissima, S. canadensis, S. graminifolia, S. lanceolata, S. nemoralis, S. rigida, S. serotina.* Predator: *Philanthus solivagus* Say. This species evidently hybridizes occasionally throughout its range with the closely related *A. placata* Mitchell.

Andrena simplex Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 114. ♀.
Andrena solidaginis Robertson, 1893. Amer. Ent. Soc., Trans. 18: 55. ♀, ♂.
Andrena radmitricha Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 51. ♀.
Andrena (*Ptilandrena*) *determinata* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 394. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 124 (type). —Cockerell, 1906. Psyche 13: 8 (type). —LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 137-143, figs. 10, 134-138, table 4 (redescription, synonymy, floral relationships).

simulata Smith. Ariz., N. Mex., Colo.; Mexico. Pollen: Unknown, but visits flowers of *Aster, Viguiera annua.*

Andrena simulata Smith, 1879. Descr. n. spp. Hymen. Brit. Mus., p. 52. ♀.
Andrena aureocincta Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 88. ♀, ♂.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48. ♂ (as *aureocincta*). —LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 189-193, figs. 204-208 (redescription, synonymy).

sitiliae Viereck. Okla., Tex. Pollen: Possibly an oligolege of *Pyrrhopappus* including *P. carolinianus,* but also visits *Coreopsis tinctoria.*

Andrena sitiliae Viereck, 1909. Ent. Soc. Wash., Proc. 11: 144. ♀.

sonorensis LaBerge. Ariz. (Show Low), N. Mex. (Carizozo). Pollen: Unknown, but visits flowers of *Gutierrezia microcephala.*

Andrena (*Callandrena*) *sonorensis* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 110, figs. 99-103. ♀, ♂.

tegularis LaBerge. Ariz. (Chiricahua and Santa Rita Mts.). Pollen: Unknown, but visits flowers of *Heliopsis.*

Andrena (*Callandrena*) *tegularis* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 195, figs. 209-213. ♀, ♂.

texana Cresson. Tex. (Roosevelt and Victoria); Mexico (San Luis Potosi). Pollen: Unknown, but visits flowers of *Amphiachyris, Aster.*

Andrena texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 258. ♂.

tonkaworum Viereck. Nebr., Kans., Colo., Tex., N. Mex. Pollen: Possibly an oligolege of *Engelmannia.*

Andrena (*Ptilandrena*) *tonkaworum* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 396. ♀.

trimaculata LaBerge. Ariz. (Canelo); Mexico (Durango).
Andrena (*Callandrena*) *trimaculata* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 68, figs. 50-54. ♀, ♂.

utahensis LaBerge. Utah, Colo., Ariz. Pollen: Unknown but visits flowers of *Geraea*.
Andrena (*Callandrena*) *utahensis* LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 258, figs. 292-296. ♀, ♂.

verbesinae Viereck and Cockerell. Tex. (Cotulla and San Antonio). Pollen: Unknown, but visits flowers of *Verbesina encelioides*.
Andrena verbesinae Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 1. ♀, ♂.

verecunda Cresson. Tex. Pollen: Unknown, but visits flowers of *Engelmannia bipinnatifida*, *Gaillardia*, *Pyrrhopappus carolinianus*, *P. grandiflora*.
Andrena verecunda Cresson, 1872. Amer. Ent. Soc., Trans. 4: 257. ♀.

vulpicolor Cockerell. Wyo., south to N. Mex., west to Oreg. and Calif. Pollen: Apparently an oligolege of *Chrysothamnus* including *C. nauseosus*, *C. n. albicaulis*, *C. n. consimilis*, *C. parryi*, *C. viscidiflorus pumilis*, *C. v. stenophyllus*, but also visits flowers of *Erigeron neomexicana*.
Andrena vulpicolor Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 512. ♀.
Andrena nubilipennis Viereck, 1904. Canad. Ent. 36: 193. ♀.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 49. ♀ (key). —Cockerell, 1931. Amer. Mus. Novitates 458: 13. ♀ (key). —LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 106-110, figs. 6, 79-83 (redescription, synonymy).

Genus ANDRENA Subgenus CHAULANDRENA LaBerge

Andrena subg. *Chaulandrena* LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 314.
Type-species: *Andrena porterae* Cockerell. Orig. desig.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 284, 288, 314-315 (tax. characters).

porterae Cockerell. Sierra Nevada, Cascade and Rocky Mts. to N. Mex. Parasite: *Stylops* sp. Pollen: Apparently oligolectic, presumably gathers pollen from the flowers of *Ribes*.
Andrena porterae Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 401. ♀.
Andrena leptanthi Viereck and Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 27. ♂.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 264, 267. ♀, ♂.

Biology: Linsley, 1937. Pan-Pacific Ent. 13: 157 (stylopization).

Genus ANDRENA Subgenus CNEMIDANDRENA Hedicke

Andrena subg. *Cnemidandrena* Hedicke, 1933. Berlin Zool. Mus., Mitt. 19: 212.
Type-species: *Melitta nigriceps* Kirby. Orig. desig.

Revision: Donovan, 1977. Calif. Univ. Pubs. Ent. 81: 1-107, 130 figs., 17 maps (N. Amer. spp.; received too late for inclusion in this catalog).

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 211 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 303 (tax. characters).

antonitonis Viereck and Cockerell. Colo.
Andrena antonitonis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 56. ♀.

apacheorum Cockerell. Rocky Mts. to N. Mex., Ariz.
Andrena apacheorum Cockerell, 1897. Entomologist 30: 306. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 14, 15. ♀, ♂ (key).

Biology: Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 249 (ecology). —Hicks, 1926. Univ. Colo., Studies 15: 221 (habits).

autumnalis Viereck and Cockerell. Nebr.
Andrena autumnalis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 44. ♀.

beulahensis Viereck. N. Mex.
Andrena beulahensis Viereck, 1903. Amer. Ent. Soc., Trans. 29: 53. ♀.

canadensis canadensis Dalla Torre. N. S. to N. Y. and N. J., west to Minn. Pollen: Unknown, but visits flowers of *Aster*, *Epilobium*, *Solidago*.
Andrena simulata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 313. ♀, ♂. Preocc.
Andrena canadensis Dalla Torre, 1896. Cat. Hym., v. 10, p. 107. N. name.
Andrena (*Pterandrena*) *persimilis* Graenicher, 1904. Ent. News 15: 66. ♀.

Taxonomy: Viereck, 1907. Ent. News 18: 282, 286. ♀, ♂ (key). —Atwood, 1934. Canad. Jour. Res. 10: 207, 209, fig. ♀, ♂ (key). —Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1059 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 172, figs. 30-31, 33, table 4 (redescription).

Biology: Salt, 1927. Jour. Expt. Zool. 48: 245 (stylopization).

canadensis oslarella Viereck and Cockerell. Colo., N. Mex.
Andrena canadensis oslarella Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 28. ♂.

Biology: Clements and Long, 1923. Carnegie Inst. Wash. Pub. 336: 249 (ecology).

chromotricha Cockerell. N. Mex., Wis.
Andrena chromotricha Cockerell, 1899. Entomologist 32: 128. ♀.
Andrena clypeonitens Cockerell, 1902. Canad. Ent. 34: 47. ♀.
Andrena truncata Viereck, 1903. Amer. Ent. Soc., Trans. 29: 53. ♀.

Taxonomy: Graenicher, 1910. Canad. Ent. 42: 160. ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 172-173, table 4 (redescription of female).

citrinihirta Viereck. Calif. Pollen: Unknown, but visits flowers of *Chrysothamnus*, *Heterotheca grandiflora*, *Solidago californica*.
Andrena (*Andrena*) *citrinihirta* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 371. ♀.

colletina Cockerell. B. C. to Calif., east to Colo. Pollen: Unknown, but visits flowers of *Achillea millefolium*, *Chrysothamnus nauseosus consimilis*, *C. viscidiflorus typicus*, *Haplopappus bloomeri* var. *angustatus*.
Andrena colletina Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 454. ♂.

Taxonomy: Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 5: 260. ♀. —Cockerell, 1931. Amer. Mus. Novitates 458: 14, 15. ♀, ♂ (key).

columbiana Viereck. B. C. to Calif., N. Mex. Pollen: Unknown, but visits flowers of *Achillea lanulosa*, *Erigeron coulteri*, *E. pygmaeus*, *Microseris nutans*, *Senecio aureus* var. *subnudus*, *S. canus*, *S. integrirrimus*, *S. scorzonella*.
Andrena (*Andrena*) *columbiana* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 374. ♀.

costillensis Viereck and Cockerell. Colo., N. Mex.
Andrena costillensis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 50. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 14. ♀, ♂.

davidsoni Viereck and Cockerell. Calif.
Andrena davidsoni Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 52. ♀.

Taxonomy: Cockerell, 1930. Pan-Pacific Ent. 7: 8. ♀ (key).

hirticincta Provancher. Alta. to N. S., south to Ga. Pollen: Unknown, but visits flowers of *Aster*, *Epilobium*, *Solidago*.
Andrena fimbriata Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 116. ♀, ♂. Preocc.
Andrena hirticincta Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 308. ♀, ♂.
Anthrena americana Dalla Torre, 1896. Cat. Hym., v. 10, p. 102. N. name.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 149 (type of *fimbriata*). —Cockerell, 1906. Psyche 13: 9 (types of *fimbriata*). —Atwood, 1934. Canad. Jour. Res. 10 (2): 207, 209, fig. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 173-174, figs. 30-31, 33-34, table 4 (redescription).

Biology: Salt, 1927. Jour. Expt. Zool. 48: 233, figs. (stylopization).

indecisa Cockerell. B. C., Alta., Mont.
Andrena costillensis indecisa Cockerell, 1937. Canad. Ent. 69: 34. ♀.

mentzeliae Cockerell. Colo., N. Mex. Pollen: Unknown, but visits flowers of *Mentzelia*.
Andrena mentzeliae Cockerell, 1897. Entomologist 30: 307. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 14, 15. ♀, ♂. —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706, 708. ♀, ♂ (key).

nubecula Smith. East. Canada., south to Ga., west to B. C. Pollen: Unknown, but visits flowers of *Aster*, *Euthamia*, *Solidago*. Predator: *Philanthus solivagus* Say.
Andrena nubecula Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 117. ♀.
Andrena nubecula tristicornis Cockerell, 1931. Canad. Ent. 63: 22. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 150 (type). —Robertson, 1902. Amer. Ent. Soc., Trans. 28: 191, 192. ♀, ♂ (key). —Cockerell, 1906. Psyche 13: 9 (type). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 174-175, figs. 31, 33-34, table 4 (redescription).

pacta Viereck. N. Mex.
Andrena pacta Viereck, 1903. Amer. Ent. Soc., Trans. 43: 54. ♀, ♂.

peckhami Cockerell. Minn. to Vt., south to N. C. Pollen: Unknown, but visits flowers of *Baptisia*, *Solidago*.
Andrena peckhami Cockerell, 1902. Ann. and Mag. Nat. Hist. (7) 9: 105. ♀.

Taxonomy: Graenicher, 1910. Canad. Ent. 42: 159. ♀, ♂. —LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 272 (subgeneric position).

ramaleyi Cockerell. Colo.
Andrena ramaleyi Cockerell, 1931. Ann. and Mag. Nat. Hist. (10) 7: 346. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 14 (key).

robervalensis Mitchell. Que., Mich., Minn. Pollen: Unknown, but visits flowers of *Melilotus alba*.
Andrena (*?Cnemidandrena*) *robervalensis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 175. ♀.

scutellinitens Viereck. Oreg., Calif., Nev. Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus speciosus*, *C. viscidiflorus typicus*, *Haplopappus bloomeri* var. *angustatus*, *Oxypolis occidentalis*, *Solidago elongata*.
Andrena (*Andrena*) *scutellinitens* Viereck, 1916. Acad. Nat. Sci. Phila, Proc. 68: 573. ♀, ♂.

Taxonomy: LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 294 (subgeneric position).

segregans Cockerell. N. Mex.
Andrena segregans Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 404. ♀, ♂.

surda Cockerell. Wyo., Colo., Oreg., Calif., N. Mex. Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus*, *C. viscidiflorus typicus*, *Erigeron pygmaeus*, *Sphenosciadium capitellatum*.
Andrena hirticincta var. *surda* Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 264. ♂.
Andrena pertarda Cockerell, 1916. Entomologist 49: 157. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 13, 14. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706, 708. ♀, ♂ (key). —Timberlake, 1951. *In* Linsley *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1082 (synonymy).

xanthigera Cockerell. N. Mex.
Andrena xanthigera Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 402. ♀.
Andrena albovirgata Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 403. ♀.

Taxonomy: Cockerell, 1931. Canad. Ent. 63: 22. ♀. —Cockerell, 1931. Amer. Mus. Novitates 458: 19. ♀.

Genus ANDRENA Subgenus CONANDRENA Viereck

Andrena subg. *Conandrena* Viereck, 1924. Canad. Ent. 56: 20.
Type-species: *Andrena bradleyi* Viereck. Monotypic and orig. desig.

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 206 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 284, 288, 300 (tax. characters).

bradleyi Viereck. Colo. to N. S., south to Ga. Pollen: Unknown, but visits flowers of *Prunus, Pyrus, Rhododendron, Ribes, Vaccinium.*
Andrena bradleyi Viereck, 1907. Ent. News 18: 285, 286. ♀, ♂.
Andrena saccharina Cockerell and Rohwer, 1907. Ann. and Mag. Nat. Hist. (4) 20: 128. ♂.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10: 206, 208, figs. ♀, ♂ (key). —Timberlake, 1951. *In* Linsley *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1059 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 226-228, figs. 40, 46-47, 49-50 (redescription).

Biology: Salt, 1927. Jour. Expt. Zool. 48: 249 (stylopization).

carolina Viereck. Minn. to N. S., south to Tenn. and Ga. Pollen: Unknown, but visits flowers of *Azalea, Claytonia, Dentaria, Ledum, Pyrus, Rhodora, Vaccinium.*
Andrena carolina Viereck, 1909. Ent. News 20: 126. ♀.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10: 208, 209. ♀, ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 228-229, figs. 40, 45-46, 49 (redescription, flower records).

cheyennorum Viereck and Cockerell. Nebr., Wyo., Idaho.
Andrena cheyennorum Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 20. ♀, ♂.
Andrena angustifrons Cockerell, 1934. Pan-Pacific Ent. 9: 155. ♀.

Taxonomy: Timberlake, 1951. *In* Linsley *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1061 (synonymy).

durangoensis Viereck and Cockerell. Colo. to N. S., south to W. Va. Ecology: Unknown, but visits flowers *Ilex, Rubus.*
Andrena durangoensis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 36. ♂.
Andrena (*Andrena*) *media* Viereck, 1922. Boston Soc. Nat. Hist., Occas. Papers 5: 41. ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 229-230, figs. 40, 45, 46 (redescription, synonymy).

rufosignata Cockerell. Minn. to N. B. and New England states.
Andrena rufosignata Cockerell, 1902. Canad. Ent. 34: 46. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 230, fig. 49 (redescription, subgeneric assignment). —Knerer and Atwood, 1963. Canad. Ent. 95: 585, figs. 5, 7. ♂.

Genus ANDRENA Subgenus DACTYLANDRENA Viereck

Andrena subg. *Dactylandrena* Viereck, 1924. Canad. Ent. 56: 20.
Type-species: *Andrena* (*Dactylandrena*) *maura* Viereck. Monotypic and orig. desig.

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 204 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 285, 288, 299 (tax. characters).

berberidis Cockerell. Colo. Pollen: Unknown, but visits flowers of *Berberis.*
Andrena milwaukeensis var. *berberidis* Cockerell, 1905. Canad. Ent. 37: 371. ♀.

Taxonomy: Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 13: 9. ♂. —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705, 707. ♀, ♂ (key).

caliginosa Viereck. Calif. Pollen: Unknown, but possibly an oligolege of *Ribes.*
Andrena (*Andrena*) *caliginosa* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 552. ♀.
Andrena (*Dactylandrena*) *maura* Viereck, 1924. Canad. Ent. 56: 31. ♂ (♀ misdet.).

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 267. ♀, ♂ (key).

submaura Linsley. South. Calif. (The Gavilan and Sandbergs). Pollen: Unknown, but possibly gathers pollen from *Ribes indecorum.*
Andrena submaura Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 269. ♂, ♀.

Genus ANDRENA Subgenus DERANDRENA Ribble

Andrena subg. *Derandrena* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 333.
Type-species: *Andrena vandykei* Cockerell. Orig. desig.

Revision: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 333-367, figs. 90-124, maps 11-18, tables 12-14 (N. Amer. spp.).

arctostaphylae Ribble. Calif. Pollen: Apparently an oligolege of *Arctostaphylos* including *A. crustacea, A. glauca, A. mariposa, A. pungens.*
Andrena (*Derandrena*) *arctostaphylae* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 344, figs. 95-99, map 12. ♀, ♂.

californiensis Ribble. Calif. Pollen: Unknown, most often collected on flowers of *Salix* including *S. argophylla, S. lasiolepis,* but visits a wide variety of flowers including *Arctostaphylos pungens, Cryptantha intermedia, Descourainia sophia, Eriodictyon californicum, Gilia multicaulis, Lasthenia chrysostoma, Lomatium dasycarpum, Orthocarpus, Plagiobothrys nothofulvus, Quercus, Rhamnus crocea, Rhus trilobata, Ribes indecorum, Salvia columbariae, Sisymbrium irio, Tamarix gallica, Trifolium.*
Andrena (*Derandrena*) *californiensis* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 348, figs. 100-104, map 13, table 13. ♀, ♂.

hermosa Ribble. Calif. (Central Valley). Pollen: Unknown, but possibly oligolectic on *Lasthenia.*
Andrena (*Derandrena*) *hermosa* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 360, figs. 115-119, map 18. ♀, ♂.

murietae Ribble. Calif. (11 miles northwest of California Hot Springs). *A. penutiani* Ribble may be the male.
Andrena (*Derandrena*) *murietae* Ribble, 1968. Nebr. Univ. State Mus. Bul. 8: 346. ♀.

penutiani Ribble. Cent. Calif. Pollen: Unknown, but visits flowers of *Lasthenia. A. murietae* Ribble may be the female.
Andrena (*Derandrena*) *penutiani* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 352, map 15. ♂.

timberlakei Cockerell. Calif. (San Benito and Tulare Cos., south to Riverside Co.). Pollen: Based upon the mouth parts of the female, this species evidently collects pollen from the flowers of *Cryptantha* including *C. intermedia,* but visits other flowers presumably for nectar including *Descourainia sophia, Encelia farinosa, Lomatium dasycarpum, Plagiobothrys californicus, P. nothofulvus, Rhamnus crocea.*
Andrena timberlakei Cockerell, 1929. Ann. and Mag. Nat. Hist. (10) 4: 300. ♀, ♂.

Taxonomy: Cockerell, 1931. Canad. Ent. 64: 158. ♀, ♂.

vandykei Cockerell. South. Oreg. (12 miles southwest of Keno), Calif.; Mexico (Baja California). Pollen: Unknown, most often collected on flowers of *Arctostaphylos* including *A. crustacea, A. glauca, A. mariposa, A. pungens* as well as *Ceanothus* including *C. arboreus, C. cuneatus, C. foliosus,* but visits other flowers including *Baccharis, Phoradenron villosum, Rhamnus crocea, Rhus diversiloba, R. ovata, Salix, Tamarix, Xylococcus bicolor.*
Andrena (*Micrandrena*) *solutula* Cockerell, 1936. Pan-Pacific Ent. 12: 150. ♀.
Andrena (*Micrandrena*) *vandykei* Cockerell, 1936. Pan-Pacific Ent. 12: 151. ♂.

viridissima Ribble. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Brassica, Lasthenia tenella, Nemophila racemosa, Phacelia ciliata, P. distans, P. douglasii, Pholisma racemosa, Ranunculus canus.*
Andrena (*Derandrena*) *viridissima* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 360, figs. 115-119, map 18. ♀, ♂.

ziziaeformis Cockerell. Mass. to Ga., Tenn., Ill. Pollen: Unknown, but visits flowers of *Potentilla* including *P. canadensis, Rubus, Waldsteinia.*
Andrena ziziaeformis Cockerell, 1908. Canad. Ent. 40: 234. ♀.

Taxonomy: Cockerell, 1932. Canad. Ent. 64: 157. ♀ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 169-171, figs. 29-32 (redescription).

Genus ANDRENA Subgenus DIANDRENA Cockerell

Diandrena Cockerell, 1903. Psyche 10: 75.
Type-species: *Panurgus chalybaeus* Cresson. Orig. desig.

Revision: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 1-146, 88 figs, 5 tables, 13 maps (N. Amer. spp., includes comparative ecological information).

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 219-220 (tax. characters). —Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 31-41 (*Camissonia* visiting spp.). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 283, 287, 309-310 (tax. characters). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 13-26, figs. 6-11 (*Camissonia* visiting spp. of Calif. and Baja Calif.).

Biology: Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 74-75, pls. 1-3 (floral relationships of Mojave Desert spp.). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 14-43, 124-128, figs. 1-2, tables 1-5 (nest architecture, life history, comparative ecology, parasites, predators). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 13-26, 47-50, tables 1-2 (life history, floral relationships of *Camissonia* visiting spp.).

ablegata (Cockerell). Idaho, Wyo., Colo., Utah Calif. Pollen: Oligolectic on ligulate Compositae, most likely collects pollen from early morning-opening flowers of the subtribe Microseridinae including *Agoseris glauca, Microseris nutans, Taraxacum officinale,* but visits other flowers including *Camissonia subacaulis, Cardaria draba, Lomatium dissectum.*

Diandrena ablegata Cockerell, 1922. Amer. Mus. Novitates 40: 1. ♀.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 32-33 (tax. characters). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 93-95, figs. 1, 29-30, 56, map 7 (redescription).

agoseridis Thorp. Calif. Pollen: Collects pollen from ligulate Compositae, primarily from *Agoseris heterophylla, Anisocoma acaulis,* but visits other flowers including *Calycoseris parryi, Camissonia campestris campestris, C. pallida pallida, Descurainia sophia, Erodium cicutarium, Euphorbia albomarginata, Hesperochiron, Lasthenia chrysostoma, Layia glandulosa, Malacothrix californica, M. glabrata, Phacelia ciliata, Rafinesquia neomexicana, Sisymbrium, Tamarix gallica.*

Andrena (*Diandrena*) *agoseridis* Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 116, figs. 1, 49-50, 56, map 12. ♀, ♂.

anatolis Linsley and MacSwain. South. Calif.; Mexico (Baja California). Pollen: Collects pollen from morning-opening flowers of *Camissonia* including *C. bistorta, C. campestris, C. cheiranthifolia suffruticosa,* but visits other flowers including *Calandrinia ciliata, Camissonia crassifolia, Ceanothus crassifolius, Cryptantha intermedia, Potentilla, Sitanion* for nectar.

Andrena (*Diandrena*) *anatolis* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 36. ♀, ♂.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 98-99, figs. 1, 33-34, 56, map 8. ♀, ♂ (redescription).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 99, fig. 1 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 21-22, 49, fig. 9 (floral relationships).

apasta Linsley and MacSwain. Calif. Pollen: Collects pollen from morning-opening flowers of *Camissonia,* principally from *C. campestris,* but occasionally from *C. ovata* in northernmost localities; also visits other flowers including *Agoseris heterophylla, Brassica, Descurainia sophia, Layia, Monolopia lanceolata* for nectar.

Andrena (*Diandrena*) *apasta* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 34. ♀.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 118-119, figs. 1, 51-52, 56, 68, 80, map 10 (redescription).

Biology: Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 75, fig. 11 (nest, floral relationships). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 99 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 26, 50, fig. 11 (floral relationships).

blennospermatis Thorp. Calif. Pollen: Collects pollen from flowers of *Blennosperma* including *B. bakeri, B. nanum.*

Andrena (*Diandrena*) *blennospermatis* Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 81, figs. 1, 19-20, 56, 63, 75. ♀, ♂.

chalybaea (Cresson). Calif. (Central coast, from Mendocino to San Luis Obispo Counties). Parasite: *Nomada* sp. Pollen: Collects pollen only from the early morning-opening

flowers of *Camissonia ovata*, but visits other flowers for nectar including *Blennosperma bakeri, Brassica, Cryptantha, Ranunculus californicus.*
Panurgus chalybaeus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 61. ♀, ♂.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 57-61, figs. 1, 3-4, 55-58, 69, 85-86, map 1 (redescription, post defecating larva).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 5-14, 59, fig. 2 (nest architecture, floral relationships, parasite). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 15-17, 48, fig. 6, pl. 1 (nest, floral relationships, mating).

chalybioides (Viereck). Wash., Oreg., Calif. Parasite: *Myopa rubida* (Bigot)? Pollen: Collects pollen almost exclusively from ligulate Compositae in the early morning, primarily from *Agoseris* including *A. heterophylla*, occasionally from introduced weedy species of Cichorieae including *Hypochoeris radicata, Taraxacum officinale*, but also visits other flowers for nectar including *Blennosperma, Ceanothus, Convolvulus, Daucus, Lasthenia chrysostoma, Layia platyglossa, Linum, Ranunculus orthorhynchus.*
Parandrena chalybioides Viereck, 1904. Canad. Ent. 36: 229. ♀, ♂.
Andrena (*Parandrena*) *perchalybea* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 591. ♀.
Diandrena purdyi Cockerell, 1936. Pan-Pacific Ent. 12: 155. ♂.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 31, 33 (synonymy). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 83-85, figs. 1, 21-22, 56 (redescription).

Biology: MacSwain and Bohart, 1947. Pan-Pacific Ent. 23: 30 (parasite). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 34, 85 (floral relationships, parasite).

chlorosoma Linsley and MacSwain. Calif. (Central Coast Ranges, from Mendocino County to Ventura County). Pollen: Collects pollen from early morning opening ligulate Compositae including *Agoseris grandiflora, A. heterophylla* as well as from introduced weedy species of Cichorieae including *Hypochoeris radicata*, but visits these and other flowers for nectar including *Camissonia ovata, Hemizonia, Lasthenia chrysostoma, Layia chrysanthemoides, Ranunculus californicus, Taraxacum officinale.*
Andrena (*Diandrena*) *subchalybea chlorosoma* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 32. ♀, ♂.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 107-111, figs. 1, 41-44, 56 (redescription).

Biology: Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 18, 30, 31 (floral relationships, as *purdyi*). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 110, 111 (floral relationships).

cuneilabris Viereck. Oreg., Calif. Parasite: *Myopa perplexa* Camras, *M. rubida* (Bigot), *Stylops pacifica* Bohart? Pollen: Collects pollen and nectar chiefly from *Ranunculus* including *R. californicus, R. occidentalis, R. orthorhynchus*, occasionally collects pollen from *Platyglossa californicus* during periods when *Ranunculus* pollen is scarce or absent; visits other flowers for nectar including *Amsinckia, Agoseris grandiflora, A. heterophylla, Blennosperma bakeri, Brassica, Calandrinia ciliata, Camissonia ovata, C. tanacetifolia, Geum macrophyllum, Lasthenia, Lomatium, Wyethia.*
Andrena (*Parandrena*) *cuneilabris* Viereck, 1926. Calif. Acad. Sci., Proc. (4) 15: 400. ♀.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 64-67, figs. 1, 7-8, 56, 59, 70, 81-82, map 2 (redescription).

Biology: MacSwain and Bohart, 1946. Pan-Pacific Ent. 23: 30 (parasite). —Camras and Hurd, 1957. Calif. Ins. Survey, Bul. 6: 39 (parasite). —Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 2-31, figs. 4, 6 (floral relationships, parasites). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 34, 66-67 (floral relationships, parasites).

cyanosoma (Cockerell). Calif.; Mexico (Baja California). Pollen: Collects pollen exclusively from the flowers of *Camissonia* including *C. bistorta, C. campestris, C. cheiranthifolia suffruticosa, C. dentata, C. sierrae sierrae, C. spiralis*, but visits these and other flowers for nectar including *Cryptantha intermedia, Lasthenia aristata, L. coronaria, Rhus trilobata, Salix.*
Diandrena cyanosoma Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 49. ♀, ♂.

Andrena (*Parandrena*) *austrocalifornica* Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 587. ♀.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 36 (synonymy). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 99-102, figs. 1, 35-36, 56, 65, 77, map 9 (redescription).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 101 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 23-24, fig. 10 (floral relationships).

eothina Linsley and MacSwain. Calif. (Merced County to Ventura County). Pollen: Collects pollen principally from *Camissonia campestris* and *C. sierrae sierrae* and also from *C. boothii decorticans*, *C. contorta*, *C. graciliflora*, but visits these and other flowers for nectar including *Agoseris heterophylla*, *Amsinckia*, *Encelia virginiensis actoni*, *Lasthenia chrysostoma*, *Layia*, *Monolopia lanceolata*, *Tropidocarpum gracile*.

Andrena (*Diandrena*) *eothina* linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 39. ♀, ♂.

Andrena (*Diandrena*) *anatolis matutina* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 38. ♀, ♂.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 95-97, figs. 1, 31-32, 56, map 8 (redescription, synonymy).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 97 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 22-23, fig. 9 (nest architecture, floral relationships).

evoluta Linsley and MacSwain. Wash., Idaho and Wyo., south to northeast. Calif., Nev. and northern Ariz. (Grand Canyon). Pollen: Collects pollen primarily from microseridine Compositae including *Agoseris glauca*, *A. g.* var. *monticola*, *Microseris nutans* and locally obtains pollen from some of the crepidine Compositae such as *Crepis occidentalis*, the onagraceous *Camissonia* including *C. pallida*, *C. tanacetifolia*, and the introduced weed *Taraxacum officinale;* visits other flowers for nectar including *Ranunculus californicus*.

Andrena (*Diandrena*) *evoluta* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 33. ♀.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 85-88, figs. 1, 23-24, 56, map 6 (redescription).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 40-41 (floral relationships). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 88 (floral relationships).

foxii Cockerell. Calif. Pollen: Collects pollen exclusively from flowers of *Camissonia*, chiefly *C. campestris*, but also from *C. contorta*, *C. dentata parishii* and *C. pallida pallida* when *C. campestris* is seasonally or locally rare or absent; visits these and other flowers for nectar including *Coreopsis californica*, *Cryptantha*, *Hemizonia*, *Isomeris arborea*, *Lupinus*, *Malacothrix*.

Andrena foxii Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 188. ♀, ♂.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 130 (subgeneric position). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 67-69, figs. 1, 9-10, 56, 60, 71, 87, map 2 (redescription).

Biology: Linsley and MacSwain, 1956. Pan-Pacific Ent. 32: 120-121 (floral relationships). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 75 (floral relationships). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 69 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 18-20, 48-49, fig. 7, pl. 1 (floral relationships).

gnaphalii (Cockerell). South. Calif. (Catalina Island and Transverse and Peninsular Ranges). Pollen: Collects pollen apparently only from early morning opening flowers of *Agoseris* including *A. heterophylla*, *A. retrorsa*, but visits these and other flowers for nectar including *Anisocoma acaulis*, *Ceanothus integerrimus*, *Descurainia sophia*, *Gnaphalium bicolor*, *Lasthenia chrysostoma*, *Potentilla*, *Sisymbrium*, *Sonchus oleraceus*.

Diandrena gnaphalii Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 148. ♂.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 91-93, figs. 1, 27-28, 56, map. 13 (redescription).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 92-93 (floral relationships).

lewisorum Thorp. Calif. Pollen: Collects pollen from flowers of the genus *Clarkia* including *C. breweri, C. concinna, C. cylindrica, C. douglasiana, C. dudleyana, C. imbricata, C. purpurea, C. speciosa, C. unguiculata, C. williamsonii, C. xantiana,* but visits these and other flowers for nectar including *Baccharis, Cryptantha flaccida, Datura, Eriogonum fasciculatum, Hemizonia kelloggii, Lonicera interrupta, Mimulus, Ranunculus occidentalis, Rhamnus californica.*

Andrena (Diandrena) lewisorum Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 72, figs. 1, 13-14, 56, 61, 73, map 3. ♀, ♂.

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 73-74 (floral relationships). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 10-13, fig. 1 (floral relationships).

macswaini Linsley. Calif. (San Joaquin Valley). Pollen: Collects pollen from the flowers of *Camissonia campestris campestris* and *C. sierrae sierrae,* but visits these and other flowers for nectar including *Camissonia boothii decorticans, Erodium, Isomeris arborea, Malacothrix californica.*

Andrena (Diandrena) macswaini Linsley, 1960. Pan-Pacific Ent. 36: 97. ♀, ♂.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 36 (tax characters). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 102-105, figs. 1, 37-38, 56, 66, 78, map 10 (redescription).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 105 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 24-26, 50, pl. 2, fig. 11 (nest architecture, floral relationships).

malacothricidis Thorp. South. Calif.; Mexico (Baja California). Pollen: Collects pollen from stephanomerine Compositae, primarily *Malacothrix* including *M. californica, M. glabrata,* but visits other flowers including *Anisocoma acaulis, Calochortus, Camissonia campestris campestris, Convolvulus malacophyllus, Cryptantha, Descourainia sophia, Euphorbia albomarginata, Lasthenia chrysostoma, Linanthus aureus, Phacelia ciliata.*

Andrena (Diandrena) malacothricidis Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 113, figs. 1, 47-48, 56, map 11. ♀, ♂.

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 115-116 (floral relationships).

nothocalaidis (Cockerell). B. C. to north. Calif., east to Wyo. and Colo. Pollen: Collects pollen from flowers of ligulate Compositae, primarily Microseridinae including *Agoseris glauca, Microseris nutans, Nothocalais cuspidata, Taraxacum officinale,* but visits other flowers for nectar including *Antennaria, Camissonia tanacetifolia tanacetifolia, Crepis occidentalis, Erigeron, Lepidium, Mimulus.*

Diandrena nothocalaidis Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 183. ♀, ♂.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 33-35 (tax. characters and status). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 105-107, figs. 1, 39-40, 56, map 11 (redescription).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 107 (floral relationships).

olivacea Viereck. Ariz. to south. Nev. and south. Calif. Pollen: Collects pollen almost exclusively from the flowers of stephanomerine Compositae, primarily *Anisocoma acaulis* and *Malacothrix* including *M. californica, M. glabrata,* but visits other flowers including *Agoseris heterophylla, Astragalus, Baileya, Calycoseris wrightii, Camissonia campestris, Coreopsis bigelovii, C. californica, Cryptantha barbigera, Encelia farinosa, Fallugia paradoxa, Geraea canescens, Hemizonia, Hyptis emoryi, Layia glandulosa, Phacelia, Rafinesquia neomexicana.* Predator: *Lestomyia* sp.

Andrena (Parandrena) olivacea Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 590. ♀, ♂.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 35 (tax. characters). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 88-91, figs. 1, 25-26, 56, 64, 76, map 7 (redescription).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 91 (floral relationships).

parachalybea Viereck. South. Calif.; Mexico (Baja California). Pollen: Collects pollen from *Camissonia* including *C. bistorta, C. campestris campestris, C. cheiranthifolia suffruticosa, C. dentata, C. pallida pallida*, but visits these and other flowers for nectar including *Agoseris heterophylla, Astragalus, Baccharis viminea, Ceanothus crassifolius, Coreopsis bigelovii, C. californica, Cryptantha intermedia, Descourainia sophia, Erodium cicutarium, Haplopappus linearifolius, Eriophyllum confertiflorum, Lasthenia, Layia glandulosa, L. platyglossa campestris, Lomatium dasycarpum, Monolopia lanceolata, Plagiobothrys californicus, Rhus trilobata, Salix laevigata, S. lasiolepis, Sisymbrium irio, Tamarix.*

Andrena (*Parandrena*) *parachalybea* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 391. ♀.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 61-63, figs. 1, 5-6, 56, map 1 (redescription).

Biology: Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 74-75 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 17-18, 48, fig. 6 (floral relationships).

puthua (Cockerell). Calif.; Mexico (Baja California). Parasite: *Stylops* sp. Pollen: Collects pollen from *Lasthenia* including *L. aristata, L. chrysostoma, L. coronaria, L. debilis, L. gracilis, L. minor, L. tenella*, but visits these and other flowers for nectar including *Calandrinia ciliata, Chaenactis glabriuscula, Cryptantha, Eschscholzia californica, Layia platyglossa, Rhamnus crocea.*

Diandrena puthua Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 24. ♂ (♀ misdet.).
Diandrena beatula Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 48. ♀.
Diandrena clariventris Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 50. ♂.
Diandrena sanctorum Cockerell, 1941. San Diego Soc. Nat. Hist., Trans. 9: 346. ♀.

Taxonomy: Timberlake, 1951. *In* Linsley *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1078 (synonymy). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 74-78, figs. 1, 15-16, 56, map 4 (redescription, synonymy).

Biology: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 34, 77 (floral relationships, parasite).

sperryi (Cockerell). Calif. Pollen: Collects pollen from the flowers of *Camissonia* including *C. campestris, C. clavaeformis, C. pallida pallida*, but visits these and other flowers for nectar including *Anisocoma acaulis, Coreopsis californica, C. bigelovii, Malacothrix glabrata.* Predator: *Lestomyia* sp.

Diandrena sperryi Cockerell, 1937. Amer. Mus. Novitates 948: 14. ♀.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 69-72, figs. 1, 11-12, 56, 72, map 3 (redescription).

Biology: Linsley, MacSwain and Thorp, 1964. Calif. Univ. Pubs. Ent. 33: 74, table 3 (floral relationships). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 33, 72 (floral relationships, predator). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 20, 49, fig. 8 (floral relationships).

subapasta Thorp. Calif. Pollen: Apparently collects pollen primarily from *Arenaria californica*, but visits other flowers including *Lasthenia, Orthocarpus erianthus.*

Andrena (*Diandrena*) *subapasta* Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 120, figs. 1, 53-54, 56, map 13. ♀, ♂.

subchalybea Viereck. Calif.; Mexico (Baja California). Parasite: *Dalmannia picta* Will. Pollen: Collects pollen primarily from ligulate Compositae, especially *Agoseris heterophylla;* visits flowers of *Amsinckia, Brassica, Camissonia campestris campestris, Coreopsis californica, Crepis vesicaria, Descourainia sophia, Erodium, Euphorbia albomarginata, Haplopappus Linearifolius, Hesperochiron californicus, Lasthenia chrysostoma, Layia chrysanthemoides, Layia platyglossa, Limnanthes douglasii, Madia gracilis, Malacothrix, Microseris douglasii, M. linearifolia, Mimulus, Monolopia lanceolata, Phacelia ciliata, Platystemon californicus, Ranunculus californicus, Sisymbrium, Sonchus oleraceus.*

Andrena (*Parandrena*) *subchalybea* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 593. ♀.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 32 (tax. status). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 111-113, figs. 1, 45-46, 56, 67, 79, 83-84, map 12 (redescription).

Biology: Bohart, 1938. Pan-Pacific Ent. 14: 132 (parasite). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 34, 113 (floral relationships, parasite).

submoesta Viereck. Calif. Parasite: *Stylops* sp. Pollen: Collects pollen from the flowers of *Lasthenia* including *L. chrysostoma, L. coronaria, L. gracilis, L. minor, L. tenella*, but visits these and other flowers for nectar including *Haplopappus, Hypochoeris radicata, Layia, Monolopia lanceolata, Tamarix.*

Andrena (*Parandrena*) *submoesta* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 594. ♀.
Diandrena marinensis Cockerell, 1936. Pan-Pacific Ent. 12: 153. ♂.

Taxonomy: Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1082 (synonymy). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 78-81, figs. 1, 17-18, 56, 62, 74, map 5 (redescription).

Biology: Thorp, 1969. Calif Univ. Pubs. Ent. 52: 34, 79-80 (floral relationships, parasite).

Genus ANDRENA Subgenus EREMANDRENA LaBerge

Andrena subg. *Eremandrena* LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 295.
Type-species: *Pterandrena pallidiscopa* Viereck. Monotypic and orig. desig.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 283, 293, 295-296 (tax. characters).

pallidiscopa pallidiscopa (Viereck). Calif., Oreg., Colo. Parasite: *Myopa rubida* (Bigot). Pollen: Unknown, but visits flowers of *Lomatium, Sanicula.*

Pterandrena pallidiscopa Viereck, 1904. Canad. Ent. 36: 227. ♀.
Pterandrena nudimedicornis Viereck, 1904. Canad. Ent. 36: 227. ♂.

Taxonomy: Timberlake and Cockerell, 1933. Pan-Pacific Ent. 9: 28 (tax. characters).

Biology: Bohart, 1941. Pan-Pacific Ent. 17: 95 (parasite).

pallidiscopa trifasciata Timberlake and Cockerell. South. Calif. Parasite: *Myopa rubida* (Bigot). Pollen: Unknown, but visits flowers of *Calandrinia menziesii, Lasthenia chrysostoma, Lomatium dasycarpum, L. utriculatum, Rhus trilobata, Sanicula bipinnatifida.*

Andrena pallidiscopa trifasciata Timberlake and Cockerell, 1933. Pan-Pacific Ent. 9: 28. ♀.

Genus ANDRENA Subgenus EUANDRENA Hedicke

Andrena subg. *Euandrena* Hedicke, 1933. Berlin Zool. Mus., Mitt. 19: 212.
Type-species: *Andrena bicolor* Fabricius. Orig. desig.
Andrena subg. *Xanthandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 218.
Type-species: *Andrena auricoma* Smith. Orig. desig.
Andrena subg. *Geandrena* LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 313.
Type-species: *Andrena caerulea* Smith. Orig. desig.

Revision: LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 371-446, 74 figs. (N. Amer. spp.).

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 309 (tax. characters, as *Xanthandrena*). —LaBerge, 1977. Amer. Ent. Soc., Trans. 103: 107-135, figs. (revised key to included spp., synonymy; received too late for inclusion in this catalog).

algida Smith. N. S. to Alta. and N. W. T., south to N. J., N. Y., Mich., Minn., S. Dak., N. Mex. and Ariz. Pollen: Apparently polylectic with some preference for the flowers of *Salix* including *S. brachycarpae*, but visits other flowers including *Cornus mas, Fragaria, Pulsatilla hirsutissima, Ranunculus testiculatus, Ribes vallicola, Taraxacum officinale, Thlaspi arvense.*

Andrena algida Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 116. ♀, ♂.
Andrena fragiliformis Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 435. ♀.
Andrena fernaldiella Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 34. ♂.
Andrena brachycarpae Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 55. ♀.
Andrena (*Andrena*) *fuscisignata* Viereck, 1917. Amer. Ent. Soc., Trans. 45: 379. ♀, ♂.
Andrena (*Andrena*) *albisigna* Viereck, 1922. Boston Soc. Nat. Hist., Occas. Papers 5: 38. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 150 (type). —Cockerell, 1906. Psyche 13: 7. ♀ (type). —Atwood, 1934. Canad. Jour. Res. 10: 207, 209, figs. ♀, ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 218-219, figs. 42-44 (redescription). —LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 396-399, figs. 3, 25-29 (redescription, synonymy).

astragali Viereck and Cockerell. Wash. to Calif. east to Utah, Wyo. and Nebr. Pollen: Unknown, although frequently collected from the flowers of *Zygadenus fremontii*, but visits other flowers including *Agoseris glauca, Allium haematochiton, Astragalus, Cardaria draba* var. *repens, Chamaebatia foliolosa, Cornus, Eriogonum, Oxytropis, Salix, Taraxacum officinale, Tofieldia occidentalis.*

Andrena astragali Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 46. ♀.

Andrena zygadeni Cockerell, 1932. Pan-Pacific Ent. 8: 174. ♀, ♂.

auricoma Smith. B. C. to south. Calif., east to Wyo., Colo. and south to Ariz. Pollen: Polylectic, most frequently collected at the flowers of *Ranunculus, Descurainia, Salix* and *Potentilla* in that order, but visits a great variety of flowers including *Baccharis, Barbarea orthoceras, Brassica nigra, Camissonia, Ceanothus, Chamaebatia foliolosa, Cornus californicus, Crataegus, Cryptantha intermedia, C. muricata, Daucus carota, Dendromecon rigida, Descurainia sophia, Eriodictyon californicum, Eriogonum marifolium, Eriophyllum obovatum, Euphorbia albomarginata, Fragaria californica, Fritillaria lanceolata, Geranium, Gilia capitata, Hackelia floribunda, H. patens, Lasthenia chrysostoma, Layia, Linanthus montanus, Lomatium dissectum, L. triternatum, Lupinus bicolor, Malacothamnus arcuatus, Malus, Mentzelia, Mirabilis laevis, Montia perfoliata, Nemophila integrifolia, Orthocarpus erianthus, Phacelia cicutaria, P. distans, P. hispida, P. ramosissima, P. tanacetifolia, Plagiobothrys californicus, P. tenellus, Potentilla glandulosa, Prunus ilicifolia, P. melanocarpa, P. subcordata, Pyracantha, Quercus agrifolia, Ranunculus californicus, R. occidentalis, Rhamnus crocea, Rhus diversiloba, R. trilobata, Rubus ursinus, Salix laevigata, S. lasiolepis, Salvia columbariae, Sanicula crassicaula, S. nevadensis, Saxifraga integrifolia, Scrophularia californica, Sedum, Sisymbrium irio, Sisyrinchium bellum, Stachys, Stenotopsis linearifolius, Tamarix gallica, Taraxacum officinale, Thysanocarpus curvipes.*

Andrena auricoma Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 56. ♂.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 155. ♂ (notes on type). —Cockerell, 1906. Psyche 13: 8 (notes on type). —Viereck, 1904. Canad. Ent. 36: 193. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706, 708. ♀, ♂ (key).

caerulea Smith. B. C. (Vancouver Is.) to Calif., east to Idaho, Nev., and Utah (Mendon). Parasite: *Myopa rubida* (Bigot), *Myopa* sp., *Nomada obscurella* Fowler, *N. opacella* Timberlake, *Stylops pacifica* Bohart. Pollen: Oligolege of *Ranunculus*, especially *R. californicus*, but visits other species of *Ranunculus* including *R. alsimaefolius, R. occidentalis, R. o. dissectus, R. orthorhynchus* as well as the flowers of *Arctostaphylos, Astragalus, Brassica, Ceanothus* including *C. cuneatus, Cryptantha, Fagus, Gilia, Ipomoea, Lasthenia chrysostoma, Lomatium, Lysichiton kamtschatcense, Mimulus, Nemophila, Phacelia, Polygonum bistortoides, Rhamnus, Ribes, Rubus, Salix, Senecio, Sanicula nevadensis, Sisyrinchium bellum, Taraxacum officinale.* Predator: *Xysticus.*

Andrena caerulea Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 55. ♀.

Andrena coerulea var. *territa* Cockerell, 1898. Entomologist 31: 89. ♀.

Pterandrena erigenoides Viereck. 1904. Canad. Ent. 36: 227. ♀.

Pterandrena crypta Viereck, 1904. Canad. Ent. 36: 227. ♀.

Pterandrena acrypta Viereck, 1904. Canad. Ent. 36: 227. ♀.

Pterandrena complexa Viereck, 1904. Canad. Ent. 36: 227. ♀.

Andrena (Ptilandrena) francisca Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 595. ♀.

Andrena supervirens Cockerell, 1924. Pan-Pacific Ent. 1: 64. ♀.

Andrena supervirens var. *aurescens* Cockerell, 1924. Pan-Pacific Ent. 1: 64. ♀.

Andrena (Andrena) innominata Viereck, 1926. Calif. Acad. Sci., Proc. (4) 15: 404. ♂.

Andrena (Ptilandrena) tristis Linsley, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1062. Nomen nudum.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 154 (type). —Cockerell, 1906. Psyche 13: 9 (type). —Viereck, 1904. Canad. Ent. 36: 227. ♀ (key, as *territa*). —Cockerell, 1932. Canad. Ent. 64: 287. ♀ (as *complexa*). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1034, figs. 82, 83, 85 (larva, as *complexa*). —LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 406-415, figs. 6, 35-39 (redescription, synonymy).

Biology: Bohart, 1936. Pan-Pacific Ent. 12: 9 (parasite). —Bohart, 1941. Pan-Pacific Ent. 17: 95 (parasite). —Bohart, 1941. Calif. Univ. Pubs. Ent. 7: 91 (parasite). —MacSwain and Bohart, 1947. Pan-Pacific Ent. 23: 30 (parasite). —MacSwain, 1949. Pan-Pacific Ent. 25: 89-90 (parasite). —Linsley and MacSwain, 1955. Wasmann Jour. Biol. 13: 253 (parasite). —Linsley and MacSwain, 1957. Calif. Univ. Pubs. Ent. 11: 395 (parasite). —Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 5-13, text figs. 1-5, plate figs. 1b, 3c and d (nest construction, life history, overwintering, emergence, behavior, sex ratio, mating, floral relationships, parasites).

chlorura Cockerell. Wash. to Calif., east to Utah and Airz.; Mexico (Baja California). Pollen: Polylectic, visits a wide variety of flowers including *Acer macrophyllum, Arbutus menziesii, Arctostaphylos bicolor, A. crustacea, A. drupacea, A. glandulosa, A. glauca, A. mariposa, A. patula, Berberis pinnata, Ceanothus arboreus, C. cordulatus, C. crassifolius, C. cuneatus, C. greggii, C. integerrimus, C. leucodermis, C. palmeri, C. soredatus, C. velutinus, C. verrucosa, Cercocarpus betulifolius, Claytonia spathulata, Cryptantha, Dentaria californica, Fragaria californica, Gilia, Lasthenia chrysostoma, Malus, Paeonia brownii, Petasites palmata, Prunus subcordata, Quercus, Ranunculus, Rhamnus californica, R. crocea, R. ilicifolia, Rhus integrifolia, R. ovata, R. trilobata, Ribes indecorum, Salix lasiolepis, Salvia mellifera, Tamarix.*

Andrena chlorura Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 48. ♀.

Andrena (*Andrena*) *complicata* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 554. ♀.

Andrena ablusula Cockerell, 1936. Pan-Pacific Ent. 12: 135. ♀.

Andrena clementina Timberlake, 1941. South. Calif. Acad. Sci., Bul. 39: 193. ♀.

Taxonomy: Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1061 (synonymy). —LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 402-406, figs. 5, 30-34 (redescription, synonymy).

dissimulans Timberlake. Calif. Pollen: Evidently an oligolege of *Lasthenia* including *L. aristata, L. chrysostoma, L. gracilis, L. tenella,* but also visits the flowers of *Calandrinia menziesii, Salvia.*

Andrena (*Thysandrena*) *dissimulans* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 408. ♀, ♂.

Andrena (*Thysandrena*) *blandula* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 410. ♀.

Taxonomy: LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 426-429, figs. 3, 55-59 (redescription, synonymy).

hamulata LaBerge and Ribble. Calif. Pollen: Unknown, but visits flowers of *Salix.*

Andrena (*Euandrena*) *hamulata* LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 399, figs. 3, 20-24. ♀, ♂.

lawrencei Viereck and Cockerell. B. C. to Calif., east to Alta., Idaho, Wyo., Utah and Nebr. Pollen: Unknown, but visits flowers of *Balsamorhiza sagittata, Carnaria draba, Helianthus nuttallii, Phlox hoodii, Silphium, Wyethia mollis.*

Andrena lawrencei Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 15. ♀.

Andrena (*Iomelissa*) *extensa* Viereck, 1924. Canad. Ent. 56: 240. ♀, ♂.

Taxonomy: Cockerell, 1932. Canad. Ent. 64: 286. ♀ (key, as *extensa*). —LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 386-390, figs. 3, 18-19 (redescription, synonymy).

misella Timberlake. Calif. Pollen: Unknown, but visits flowers of *Amsinckia eastwoodae, Anagallis arvensis, Brassica, Calandrinia ciliata, Lasthenia, Montia perfoliata, Phacelia, Ranunculus.*

Andrena misella Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 410. ♀.

nigrihirta (Ashmead). Alaska and transcont. south. Canada, south to Calif., Nev., Utah, Colo., N. Dak., Minn., Wis., Ill., Mich., N. Y. and Conn. Pollen: Apparently polylectic, visits flowers of *Angelica, Dentaria californica, Eriogonum, Eriophyllum confertiflorum,*

Erythronium grandiflorum, Fragaria, Fritillaria pumila, Lonicera, Lotus, Montia perfoliata, Petasites palmata, Pulsatilla hirsutissima, Ranunculus, Rhododendron occidentale, Rosa, Rubus, Smilacina stellata, Synthiridis plantagium.

Cillissa nigrihirta Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 6. ♂.

Andrena longihirtiscopa Viereck, 1904. Canad. Ent. 36: 191. ♀.

Andrena decussata Viereck, 1904. Canad. Ent. 36: 193, 194. ♀, ♂.

Andrena decussatula Viereck, 1904. Canad. Ent. 36: 193. ♀.

Andrena synthiridis Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 436. ♀.

Andrena novae-angliae Viereck, 1907. Ent. News 18: 283. ♀.

Andrena nivaloides Graenicher, 1911. Pub. Mus. Milwaukee, Bul. 1: 235. ♀.

Andrena discolor Viereck, 1916. Amer. Mus. Nat. Hist., Bul. 35: 370. ♀.

Andrena (*Andrena*) *tumida* Viereck, 1922. Boston Soc. Nat. Hist., Occas. Papers 5: 35. ♀, ♂.

Andrena (*Andrena*) *vancouverensis* Viereck, 1924. Canad. Ent. 56: 80. ♂.

Andrena (*Andrena*) *nigrovaria* Viereck, 1924. Canad. Ent. 56: 237. ♀.

Andrena (*Andrena*) *marina* Viereck, 1926. Calif. Acad. Sci., Proc. (4) 15: 405. ♂.

Andrena ripariella Cockerell, 1936. Pan-Pacific Ent. 12: 148. ♂.

Andrena (*Thysandrena*) *crenata* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 221, figs. 44, 51. ♂.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10: 207. ♀ (key, as *novaeangliae*). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705. ♀, ♂ (key). —LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 380-386, figs. 2, 8-12 (redescription, synonymy).

nigrocaerulea Cockerell. B. C. to Calif., east to Wyo. and Colo. Parasite: *Stylops pacifica* Bohart. Pollen: Polylectic, visits a wide variety of flowers including *Allium, Arbutus menziesii, Arctostaphylos nevadensis, Arenaria kingii, Barbarea orthoceras, B. vulgaris, Berberis aquilifolium, Brassica, Cakile edentula californica, Calyptridium umbellatum, Ceanothus integerrimus, Cercocarpus betuloides, Chamaebatia foliolosa, Cryptantha intermedia, Daucus carota, Descourainia sophia, Doronicum, Eriodictyon californicum, Eriogonum lobbii, E. marifolium, Erodium botrys, Erysimum asperum, Fragaria californica, Gilia capitata, G. multicaulis, G. tricolor, Hackelia patens, Hesperochiron californicus, Horkelia tillingi, Lappula, Linanthus androsaceus, L. parviflorus, Lithophragma affinis, Lomatium dissectum, Lonicera, Lotus, Mertensia, Microseris nutans, Mimulus guttatus, Montia perfoliata, M. sibirica, Nemophila integrifolia, N. spatulata, Oenothera, Penstemon cyananthus, Phacelia humilis, P. linearis, P. pusilla, P. tanacetifolia, Plectritis macrocera, Potentilla glandulosa, Prunus virginiana, P. subcordata, Pyracantha, Quercus agrifolia, Ranunculus californicus, Raphanus sativa, Rhamnus californicus, R. crocea, Rubus, Salix, Sanicula nevadensis, Senecio canus, S. integerrimus, Sisyrinchium bellum, Spraguea umbellata, Taraxacum officinale, T. vulgare, Trifolium repens.*

Andrena nigrocaerulea Cockerell, 1897. Entomologist 30: 309. ♀, ♂.

Andrena seattlensis Viereck, 1904. Canad. Ent. 36: 191, 195. ♀, ♂.

Andrena epileuca Cockerell, 1924. Pan-Pacific Ent. 1: 62. ♀, ♂.

Andrena lustrans Cockerell, 1924. Pan-Pacific Ent. 1: 63. ♀.

Taxonomy: Cockerell, 1932. Canad. Ent. 64: 286 (key). —Cockerell, 1932. Canad. Ent. 64: 286. ♀ (variation, as *lustrans*). —Cockerell, 1932. Canad. Ent. 64: 286. ♀ (key, as *epileuca*). —LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 390-396, figs. 4, 13-17 (redescription, synonymy).

Biology: Linsley and MacSwain, 1957. Calif. Univ. Pubs. Ent. 11: 399 (stylopization). —Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 19 (floral relationships, stylopization).

penemisella LaBerge and Ribble. Calif. and Oreg. (Cayuse and The Dalles). Pollen: Unknown, but visits flowers of *Calandrinia, Cryptantha, Erodium, Montia perfoliata.*

Andrena (*Euandrena*) *penemisella* LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 422. ♀.

suavis Timberlake. Oreg. (Klamath Co.), Calif. Parasite: *Nomada obliquella* Timberlake, *N. opacellus* Timberlake, *Stylops pacifica* Bohart. Pollen: Oligolectic, apparently collects

pollen only from the flowers of *Ranunculus californicus*, but visits other flowers presumably for nectar including *Astragalus*, *Calandrinia menziesii*, *Ceanothus*, *Lasthenia chrysostoma*, *Lomatium utriculatum*, *Montia perfoliata*, *Oenothera ovata*, *Orthocarpus densiflorus*, *Platystemon californicus*, *Rhus trilobata*, *Wyethia angustifolia*. Predator: *Xysticus* sp.

Andrena (*Ptilandrena*) *suavis* Timberlake, 1938. Pan-Pacific Ent. 14: 24. ♀, ♂.

Biology: Bohart, 1941. Calif. Univ. Pubs. Ent. 7: 128 (parasite). —MacSwain, 1949. Pan-Pacific Ent. 25: 89 (stylopization). —Linsley and MacSwain, 1955. Wasmann Jour. Biol. 13: 253 (parasite). —Linsley and MacSwain, 1957. Calif. Univ. Pubs. Ent. 11: 395-422 (parasite, stylopization). —Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 13-16, plate 3, figs. a and b (nest architecture, life history, overwintering, emergence, sex ratio, floral relationships, parasites, predator).

subdepressa Timberlake. Calif. Pollen: Unknown, but visits flowers of *Brassica*, *Dentaria californica*, *Ranunculus californicus*, *Salix lasiolepis*.

Andrena (*Thysandrena*) *subdepressa* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 407. ♀, ♂.

Biology: Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 19 (floral relationships).

venata LaBerge and Ribble. Calif. (Sonora Pass). Pollen: Unknown, but visits flowers of *Ranunculus*.

Andrena (*Euandrena*) *venata* LaBerge and Ribble, 1975. Amer. Ent. Soc., Trans. 101: 429, figs. 60-64. ♀, ♂.

Genus ANDRENA Subgenus GEISSANDRENA LaBerge

Andrena subg. *Geissandrena* LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 302. Type-species: *Andrena trevoris* Cockerell. Monotypic and orig. desig.

Revision: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 302-307, figs. 1, 36-40.

trevoris Cockerell. B. C. and Alta., south to Calif., south to Idaho, Utah and ?Ariz. (Huachuca Mts. and Nogales). Pollen: Unknown, but visits flowers of *Aesculus*, *Cirsium*, *Lonicera*, *Rosa*, *Symphoricarpos*.

Andrena trevoris Cockerell, 1897. Entomologist 30: 306. ♂.
Andrena semipolita Viereck, 1904. Canad. Ent. 36: 192. ♀.
Andrena ricardonis Cockerell, 1916. Canad. Ent. 48: 272. ♂.

Taxonomy: Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 380. ♀.

Genus ANDRENA Subgenus GONANDRENA Viereck

Andrena subg. *Gonandrena* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 390. Type-species: *Andrena* (*Gonandrena*) *persimulata* Viereck. Monotypic.
Andrena subg. *Tropandrena* Viereck, 1924. Canad. Ent. 56: 21. Type-species: *Andrena fragilis* Smith. Monotypic and orig. desig.

Revision: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 271-302, figs. 1-4, 10-35 (N. Amer. spp.).

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 210 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 302 (tax. characters).

avulsa LaBerge and Ribble. Tex. Pollen: Unknown, but visits flowers of *Parkinsonia*, *Phacelia*.

Andrena (*Gonandrena*) *avulsa* LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 298, figs. 4, 26-30. ♀, ♂.

flocculosa LaBerge and Ribble. Wash., Calif. (Gold Lake and Meadow Valley), Nev. (Lamoille).

Andrena (*Gonandrena*) *flocculosa* LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 296, figs. 4, 24-25. ♀, ♂.

fragilis Smith. Que. to Ga., west to Wis., Iowa and Kans. Pollen: Apparently an oligolege of *Cornus* including *C. amonum*, *C. paniculata*, but visits other flowers including *Aruncus*,

Castanea pumila, Ceanothus, Cicuta maculata, Cirsium, Hydrangea, Pastinaca sativa, Ptelea, Salix, Svida, Trifolium, Viburnum dentatum, V. molle.
Andrena fragilis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 115. ♂.
Andrena laticeps Provancher, 1888. Addit. Corr. Fauna Ent. Canada, Hym., p. 307. ♂. Preocc.
Andrena provancheri Dalla Torre, 1896. Cat. Hym. v. 10, p. 147. N. name.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 149 (type of *fragilis*). —Cockerell, 1906. Psyche 13: 7 (type of *fragilis*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 231-232, figs. 46-49, table 6 (redescription). —LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 278-284, figs. 2, 10-14 (redescription, synonymy).

integra Smith. Que. and Ont., south to N. C., west to Minn. and Kans. Pollen: Possibly an oligolege of *Cornus* including *C. stolonifera*, but visits other flowers including *Achillea, Aruncus, Barbarea vulgare, Crataegus, Cryptotaenia, Melilotus alba, M. officinalis, Pastinaca, Ptelea, Rhus, Viburnum, Vitis.*
Andrena integra Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 114. ♀.
Andrena lineata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 309. ♀.
Andrena (*Gonandrena*) *lucifera* Cockerell, 1932. Canad. Ent. 64: 155. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 124 (type of *integra*). —Cockerell, 1906. Psyche 13: 6 (type of *integra*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 232-233, figs. 46-49, table 6 (redescription). —LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 284-287, figs. 2, 15-19 (redescription, synonymy).

nigrifrons (Cresson). Ont. and N. H. south to N. C., west to Man., Minn., Nebr., Kans. and Tex. Pollen: Possibly polylectic, although seems to prefer pollen of *Cornus* including *C. asperifolia, C. paniculata, C. racemosa, C. sericea, C. stolonifera*, but visits other flowers including *Achillea, Barbarea vulgaris, Ceanothus americanus, Cryptotaenia canadensis, Erigeron philadelphus, Hieraceum, Lotus corniculatus, Melilotus alba, M. officinalis, Ptelea trifoliata, Rhus glabra, Rubus, Sambucus americanus, Spiraea aruncus, S. vanhouttei, Taraxacum, Toxicodendron, Viburnum dentatum, Zizia aurea.*
Panurgus nigrifrons Cresson, 1878. Amer. Ent. Soc., Trans. 7: 62. ♂.
Andrena platyparia Robertson, 1895. Amer. Ent. Soc., Trans. 22: 119. ♀, ♂.
Andrena (*Andrena*) *barbarica* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 369. ♀.
Andrena (*Gonandrena*) *monroensis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 233. ♀.

Taxonomy: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 287-292, figs. 3, 20-21 (redescription, synonymy).

persimulata Viereck. N. S. to N. W. T. and Alta., south to Conn., N. Y., Mich., Wis., Minn., Nebr., Colo. and Utah. Pollen: Possibly an oligolege of *Cornus* including *C. asperifolia, C. stolonifera*, but visits other flowers including *Angelica atropurpurea, Crataegus, Deutzia gracilis, Fragaria, Lomatium dissectum, Polygonum convolvulus, Prunus, Spiraea, Taraxacum officinalis, Viburnum.*
Andrena (*Gonandrena*) *persimulata* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 390. ♀.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10: 206, 209. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 235-236, figs. 45-46, 48, table 6 (redescription). —LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 292-296, figs. 4, 22-23 (redescription).

Genus ANDRENA Subgenus HESPERANDRENA Timberlake

Andrena subg. *Hesperandrena* Timberlake, 1949. *In* Lanham, Calif. Univ. Pubs. Ent. 8: 208.

Type-species: *Andrena escondida* Cockerell. Orig. desig.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 283, 293, 301 (tax. characters).

baeriae Timberlake. Calif. Pollen: Apparently an oligolege of the flowers of *Lasthenia* including *L. aristata, L. chrysostoma, L. gracilis*, but visits other flowers including *Eriophyllum confertiflorum, Layia platyglossa, Lessingia germanorum, Senecio californica.*
Andrena baeriae Timberlake, 1941. South. Calif. Acad. Sci., Bul. 39: 194. ♀, ♂.

duboisi Timberlake. North. Calif. Pollen: Unknown, but visits flowers of *Lasthenia chrysostoma, Layia platyglossa.*
Andrena (*Hesperandrena*) *duboisi* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 390. ♀, ♂.

escondida Cockerell, South. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Encelia, Layia platyglossa.*
Andrena escondida Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 146. ♂.

lativentris Timberlake. Calif. Pollen: Unknown, but visits flowers of *Amsinckia intermedia, Coreopsis maritima, Hemizonia pungens, Lasthenia chrysostoma, L. gracilis, L. tenella, Layia platyglossa.*
Andrena (*Hesperandrena*) *lativentris* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 388. ♀, ♂.

limnanthis Timberlake. Calif. Pollen: Possibly an oligolege of *Limnanthes* including *L. douglasii*, but visits other flowers including *Chamaebatia foliolosa, Layia platyglossa, Raphanus sativus.*
Andrena (*Hesperandrena*) *limnanthis* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 387. ♀, ♂.

Genus ANDRENA Subgenus IOMELISSA Robertson

Iomelissa Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 50.
Type-species: *Andrena violae* Robertson. Monotypic.

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 207 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 284, 288, 300 (tax. characters).

violae Robertson. N. Y. to N. C., west to Ill. and Colo. Pollen: Obtains pollen solely from the flowers of *Viola*, but visits other flowers for nectar including *Cardamine, Ellisia, Oxalis, Potentilla.*
Andrena violae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 53. ♀, ♂.
Andrena davisi Viereck, 1907. Ent. News 18: 283. ♀.

Taxonomy: Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 10. ♀ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706, 707. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 252-254, figs. 54-56 (redescription, synonymy).

Genus ANDRENA Subgenus LARANDRENA LaBerge

Andrena subg. *Larandrena* LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 304.
Type-species: *Andrena miserabilis* Cresson. Orig. desig.

Revision: Ribble, 1967. Nebr. Univ. State Mus., Bul. 6: 27-42, figs. 1-5, 1 table, 1 map.

Taxonomy: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 308 (tax. status).

miserabilis Cresson. Transcont. south. Canada and U. S., south to Fla., Ala., Miss., Tex., N. Mex., Utah and Calif.; Mexico (Tamaulipas). Parasite: *Leucophora obtusa* (Zett.), *Nomada* sp., *Stylops bipunctata* Pierce, *S. oklahomae* Pierce. Pollen: Polylectic, principally obtains pollen from the flowers of Rosaceae and Salicaceae; visitation records include *Amelanchier, Antennaria, Arabis, Aronia, Berberis, Brassica, Capsella, Cardamine, Ceanothus, Cercis, Cercocarpus, Claytonia, Comandra, Convolvulus, Cornus, Crataegus, Cydonia, Dentaria, Erigenia, Exochorda, Fragaria, Hepatica, Heracleum, Ilex, Isopyrum, Malus, Prunus, Ptelea, Pyracantha, Pyrus, Ranunculus, Rhamnus, Rhus, Rubus, Salix, Solidago, Sorbaria, Spiraea, Stachys, Staphylea, Stellaria, Taraxacum, Viburnum, Viola, Zanthoxylum.*
Andrena clypeata Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 115. ♀. Preocc.
Andrena miserabilis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 259. ♀ (♂ misdet.).
Andrena bipunctata Cresson, 1872. Amer. Ent. Soc., Trans. 4: 259. ♂.
Andrena flavoclypeata Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 54. ♂.
Andrena scutellaris Robertson, 1893. Amer. Ent. Soc., Trans. 10: 148. ♀. Preocc.
Anthrena clypeolata Dalla Torre, 1896. Cat. Hym., v. 10, p. 133. N. name.
Anthrena scutellata Dalla Torre, 1896. Cat. Hym., v. 10, p. 151. N. name.
Andrena pennsylvanicola Viereck, 1907. Ent. News 18: 284. ♀.
Andrena pronitens Cockerell, 1930. Ann. and Mag. Nat. Hist. (10) 5: 114. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 124, 152 (types of *clypeata, flavoclypeata*). —Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193. ♀, ♂ (key). —Cockerell, 1906. Psyche 13: 9, 36, (types of *clypeata, flavoclypeata*). —Atwood, 1934. Canad. Jour. Res. 10 (2): 208, 209, fig. ♀, ♂ (key). —Lanham and Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1058 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 95, 160, fig. 29, table 4 (redescription). —Ribble, 1967. Nebr. Univ. State Mus., Bul. 6: 27-42, 5 figs., 1 table, 1 map (redescription, synonymy).

Biology: Michener and Rettenmeyer, 1956. Kans. Univ. Sci. Bul. 37: 679-681, fig. 21 (nest architecture, life history, parasites, as *bipunctata*). —Ribble, 1967. Nebr. Univ. State Mus., Bul. 6: 37, table 1 (floral relationships).

Genus ANDRENA Subgenus LEUCANDRENA Hedicke

Andrena subg. *Leucandrena* Hedicke, 1933. Berlin Zool. Mus., Mitt. 19: 215.
Type-species: *Apis sericea* Christ. Orig. desig.

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 220 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 285, 290, 310 (tax. characters).

bifurcata Mitchell. Mich., Ohio.
Andrena (*Leucandrena*) *bifurcata* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 211, figs. 40-42. ♂.

chippewaensis Mitchell. Mich., N. B.
Andrena (*‡Leucandrena*) *chippewaensis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 212, fig. 43. ♀.

Taxonomy: Knerer and Atwood, 1963. Canad. Ent. 95: 584, figs. 2, 4. ♂.

electrica Casad and Cockerell. N. Mex.
Andrena electrica Casad and Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 89. ♂, ♀.

Taxonomy: Cockerell, 1898. Denison Univ Sci. Labs., Bul. 11: 49. ♀, ♂ (key).

erythronii Robertson. Que. to Mich., Ill. and Kans., south to Maine and Mass. Pollen: Primarily collects pollen of *Erythronium* including *E. mesochoreum*, but also collects pollen from the flowers of *Malus, Prunus, Quercus, Taraxacum;* visits other flowers presumably for nectar including *Amelanchier, Claytonia, Erigenia, Hepatica, Salix.*
Andrena erythronii Robertson, 1891. Amer. Ent. Soc., Trans. 18: 53. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190, 193. ♀, ♂ (key). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1035, figs. 88-91 (larva). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 212-213, figs. 40-42 (redescription). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 5 (pupa).

Biology: Michener and Rettenmeyer, 1956. Kans. Univ. Sci. Bul. 37: 645-679, figs. 1-20 (nest architecture, life history, floral relationships, mating, number of females per nest, immature stages).

lupini Cockerell. Calif. Pollen: Unknown, but visits flowers of *Arctostaphylos glandulosa, A. glauca, Ceanothus cuneatus, C. greggii, C. integerrimus, C. verrucosus, Clematis lasiantha, Erodium botrys, Eschscholzia californica, Lasthenia chrysostoma, Lathyrus alfeldii, Lupinus, Phacelia.*
Andrena lupini Cockerell, 1936. Pan-Pacific Ent. 12: 142. ♀.

mariposorum Viereck. Calif.
Andrena (*Andrena*) *mariposorum* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 382. ♀.

parnassiae Cockerell. Mich., Wis., Vt. Pollen: Unknown, but visits flowers of *Parnassia.*
Andrena parnassiae Cockerell, 1902. Ann. and Mag. Nat. Hist. (7) 9: 105. ♀.

Taxonomy: Graenicher, 1904. Ent. News 15: 66. ♀, ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 213-214, figs. 40-43 (redescription).

perezana Viereck and Cockerell. Nebr.
Andrena perezana Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 47. ♀.

picta Mitchell. N. Y. (Ithaca).
Andrena (*Leucandrena*) *picta* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 214. ♀.

placida placida Smith. Alaska to N. S., south to Va., Ohio, Ill., Mich., Minn. and Calif. Parasite: *Meloe opacus* LeC., *M. strigulosus* Mann., *Stylops* sp.?. Pollen: Polylectic, analyzed pollen stores reveal that a given female, with one exception, provisions her cells with only one kind of pollen which in California consisted of predominantly pollen of *Eschscholzia californica*, while others stored pollen of a ligulate Compositae (*Agoseris?*), legume (*Lupinus?*), and a crucifer (*Raphanus?*); visitation records for other flowers include *Acer, Amelanchier, Fragaria, Layia carnosa, Prunus, Pyrus malus, Taraxacum, Viburnum.*
Andrena placida Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 112. ♀.
Andrena macilenta Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 313. ♀, ♂.
Andrena macgillivrayi Cockerell, 1897. Entomologist 30: 308. ♀.
Andrena salicacea Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 48. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 151 (type of *placida*). —Cockerell, 1906. Psyche 13: 7 (type of *placida*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 214-216, figs. 40-42, table 6 (redescription). —Thorp and Stage, 1968. Ent. Soc. Amer., Ann. 61: 1583-1584, figs. 3-9. (immature stages, chromosome number).

Biology: Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 249 (ecology). —Thorp and Stage, 1968. Ent. Soc. Amer., Ann. 61: 1580-1586, 9 figs., table (nest architecture, life history, floral realtionships, parasites).

placida sapellonis Cockerell. Colo., N. Mex.
Andrena sapellonis Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 19. ♀.

recta Mitchell. Minn. to N. Y. south to N. C. Pollen: Unknown, but visits flowers of *Helianthus annuus*. Predator: *Philanthus* sp.
Andrena (*Leucandrena*) *recta* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 217, fig. 43. ♀.

seavillensis Mitchell. N. J. (South Seaville).
Andrena (*?Leucandrena*) *seavillensis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 217, fig. 43. ♀.

trapezoidina Viereck and Cockerell. Nebr.
Andrena trapezoidina Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 58. ♀.

Genus ANDRENA Subgenus MELANDRENA Perez

Melandrena Perez, 1890. Soc. Linn. Bordeaux, Actes 44: 170.
Type-species: *Andrena morio* Brulle. Desig. by Hedicke, 1933.
Andrena subg. *Gymnandrena* Hedicke, 1933. Berlin Zool. Mus., Mitt. 19: 213.
Type-species: *Apis thoracica* Fabricius. Orig. desig.
Andrena subg. *Cryptandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 222. Preocc.
Type-species: *Andrena carlini* Cockerell. Orig. desig.
Andrena subg. *Bythandrena* Lanham, 1950. Ent. News 61: 140. N. name.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 310, 311 (tax. characters, as *Gymnandrena* and *Melandrena*. —LaBerge, 1971. Pan-Pacific Ent. 47: 47 (synonymy).

bisignata Mitchell. Mass. to N. C., west to Minn. Pollen: Unknown, but visits flowers of *Erythronium americanum, Ilex verticillata, Prunus serotina, Pyrus malus, Salix sericea, Viburnum acerifolium.*
Andrena (*Gymnandrena*) *bisignata* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 122, figs. 20, 22, 23. ♀, ♂.

bryanti Cockerell. Alta.
Andrena bryanti Cockerell, 1938. Canad. Ent. 70: 5. ♀.

carlini carlini Cockerell. N. S. to Ga., west to Minn., Colo., Wyo. and Oreg.?, B. C.? Pollen: Apparently polylectic, visits flowers of *Amelanchier, Anemonella, Arabis, Brassica, Cercis, Chaerophyllum, Claytonia, Cornus, Dentaria, Dicentra, Erigenia, Erythronium, Hepatica, Heracleum, Hydrophyllum, Isopyrum, Malus, Polemonium, Prunus, Pyrus,*

Rhus, Ribes, Rubus, Salix, Sanguinaria, Sassafras, Smilacina, Solidago, Thaspium, Tragana, Trifolium, Uvularia, Vaccinium, Viburnum, Vicia.
Andrena carlini Cockerell, 1901. Canad. Ent. 23: 150, 153. ♀.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10: 207, 209. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705, 708. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 111-112, figs. 17, 19, table 3 (redescription).

Biology: Atwood, 1933. Canad. Jour. Res. 9: 456 (floral relationships). —Brittain, 1933. Canad. Dept. Agr., Bul. 162: 94, figs. (floral relationships).

carlini neorhodura Mitchell. Mass., Pa., Mich.
Andrena (*Bythandrena*) *carlini neorhodura* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 113. ♂.

carliniformis Viereck and Cockerell. B. C. to Calif., east to Wyo., Colo. and Utah. Pollen: Unknown, but visits flowers of *Agastache urticifolia, Allium, Calochortus, Ceanothus, Chamaebatia foliolosa, Eriogonum, Euphorbia crenulata, Gilia, Horkelia, Lappula, Lotus nevadensis, Lupinus bicolor, Phacelia Plagiobothrys nothofulvus, Potentilla, Prunus demissa, Ranunculus californicus, Rhamnus crocea, R. californica, Salix, Salvia columbariae, Taraxacum officinale, Vicia, Wyethia.*
Andrena carliniformis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 25. ♀.

carolinensis Mitchell. N. C. (Raleigh). Pollen: Unknown, but visits flowers of *Vicia caroliniana.*
Andrena (*Gymnandrena*) *carolinensis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 123, fig. 20. ♀.

cerasifolii Cockerell. Calif., Ariz., Utah, N. Mex. Pollen: Polylectic, visits flowers of *Arctostaphylos drupacea, A. glauca, A. mariposa, A. patula, Brassica arvensis, B. campestris, Ceanothus cuneatus, C. greggii, C. palmeri, Cirsium californicum, Clarkia biloba, C. nitens, C. unguiculata, Cryptantha intermedia, Emmenanthe penduliflora, Eriogonum fasciculatum, Erodium, Erysimum asperum, Heteromeles arbutifolia, Horkelia bolanderi, Hyptis emoryi, Penstemon spectabilis, Phacelia brachyloba, P. cicutaria, Rhamnus californicus, R. crocea, Rhus trilobata, Ribes indecorum, Salix hindsiana, S. lasiolepis, Sisymbrium irio, Swertia parryi, Trichostema parryi, Viburnum.*
Andrena cerasifolii Cockerell, 1896. Ent. Monthly Mag. (2) 7: 220. ♂.
Andrena mimetica Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 412. ♀, ♂.
Andrena mimetica var. *falli* Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 536.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48. ♂ (key). —Cockerell, 1924. Pan-Pacific Ent. 1: 58. ♂. —Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1060 (synonymy).

Biology: Linsley, 1937. Brooklyn Ent. Soc., Bul. 32: 125 (floral relationships, number of generations). —MacSwain, Raven, Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 46 (floral relationships).

commoda Smith. Southeast. Canad, south to Ga., west to N. Dak. Pollen: Unknown, but visits flowers of *Cornus paniculata.*
Andrena commoda Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 53. ♀.
Andrena corni Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 50. ♀.
Andrena pyrura Cockerell, 1906. Ann. Mag. and Nat. Hist. (7) 17: 309. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 152 (type). —Cockerell, 1906. Psyche 13: 6. ♀ (type). —Viereck, 1907. Ent. News 18: 283, 286. ♀, ♂ (key). —Cockerell, 1931. Amer. Mus. Novitates 458: 18, 19. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 124, figs. 22-23, table 3 (redescription, synonymy).

confederata Viereck. Ohio to N. J., south to Fla. Pollen: Unknown, but visits flowers of *Amelanchier, Castanea, Crataegus, Fragaria, Ilex, Malus, Padus, Prunus, Pyracantha, Rubus.*
Andrena (*Andrena*) *confederata* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 375. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 125, figs. 22-23, table 3 (redescription).

critica Mitchell. N. Y. (Catskill Mts.).
Andrena (*Bythandrena*) *critica* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 113. ♀.

dunningi Cockerell. Que. to N. C., west to Minn. Pollen: Unknown, but visits flowers of *Claytonia, Gleditsia, Malus, Narcissus, Ribes, Rubus, Salix, Taraxacum, Viburnum.*
Andrena dunningi Cockerell, 1898. Canad. Ent. 30: 103. ♀.
Andrena viciniformis Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 47. ♀, ♂.
Andrena annae Cockerell, 1931. Canad. Ent. 63: 200. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190, 192. ♀, ♂ (key). —Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1064 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 113-114, figs. 18-19, table 3 (redescription).

errans Smith. B. C. to Calif. and N. Mex. Pollen: Unknown, but visits flowers of *Arctostaphylos mariposa, Ceanothus, Eriogonum marifolium, Lappula, Ranunculus, Salix.*
Andrena errans Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 55. ♀, ♂.
Andrena pluvialis Cockerell, 1901. Canad. Ent. 33: 154. ♀.
Andrena junonia Viereck, 1904. Canad. Ent. 36: 191. ♀.
Andrena compactiscopa Viereck, 1904. Canad. Ent. 36: 191. ♀.
Andrena argentiniae var. *trichomelaena* Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 12: 376. ♂, ♀.
Andrena spaldingi Cockerell, 1934. Amer. Mus. Novitates 697: 3. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 153 (type). —Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 443. ♂ (as *pluvialis*). —Cockerell, 1906. Psyche 13: 34 (type). —Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1065 (synonymy).

flexa Malloch. Ill. to Tex. Parasite: *Nomada* sp.
Andrena flexa Malloch, 1917. Brooklyn Ent. Soc., Bul. 12: 92. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 126 (redescription).

Biology: Rozen, 1966. Amer. Mus. Novitates 2244: 26 (parasite).

gabrielsoni Mitchell. Maine, Conn., N. C., Mich.
Andrena (*Bythandrena*) *gabrielsoni* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 115. ♀.

hilaris Smith. Mich. and Ohio to eastern Canada and New England States, south to Ga. and Ala. Pollen: Unknown, but visits flowers of *Aronia, Crataegus, Hydrangea, Ilex, Malus, Prunus, Pyrus, Rubus, Salix, Vaccinium.*
Andrena hilaris Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 112. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 151 (type). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 126-127, figs. 21-23, table 3 (redescription).

lupinorum helenae Cockerell. Colo.
Andrena lupinorum helenae Cockerell, 1934. Amer. Mus. Novitates 697: 2. ♀.

lupinorum lupinorum Cockerell. Wyo., Colo., Nebr. Pollen: Unknown, but visits flowers of *Lupinus.*
Andrena lupinorum Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 308. ♀.
Andrena vicina argentiniae Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 432. ♀.

Taxonomy: Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705. ♀ (key). —Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1070 (synonymy).

macra Mitchell. N. C. Pollen: Unknown, but visits flowers of *Crataegus, Pyracantha, Rubus.*
Andrena macra Mitchell, 1951. Elisha Mitchell Sci. Soc., Jour. 67: 246, figs. 1-3. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 127-128, figs. 22-23, table 3 (redescription).

Biology: Sivik, 1954. Ent. News 65: 253-255 (nest, supersedure).

nigra Provancher. Ariz., south. Calif.; Mexico (Baja California). Pollen: Apparently an oligolege of *Phacelia* including *P. distans*, but also visits flowers of *Coreopsis maritima*, *Cryptantha intermedia*, *Layia platyglossa*, *Malacothrix*, *Malus*, *Salix*.
Andrena nigra Provancher, 1896. Nat. Canad. 23: 173. ♀.
Andrena griseonigra Cockerell, 1905. Canad. Ent. 37: 371. ♂.
Andrena subtristis Cockerell, 1905. Canad. Ent. 37: 372. ♀.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 266, 279. ♀, ♂ (key).

Biology: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 280 (floral relationships).

nigripes Provancher. Calif.
Andrena nigripes Provancher, 1895. Nat. Canad. 22: 173. ♀.

nivalis Smith. Que. to Ga., west to B. C., south to Calif. and N. Mex. Pollen: Unknown, but visits flowers of *Hydrangea*, *Rhododendron*, *Rubus*, *Vagnera*.
Andrena nivalis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 118. ♀, ♂.
Andrena convexa Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 311. ♀, ♂.
Andrena semirufa Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 407. ♀.
Andrena solidula Viereck, 1904. Canad. Ent. 36: 191, 194. ♀, ♂.
Andrena idahorum Viereck, 1916. Amer. Mus. Nat. Hist., Bul. 35: 732. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 151. ♀ (type). —Cockerell, 1906. Psyche 13: 9 (type). —Cockerell, 1931. Amer. Mus. Novitates 458: 14. ♀ (key, as *semirufa*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 128-129, figs. 22, 23, table 3 (redescription, synonymy).

obscuripennis Smith. N. J.(?), N. C., Ga., La.(?). Parasite: *Nomada crudelis* Cress.? Pollen: Unknown, but visits flowers of *Batodendron*, *Crataegus*, *Ilex*, *Padus*.
Andrena obscuripennis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 188. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 150. ♀ (type). —Cockerell, 1906. Psyche 13: 36. ♀ (type). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 129-131, figs. 21, 23, table 3 (redescription).

perimelas Cockerell. Coastal Calif. and Catalina Island Parasite: *Nomada edwardsii edwardsii* Cress., *Stylops pacifica* Bohart, *S. vandykei* Bohart. Pollen: Apparently polylectic, visits flowers of *Brassica*, *Coreopsis maritima*, *Crepis*, *Limnanthes douglasii*, *Mesembryanthemum edule*, *Prunus*, *Ranunculus californicus*, *Raphanus sativus*, *Ribes cereum*, *Rubus*, *Salix*, *Sisymbrium bellum*, *Zygadenus fremontii*.
Andrena perimelas Cockerell, 1905. Canad. Ent. 37: 371. ♀.
Andrena meadowsi Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 146. ♂.

Biology: Linsley and MacSwain, 1955. Wasmann Jour. Biol. 13: 254-256, 270, pl. 1, fig. 5 (nest, floral relationships, parasite). —Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 19, pl. 5 (nest, floral relationships, parasite, stylopization).

pertristis Cockerell. Calif. Pollen: Unknown, but visits flowers of *Brassica*, *Cryptantha intermedia*, *Eriodictyon trichocalyx*, *Fremontodendron californica*, *Lupinus formosus*, *Malus*, *Nemophila integrifolia*, *Phacelia heterophylla*, *Stanleya pinnata*.
Andrena pertristis Cockerell, 1905. Canad. Ent. 37: 372. ♀.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 265, 267. ♀, ♂ (key).

platyrhina Cockerell. Colo.
Andrena (*Pterandrena*) *platyrhina* Cockerell, 1930. N. Y. Ent. Soc., Jour. 37: 446. ♀.

pruni Robertson. Minn. and Ill. to Mass., south to Ga. Pollen: Unknown, but visits flowers of *Aruncus*, *Claytonia*, *Crataegus*, *Dentaria*, *Heracleum*, *Pastinaca*, *Polemonium*, *Prunus*, *Ribes*, *Rubus*, *Salix*, *Staphylea*, *Uvularia*, *Viburnum*, *Zanthoxylum*.
Andrena pruni Robertson, 1891. Amer. Ent. Soc., Trans. 18: 51. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 191, 192. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 117-118, figs. 19-20, table 3 (redescription).

pulverulenta Viereck. Oreg.
Andrena pulverulenta Viereck, 1904. Canad. Ent. 36: 190, 195. ♀, ♂.

regularis Malloch. B. C. to N. S., in eastern U. S. from Minn. to New England States, south to Ga. Pollen: Unknown, but visits flowers of *Aster, Brassica, Pyrus, Rubus, Syringa, Vaccinium.*

Andrena regularis Malloch, 1917. Brooklyn Ent. Soc., Bul. 12: 91. ♂, ♀.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10: 207, 209. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 118-119, figs. 18-19, table 3 (redescription).

sayi Robertson. N. B. to N. C., west to Minn., Ill. and Kansas. Pollen: Unknown, but visits flowers of *Amelanchier, Aronia, Brassica, Cercis, Crataegus, Malus, Padus, Prunus, Pyrus, Rubus, Salix, Stellaria, Taraxacum, Vaccinium.*

Andrena sayi Robertson, 1891. Amer. Ent. Soc., Trans. 18: 52. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 191, 192. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 131-132, fig. 23, table 3 (redescription).

sevierensis Mitchell. Tenn. (Sevier Co.).

Andrena (*?Gymnandrena*) *seviensis*(!) Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 132, fig. 20. ♀.

Andrena (*?Gymnandrena*) *sevierensis* Krombein, 1967. *In* Krombein and Burks, U. S. Dept. Agr., Agr. Monog. 2, Second Suppl. p. 434. Emend.

sola Viereck. B. C. to Calif., Ariz.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Amsinckia intermedia, Arctostaphylos, Baccharis, Brassica, Ceanothus crassifolius, Chaenactis glabriuscula, Clematis lasiantha, Cryptantha intermedia, Encelia farinosa, Eriodictyon, Gallium nuttallii, Gilia, Layia platyglossa, Melilotus, Papaver californica, Plagiobothrys californicus, Platystemon californica, Prunus subcordatus, Quercus, Ranunculus, Rhamnus californica, R. crocea, Rhus diversiloba, R. trilobata, Senecio californicus, Solanum umbelliferum, Tamarix.*

Andrena (*Andrena*) *sola* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 577. ♀.

Andrena carissima Cockerell, 1924. Pan-Pacific Ent. 1: 58. ♀.

Andrena microdonta Cockerell, 1924. Pan-Pacific Ent. 1: 61. ♂.

Andrena ensenadensis Cockerell, 1941. San Diego Soc. Nat. Hist., Trans. 9: 345. ♀.

Taxonomy: Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1081 (synonymy).

transnigra Viereck. B. C. to Calif., Colo. and Wyo. Pollen: Unknown, but visits flowers of *Allium, Brassica, Ceanothus integerrimus, C. parviflorus, Chamaebatia foliolosa, Lappula, Madia ramii, Ranunculus, Ribes, Salix, Taraxacum, Vaccinium, Wyethia.*

Andrena transnigra Viereck, 1904. Canad. Ent. 36: 191. ♀.

Andrena cyanura Cockerell, 1916. Canad. Ent. 48: 252. ♀.

Andrena transnigra paysoni Cockerell, 1924. Ent. News 35: 349. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 18. ♀.

vicina Smith. N. S. to Ga., west to B. C., Colo. and Oreg. Parasite: *Nomada imbricata* Sm., *N. obliterata* Cress., *N. vicina vicina* Sm. Pollen: Unknown, but visits flowers of *Amelanchier, Azalea, Caragana, Castanea, Ilex, Malus, Narcissus, Padus, Prunus, Pyrus, Rhododendron, Rhodura, Rubus, Salix, Scilla, Spiraea, Taraxacum, Trifolium, Tulipa, Vaccinium, Viburnum.*

Andrena vicina Smith, 1853. Cat. Hym. Brit. Mus., v. 1 p. 112. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 151 (type). —Cockerell, 1906. Psyche 13: 9. —Atwood, 1934. Canad. Jour. Res. 10: 207, 210, figs. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705, 708. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 132-134, fig. 23, table 3 (redescription).

Biology: Packard, 1869. Guide Study Ins., p. 144 (nesting habits, parasites). —Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 249 (ecology). —Salt, 1927. Jour. Expt. Zool. 48: 251 (stylopization).

victima Smith. N. S. to Ont. and Conn. Possibly a syn. of *A. vicina* Smith.

Andrena victima Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 113. ♀.

Andrena desponsa Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 114. ♂.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 123, 124. ♀, ♂ (types). —Cockerell, 1906. Psyche 13: 36. ♀ (type). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 134-135 (stylopization and its possible effect on tax. characters).

Genus ANDRENA Subgenus MICRANDRENA Ashmead

Micrandrena Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 89.
Type-species: *Andrena melanochroa* Cockerell. Monotypic and orig. desig. (=*Micrandrena pacifica* Ashmead).
Andrena subg. *Andrenella* Hedicke, 1933. Berlin Zool. Mus., Mitt. 19: 210.
Type-species: *Melitta minutula* Kirby. Orig. desig.

Revision: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 242-333, figs. 1-89, maps 1-10, tables 1-11 (N. Amer. spp.).

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 208 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 301 (tax. characters).

annectens Ribble. Calif. (San Benito Co.). Pollen: Unknown, but visits flowers of *Salix*.
Andrena (*Micrandrena*) *annectens* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 323, figs. 80-84. ♀, ♂.

candidiformis Viereck and Cockerell. B. C. and Wash. to Calif., east to Wyo., Colo. and Ariz. Pollen: Polylectic, visits a wide variety of flowers including *Arctostaphylos patula, A. pungens, Arenaria douglasii, Baccharis, Ceanothus cordulatus, C. cuneatus, C. divaricatus, C. greggii, C. integerrimus, Chamaebatia foliolosa, Crepis, Cryptantha, Eriodictyon californicum, Eriogonum, Heracleum lanatum, Linum lewisii, Lomatium dissectum, L. triternatum, Malus, Montia perfoliata, Nemophila menziesii, Physocarpa intermedia, Prunus subcordata, P. virginiana, Pyrus, Ranunculus californicus, Rhamnus californicus, Ribes nevadense, Salix foliosus, S. laevigata, S. lasiolepis, Solanum umbelliferum, Taraxacum, Thysanocarpus curvipes, Trifolium, Veronica americana, Wyethia.*
Andrena candidiformis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 33. ♂.
Andrena nigritarsis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 53. ♀.
Andrena semotula Cockerell, 1936. Pan-Pacific Ent. 12: 149. ♂.

Taxonomy: Cockerell, 1936. Pan-Pacific Ent. 12: 150. ♂. —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706, 708. ♀, ♂ (key). —Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1060 (synonymy). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 288-293, figs. 49-53, map 4 (redescription, synonymy).

Biology: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 291-292, table 6 (floral relationships, stylopiatiom).

chlorogaster Viereck. B. C. to Calif., east to Idaho, Utah and Ariz. Parasite: *Stylops duboisi* Bohart, *Imparipes* sp. Pollen: Polylectic, visits a wide variety of flowers including *Alyssum maritimum, Amsinckia, Arctostaphylos crustacea, A. glauca, A. mariposa, A. pungens, Baccharis, Brassica, Capsella bursa-pastoris, Ceanothus crassifolius, C. cuneatus, C. greggii, C. oreuttii, C. soredatus, Cercocarpus betuloides, Collinsia heterophylla, Cryptantha, Daucus, Descourainia sophia, Eriodictyon californicum, Geranium molle, Gilia, Lasthenia chrysostoma, Layia glandulosa, Lomatium dasycarpum, L. dissectum, L. triternatum, L. utriculatum, Montia perfoliata, Nemophila menziesii, Phacelia ciliata, P. distans, Prunus subcordata, Ranunculus californicus, R. canus, Rhamnus crocea, Rhus diversiloba, Salix gooddingii, S. lasiolepis, S. leucodendroides, S. nigra, Sambucus, Sanicula bipinnatifida, S. crassicaulis, S. nevadensis, S. tuberosa, Sedum, Sisymbrium irio, Sonchus, Tamarix, Taraxacum officinale, Trifolium pratense.*
Andrena chlorogaster Viereck, 1904. Canad. Ent. 35: 189. ♀.
Andrena subtilicornis Viereck, 1926. Pomona Jour. Ent. Zool. 18: 4. ♂.
Andrena (*Micrandrena*) *nitidicornis* Cockerell, 1936. Pan-Pacific Ent. 12: 144. ♂.
Andrena catalinica Cockerell, 1939. Pomona Jour. Ent. Zool. 31: 25. ♀.
Andrena (*Micrandrena*) *chlorogaster nesiotes* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 394. ♂.

Andrena (*Micrandrena*) *chlorogaster gavilanica* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 394. ♂, ♀.
Andrena (*Micrandrena*) *radialis* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 395. ♂, ♀.

Taxonomy: Timberlake, 1951. U. S. Natl. Mus. Proc. 101: 396 (tax. characters, as *nitidicornis*). —Ribble, 1965. Kans. Ent. Soc., Jour. 38: 87, fig. 1 (anomalous specimen). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 279-288, figs. 41-48, map 2 (redescription, synonymy).

Biology: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 287-288, table 5 (floral relationships, parasites).

illinoiensis Robertson. South. Canada (Man. to Alta.) and Ohio, Mich., west to Wash., Oreg. and south. Calif. (Blythe), south to Tex., N. Mex. and Ariz. Parasite: *Stylops bruneri* Pierce. Pollen: Polylectic, visits a wide variety of flowers including *Amelanchier, Amorpha fruticosa, Anemone, Antennaria plantaginifolia, Capsella, Cardamine, Ceanothus ovatus, Cornus, Crataegus, Descourainia pinnata, Lepidium, Lomatium daucifolium, L. foeniculaceum, Nasturtium, Prunus americana, Pyrus, Rhus aromatica, Ribes missouriense, Rosa, Rubus, Salix amygdaloides, S. babylonica, S. cardata, S. interior, S. nigra, Senecio, Shepherdia argentea, Sisymbrium, Sphaeralcea coccinea, Spiraea thunbergii, Taraxacum officinale, T. vulgare, Thlaspi arvense, Zizia aurea.*
Andrena illinoiensis Robertson, 1891. Amer. Ent. Soc., Trans. 18: 54. ♀, ♂.
Andrena salicinella Cockerell, 1895. Psyche 7 (sup.): 4. ♀.
Andrena placitae Cockerell, 1903. Ent. News 14: 215. ♂.
Andrena vegana Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 17. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190, 192. ♀, ♂ (key). —Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 10. ♀ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706, 708. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 162-163, figs. 29, 31-32, table 4 (redescription). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 299-308, figs. 59-63, map 6 (redescription, synonymy).

Biology: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 306-307, table 8 (floral relationships, stylopization).

ishii Ribble. Calif. Pollen: Unknown, but visits flowers of *Salix*.
Andrena (*Micrandrena*) *ishii* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 319, figs. 70-74, map 8. ♀, ♂.

labergei Ribble. Ariz. (Southwestern Research Station), N. Mex. (Fort Wingate). Pollen: Unknown, but visits flowers of *Salix*.
Andrena (*Micrandrena*) *labergei* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 321, figs. 75-79, map 8. ♀, ♂.

lamelliterga Ribble. Md., Pa., Ind., Tenn., Ill., Kans. Pollen: Unknown, but visits flowers of *Phacelia* including *P. dubia, P. ranunculacea*.
Andrena (*Micrandrena*) *lamelliterga* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 272, figs. 31-35, map 4. ♀, ♂.

lepidii Ribble. South. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Cryptantha, Lasthenia chrysostoma, Lepidium flavum*.
Andrena (*Micrandrena*) *lepidii* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 262, figs. 16-20, map 3. ♀, ♂.

melanochroa Cockerell. N. S. to N. C., west to B. C., Wash., Oreg and Calif. Pollen: Polylectic, apparently with a preference for pollens of *Fragaria* and *Potentilla*, but visits a variety of flowers including *Ceanothus, Cerastium arvense, Cornus drummondi, Fragaria virginiana, Kalmia, Potentilla canadensis, Ranunculus, Rubus, Salix, Taraxacum officinale, Vaccinium, Waldsteinia*.
Andrena melanochroa Cockerell, 1898. Entomologist 31: 89. ♀, ♂.
Micrandrena pacifica Ashmead, 1899. Amer. Ent. Soc., Trans. 43: 54. ♀, ♂.
Andrena fragariana Graenicher, 1904. Ent. News 15: 64. ♀, ♂.
Andrena (*Micrandrena*) *vagans* Cockerell, 1932. Canad. Ent. 64: 157. ♀.

Taxonomy: Cockerell, 1932. Canad. Ent. 64: 157. ♀ (key). —Cockerell, 1932. Canad. Ent. 64: 157, 158. ♀, ♂ (key, as *fragariana*). —Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1071 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 161, figs. 29-32, table 4 (redescription). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 293-299, figs. 54-58, map 5 (redescription, synonymy).

Biology: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 297, table 7 (floral relationshiips, stylopization).

micheneri Ribble. Tex. (Brownsville). Pollen: Unknown, but visits flowers of *Lesquerella*.
Andrena (*Micrandrena*) *micheneri* Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 264, figs. 21-25. ♀, ♂.

microchlora Cockerell. B. C. to Calif., east to N. Dak., Wyo., Colo. and Ariz. Pollen: Polylectic with some preference for the pollens of the Umbelliferae and to a lesser extent those of the Cruciferae, Compositae, Caryophyllaceae and Ranunculaceae; visitation records include *Amsinckia, Arenaria californica, Brassica, Ceanothus cuneatus, Descourainia sophia, Euphorbia albomarginata, Gilia, Helianthus, Lasthenia chrysostoma, Lomatium dissectum, L. utriculatum, Musineon, Nemophila, Plectritis macrocera, Prunus virginiana, Ranunculus californicus, Salix, Sanicula nevadensis, Taraxacum, Tropidocarpum gracile.*
Andrena microchlora Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 265. ♂, ♀.
Andrena microchlora var. *subalia* Cockerell, 1936. Pan-Pacific Ent. 12: 143. ♀.

Taxonomy: Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705, 707. ♀, ♂ (key). —Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 397 (tax. characters and status). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 274-279, figs. 36-40, map 3 (redescription, synonymy).

Biology: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 277, table 4 (floral relationships, stylopization).

neonana Viereck. N. J. to Fla., west to Ark. and Tex. Pollen: Unknown, but visits flowers of *Fragaria virginiana, Ilex, Prunus persica, Pyrus.*
Andrena (*Scrapter*) *neonana* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 400. ♀.

Taxonomy: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 259-262, figs. 11-15, map 3 (redescription).

nigrae Robertson. Conn. to north. Fla., west to Alta., Wash., Idaho, Utah and Tex. Pollen: Apparently polylectic, although majority of collections have been made at the flowers of *Salix;* visitation records include *Alnus, Anemone virginiana, Antennaria plantaginifolia, Arabis laevigata, Barbarea, Capsella, Cotoneaster, Crataegus, Cymopterus acaulis, Descourainia pinnata, Erigenia bulbosa, Lomatium daucifolium, L. dissectum, Prunus americana, P. angustifolia, P. serotina, P. virginiana, Pyrus, Rhus aromatica, Ribes, Rubus, Salix amygdaloides, S. babylonica, S. cordata, S. humilis, S. interior, S. nigra, S. sericea, Sassafras albidum, Sphaeralcea coccinea, Spiraea, Taraxacum, Thlaspi arvense, Viburnum, Zizia aurea.*
Andrena illinoensis var. *bicolor* Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 46. ♀. Preocc.
Andrena nigrae Robertson, 1905. Canad. Ent. 37: 237. N. name.
Andrena salicinellina Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 17. ♂.
Andrena (*Andrena*) *abacta* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 365. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 165. ♀. —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 313-319, fig. 69, map 8 (redescription, synonymy).

Biology: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 317, table 10 (floral relationships, stylopization).

personata Robertson. Pa. to Ga., west to Nebr., Kans., Okla. and Tex. Pollen: Polylectic, visits a wide variety of flowers, especially those of the Rosaceae, Salicaceae, Umbelliferae, and Hydrophyllaceae in that order; visitation records include *Alliaria officinalis, Apocynum cannabinum, Arenaria patula, Aruncus, Claytonia virginica, Cornus, Crataegus crus-galli, C. mollis, Ellisia nyctelea, Erigeron, Euphorbia commutata, Fragaria, Geranium carolinianum, Lesquerella, Osmorhiza longistylus, Oxalis violacea,*

Pastinaca sativa, Perideridea americana, Phacelia dubia, P. ranunculacea, P. purshii, Potentilla canadensis, Prunus, Ranunculus abortivus, R. septentrionalis, Rubus flagellaris, Salix nigra, Sanicula marilandica, Sisymbrium, Spiraea, Taenidia integerrima, Thaspium barbinode, T. trifoliatum, Viburnum molle.

Andrena personata Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 336. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193. ♀, ♂ (key). —Cockerell, 1932. Canad. Ent. 64: 157, 158. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 165-167, figs. 28, 31-33, table 4 (redescription). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 254-259, figs. 6-10, map 2 (redescription).

Biology: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 257-258, table 2 (floral relationships, stylopization).

piperi Viereck. B. C. to Calif., east to Idaho, Colo. and Ariz. (Tucson); Mexico (Baja California). Pollen: Polylectic, visits a wide variety of flowers, especially those of the Cruciferae; visitation records include *Agoseris auriantiaca, Alyssum, Amsinckia, Barbarea orthoceras, Brassica alba, B. campestris, B. nigra, Capsella bursa-pastoris, Cardaria draba, C. pubescens, Ceanothus, Cirsium, Cryptantha intermedia, C. muricata, Descurainia pinnata, D. sophia, Erysimum repandum, Lasthenia chrysostoma, Lepidium, Lobularia maritima, Lomatium dissectum, Lupinus, Medicago sativa, Penstemon, Phacelia fremontii, Platystemon californicus, Polygonum, Prunus subcordata, Ranunculus californicus, Raphanus sativus, Ribes, Rubus, Salix lasiolepis, Salsola kali, Sisymbrium altissimum, S. irio, S. pinnatum, Stellaria media, Tamarix, Taraxacum officinale, Thlaspi arvense, Tropidocarpum gracile.*

Andrena piperi Viereck, 1904. Canad. Ent. 35: 189. ♀.

Taxonomy: Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 392. ♂. —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 248-254, figs. 1-5, map 1 (redescription).

Biology: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 252-254, table 1 (floral relationships, stylopization),

salictaria Robertson. Transcont. south. Canada (N. S. to B. C.) and Maine to N. C. west to Wash., Utah, Colo. and N. Mex. Parasite: *Stylops bruneri* Pierce. Pollen: Apparently narrowly polylectic, chiefly *Salix* including *S. bebbiana, S. cordata, S. humilis*, but visits other flowers including *Amelanchier, Antennaria, Barbarea, Chamaedaphne, Claytonia, Cotoneaster, Crataegus, Lomatium, Prunus americana, Rhus, Sassafras, Viburnum opulus.*

Andrena salictaria Robertson, 1905. Canad. Ent. 37: 236. ♀, ♂.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10: 207, 210. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705, 706, 708. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 167-168, figs. 30-32, table 4 (redescription). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 309-313, figs. 64-68, map 7 (redescription).

Biology: Salt, 1927. Jour. Expt. Zool. 48: 252 (stylopization).

Taxonomy: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 311-312, table 9 (stylopization, floral relationships).

ziziae Robertson. New England to Ga., west to Man., N. Dak., S. Dak., Nebr., Kans. and N. Mex. Parasite: *Imparipes* sp. Pollen: Polylectic although nearly all floral records are from *Zizia* including *Z. aptera, Z. aurea*, but visits other flowers including *Amorpha fruticosa, Aruncus dioicus, Barbarea vulgaris, Ceanothus ovatus, Echinacea angustifolia, Hieracium, Pastinaca sativa, Polytaenia nuttallii, Rudbeckia amplexicaulis, Sanicula marilandica, Taenidia integerrima, Thaspium barbinode, T. trifoliatum.*

Andrena ziziae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 55. ♀, ♂.

Andrena (*Micrandrena*) *vernalis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 168, fig. 29. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193. ♀, ♂ (key). —Cockerell, 1932. Canad. Ent. 64: 157, 158. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141:

168-169, figs. 31-32, table 4 (redescription). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 267-271, figs. 26-30, map 1 (redescription, synonymy).

Biology: Ribble, 1968. Nebr. State Mus., Bul. 8: 270, table 3 (floral relationships, parasite).

Genus ANDRENA Subgenus NEMANDRENA LaBerge

Andrena subg. *Nemandrena* LaBerge, 1971. Pan-Pacific Ent. 47: 48.
Type-species: *Andrena torulosa* LaBerge. Orig. desig.

Revision: LaBerge, 1971. Pan-Pacific Ent. 47: 47-57, 15 figs. (N. Amer. spp.).

Biology: Cruden, 1972. Evolution 26: 373-389, 8 figs., 9 tables (floral relationships). —Cruden, 1972. Madrono 21: 505-515, 2 tables (floral relationships).

crudeni LaBerge. Calif. Pollen: Apparently oligolectic on flowers of *Nemophila* including *N. maculata, N. menziesii menziesii.*
Andrena (*Nemandrena*) *crudeni* LaBerge, 1971. Pan-Pacific Ent. 47: 54, figs. 6-10. ♀, ♂.

subnigripes Viereck. Calif. Pollen: Collects pollen from flowers of *Nemophila menziesii menziesii.*
Andrena (*Andrena*) *subnigripes* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 581. ♀.

torulosa LaBerge. Oreg., Calif. Pollen: Apparently oligolectic on flowers of *Nemophila* including *N. menziesii atomeria, N. m. liniflora, N. m. menziesii,* but visits other flowers presumably for nectar including *Arctostaphylos, Limnanthes douglasii, Platystemon californica.*
Andrena (*Nemandrena*) *torulosa* LaBerge, 1971. Pan-Pacific Ent. 47: 49, figs. 1-5. ♀, ♂.

Genus ANDRENA Subgenus OLIGANDRENA Lanham

Andrena subg. *Oligandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 207.
Type-species: *Andrena macrocephala* Cockerell. Orig. desig.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 284, 290, 301 (tax. characters).

angelesia Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Cryptantha intermedia, Encelia farinosa, Platystemon californicus.*
Andrena (*Oligandrena*) *angelesia* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 404. ♀, ♂.

anisochlora Cockerell. Oreg., Calif. Pollen: Unknown, but visits flowers of *Amsinckia douglasiana, Claytonia spathulata, Lasthenia, Montia perfoliata, Nemophila heterophylla.*
Andrena anisochlora Cockerell, 1936. Pan-Pacific Ent. 12: 137. ♀.
Andrena (*Micrandrena*) *dinognatha* Timberlake, 1938. Pan-Pacific Ent. 14: 26. ♂.

Taxonomy: Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1056 (synonymy).

macrocephala macrocephala Cockerell. Calif. (lowlands); Mexico (Baja California). Parasite: *Stylops timberlakei* Bohart. Pollen: Collects pollen from flowers of *Nemophila* including *N. menziesii, N. integrifolia* as well as *Pholistoma auritum,* but visits other flowers presumably for nectar including *Calandrinia ciliata, Cryptantha intermedia, Eriogonum fasciculatum, Erodium, Gilia, Orthocarpus densiflorus, Phacelia distans, Ranunculus, Rhus trilobata, Sisymbrium irio.*
Andrena macrocephala Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 278. ♂.
Andrena peratra Cockerell, 1916. Pomona Jour. Ent. Zool. 7: 46. ♀.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 281. ♀, ♂ (synonymy, floral relationships, parasite).

Biology: Cruden, 1972. Evolution 26: 378-380, fig. 7, tables 3, 4 (floral relationships). —Cruden, 1972. Madrono 21: 505-515, 1 fig. 2 tables (floral relationships).

macrocephala tetleyi Linsley. South. Calif. (montane). Pollen: Collects pollen from flowers of *Nemophila integrifolia.*
Andrena macrocephala tetleyi Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 282. ♀.

Biology: Cruden, 1972. Evolution 26: 379 (floral relationships). —Cruden, 1972. Madrono 21: 511 (floral relationships).

nigroclypeata Linsley. Calif. Pollen: Unknown, but visits flowers of *Lasthenia, Layia platyglossa, Marah, Phacelia alba, Platystemon californicus, Pholistoma racemosa, Raphanus sativa, Tamarix.*

Andrena nigroclypeata Linsley, 1939. Pan-Pacific Ent. 15: 155. ♀, ♂.

Genus ANDRENA Subgenus ONAGRANDRENA Linsley and MacSwain

Andrena subg. *Onagrandrena* Linsley and MacSwain, 1956. Pan-Pacific Ent. 32: 111. Type-species: *Andrena oenotherae* Timberlake. Orig. desig.

The species of this subgenus are chiefly dependent upon the pollen and nectar of several genera within the family Onagraceae, especially *Camissonia, Clarkia,* and *Oenothera.* These bees are largely or entirely dark or black in coloration and their behavior is usually closely synchronous with the diurnal flowering regimes of their host plants. Thus some of these bees are matinal species while others are active at the flowers only in the late afternoon and early evening and still others are active at the flowers both in the early morning and again in the late afternoon and early evening hours.

Taxonomy: Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 163-172 (as *Melandrena*). —Linsley and MacSwain, 1956. Pan-Pacific Ent. 32-111-114 (tax. characters, included spp.). —Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 117-130 (*Oenothera* and *Clarkia* visiting spp.). —Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 49-52 (new spp. from Calif., Nev., Wyo.). —Linsley and MacSwain, 1963. Pan-Pacific Ent. 39: 189-198 (*oenotherae* complex). —Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 5-6 (key to Colorado Desert spp.). —Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 31 (key to Great Basin spp.). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 64-65 (key to Mojave Desert spp.). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 284, 287, 290, 292, 315 (tax. characters). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27 (key to cismontane Calif. and Baja California spp.).

Biology: Linsley, MacSwain and Smith, 1955. Pan-Pacific Ent. 31: 173-185 (nesting habits, flower relationships). —Linsley and MacSwain, 1956. Pan-Pacific Ent. 32: 114-121 (nesting habits, floral relationships). —Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 1-58, 6 plates, 6 text figs., 19 tables (comparative behavior of *Oenothera* visiting spp. on the Colorado Desert and Great Basin). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 59-98, 3 plates, 17 tables (comparative behavior of *Oenothera* visiting spp. on the Mojave Desert). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 1-80, 3 plates, 10 text figs., 18 tables (comparative behavior of *Clarkia* visiting spp. in western U. S.). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 1-68, 6 plates, 15 text figs., 10 tables (comparative behavior of *Camissonia* and *Oenothera* visiting spp. in cismontane Calif. and Baja California).

anograe anograe Cockerell. Calif., Colo. Wyo. Pollen: Collects pollen from *Oenothera caespitosa,* but visits other onagraceous flowers including *Anogra, Oenothera albicaulis, O. caespitosa* var. *montana,* and may collect pollen from these as well as the large white flowered evening primroses of the subgenus *Pachylophis.*

Andrena anograe Cockerell, 1901. Canad. Ent. 33: 154. ♀.

Andrena micranthophila Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 432. ♀, ♂.

Taxonomy: Cockerell, 1934. Amer. Mus. Novitates 697: 2 (tax. characters). —Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 166 (synonymy, geogr. records). —Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 126 (changed status). —Linsley, MacSwain, and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 31 (tax. characters).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 39 (floral relationships).

anograe knowltoni Linsley and MacSwain. Utah. Pollen: Unknown, but visits flowers of *Camissonia scapoidea scapoidea, Stanleya pinnata.*

Andrena (*Onagrandrena*) *anograe knowltoni* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 126. ♀.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 39 (floral relationships).

bernardina Linsley. Calif. (San Bernardino Mts.). Pollen: Possibly oligolectic on *Clarkia*, but visits other flowers for nectar including *Potentilla glandulosa*.
Andrena bernardina Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 275. ♀, ♂.

Taxonomy: Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 166 (tax. status). —Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 128 (tax. status).

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 16, fig. 2, table 6 (floral relationships).

blaisdelli Cockerell. South. Calif. Pollen: Principal source of pollen is *Camissonia campestris*, but also collects pollen from *C. bistorta, C. californica, C. contorta;* visits these and other flowers for nectar including *Cryptantha intermedia, Eriophyllum confertiflorum*.
Andrena blaisdelli Cockerell, 1924. Pan-Pacific Ent. 1: 59. ♀.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 266, 267. ♀, ♂ (key). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27 (key).

Biology: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27-29, fig. 12 (floral relationships).

boronensis Linsley and MacSwain. Calif. (Mojave Desert). Parasite: *Stylops* sp. Pollen: Collects pollen almost exclusively from the flowers of *Camissonia campestris*, but has been observed collecting pollen from the flowers of *C. clavaeformis* and *C. kernensis;* nectar requirements are chiefly satisfied at the flowers of *C. campestris*, but other flowers are visited for nectar including *Baccharis viminea, Camissonia bistorta, Cryptantha intermedia, Encelia farinosa, Eriophyllum confertiflorum, Layia glandulosa, Potentilla, Salix lasiolepis*.
Andrena (*Onagrandrena*) *boronensis* Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 49. ♀, ♂.

Taxonomy: Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 64, 65, 69 (key, identity).

Biology: Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 69-71, tables 3-4, 7-15 (nest architecture, male behavior, floral relationships, parasite).

camissoniae Linsley and MacSwain. Calif. (Santa Barbara County). Pollen: Apparently obtains pollen from the flowers of *Camissonia campestris*.
Andrena (*Onagrandrena*) *camissoniae* Linsley and MacSwain, 1968. Pan-Pacific Ent. 44: 144. ♀.

Taxonomy: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27, 29 (key, tax. characters).

Biology: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 29 (floral relationship).

chylismiae Linsley and MacSwain. Calif. (Owens Valley), Nev. Parasite: *Nomada* sp., *Stylops* sp. Pollen: Collects pollen from the flowers of *Camissonia clavaeformis cruciformis* and *C. c. integrior*, but visits these and other flowers for nectar including *Haplopappus acaulis, Sisymbrium altissimum, Stanleya pinnata, Taraxacum officinale*.
Andrena (*Onagrandrena*) *chylismiae* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 121. ♀, ♂.

Taxonomy: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 31 (key).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 37-38, fig. 6, tables 16, 17, 19 (floral relationships, parasites).

convallaria convallaria Linsley and MacSwain. Calif. (Central Valley and south. cent. Coast Ranges). Pollen: Collects pollen principally from the flowers of *Camissonia campestris* although occasionally obtains pollen from the flowers of *C. californica, C. cheiranthifolia, C. c. obispoensis, C. contorta, C. sierrae;* visits these and other flowers

for nectar including *Brassica, Camissonia micrantha, Encelia actoni, Isomeris arborea, Lasthenia, Lupinus, Malacothrix.*

Andrena (Onagrandrena) convallaria convallaria Linsley and MacSwain, 1963. Pan-Pacific Ent. 39: 193. ♀, ♂.

Taxonomy: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27 (key).

Biology: Linsley, MacSwain, Raven and Thorp, 1973. Univ. Calif. Pubs. Ent. 71: 29-31, fig. 13, tables 1, 3-8 (floral relationships).

convallaria subhyalina Linsley and MacSwain. Calif. (west. margin Mojave Desert). Parasite: *Stylops* sp. Pollen: Collects pollen almost exclusively from the flowers of *Camissonia campestris* although occasionally obtains pollen from the flowers of *C. abramsii;* visits these and other flowers for nectar including *Aniscoma acaulis, Camissonia clavaeformis clavaeformis, Coreopsis bigelovii, C. californica, Layia californica.*

Andrena (Onagrandrena) convallaria subhyalina Linsley and MacSwain, 1963. Pan-Pacific Ent. 39: 193. ♀, ♂.

Biology: Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 71-72, tables 3, 11-12, 14 (mating, floral relationships, parasite).

deserticola Timberlake. Calif. (Mojave Desert). Parasite: *Nomada* sp., *Stylops* sp. Pollen: Collects pollen almost exclusively from the flowers of *Camissonia campestris* although on one occasion collected pollen from the flowers of *C. kernensis;* visits these and other flowers for nectar including *Baileya multiradiata, Camissonia abramsii, C. clavaeformis, C. boothii decorticans, Coreopsis bigelovii, C. californica, Isomeris arborea.*

Andrena deserticola Timberlake, 1937. Pan-Pacific Ent. 12: 173. ♀.

Taxonomy: Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 172 (geogr. and floral records). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 64, 65 (key). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27 (key).

Biology: Linsley, MacSwain and Smith, 1955. Pan-Pacific Ent. 31: 182-183 (nest architecture, parasites). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 68-69, tables 3-4, 7-11, 15 (nest architecture, floral relationships, male behavior, parasite). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 31, table 1 (floral relationships).

flandersi Timberlake. South. Calif (Mojave Desert). Pollen: Collects pollen from the flowers of *Camissonia campestris, C. clavaeformis, C. contorta, C. kernensis,* but visits these and other flowers for nectar including *Chaenactis, Coreopsis bigelovii, C. californica, Cryptantha, Ericameria, Lasthenia chrysostoma, Layia glandulosa.*

Andrena flandersi Timberlake, 1937. Pan-Pacific Ent. 12: 72. ♀.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 266, 278. ♀ (key). —Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 167 (geogr. and floral records). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 64, 65 (key).

Biology: Linsley and MacSwain, 1956. Pan-Pacific Ent. 32: 118-120 (nest site, floral relationships). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 72, tables 3, 7, 11-15 (floral relationships).

furva Linsley and MacSwain. South. Calif.; Mexico (Baja California). Pollen: Principally gathers pollen from *Camissonia campestris* although it has been observed gathering pollen from *Clarkia cylindrica* and occasionally with mixed pollen loads of *Camissonia* and *Clarkia.*

Andrena (Onagrandrena) furva Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 117. ♀.

Taxonomy: Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 64, 73 (key, geogr. records). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27 (key).

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 46 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 32-33, fig. 15 (floral relationships).

linsleyi Timberlake. South. Calif., southeast. Nev.; Mexico (Baja California). Parasite: *Nomada* sp., *Stylops* sp. Pollen: Usually collects pollen from *Oenothera deltoides*, but occasionally takes pollen from *Camissonia clavaeformis* including *C. c. aurantiaca C. c. clavaeformis* and also occasionally from *C. decorticans desertorum, Oenothera trichocalyx;* visits these and other flowers for nectar including *Baileya, Dithyrea californica, Encelia, Geraea canescens, Hyptis emoryi.*
Andrena linsleyi Timberlake, 1937. Pan-Pacific Ent. 12: 71. ♀.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 266. ♀ (key). —Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 165, 166, 170-171 (key, geogr. and floral records). —Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 6 (key).

Biology: Linsley, MacSwain and Smith, 1955. Pan-Pacific Ent. 31: 176 (floral relationships). —Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 11-16, fig. 2, tables 1, 3, 7-12 (floral relationships, parasites). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 3: 73 (floral relationships).

mojavensis Linsley and MacSwain. Calif. (Jawbone and Short Canyons, Kern County). Pollen: Principal pollen source is *Camissonia kernensis*, but also takes pollen from *C. campestris, C. clavaeformis, C. dentata johnstonii, C. d. parishii;* visits these and other flowers for nectar including *Coreopsis bigelovii, Dithyrea californica, Salix.*
Andrena (*Melandrena*) *mojavensis* Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 171. ♀, ♂.

Taxonomy: Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 165 (key). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 64, 65 (key).

Biology: Linsley, MacSwain and Smith, 1955. Pan-Pacific Ent. 31: 179-181 (nest architecture, floral relationships). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 65-67, tables 5-10 (nest architecture, floral relationships, male behavior).

nevadae Linsley and MacSwain. Nev. (Eureka and White Pine Counties). Pollen: Unknown, presumably collects pollen from the flowers of the subgenera *Anogra* or *Pachylophis;* visits flowers of *Camissonia clavaeformis* and *Stanleya pinnata* for nectar.
Andrena (*Onagrandrena*) *nevadae* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 125. ♀.

Taxonomy: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 31 (key).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 39 (floral relationships).

oenotherae Timberlake. Calif. (Coastal Santa Barbara Co. east to Colorado Desert); Mexico (Baja California). Parasite: *Lytta stygica* (LeC.)?, *Meloe* sp.?, *Stylops* sp. Pollen: Principally collects pollen from the flowers of *Camissonia cheiranthifolia cheiranthifolia* on Santa Cruz Island, and *C. c. suffruticosa* along the mainland coast while more interior populations collect from *C. bistorta;* visits these and other flowers for nectar including *Cakile edentula, Calandrinia, Chaenactis, Chrysanthemum coronarium, Coreopsis californica, Croton californicus, Cryptantha intermedia, Eriogonum fasciculatum, Haplopappus cooperi, Hemizonia kelloggii, Lantana, Layia platyglossa, Lupinus, Salix lasiolepis, Sisymbrium.*
Andrena oenotherae Timberlake, 1937. Pan-Pacific Ent. 12: 69. ♀, ♂.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 266, 267. ♀, ♂ (key). —Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 164, 166, 170 (key, geog. and floral records). —Linsley and MacSwain, 1963. Pan-Pacific Ent. 39: 189-190. —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27 (key).

Biology: Linsley, MacSwain and Smith, 1955. Pan-Pacific Ent. 31: 181-182 (nest architecture, floral relationships, parasites). —Linsley and MacSwain, 1956. Pan-Pacific Ent. 32: 116-118, 1 fig. (nest architecture, floral relationships, parasite). —Linsley and MacSwain, 1963. Pan-Pacific Ent. 39: 189-190 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 33-34, fig. 14, table 9 (floral relationships).

omninigra clarkiae Linsley and MacSwain. Calif. (Monterey and San Luis Obispo Counties). Pollen: Collects pollen from the flowers of *Clarkia cylindrica, C. speciosa.*
Andrena (*Onagrandrena*) *omninigra clarkiae* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 127. ♀, ♂.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 15-16, fig. 1, tables 7-11 (floral relationships, mating behavior).

omninigra omninigra Viereck. Calif. (west. slopes of Sierra Nevada Mts.). Pollen: Collects pollen from the flowers of *Clarkia* including *C. biloba, C. cylindrica, C. dudleyana, C. purpurea quadrivulnera, C. rhomboidea, C. speciosa polyantha, C. unguiculata, C. xantiana;* visits these and other flowers for nectar including *Cryptantha flaccida, Gilia capitata.* Predator: *Callinicus calcaneus* (Loew).
Andrena (*Andrena*) *omninigra* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 385. ♀.
Andrena grundeli Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 274. ♀, ♂.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 265. ♀ (key). —Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 164, 165, 166 (key, geogr. records). —Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 27 (type).

Biology: Linsley, 1972. Pan-Pacific Ent. 48: 94-96 (predator). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 14, fig. 1, tables 1, 6-9, 13-18 (floral relationships).

oraria actitis Linsley and MacSwain. Calif. (San Francisco). Pollen: Collects pollen from the flowers of *Camissonia cheiranthifolia cheiranthifolia.*
Andrena (*Onagrandrena*) *oraria actitis* Linsley and MacSwain, 1963. Pan-Pacific Ent. 39: 196. ♀, ♂.

Biology: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 35, fig. 15 (floral relationship).

oraria oraria Linsley and MacSwain. Calif. (Marin and Sonoma Counties). Pollen: Collects pollen from the flowers of *Camissonia* including *C. cheiranthifolia cheiranthifolia, C. ovata.*
Andrena (*Onagrandrena*) *oraria oraria* Linsley and MacSwain, 1963. Pan-Pacific Ent. 39: 196. ♀, ♂.

Biology: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 35, fig. 15 (floral relationships).

raveni Linsley and MacSwain. Oreg., Calif., Nev., Utah. Parasite: *Nomada* sp., *Stylops* sp. Pollen: Collects pollen from the flowers of *Camissonia clavaeformis clavaeformis, C. c. integrior, C. tanacetifolia, Oenothera deltoides piperi,* but visits these and other flowers for nectar including *Agoseris, Madia, Stanleya pinnata, Taraxacum officinale.*
Andrena (*Onagrandrena*) *raveni* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 118. ♀, ♂.

Taxonomy: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 31 (key).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 31-36, fig. 4, tables 14-19 (nest architecture, floral relationships, parasites).

rozeni Linsley and MacSwain. Ariz., south. Calif., Nev.; Mexico (Baja California), deserts. Parasite: *Nomada* sp., *Stylops* sp. Pollen: Collects pollen from the flowers of *Camissonia* including *C. clavaeformis aurantiaca, C. c. clavaeformis, C. c. integrior, C. c. peirsonii, C. decorticans, C. latifolia, C. tanacetifolia, C. trichocalyx* and *Oenothera deltoides piperi;* visits these and other flowers for nectar including *Agoseris glauca, Brassica, Cryptantha clevelandii, C. intermedia, Encelia farinosa, Geraea canescens, Madia ramii, Mirabilis, Sisymbrium altissimum, Stanleya pinnata, Taraxacum officinale.*
Andrena (*Melandrena*) *rozeni* Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 168. ♀, ♂.

Taxonomy: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 5, 31 (key). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 64, 65 (key).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 6-11, 36-37, figs. 1, 5, tables 1-6, 17-18 (nest architecture, floral relationships, male behavior, parasites).

—Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 72-73, table 16 (floral relationships).

rubrotincta Linsley. South. Calif., northwest. Ariz., south. Nev., southwest. Utah. Pollen: Collects pollen regularly only from *Camissonia brevipes pallidula* and *C. parryi*, although females have been taken at flowers of *C. brevipes brevipes* and *C. clavaeformis aurantiaca* with pollen in their scopae.
Andrena rubrotincta Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 278. ♀.

Taxonomy: Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 165, 170 (key, geogr. records). —Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 5, 6 (key).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 16-18, fig. 3, table 13 (floral relationships).

stagei Linsley and MacSwain. Wyo. (Sweetwater Co.). Pollen: Collects pollen from the flowers of *Oenothera trichocalyx*.
Andrena (*Onagrandrena*) *stagei* Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 52. ♀.

Taxonomy: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 31 (key).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 38 (floral relationships).

thorpi Linsley and MacSwain. Nev. (Humboldt Co.). Parasite: *Stylops* sp. Pollen: Collects pollen from the flowers of *Oenothera deltoides piperi*.
Andrena (*Onagrandrena*) *thorpi* Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 51. ♀.

Taxonomy: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 31 (key).

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 38-39, table 15 (floral relationships, parasite).

vanduzeei Linsley. Calif. Pollen: Possibly an oligolege of *Gayophytum*.
Andrena vanduzeei Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 280. ♀, ♂.

Taxonomy: Linsley and MacSwain, 1955. Pan-Pacific Ent. 31: 165, 166, 172 (key, geogr. records).

vespertina Linsley and MacSwain. Calif. (Kern and Stanislaus Counties). Pollen: Collects pollen only from the flowers of *Camissonia boothii decorticans;* visits flowers of *Isomeris arborea* for nectar.
Andrena (*Onagrandrena*) *vespertina* Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 123. ♀, ♂.

Taxonomy: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 27 (key).

Biology: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 35-36, fig. 15, table 10 (floral relationships).

yumorum Viereck. South. Calif.
Andrena (*Andrena*) *yumorum* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 585. ♂.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 128-129 (type).

Genus ANDRENA Subgenus OPANDRENA Robertson

Opandrena Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193.
Type-species: *Andrena cressonii* Robertson. Orig. desig.

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 210 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 284, 289, 303 (tax. characters).

cressonii cressonii Robertson. U. S. and southern Canada. Pollen: Apparently polylectic, visits a wide variety of flowers including *Amelanchier, Anemonella, Arabis, Aronia, Aruncus, Brassica, Capsella, Ceanothus, Celastrus, Claytonia, Cornus, Crataegus, Dentaria, Fragaria, Heracleum, Ilex, Oxalis, Pastinaca, Philadelphus, Polytaenia, Potentilla, Prunus, Ptelea, Pyracantha, Radicula, Ranunculus, Rhamnus, Rhus, Rosa, Rubus, Salix, Sanicula, Sisymbrium, Smilacina, Smilax, Stellaria, Taenidia, Taraxacum, Thaspium, Tradescantia, Trifolium, Veronica, Viburnum, Zanthoxylum, Zizia.*
Andrena Cressonii Robertson, 1891. Amer. Ent. Soc., Trans. 18: 56. ♀, ♂.

Andrena kansensis Cockerell, 1899. Ent. News 10: 255. ♂.
Andrena bridwelli Cockerell, 1899. Ent. News 10: 255. ♂.
Andrena dubia Robertson, 1902. Canad. Ent. 34: 48. ♂.
Andrena (*Trachandrena*) *trumani* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 12. ♀.
Andrena latisigna Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 22. ♂.
Andrena cressoni transformans Cockerell, 1934. Pan-Pacific Ent. 9: 157. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193. ♀, ♂ (key). —Lanham, 1949. Pan-Pacific Ent. 25: 147 (tax status). —Timberlake and Lanham, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1063 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 248-249, figs. 50, 52-54 (redescription).

cressonii infasciata Lanham. Calif., Oreg., Wash. Pollen: Presumably gathers pollen from *Gilia*, but visits other flowers for nectar including *Brassica campestris*, *Ranunculus californicus*, *Pyracantha*, *Salix lasiolepis*, *S. nigra*.
Andrena cressonii infasciata Lanham, 1949. Pan-Pacific Ent. 25: 147. ♀, ♂.

Biology: Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 19 (floral relationships).

cressonii ivanensis Mitchell. Va., N. C. Pollen: Unknown, but visits flowers of *Brassica*, *Padus*.
Andrena (*Opandrena*) *cressonii ivanensis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 249, fig. 52. ♂.

cressonii tallahasseensis Mitchell. Fla., N. C. Pollen: Unknown, but visits flowers of *Castanea pumila*.
Andrena (*Opandrena*) *cressonii tallahasensis(!)* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 249, figs. 50, 53. ♂.
Andrena (*Opandrena*) *cressonii tallahasseensis* Mitchell, 1967. *In* Krombein and Burks, U. S. Dept. Agr., Agr. Monog. 2, Second Suppl., p. 428. Emend.

prunifloris Cockerell. N. Mex. Pollen: Unknown, but visits flowers of *Prunus*.
Andrena prunifloris Cockerell, 1898. Canad. Ent. 30: 147. ♀.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 49. ♀. (key).

Genus ANDRENA Subgenus PARANDRENA Robertson

Parandrena Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 337.
Type-species: *Panurgus andrenoides* Cresson. Desig. by Cockerell, 1897.

The species of this Nearctic subgenus are apparently oligoleges of *Salix*.

Revision: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 307-346, figs. 5-9, 41-70 (N. Amer. spp.).

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 202 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 298 (tax. characters).

andrenoides (Cresson). South. Canada (B. C., Sask., Man. and Ont.), south to Fla., Tex., N. Mex. and Utah. Pollen: Oligelege of *Salix* including *S. amygdaloides*, *S. cordata*, *S. interior*, *S. nigra*, but visits these and other flowers for nectar including *Amelanchier canadensis*, *Anemone patens*, *Antennaria plantaginifolia*, *Crataegus crus-galli*, *Erigenia bulbosa*, *Heracleum maximum*, *Lomatium foeniculaceum*, *Prunus americana*, *P. angustifolia*, *P. gracilis*, *Pyrus*, *Rubus*, *Sassafras variifolium*, *Sisymbrium*, *Stellaria media*, *Viola*.
Panurgus andrenoides Cresson, 1878. Amer. Ent. Soc., Trans. 7: 62. ♂.
Panurgus rufocinctus Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 4. ♀.
Andrena andrenoides f. *bicolor* Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 47. Preocc.
Parandrena andrenoides var. *clarigastra* Viereck, 1908. Ent. News 19: 42. N. name.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 238-239, figs. 49-50, 52, 55, table 6 (redescription).

Biology: Salt, 1927. Jour. Exp. Zool. 48: 250 (stylopization).

arenicola LaBerge and Ribble. Kans., Okla., Tex. Pollen: Apparently an oligolege of *Salix* including *S. amygdaloides, S. longifolia, S. nigra,* but visits other flowers including *Pyrus pyrus.*
Andrena (*Parandrena*) *arenicola* LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 328, figs. 7, 53-54. ♀, ♂.

Biology: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 330 (stylopization).

bucculenta LaBerge and Ribble. Calif. Pollen: Presumably an oligolege of *Salix,* but visits other flowers including *Eschscholzia californica, Layia platyglossa, Prunus.*
Andrena (*Parandrena*) *bucculenta* LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 334, figs. 6, 60-61. ♀, ♂.

concinnula (Cockerell). Oreg., Calif., Ariz. (Chiricahua Mts.). Pollen: Oligolege of *Salix* including *S. argophylla, S. cordata, S. exigua, S. gooddingii, S. hindsiana, S. laevigata, S. lasiolepis,* but visits other flowers presumably for nectar including *Amsinckia douglasiana, Capsella bursa-pastoris, Eschscholzia californica, Gilia, Sambucus, Spiraea prunifolia, Tamarix gallica.*
Parandrena concinnula Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 189. ♂.
Andrena (*Parandrena*) *mendosa* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 588. ♀.

Taxonomy: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 331-334, figs. 8, 55-59 (redescription, synonymy).

gibberis Viereck. B. C. (Fairview), Oreg. (Irrigon), Calif. (Lassen and Mono Counties), Nev. (Elko), Utah (Cedar City). Pollen: Presumably an oligolege of *Salix.*
Andrena (*Parandrena*) *gibberis* Viereck, 1924. Canad. Ent. 56: 241. ♀, ♂.

nevadensis (Cresson). B. C. to Calif., Nev. and Utah. Pollen: Presumably an oligolege of *Salix,* but visits other flowers including *Acer, Ribes, Senecio, Tamarix.*
Panurgus nevadensis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 214. ♂.
Andrena (*Parandrena*) *garretti* Viereck, 1924. Canad. Ent. 53: 243. ♂.
Andrena (*Parandrena*) *triangularis* Viereck, 1924. Canad. Ent. 55: 243. ♀.

Taxonomy: Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 188. ♂. —LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 341-344, figs. 7, 67-68 (redescription, synonymy).

nida Mitchell. Vt. to Ga., west to Mich., Ill., Mo. and Miss. Pollen: Presumably an oligolege of *Salix* including *S. interior,* but visits other flowers including *Amelanchier, Crataegus, Prunus, Rubus, Viola.*
Andrena (*Parandrena*) *nida* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 240, figs. 49, 50, 52, 55. ♀, ♂.

Taxonomy: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 321-324, fig. 7, 46-47 (redescription).

papagorum Viereck and Cockerell. Ariz., south. Calif., Utah. Pollen: Presumably an oligolege of *Salix,* visits flowers of *S. gooddingii, S. nigra.*
Andrena papagorum Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 2. ♀.

Taxonomy: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 338-341, figs. 9, 62-66 (redescription).

wellesleyana Robertson. Mass. and Conn., west to N. W. T., Alta., and Utah. Pollen: Unknown, but visits flowers of *Prunus virginiana, Salix.*
Andrena wellesleyana Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 337. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 241-242, figs. 50, 52, 55, table 6 (redescription). —LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 325-328, figs. 8, 42-52 (redescription).

Genus ANDRENA Subgenus PELICANDRENA LaBerge and Ribble

Andrena subg. *Pelicandrena* LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 346.
Type-species: *Parandrena atypica* Cockerell. Monotypic and orig. desig.

Revision: LaBerge and Ribble, 1972. Amer. Ent. Soc., Trans. 98: 346-351, figs. 71-76.

atypica (Cockerell). Oreg (Klamath Falls), Calif.; Mexico (Baja California). Pollen: Apparently polylectic with some preference for flowers of *Cryptantha, Salix, Rhus, Rhamnus* and *Ceanothus* in approximately that order; visitation records include *Adenostoma fasciculatum, Allium haematochiton, Arctostaphylos bicolor, Baccharis, Brassica, Ceanothus crassifolius, C. cuneatus, C. greggii, C. soredatus, C. verrucosus, Cryptantha intermedia, Emmenanthe penduliflora, Gilia capitata, G. multicaulis, Lomatium dasycarpum, Marah macrocarpus, Oenothera, Plagiobothrys nothofulvus, Prunus ilicifolia, Quercus, Rhamnus californica, R. crocea, Rhus diversiloba, R. integrifolium, R. ovata, R. trilobata, Rosa minutiflora, Salix argophylla, Salvia columbariae, S. mellifera, Tamarix gallica.*

Parandrena atypica Cockerell, 1941. San Diego Soc. Nat. Hist., Trans. 9: 347. ♀.

Taxonomy: Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 123 (tax. characters and status).

Genus ANDRENA Subgenus PLASTANDRENA Hedicke

Andrena subg. *Plastandrena* Hedicke, 1933. Berlin Zool. Mus., Mitt. 19: 217.
Type-species: *Melitta tibialis* Kirby. Orig. desig.

Andrena subg. *Schizandrena* Hedicke, 1933. Berlin Zool. Mus., Mitt. 19: 218.
Type-species: *Andrena aulica* Morawitz. Orig. desig.

Revision: LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 2-34, figs. 1-23, 3 tables (N. Amer. spp.).

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 201 (tax. characters, as *Schizandrena*). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 297 (tax. characters, synonymy).

argemonis Cockerell. Nebr. and Colo. south to N. Mex. and Ariz.; Mexico (Chihuahua, Coahuila, and Sonora south to Oaxaca). Pollen: Polylectic, visits flowers of *Acacia, Argemone mexicana, A. platyceras, Cleome serrulata, Medicago sativa, Melilotus alba, Penstemon occidentalis, Persicaris pennsylvanicus, Sisymbrium irio.*

Andrena argemonis Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 80. ♂.

Taxonomy: Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 449. ♀. —Cockerell, 1931. Amer. Mus. Novitates 458: 16. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704, 707. ♀, ♂. —LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 12-15, figs. 24-28 (redescription).

crataegi Robertson. Transcont. in southern Canada (N. S. to B. C.) and northern U. S., south to Ga., Ala., Ark., Tex., N. Mex., Utah, Nev. and north. Calif. Pollen: Polylectic with some preference for the flowers of the family Rosaceae, visits flowers of *Amelanchier, Amorpha, Aruncus, Astragalus, Barbarea, Blephilia, Brassica, Caragana, Cardaria, Carduus, Castanea, Ceanothus, Chamaebatia foliolosa, Chrysanthemum, Conium, Cornus, Crataegus, Crepis, Cryptantha intermedia, Daucus, Deutzia, Eulophus, Euphorbia, Fragaria, Frasera, Gilia achillaefolia, Hackelia, Heracleum lanatum, Holodiscus, Hydrangea, Ilex, Iris, Ledum, Lomatium dasycarpum, Malvastrum, Melilotus, Monarda, Narcissus, Opulaster, Pastinaca, Philadelphus, Polytaenia, Potentilla, Prunus, Ptelea, Purshia, Pyracantha, Pyrus, Ranunculus, Raphanus, Rhamnus, Rhododendron, Rhus, Rorippa nasturtium-aquaticum, Rosa, Rubus, Salix, Senecio, Solidago, Sorbaria, Spiraea, Symphoricarpos, Taenidia, Tamarix, Taraxacum, Thaspium, Trifolium repens, Vaccinium, Viburnum, Zizia.*

Andrena crataegi Robertson, 1893. Amer. Ent. Soc., Trans. 20: 273. ♀, ♂.
Andrena subcommoda Cockerell, 1902. Canad. Ent. 34: 45. ♀.
Andrena angusi Viereck, 1907. Ent. News 18: 284. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190. ♀, ♂ (key). —Atwood, 1934. Canad. Jour. Res. 10: 208, 210. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 206-209, figs. 37-39, table 5 (redescription, synonymy). —LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 294 (subgeneric assignment, *angusi*). —LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 5-12, figs. 1, 24-28 (redescription).

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 33-34 (nest). —Clements and Long, 1923. Carnegie Inst. Wash., Pub. 326: 249 (ecology). —Brittain, 1933. Canada Dept. Agr., Bul. 162: 94, figs. (floral relationships). —LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 11, table 1 (floral relationships).

fracta Casad and Cockerell. West. Tex. to south Calif.; Mexico (Distrito Federal, Puebla, Zacatecas). Pollen: Polylectic, visits flowers of *Acacia, Argemone, Baileya, Cryptantha intermedia, Descourainia sophia, Dithyrea, Encelia farinosa, Eschscholzia, Fallugia, Geraea canescens, Lepidium, Lesquerella, Medicago, Oenothera, Opuntia, Phacelia, Physaria, Prosopis, Prunus, Pyrus, Salix, Senecio.*

Andrena fracta Casad and Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 84. ♂, ♀.

Taxonomy: LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 30-34, figs. 14-18 (redescription).

Biology: LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 34, table 3 (floral relationships).

mellea Cresson. Tex., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Argemone, Asclepias subverticillata, Baccharis glutinosa, Fallugia paradoxa, Melilotus alba, Salix.*

Andrena mellea Cresson, 1868. Amer. Ent. Soc., Trans. 1: 384. ♀.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48 (key). —Cockerell, 1931. Amer. Mus. Novitates 458: 16. ♀ (key). —LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 16-18, figs. 19-23 (redescription).

prunorum prunorum Cockerell. Sask., west to B. C., south to west. Tex., N. Mex., Ariz. and Calif.; Mexico (Baja California). Pollen: Polylectic, visits a wide variety of flowers including *Acer, Actinea, Adenostoma, Amsinckia douglasiana, Arabis, Arctostaphylos, Argemone, Baccharis glutinosa, B. viminea, Barbarea orthoceras, Berberis, Brassica campestris, B. incana, B. nigra, Calochortus venustus, Calyptridium umbellatum, Ceanothus integerrimus, Cercocarpus betuloides, Chaenactis glabriuscula, Chamaebatia foliolosa, Chrysothamnus, Clarkia biloba, C. rhomboidea, Clematis, Cleome serrulata, Crataegus, Crepis, Cryptantha intermedia, Cymopteris, Encelia farinosa, Eriastrum virgata, Erigeron, Eriodictyon trichocalyx lanatum, Eriogonum fasciculatum, E. nudum, Eriophyllum, Erysimum asperum, Eschscholzia californica, Fallugia paradoxa, Gilia capitata, G. davyi, Hackelia, Helianthus, Heracleum, Hyptis emoryi, Lappula, Larrea tridentata, Lepidium flavum, Lesquerella, Linaria, Lithospermum, Lomatium, Malus, Melilotus, Mentzelia, Micrampelis, Monardella lanceolata, Nemophila, Opuntia, Pastinaca, Penstemon, Petalostemon, Phacelia distans, P. minor, Philadelphus lewisii californica, Platystemon, Plumbago, Potentilla, Prosopis, Prunus, Purshia, Ranunculus, Raphanus sativa, Rhamnus californicus, Rhus, Ribes, Rorippa, Rubus, Salix, Sambucus caerulea, Sanicula nevadensis, Sophia, Sphaeralcea ambigua, Shepherdia, Sisymbrium irio, S. linifolia, Solidago, Spiraea, Symphoricarpos, Syringa, Tamarix gallica, Taraxacum officinale, Thysanocarpus curvipes, Trichostema parishii, Trifolium.*

Andrena prunorum Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 81. ♀, ♂.
Andrena kincaidii Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 351. ♀.
Andrena pascoensis Cockerell, 1897. Entomologist 30: 305. ♀.
Andrena prunorum gillettei Cockerell, 1898. Ent. News 9: 172. ♂.
Andrena vernoni Viereck, 1904. Canad. Ent. 36: 190, 195. ♀, ♂.
Andrena arizonensis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 42. ♂.
Andrena prunorum var. *mariformis* Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 46. ♀.
Andrena (*Andrena*) *shasta* Viereck, 1926. Calif. Acad. Sci., Proc. (4) 15: 402. ♀.
Andrena prunorum var. *pauperatula* Cockerell, 1938. Canad. Ent. 70: 6. ♀.

Taxonomy: Viereck, 1904. Canad. Ent. 36: 190, 195. ♀, ♂ (key, as *kincaidii*). —Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 11. ♀ (key). —Cockerell, 1931. Amer. Mus. Novitates 458: 16. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704, 707. ♀, ♂ (key). —LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 18-30, figs. 2-3, 9-13 (redescription, synonymy, integumental color variation).

Biology: LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 28-30, table 2 (floral relationships).

prunorum sinaloa Viereck. Ariz.; Mexico (Baja California and Sinaloa). Pollen: Presumably polylectic, visits flowers of *Encelia farinosa, Larrea tridentata.*

Andrena sinaloa Viereck, 1926. Calif. Acad. Sci., Proc. (4) 15: 403. ♀.

Taxonomy: LaBerge, 1969. Amer. Ent. Soc., Trans. 95: 30 (redescription).

Genus ANDRENA Subgenus PTILANDRENA Robertson

Ptilandrena Robertson, 1902. Amer. Ent. Soc., Trans. 28: 192.
Type-species: *Andrena erigeniae* Robertson. Orig. desig.

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 215 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 283, 290, 307-308 (tax. characters). —Davis and LaBerge, 1975. Ill. Nat. Hist. Survey, Biol. Notes 95: 2 (included spp.).

distans Provancher. Canada; Minn. to New England, south to N. C. Pollen: Unknown, but visits flowers of *Geranium maculatum, Heracleum lanatum, Polemonium reptans.*
Andrena distans Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 307. ♀, ♂.
Andrena g. maculati Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 333. ♀, ♂. Trinomial.
Andrena gerani-maculati Viereck, 1907. Ent. News 18: 282. ♀.

Taxonomy: Viereck, 1907. Ent. News 18: 282, 286. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 154-155, figs. 27, 29-30, table 4 (redescription, synonymy).

erigeniae Robertson. Ont. to Ga., west to Minn., Mo. and Okla. Parasite: *Leucophora obtusa* (Zett.), *Stylops erigeniae* Pierce. Pollen: Apparently collects pollen only from the flowers of *Claytonia virginica* with which it is largely coterminous, but visits these and other flowers for nectar including *Barbarea vulgaris, Collinsia verna, Dicentra laciniata, D. cucullaria, Erigenia bulbosa, Erythronium americanum, Hydrophyllum appendiculata, Isopyrum biternatum, Prunus, Veronica hederaefolia.*
Andrena erigeniae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 52. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 192. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 155-156, figs. 27, 29-31, table 4 (redescription). —Davis and LaBerge, 1975. Ill. Nat. Hist. Survey, Biol. Notes 95: 13, figs. 13, 16-24 (immature stages).

Biology: Davis and LaBerge, 1975. Ill. Nat. Hist. Survey, Biol. Notes 95: 1-16, figs. 1-25, 1 table (nest, architecture, life history, provisioning, inquilinism, parasitism).

polemonii Robertson. Ill., Mich. Pollen: Unknown, but visits flowers of *Geranium maculatum, Polemonium reptans, Ranunculus septentrionalis.*
Andrena polemonii Robertson, 1891. Amer. Ent. Soc., Trans. 18: 54. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190, 192. ♀, ♂ (key). —Robertson 1904. Canad. Ent. 36: 278. (tax. characters). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 157-158, figs. 27, 31, table 4 (redescription).

Genus ANDRENA Subgenus RHAPHANDRENA LaBerge

Andrena subg. *Rhaphandrena* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 507.
Type-species: *Andrena prima* Casad and Cockerell. Orig. desig.

Revision: LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 507-514, figs. 1, 3, 6, 59-68 (N. Amer. spp.).

dapsilis LaBerge. Tex., Okla. Pollen: Unknown, but visits flowers of *Descourainia pinnata brachycarpa, Lesquerella.*
Andrena (*Rhaphandrena*) *dapsilis* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 511, figs. 6, 64-68. ♀, ♂.

prima Casad. West. Tex. to south. Calif. and north. Utah. Pollen: Apparently an oligolege of the brassicaceous flowers, especially *Lesquerella* including *L. gordonii*, but visits other flowers presumably for nectar including *Alyssum, Brassica oleracea, Cryptantha* probably *jamesii, Dithyrea wislizenii, Geraea canescens, Prunus.*
Andrena prima Casad, 1896. Ann. and Mag. Nat. Hist. (6) 18: 78. ♀.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48. ♀ (key). —Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 129 (subgeneric assignment).

Genus ANDRENA Subgenus SCAPHANDRENA Lanham

Andrena subg. *Scaphandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 200.
Type-species: *Andrena montrosensis* Viereck and Cockerell. Orig. desig.

Andrena subg. *Elandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 203.
Type-species: *Andrena amplificata* Cockerell. Orig. desig.
Andrena subg. *Truncandrena* Warncke, 1968. Est. Mus. Zool. Coimbra Univ., Mem. 307: 46.
Type-species: *Andrena truncatilabris* Morawitz. Orig. desig.

Revision: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 101-189, 99 figs., 5 tables (N. Amer. spp.).

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 296 (tax. characters). —Ribble, 1973. Ent. Soc. Amer., Ann. 66: 1281-1286 (tax. status of type species).

albiculta Viereck. Calif.
Andrena albiculta Viereck, 1917. Amer. Ent. Soc., Trans. 43: 366. ♀.

Taxonomy: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 173-174 (tax. status).

arabis Robertson. N. Y. to N. C., west to Mich. and Ill. Pollen: Polylectic, often collected on early spring flowering plants of the family Cruciferae; visitation records include *Arabis laevigata, Barbarea vulgaris, Brassica, Buxus, Capsella bursa-pastoris, Cardamine bulbosa, Claytonia virginica, Dentaria diphylla, D. lanciniata, Erigenia bulbosa, Erythronium americanum, Prunus, Salix microphylla, Spiraea, Stellaria media, Taraxcum officinale, Tussilago farfara.* Hybridizes with *A. scurra* Viereck and *A. capricornis* Casad and Cockerell.
Andrena arabis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 334. ♀.
Andrena (*Pterandrena*) *brassicae* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 142, figs. 24, 25, 28. ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 191. ♀ (key). —Viereck, 1907. Ent. News 18: 282. ♀ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 251-252, figs. 54-56, table 7 (redescription). —Ribble, 1973. Ent. Soc. Amer., Ann. 66: 1281-1286 (hybridization). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 115-118, figs. 1, 14-18 (redescription, synonymy).

Biology: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 118, table 1 (floral relationships).

bruneri Viereck and Cockerell. Nebr., Wyo., Colo., Nev. Pollen: Unknown, but visits flowers of *Astragalus, Erysimum.*
Andrena bruneri Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 15. ♀.
Andrena laramiensis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 22, 23. ♂.
Andrena viridibasis Cockerell, 1930. N. Y. Ent. Soc., Jour. 37: 444. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 9. —Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1059 (synonymy). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 161-164, figs. 1, 80-84 (redescription, synonymy).

capricornis Casad and Cockerell. Tex. to south. Calif. Parasite: *Stylops* sp. Pollen: Apparently polylectic, often collected at the flowers of the family Cruciferae; visitation records include *Actinea, Alyssum maritimum, Brassica oleracea, Descourainia sophia, Lesquerella gordonii, Physaria, Prunus, Salvia.* Hybridizes with *A. scurra* Viereck and *A. arabis* Robertson.
Andrena capricornis Casad and Cockerell, 1896. Canad. Ent. 28: 182. ♂.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48. ♂ (key). —Cockerell, 1899. Ent. News 10: 255. ♂ (key). —Ribble, 1973. Ent. Soc. Amer., Ann. 66: 1281-1286 (hybridization). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 120-122, figs. 1, 19-23 (redescription).

chapmanae Viereck. Calif., Oreg., Idaho, Nev. and Utah. Pollen: Unknown, but visits flowers of *Ceanothus, Chamaebatia foliolosa, Clarkia dudleyana, Cryptantha ambigua, C. flaccida, C. intermedia, C. micrantha* var. *lepida, Descourainia sophia, Gilia capitata, G. latiflora* var. *cana, Hackelia patens, Lupinus, Mentzelia, Nemophila maculata, Phacelia linearis, Plagiobothrys canescens, P. nothofulvus, Prunus andersonii, Salix, Senecio canus.*
Andrena (*Andrena*) *chapmanae* Viereck, 1904. Canad. Ent. 36: 191. ♀.
Andrena yosemitensis Cockerell, 1924. Pan-Pacific Ent. 1: 61. ♀.

Taxonomy: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 166-170, figs. 1, 8, 90-94 (redescription).

Biology: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 168, table 5 (floral relationships).

cruciferarum Ribble. Calif. Pollen: Unknown, but visits flowers of *Amsinckia, Brassica, Capsella bursa-pastoris, Phacelia, Sisymbrium irio.*
Andrena (*Scaphandrena*) *cruciferarum* Ribble, 1974. Amer. Ent. Soc., Trans. 100: 128, figs. 1-2, 29-33. ♀, ♂.

gordoni Ribble. Northeast. Calif., Oreg., Wash., Wyo.
Andrena (*Scaphandrena*) *gordoni* Ribble, 1974. Amer. Ent. Soc., Trans. 100: 134, figs. 1-2, 39-43. ♀, ♂.

hicksi Cockerell. Colo., Wyo., Utah and Nev. (Ruby Mts.). Parasite: *Stylops* sp.
Andrena hicksi Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 628. ♀.
Andrena unicula Cockerell, 1934. Pan-Pacific Ent. 9: 155. ♂.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 265. ♀ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705, 707. ♀, ♂ (key). —Lanham, 1941. Ent. Soc., Amer., Ann. 34: 707. ♂ (key, as *unicula*). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 164-166, figs. 1, 6, 85-89 (redescription, synonymy).

Biology: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 165 (stylopization).

kaibabensis Ribble. Ariz., Utah.
Andrena (*Scaphandrena*) *kaibabensis* Ribble, 1974. Amer. Ent. Soc., Trans. 100: 160, figs. 1, 8. ♀.

lomatii Ribble. Calif. Pollen: Unknown, but visits flowers of *Lomatium dasycarpum, Rhus trilobata, Salvia sonomensis, Sanicula nevadensis.*
Andrena (*Scaphandrena*) *lomatii* Ribble, 1974. Amer. Ent. Soc., Trans. 100: 131, figs. 1, 5, 34-38. ♀, ♂.

mackieae Cockerell. South. Oreg., Calif., Nev., Utah, Ariz.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Amsinckia, Arctostaphylos, Brassica, Ceanothus cordulatus, C. crassifolius, C. cuneatus, C. integerrimus, C. verrucosus, Cryptantha, Phacelia distans, Plagiobothrys, Prunus virginiana, Rhamnus crocea, Rhus diversiloba, Salix lasiolepis.*
Andrena mackieae Cockerell, 1937. Amer. Mus. Novitates 899: 3. ♀.
Andrena (*?Scaphandrena*) *mackiae*(!) Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 201.

Taxonomy: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 144-149, figs. 1, 6, 59-63 (redescription).

Biology: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 147, table 3 (floral relationships).

merriami Cockerell. B. C. to Calif., east to Mont., Nebr. Colo. and N. Mex. Pollen: Unknown, but visits flowers of *Acer, Astragalus, Cardaria draba, Claytonia, Daucus carota, Fraxinus, Gilia capitata, Hackelia patens, Lappula floribunda, Leptotaenia, Lithophragma affinis, Lomatium ambiguum* var. *leptocarpum, L. dissectum, L. orientale, L. triternatum, Phacelia, Prunus demissa, P. virginiana,* var. *melanocarpa, P. subcordata, Pyrus, Ranunculus, Salix, Taraxacum officinale, Thelypodium.*
Andrena merriami Cockerell, 1901. Psyche 9: 284. ♀.
Andrena pullmani Viereck, 1904. Canad. Ent. 36: 191, 195. ♀, ♂.
Andrena amplificata Cockerell, 1910. Canad. Ent. 42: 368. ♀, ♂.
Andrena fulvinigra Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 42. ♀.

Taxonomy: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 150-155, figs. 1, 3, 64-69 (redescription, synonymy).

Biology: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 153, table 4 (floral relationships).

mohavensis Ribble. South. Calif. (Mohave Desert). Pollen: Unknown, but visits flowers of *Lepidium flavum, Phacelia, Salix exigua.*
Andrena (*Scaphandrena*) *mohavensis* Ribble, 1974. Amer. Ent. Soc., Trans. 100: 126, figs. 1, 2, 24-28. ♀, ♂.

plana Viereck. Oreg., Calif. Pollen: Apparently oligolectic on *Trifolium* including *T. involucratum, T. microcephalum, T. pratense, T. repens, T. tridentatum, T. variegatum,* but visits other flowers presumably for nectar including *Brassica, Chamaebatia*

foliolosa, Cryptantha, Gilia, Lasthenia chrysostoma, Layia platyglossa var. *breviseta, Limnanthes douglasii, Nemophila, Orthocarpus faucibarbatus, Plagiobothrys nothofulvus, Ranunculus, Rhus trilobata, Sisyrinchium bellum, Vicia.*
Andrena plana Viereck, 1904. Canad. Ent. 36: 193. ♀.

Taxonomy: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 141-144, figs. 1, 7, 54-58 (redescription).

primulifrons Casad. Tex. to Ariz. and south. Nev. (Hoover Dam). Pollen: Possibly an oligolege of *Lesquerella* including *L. densiflora, L. gordonii, L. ludoviciana,* but visits other flowers including *Descourainia pinnata, Dithyraea wislizenii, Larrea tridentata, Lobularia, Machaeranthera tanacetifolia, Oreocarya, Phacelia crenulata, Physaria, Prunus, Sisymbrium.*
Andrena primulifrons Casad, 1896. Canad. Ent. 28: 183. ♂, ♀.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48, 49. ♂, ♀ (key). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 328-332, figs. 85-87, map 10, table 11 (redescription). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 104, fig. 1 (subgeneric position).

santaclarae Ribble. Calif. Pollen: Unknown, but males visit flowers of *Cryptantha, Lasthenia, Nemophila, Prunus subcordata.*
Andrena (*Scaphandrena*) *santaclarae* Ribble, 1974. Amer. Ent. Soc., Trans. 100: 136, figs. 1, 4, 44-48. ♀, ♂.

scurra Viereck. B. C. to Calif., east to Idaho and north. Utah. Pollen: Unknown, but visits flowers of *Achillea lanulosa, Baccharis, Brassica campestris, Capsella bursa-pastoris, Cardaria draba, Ceanothus greggii, C. palmeri, Cosmos, Cotoneaster, Descourainia sophia, Lepidium, Lomatium dissectum, L. triternatum, Medicago sativa, Prunus subcordata, Salix, Scrophularia californica, Sisymbrium altissimum, Spiraea, Taraxacum, Thlaspi arvense.* Hybridizes with *A. arabis* Robertson and *A. capricornis* Casad and Cockerell in the Great Basin area of the western United States and in the Rocky Mountain area.
Andrena scurra Viereck, 1904. Canad. Ent. 36: 193, 195. ♀, ♂.

Taxonomy: Ribble, 1973. Ent. Soc. Amer., Ann. 66: 1281-1286 (hybridization). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 110-115, figs. 1, 9-13 (redescription).

scurra x arabis x capricornis Hybrids. Idaho, Wyo., Colo., Utah, Nev. and along the east slope of the Rocky Mountains from north. N. Mex. to south. Alta; Calif. (Seven Oaks) and Ariz. (Fredonia). Pollen: Apparently polylectic, exhibits a preference for the flowers of the family Cruciferae, but visits a variety of flowers including *Agoseris, Astragalus, Brassica, Cardaria draba, Cleome serrulata, Euphorbia, Lappula floribunda, Lepidium virginicum* var. *medium, Lesquerella ovalifolia, Oxytropis, Philadelphus, Physaria didymocarpa, Prunus, Ribes, Senecio canus, Sisymbrium altissimum, S. pinnatum, Taraxacum officinale.*
Andrena sieverti Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 436. ♀.
Andrena lappulae Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 437. ♂.
Andrena ellisiae Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 9. ♀.
Andrena montrosensis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 48. ♀.
Andrena speculifera Cockerell, 1930 (1929). N. Y. Ent. Soc., Jour. 37: 444. ♀.
Andrena physariae Cockerell, 1934. Pan-Pacific Ent. 9: 154. ♀.
Andrena sieverti var. *opacicauda* Cockerell, 1936. Amer. Mus. Novitates 831: 1. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 13. ♀ (key, as *sieverti*). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706. ♀ (key, as *ellisiae*). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706. ♀ (key, as *physariae*). —Ribble, 1973. Ent. Soc. Amer., Ann. 66: 1281-1286 (hybridization). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 122-126 (synonymy).

Biology: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 124, table 2 (floral relationships, stylopization).

shoshoni Ribble. Wyo. (Big Horn and Foxpark).
Andrena (*Scaphandrena*) *shoshoni* Ribble, 1974. Amer. Ent. Soc., Trans. 100: 172, figs. 1, 8. ♀.

sladeni Viereck. B. C. to Wyo. and Nev. Pollen: Unknown, but visits flowers of *Taraxacum officinale*.
Andrena (*Andrena*) *sladeni* Viereck, 1924. Canad. Ent. 56: 239. ♀.

Taxonomy: Cockerell, 1932. Canad. Ent. 64: 286 (key). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 155-158, figs. 1, 4, 70-74 (redescription).

tildeni Ribble. Calif., Ariz. Pollen: Unknown, but visits flowers of *Cryptantha intermedia*, *Salix argophylla*, *S. exigua*.
Andrena (*Scaphandrena*) *tildeni* Ribble, 1974. Amer. Ent. Soc., Trans. 100: 139, figs. 1, 3, 49-53. ♂.

trapezoidea Viereck. Tex., Okla. Pollen: Unknown, but visits flowers of *Descourainia pinnata*, *Lesquerella densiflora*, *L. gordonii*, *L. gracilis*, *L. recurvata*, *Rhus microphylla*.
Andrena (*Scrapter*) *trapezoidea* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 402. ♀.

Taxonomy: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 328-332, figs. 85-87, map 10, table 11 (redescription). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 104, fig. 1 (subgeneric position).

vestali Cockerell. Colo., Nebr. Pollen: Unknown, but visits flowers of *Viola*.
Andrena vestali Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 64. ♂.
Andrena vestali var. *dolichocera* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 19. ♂.

Taxonomy: Lanham, 1941. Ent. Soc. Amer., Ann. 34: 707. ♂ (key). —Ribble, 1974. Amer. Ent. Soc., Trans. 100: 170-172, figs. 1, 8, 95-99 (redescription).

walleyi Cockerell. B. C. to Calif. (Alpine Co.), east to Idaho and Utah. Pollen: Unknown, but visits flowers of *Cardaria draba*.
Andrena walleyi Cockerell, 1932. Canad. Ent. 64: 286. ♀.

Taxonomy: Ribble, 1974. Amer. Ent. Soc., Trans. 100: 158, figs. 1, 5, 75-79 (redescription).

Genus ANDRENA Subgenus SCOLIANDRENA Lanham

Andrena subg. *Scoliandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 223.
Type-species: *Andrena osmioides* Cockerell. Monotypic and orig. desig.

The species of this subgenus chiefly visit the flowers of *Cryptantha* upon which the females are apparently solely dependent for pollen.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 283, 291, 313 (tax. characters).

cryptanthae Timberlake. South. Calif. Pollen: Oligolege of *Cryptantha* including *C. barbigera*, *C. intermedia*, but visits other flowers for nectar.
Andrena (*Scoliandrena*) *cryptanthae* Timberlake, 1951. U. S. Natl. Mus. Proc. 101: 401. ♀, ♂.

osmioides benitonis Lanham. North. Calif. Pollen: Oligolege of *Cryptantha*.
Andrena osmioides benitonis Lanham, 1949. Pan-Pacific Ent. 25: 148. ♀, ♂.

osmioides osmioides Cockerell. South. Calif. Pollen: Oligolege of *Cryptantha* including *C. intermedia*, but visits other flowers for nectar including *Plagiobothrys californica*, *P. nothofulvus*.
Andrena osmioides Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 45. ♂.

Genus ANDRENA Subgenus SCRAPTEROPSIS Viereck

Andrena subg. *Scrapteropsis* Viereck, 1922. Boston Soc. Nat. Hist., Occas. Papers 5: 42.
Type-species: *Andrena* (*Scrapteropsis*) *fenningeri* Viereck. Monotypic.
Andrena subg. *Mimandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 217.
Type-species: *Andrena imitatrix* Cresson. Orig. desig.

Revision: LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 441-504, figs. 1-53, 1 table (N. Amer. spp.).

Taxonomy: Warncke, 1968. Coimbra Univ. Est. Mus. Zool., Mem. 307: 68-69 (synonymy). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 235, 237-240 (phylogeny, tax. status).

alamonis Viereck. West. Tex., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Lesquerella.*

Andrena (*Scrapter*) *alamonis* Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 599. ♀.

alleghaniensis Viereck. Ont. and Maine to S. C. west to Sask. and Colo. Pollen: Apparently polylectic, visits flowers of *Amelanchier, Barbarea, Brassica, Chrysanthemum leucanthemum, Cornus, Crataegus, Euphorbia cyparissias, Fragaria vesca, F. virginiana, Ledum, Melilotus alba, Prunus, Ranunculus, Rubus idaeus, Salix, Viburnum opulus.*

Andrena (*Trachandrena*) *alleghaniensis* Viereck, 1907. Ent. News 18: 280, 286. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 177 (redescription). —Knerer and Atwood, 1963. Canad. Ent. 95: 583, figs. 1, 3. ♂. —Knerer and Atwood, 1964. Ent. Soc. Ontario, Proc. 94: 47-48. —LaBerge, 1971. Ent. Soc. Amer., Trans. 97: 474-479, figs. 1, 5, 27-31 (redescription).

angusticrus LaBerge. Calif. Pollen: Unknown, but visits flowers of *Lasthenia chrysostoma, Platystemon californicus.*

Andrena (*Scrapteropsis*) *angusticrus* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 499, figs. 1, 6. ♀.

aquila LaBerge Calif. (Fresno County). Pollen: Unknown, but visits flowers of *Platystemon californicus.*

Andrena (*Scrapteropsis*) *aquila* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 502, figs. 1, 6. ♀.

atlantica Mitchell. N. J. to Fla., west to Miss. Pollen: Apparently polylectic, visits flowers of *Crataegus, Diospyros virginiana, Fragaria, Ilex glabra, Ligustrum, Linaria, Lyssa sylvatica, Polycodium, Pyracantha, Rubus, Salix nigra, Senecio, Spiraea, Toxicodendron.*

Andrena (*Trachandrena*) *atlantica* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 178, figs. 35-37. ♀, ♂.

Taxonomy: LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 479-481, figs. 1, 5 (redescription).

biareola LaBerge. Calif. Pollen: Unknown, but visits flowers of *Cryptantha, Meconella, Platystemon californicus.*

Andrena (*Scrapteropsis*) *biareola* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 494, figs. 1, 3. ♀, ♂.

buccata LaBerge. Calif. Pollen: Unknown, but visits flowers of *Blennosperma nana, Lasthenia, Platystemon.*

Andrena (*Scrapteropsis*) *buccata* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 497, figs. 1, 6, 49-53. ♀, ♂.

daeckei Viereck. N. J., Pa.

Andrena (*Trachandrena*) *daeckei* Viereck, 1907. Ent. News 18: 280, 285, 286. ♀, ♂.

Taxonomy: LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 486-489, figs. 1, 4, 37-41 (redescription, distribution).

fenningeri Viereck. Mass. to Ga., west to Ill., Tenn. and Tex. Pollen: Polylectic, with a strong preference for *Salix* including *S. humilis, S. sericea, S. tristis* and a secondary preference for *Prunus* including *P. americanus, P. persica,* but visits other flowers including *Acer rubrum, Alsine media, Amelanchier, Aronia, Pyrus malus.*

Andrena (*Scrapteropsis*) *fenningeri* Viereck, 1922. Boston Soc. Nat. Hist., Occas. Papers 5: 42, figs. ♀, ♂.

Andrena (*Trachandrena*) *indianensis* Cockerell, 1929. Ent. Soc. Amer., Ann. 22: 757. ♀.

Andrena (*Mimandrena*) *verna* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 206, figs. 37, 38. ♂.

Taxonomy: LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 465-470, figs. 1, 6, 17-21 (redescription, synonymy).

flaminea LaBerge. Tex. (Beeville and Edinburg).

Andrena (*Scrapteropsis*) *flaminea* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 472, fig. 1. ♀.

ilicis Mitchell. N. Y. to north. Fla., west to Kans. and Tex. Pollen: Unknown, but visits flowers of *Batodendron, Castanea pumila, Celastrus, Crataegus, Diospyros virginiana, Ilex, Prunus, Rhus glabra, Salix.*

Andrena (*Trachandrena*) *ilicis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 186, fig. 35. ♀.

Taxonomy: LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 459-463, figs. 1, 3, 12-16 (redescription).

imitatrix Cresson. Que. to Fla. west to Alta., Mont., Utah and Ariz. Pollen: Polylectic, although exhibits a strong preference for the flowers of the Rosaceae and Salicaceae; visitation records include *Acer negundo, Alsine media, Amelanchier arborea, A. canadensis,* Amorpha *fruticosa, Angelica atropurpurea, Antennaria dioicum, Astragalus, Barbarea vulgaris, Benzoin aestivale, Cassia fasciculata, Ceanothus ovatus, Claytonia, Cornus, Crataegus mollis, C. occidentalis, Dentaria laciniata, Descourainia intermedia, Diospyros virginiana, Erythronium, Euphorbia, Exochoroa racemosa, Forsythia, Grossularia, Heracleum, Ilex, Laurocerasus caroliniana, Lepargyraea canadensis, Lomatium daucifolium, L. foeniculaceum, Lonicera morrowi, Medicago sativa, Pastinaca sativa, Paeonia, Phacelia, Physocarpus opulifolius, Populus, Prunus americana, P. gracile, P. pennsylvanica, P. serotina, P. virginiana, Ptelea, Pyracantha, Pyrus malus, Rhamnus utilis, Rhus aromatica, R. canadensis, Ribes gracile, Rosa, Rubus, Salix amygdaloides, S. babylonica, S. bebbiana, S. discolor, S. longifolia, S. nigra, Senecio, Spiraea aruncus, S. thunbergi, S. vanhouttei, Tamarix gallica, Taraxacum officinale, Thlaspi arvense, Vaccinium, Viburnum dentatum, V. prunifolium, Zygadenia, Zizia.*

Andrena imitatrix Cresson, 1872. Amer. Ent. Soc., Trans. 4: 258. ♀.

Andrena claytoniae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 59. ♀, ♂.

Trachandrena albofoveata Graenicher, 1903. Canad. Ent. 35: 166. ♀.

Andrena johnsoniana Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 224. ♀.

Andrena (*Trachandrena*) *crataegiphila* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 7. ♂.

Andrena (*Trachandrena*) *titusi* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 12. ♀.

Andrena (*Scrapter*) *imitatrix* var. *profunda* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 398. ♀.

Andrena (*Trachandrena*) *tardula* Cockerell, 1930. N. Y. Ent. Soc., Jour. 37: 447. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190. ♀, ♂ (key). —Cockerell, 1929. Ent. Soc. Amer., Ann. 22: 755 (tax. characters). —Cockerell, 1931. Canad. Ent. 63: 22. ♀ (as *johnsoniana*). —Cockerell, 1931. Amer. Mus. Novitates 458: 11. ♀ (as *johnsoniana*). —Lanham and Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1068 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 205-206, fig. 37-39, table 5 (redescription, synonymy). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 6 (pupa). —LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 451-459, figs. 1-2, 7-11 (redescription, synonymy).

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 34 (nesting habits). —Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 249 (ecology). —LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 457-459, table 1 (floral relationships).

kalmiae Atwood. N. S., Que. and Ont. south to Mass. and Conn. Pollen: Apparently an oligolege of *Kalmia* including *K. angustifolia,* but visits other flowers presumably for nectar including *Ledum, Lyonia ligustrina, Vaccinium.*

Andrena kalmiae Atwood, 1934. Canad. Jour. Res. 10: 210, fig. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 186, fig. 35, table 5 (redescription). —LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 489-491, figs. 1, 4 (redescription, distribution).

morrisonella Viereck. Ont. to Fla., west to Ill. and Ala. Pollen: Unknown, but visits flowers of *Amelanchier, Crataegus, Gypsophila, Ilex, Malus, Populus, Prunus, Ranunculus acris, Rubus, Salix.*

Andrena (*Scrapter*) *morrisonella* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 399. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 192, fig. 35, table 5 (redescription). —LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 463-465, fig. 1 (redescription).

phenax Cockerell. South. Calif.
Andrena phenax Cockerell, 1898. Amer. Ent. Soc. Trans. 25: 188. ♀.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 129 (tax. status). —Thorp, 1969. Calif. Univ. Pubs. Ent. 52: 121-123 (tax. status). —LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 503-504, fig. 1 (redescription).

rubi Mitchell. N. C. to Ga., west to Tex., Okla., Kans. and Nebr. Pollen: Unknown, but visits flowers of *Aronia, Crataegus, Descourainia intermedia, D. pinnata, Prunus americana, P. gracilis, Rubus, Salix nigra, Spiraea.*
Andrena (*Trachandrena*) *rubi* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 198, fig. 35. ♀.

stipator LaBerge. Calif. Pollen: Unknown, but visits flowers of *Cryptantha, Meconella, Platystemon californicus.*
Andrena (*Scrapteropsis*) *stipator* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 491, figs. 1, 3, 44-48. ♀, ♂.

unicostata LaBerge. Tex., Okla. Pollen: Unknown, but visits flowers of *Salix.*
Andrena (*Scrapteropsis*) *unicostata* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 481, figs. 1, 5, 32-36. ♀, ♂.

Genus ANDRENA Subgenus SIMANDRENA Perez

Simandrena Perez, 1890. Soc. Linn. Bordeaux, Actes. 44: 174.
Type-species: *Andrena propinqua* Schenck. Desig. by Hedicke, 1933.
Andrena subg. *Platandrena* Viereck, 1924. Canad. Ent. 56: 21.
Type-species: *Andrena vestita* Provancher. Monotypic and orig. desig. (=*Andrena nasonii* Robertson)
Andrena subg. *Stenandrena* Timberlake, 1949. *In* Lanham, Calif. Univ. Pubs. Ent. 8: 213.
Type-species: *Andrena pallidifovea* (Viereck). Orig. desig.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 285, 286, 293, 304 (tax. characters, synonymy).

angustitarsata Viereck. Wash. to Calif. Pollen: Apparently polylectic, visits a wide variety of flowers including *Achillea lanulosa, A. millefolium, Arenaria douglasii, Ceanothus cuneatus, C. greggii, C. integerrimus, C. leucodermis, C. orcuttii, C. palmeri, C. soredatus, Chamaebatia foliolosa, Claytonia spatulata, Eriodictyon californicum, Eriophyllum confertiflorum, Gilia capitata, Grossularia californica, Horkelia bolanderi, Lasthenia chrysostoma, Linanthus aureus, Lomatium utriculatum, Paeonia californica, Plagiobothrys nothofulvus, Potentilla glandulosa, Prunus ilicifolia, Ranunculus californicus, Rhamnus californicus, R. crocea, Rhus diversiloba, Salix laevigata, S. lasiandra, S. lasiolepis, Sanicula bipinnatifida, S. nevadensis, S. tuberosa, Saxifraga integrifolia, Swertia parryi, Thysanocarpus curvipes.*
Andrena angustitarsata Viereck, 1904. Canad. Ent. 36: 189, 196. ♀.
Pterandrena nudiscopa Viereck, 1904. Canad. Ent. 36: 227, 228. ♀.

essigi Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Cryptantha intermedia, Lasthenia aristata, L. gracilis, Layia elegans, Rhamnus crocea, Rhus trilobata, Sisymbrium irio.*
Andrena (*Stenandrena*) *essigi* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 384. ♀, ♂.

friesei Viereck. Calif. Ecology: Unknown, but visits flowers of *Amsinckia douglasiana, Brassica, Calandrinia menziesii, Eschscholzia californica, Lasthenia, Raphanus sativus.*
Andrena (*Andrena*) *friesei* Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 558. ♀.

huardi Viereck. Calif. Pollen: Possibly an oligolege of *Salix* including *S. argophylla, S. gooddingii, S. hindsiana, S. laevigata, S. lasiolepis, S. nigra,* but visits other flowers possibly for nectar only including *Alyssum maritimum, Sambucus.*
Andrena (*Andrena*) *angustitarsata huardi* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 368. ♀.

hypoleuca Cockerell. South. Calif. (Catalina Island).
Andrena hypoleuca Cockerell, 1939. Pomona Jour. Ent. Zool. 31: 25. ♀.

nasonii Robertson. Eastern Canada and Minn., south to Ga. and Tex., Colo. Pollen: Apparently polylectic, visits a wide variety of flowers including *Acer, Amelanchier, Apocynum, Arabis, Capsella, Chaerophyllum, Claytonia, Crataegus, Forsythia, Fragaria, Ilex, Ligustrum, Polemonium, Polytaenia, Potentilla, Prunus, Pyracantha, Ranunculus, Rhamnus, Rubus, Senecio, Sisymbrium, Spiraea, Taenidia, Toxicodendron, Viburnum, Viola, Zizia.*
Andrena vestita Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 310. ♂. Preocc.
Andrena nasonii Robertson, 1895. Amer. Ent. Soc., Trans. 22: 120. ♀.
Andrena hartfordensis Cockerell, 1902. Ann. and Mag. Nat. Hist. (7) 9: 103. ♀.
Andrena (*Andrena*) *nasonii* var. *fulvodorsata* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 385. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190, 192. ♀, ♂ (key). —Viereck, 1907. Ent. News 18: 283, 285. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 244-245, figs. 51-52, 54 (redescription).

opacella Timberlake. Calif. (Mt. Hamilton Range). Pollen: Unknown, but visits flowers of *Salix.*
Andrena (*Simandrena*) *opacella* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 406. ♀.

opacibasis Cockerell. Calif.
Andrena (*Platandrena*) *opacibasis* Cockerell, 1936. Pan-Pacific Ent. 12: 146. ♀.

opacissima Cockerell. Idaho, Wash. to Utah and Calif. Pollen: Unknown, but visits flowers of *Ceanothus cordulatus, Cryptantha intermedia, Lomatium, Salix lasiolepis.*
Andrena opacissima Cockerell, 1918. Ann. and Mag. Nat. Hist. (9) 1: 165. ♀.

Taxonomy: Cockerell, 1933. Pan-Pacific Ent. 9: 158. ♀. —Cockerell, 1936. Ann. and Mag. Nat. Hist. (10) 18: 632.

opaciventris Cockerell. Calif. Pollen: Unknown, but visits flowers of *Ceanothus crassifolius, C. integerrimus, C. vestitus, Cryptantha intermedia, Lomatium dasycarpum, Prunus, Ranunculus occidentalis, Rhamnus crocea, Salix lasiolepis, Sanicula tuberosa, S. bipinnatifida.*
Andrena opaciventris Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 47. ♀.

orthocarpi Cockerell. Calif. Pollen: Unknown, but visits flowers of *Achillea millefolium, Calycadenia multiglandulosa, Ceanothus cuneatus, C. soredatus, Limnanthes douglasii, Lomatium utriculatum, Orthocarpus densiflorus, O. lithospermoides, Ranunculus californicus, Salix lasiolepis, Phoradendron, Thysanocarpus curvipes.*
Andrena (*Platandrena*) *orthocarpi* Cockerell, 1936. Pan-Pacific Ent. 12: 147. ♀.

Taxonomy: Lanham, 1947. Pan-Pacific Ent. 23: 72. ♂.

pallidifovea (Viereck). B. C. to Calif., Utah. Pollen: Collects pollen from the flowers of Compositae including *Chaenactis, Ericameria cooperi, Eriophyllum, Helianthus gracilentus, Layia*, but visits other flowers for nectar including *Gilia capitata, Lasthenia chrysostoma.*
Pterandrena pallidifovea Viereck, 1904. Canad. Ent. 36: 195, 227, 228. ♂, ♀.
Andrena plumifera Cockerell, 1916. Canad. Ent. 48: 393. ♀.

Taxonomy: Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1075 (synonymy). —Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 383. ♂.

pensilis Timberlake. Calif. Pollen: Unknown, but visits flowers of *Eriodictyon californicum, Eschscholzia californica, Lasthenia chrysostoma, Limnanthes douglasii, Layia platyglossa, Orthocarpus densiflorus, O. lithospermoides, Ranunculus californicus, Sisyrinchium bellum.*
Andrena (*Platandrena*) *pensilis* Timberlake, 1938. Pan-Pacific Ent. 14: 27. ♀, ♂.

runcinatae Cockerell. B. C. and Alta. to Colo., N. Dak.
Andrena runcinatae Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 434. ♀, ♂.

uvulariae Mitchell. Md. (Beltsville). Pollen: Unknown, but visits flowers of *Uvularia sessilifolia*.
Andrena (*?Simandrena*) *uvulariae* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 245, fig. 54. ♀.

vexabilis Timberlake. North. Calif. Pollen: Unknown, but visits flowers of *Achillea lanulosa, Agoseris heterophylla, Chamaebatia foliolosa, Coreopsis maritima, Cryptantha micrantha, Encelia californica, Eriophyllum confertiflorum, Lasthenia chrysostoma, L. gracilis, Layia platyglossa, Helianthella californica, Horkelia fusca, Senecio californicus, Viguiera, Wyethia angustifolia.*
Andrena (*Stenandrena*) *vexabilis* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 385. ♀, ♂.

wheeleri Graenicher. N. S. and Maine to Alta., south to Colo., Minn., Wis. and N. C. Pollen: Unknown, but visits flowers of *Centaurea, Chrysanthemum leucanthemum, Cornus, Rhododendron, Rubus, Sedum acre.*
Andrena wheeleri Graenicher, 1904. Ent. News 15: 65. ♀, ♂.
Andrena wheeleri pallidior Cockerell, 1938. Canad. Ent. 70: 7. ♀.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10: 208, 209. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 246-247, figs. 51-52 (redescription, synonymy).

Genus ANDRENA Subgenus TAENIANDRENA Hedicke

Andrena subg. *Taeniandrena* Hedicke, 1933. Berlin Zool. Mus., Mitt. 19: 219.
Type-species: *Melitta ovatula* Kirby. Orig. desig.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 286, 292, 306-307 (tax. characters).

wilkella (Kirby). Holarctic; N. S. to Wis., south to Va. and Ohio. Presumably introduced. Pollen: Apparently polylectic, visits flowers of *Achillea, Amorpha, Brassica, Cirsium, Crataegus, Daucus, Epilobium, Fragaria, Leontodon, Malus, Philadelphus, Pinus, Prunus, Raphanus, Rhododendron, Rhodura, Rubus, Solidago, Stellaria, Taraxacum, Trifolium, Vaccinium.*
Melitta wilkella Kirby, 1802. Monog. Apum Angliae, v. 2, p. 145. ♀, ♂.
Andrena winkleyi Viereck, 1907. Ent. News 18: 283, 285. ♀, ♂.

Taxonomy: Malloch, 1918. Biol. Soc. Wash., Proc. 31: 61. —Atwood, 1934. Canad. Jour. Res. 10: 207, 210. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 250-251, figs. 52, 54-55 (redescription).

Biology: Brittain, 1933. Canada Dept. Agr., Bul. 162: 94 (floral relationships). —Atwood, 1933. Canad. Jour. Res. 9: 456 (floral relationships). —Brittain and Newton, 1933. Canad. Jour. Res. 9: 341 (flower records). —Brittain and Newton, 1934. Canad. Jour. Res. 10: 261 (flower records).

Genus ANDRENA Subgenus THYSANDRENA Lanham

Andrena subg. *Thysandrena* Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 213.
Type-species: *Andrena candida* Smith. Orig. desig.

Taxonomy: LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 287, 293, 294, 306 (tax. characters).

argentiscopa Viereck. Calif.
Andrena (*Andrena*) *argentiscopa* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 368. ♀.

beckeri Cockerell. Colo.
Andrena beckeri Cockerell, 1921. Ann. and Mag. Nat. Hist. (9) 7: 211. ♀.

Taxonomy: Cockerell, 1932. Pan-Pacific Ent. 8: 175. —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706. ♀.

bisalicis Viereck. N. Dak. to New England states, south to Ga. Parasite: *Nomada* sp. Pollen: Unknown, but visits flowers of *Amelanchier, Aronia, Brassica, Crataegus, Ilex, Prunus, Salix.*
Andrena salicis Robertson, 1891. Amer. Ent. Soc., Trans. 18: 53. ♀, ♂. Preocc.
Andrena bisalicis Viereck, 1908. Ent. News 19: 42. N. name.
Andrena (*Andrena*) *adelae* Viereck, 1922. Boston Soc. Nat. Hist., Occas. Papers 5: 37. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 191, 192. ♀, ♂ (key). —Mitchell, 1958. *In* Krombein, U. S. Dept. Agr., Agr. Monog 2, First Suppl. p. 212 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 219-220, figs. 42-44, table 6 (redescription). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 5, figs. 1-2 (pupa).

Biology: Rozen, 1966. Amer. Mus. Novitates 2244: 26 (parasite).

brevipalpis Cockerell. Colo.
Andrena brevipalpis Cockerell, 1930. Ann. and Mag. Nat. Hist. (10) 5: 109. ♀.

Taxonomy: Cockerell, 1932. Pan-Pacific Ent. 8: 175. ♀. —Cockerell, 1937. Amer. Mus. Novitates 899: 4. ♀.

campanulae Viereck and Cockerell. Colo., Nebr.
Andrena campanulae Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 43: 38, 43. ♂, ♀.

Taxonomy: Cockerell, 1932. Pan-Pacific Ent. 8: 177. ♀, ♂.

candida Smith. B. C. to south. Calif., Colo. and Utah; Mexico (Baja California). Pollen: Polylectic, visits a wide variety of flowers during both the first and second broods including *Acer grandidentatum, A. platynoides, Adenostoma fasciculatum, Alyssum maritimum, Amelanchier, Arctostaphylos glauca, Baccharis glutinosa, B. viminea, Brassica alba, B. adpressa, B. arvensis, B. campestris, B. nigra, Calandrinia menziesii, Ceanothus cordulatus, C. crassifolius, C. cuneatus, C. integerrimus, C. orcuttii, C. palmeri, C. verrucosus, Chamaebatia foliolosa, Conium maculatum, Cryptantha flaccida, C. lepida, Cymopterus longipes, Daucus carota, Eriogonum fasciculatum, E. f. polifolii, Eriophyllum tridactyllum, Gnaphalium bicolor, Isomeris arborea, Lomatium dasycarpum, L. grayi, Ligusticum vulgare, Lupinus paynei, Malus pumila, Medicago sativa, Melilotus alba, Nemophila menziesii, Phacelia affinis, P. distans, P. minor, P. ramosissima, Plagiobothrys tenellus, Prunus fremontii, P. ilicifolia, P. lyonii, P. subcordata, Ranunculus californicus, Rhamnus californica, R. crocea, R. ilicifolia, Salix argophylla, S. discolor, S. exigua, S. hindsiana, S. laevigata, S. lasiolepis, S. nigra, Salvia mellifera, Sambucus caerulea, Sisymbrium irio, S. officinale.*
Andrena candida Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 56. ♀.
?Andrena (Andrena) candida tramoserica Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 533. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 155 (type). —Cockerell, 1906. Psyche 13: 10 (type). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706, 708. ♀, ♂ (key). —Youssef and Bohart, 1968. Kans. Ent. Soc., Jour. 41: 450-455, figs. 2-7, 11-22 (immature stages).

Biology: Linsley, 1937. Brooklyn Ent. Soc., Bul. 32: 127 (floral relationships, spring and early summer broods). —Youssef and Bohart, 1968. Kans. Ent. Soc., Jour. 41: 442-455, 22 figs. (nest architecture, life history, floral relationships).

ceanothina Cockerell. Calif. Pollen: Unknown, but visits flowers of *Arctostaphylos, Ceanothus crassifolius, Ribes indecorum.*
Andrena ceanothina Cockerell, 1936. Pan-Pacific Ent. 12: 138. ♀.

cercocarpi Cockerell. Calif. Pollen: Unknown, but visits flowers of *Cercocarpus.*
Andrena (Platandrena) cercocarpi Cockerell, 1936. Pan-Pacific Ent. 12: 140. ♀.

Taxonomy: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 332 (subgeneric position).

chlorinella Viereck. Oreg.
Andrena chlorinella Viereck, 1904. Canad. Ent. 35: 189. ♀.
Andrena xanthostigma Viereck, 1904. Canad. Ent. 35: 193. ♀.

Taxonomy: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 333 (subgeneric position).

claremonti Viereck. Calif.
Andrena claremonti Viereck, 1926. Pomona Jour. Ent. Zool. 18: 2. ♂.

coloradina Viereck and Cockerell. Colo.
Andrena coloradina Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 53, 56. ♀.

Taxonomy: Cockerell, 1933. Pan-Pacific Ent. 9: 154. ♀ (key).

fulvihirta Viereck and Cockerell. B. C. to Colo. and Calif.
Andrena fulvihirta Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 54. ♀.

Andrena washingtoni manitouensis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 31. ♂.

Taxonomy: Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1066 (synonymy).

geranii Robertson. New England states and Va., west to Minn. and Colo. Pollen: Unknown, but visits flowers of *Arabis*, *Blephilia*, *Geranium*, *Hydrophyllum*, *Osmorrhiza*, *Polemonium*.
Andrena geranii Robertson, 1891. Amer. Ent. Soc., Trans. 18: 54. ♀, ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190, 192. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 221-222, figs. 44-45, table 6 (redescription).

haroldi Timberlake. Calif. Pollen: Unknown, but visits flowers of *Lasthenia*.
Andrena (*Micrandrena*) *haroldi* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 398. ♀, ♂.

Taxonomy: Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 333 (subgeneric position).

knuthiana Cockerell. Oreg., Calif. Pollen: Unknown, but visits flowers of *Ceanothus cordulatus*, *Cryptantha lepida*, *Rhamnus californica*, *Salix*, *Sambucus velutina*.
Andrena knuthiana Cockerell, 1906. Ztschr. System. Hym. Dipt. 1: 80. ♀, ♂.

Taxonomy: Cockerell, 1901. Ent. News 12: 74. ♀.

lata Viereck. N. S. to Minn., south to Ga. Pollen: Unknown, but visits flowers of *Brassica*, *Hydrangea*, *Potentilla*, *Prunus*, *Pyrus*, *Rubus*.
Andrena (*Andrena*) *lata* Viereck, 1922. Boston Soc. Nat. Hist., Occas. Papers 5: 39. ♀.
Andrena (*Andrena*) *vulgaris* Viereck, 1922. Boston Soc. Nat. Hist., Occas. Papers 5: 40. ♂.

Taxonomy: Atwood, 1934. Canad. Jour. Res. 10 (2): 208, 210. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 222-224, figs. 44-45, table 6 (redescription, synonymy).

medionitens Cockerell. B. C. and Alta. to Calif. and Colo. Pollen: Unknown, but visits flowers of *Cymopterus terebinthus*, *Eriogonum latifolium* var. *nudum*, *E. subscaposum*, *Erysimum asperum*, *Gilia tenuiflora*, *Hackelia jessicae*, *Holodiscus discolor*, *Horkelia bernardina*, *H. fusca*, *Oxytropis*, *Potentilla glandulosa*, *P. wheeleri*, *Sisymbrium incisum*, *Sprague a umbellata*, *Streptanthus tortuosus*.
Andrena medionitens Cockerell, 1902. Ann. and Mag. Nat. Hist. (7) 9: 101. ♀.

Taxonomy: Viereck, 1904. Canad. Ent. 36: 192, 194. ♀, ♂. —Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 48. ♀ (variation).

Biology: Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 249 (ecology, as *madronitens*).

phaceliae Mitchell. Md., Va., Ill. Pollen: Unknown, but visits flowers of *Alsine pubera*, *Phacelia dubia*, *P. purshii*.
Andrena (*Thysandrena*) *phaceliae* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 224, figs. 44, 45. ♀, ♂.

phocata Cockerell. Colo.
Andrena phocata Cockerell, 1910. Canad. Ent. 42: 369. ♀.

subcandida Viereck. B. C. to Calif.
Andrena subcandida Viereck, 1904. Canad. Ent. 36: 193. ♀.

subdistans Viereck. Wash., Oreg.
Andrena subdistans Viereck, 1904. Canad. Ent. 36: 193. ♀.

subtrita Cockerell. Nev.
Andrena subtrita Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 263. ♀.

taeniata Viereck. Calif.
Andrena (*Andrena*) *taeniata* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 538. ♀.

trizonata (Ashmead). Colo.
Cilissa trizonata Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 6. ♀.

vierecki Cockerell. Utah, Colo., Calif. Parasite: *Myopa rubida* (Bigot).
Andrena vierecki Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 26. ♀.
Andrena boharti Linsley, 1939. Pan-Pacific Ent. 15: 159. ♀, ♂.

Taxonomy: Lanham, 1941. Ent. Soc. Amer., Ann. 34: 706, 707. ♀, ♂ (key). —Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1085 (synonymy).

Biology: MacSwain and Bohart, 1947. Pan-Pacific Ent. 23: 30 (parasite).

w-scripta Viereck. B. C. to Calif. Pollen: Unknown, but visits flowers of *Acacia greggii, Adenostoma fasciculatum, Arctostaphylos glandulosa, A. mariposa, A. patula, A. pungens, Ceanothus cordulatus, C. cuneatus, C. greggii, C. soredatus, Chamaebatia foliolosa, Claytonia spathulata, Cryptantha intermedia, C. lepida, Daucus carota, Eriogonum fasciculatum, Eriophyllum confertiflorum, Fritallaria, Heteromeles arbutifolia, Holodiscus discolor, Horkelia, Lasthenia chrysostoma, Lomatium, Lotus scoparius, Phacelia distans, Prunus ilicifolia, Ranunculus californicus, Rhamnus californicus, Salix laevigata.*

Andrena w-scripta Viereck, 1904. Canad. Ent. 36: 193, 194. ♀, ♂.

Genus ANDRENA Subgenus TRACHANDRENA Robertson

Trachandrena Robertson, 1902. Amer. Ent. Soc., Trans. 28: 189.
Type-species: *Andrena rugosa* Robertson. Orig. desig.

All the species of this subgenus, except the Eurasian *Andrena lagopus* Latreille, are centered in America north of Mexico and are not known to occur south of the United States.

Revision: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 235-371, 69 figs., 2 tables, 15 maps (N. Amer. spp.).

Taxonomy: Lanham, 1949. Calif. Univ. Pubs. Ent. 8: 216 (tax. characters). —LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 282, 292, 308 (tax. characters). —Warncke, 1968. Coimbra Univ. Est. Mus. Zool., Mem. 307: 68-69 (tax. status).

amphibola (Viereck). B. C. south to Calif., east to Alta., Mont. Wyo., Nebr. and Colo. Pollen: Apparently polylectic, visits flowers of *Astragalus, Daucus pusilla, Drymocallis, Eriogonum flavum, Geum triflorum, Holodiscus discolor, Iris, Lappula floribunda, Lonicera, Lupinus, Medicago sativa, Penstemon, Phacelia, Potentilla, Salix, Senecio, Symphoricarpos, Taraxacum officinale, Thermopsis divaricata.*

Trachandrena amphibola Viereck, 1904. Canad. Ent. 35: 158, 159. ♀, ♂.
Trachandrena crassihirta Viereck, 1904. Canad. Ent. 35: 158. ♀.
Trachandrena perdensa Viereck, 1904. Canad. Ent. 35: 158. ♀.
Trachandrena hadra Viereck, 1904. Canad. Ent. 35: 158. ♀.
Trachandrena limarea Viereck, 1904. Canad. Ent. 36: 158, 159. ♀, ♂.
Andrena (*Trachandrena*) *eriogoni* Cockerell, 1927. Ent. Soc. Amer., Ann. 20: 397. ♀.
Andrena (*Trachandrena*) *seneciophila* Cockerell, 1928. Psyche 35: 62. ♀.

Taxonomy: Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 10. ♀ (as *perdensa*). —Lanham, 1914. Ent. Soc. Amer. Ann. 34: 704. ♀ (key, as *seneciophila*). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 284-292, figs. 1, 7, 34-35 (redescription, synonymy, variation in color of vestiture).

ceanothi Viereck. N. S. and Que., south to Ga., west to Minn. and Colo. Pollen: Polylectic, visits flowers of *Amelanchier, Amorpha fruticosa, Barbarea vulgaris, Ceanothus americanus, Cerasus serotina, Chamaedaphne, Chrysanthemum leucanthemum, Cornus candidissimus, Crataegus, Fragaria, Ledum; Prunus, Ptelea, Rhus, Rubus argutus, R. villosus, Salix, Taraxacum officinale, Vaccinium angustifolium, Viburnum, Waldsteinia.*

Andrena (*Trachandrena*) *ceanothi* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 404. ♀ (♂ misdet.).
Andrena (*Trachandrena*) *compacta* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 181. ♂.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 17. ♀ (key). —Atwood, 1934. Canad. Jour. Res. 10: 212. ♀, ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 179-180, figs. 35-36, table 5 (redescription, synonymy). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 346-349, figs. 1, 12, 58, 59 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 349 (floral relationships).

cleodora cleodora (Viereck). B. C. to north. Calif., east to Mont., Wyo. and Colo., ?Ariz. (Santa Catalina Mts.). Pollen: Oligolege of *Ceanothus* including *C. cuneatus, C. integerrimus, C. laevigatus,* but visits other flowers presumably for nectar including *Arctostaphylos, Aster, Chamaebatia foliolosa, Conium maculatum, Eriogonum nudum, Lupinus, Phacelia, Prunus, Rhamnus, Ribes, Salix, Sorbus.*

Trachandrena cleodora Viereck, 1904. Canad. Ent. 35: 158. ♀.

Andrena (*Trachandrena*) *lutzi* Cockerell, 1931. Amer. Mus. Novitates 458: 12. ♀.

Taxonomy: Cockerell, 1932. Pan-Pacific Ent. 8: 173. ♂. —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 323-326, figs. 1, 12, 48-49 (redescription).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 327 (floral relationships).

cleodora melanodora Cockerell. South. Calif. Pollen: Oligolege of *Ceanothus* including *C. cordulatus, C. integerrimus, C. palmeri,* but visits other flowers presumably for nectar including *Arctostaphylos patula, Barbarea orthoceras, Cryptantha lepida, Eriodictyon californicum, Prunus emarginata, P. ilicifolia, Pyrus malus, Rhamnus californica.*

Andrena (*Trachandrena*) *melanodora* Cockerell, 1932. Pan-Pacific Ent. 8: 173. ♀.

Taxonomy: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 326-327, figs. 48-49 (redescription).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 327 (floral relationships).

cupreotincta Cockerell. B. C., Alta. and Sask., south to Calif., Nev., Utah and N. Mex. Pollen: Apparently polylectic, visits flowers of *Abies concolor, Arctostaphylos nevadensis, Ceanothus integerrimus, Eriogonum, Hackelia, Lesquerella, Penstemon, Prunus virginiana demissa, Pyrus malus, Rhamnus californica, R. rubra, Ribes inerme, Rubus, Salix, Taraxacum officinale.*

Andrena cupreotincta Cockerell, 1901. Canad. Ent. 33: 153. ♀.

Trachandrena ochreopleura Viereck, 1904. Canad. Ent. 35: 158. ♀.

Andrena (*Trachandrena*) *swenki* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 3. ♀.

Andrena (*Trachandrena*) *jockorum* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 3. ♂.

Trachandrena abjuncta Cockerell, 1929. N. Y. Ent. Soc., Jour. 37: 445. ♀.

Taxonomy: Viereck, 1904. Canad. Ent. 36: 158. ♀ (key). —Cockerell, 1937. Ent. News 49: 257. ♀ (as *abjuncta*). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 315-321, figs. 1, 11, 46-47 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 321 (floral relationships).

cyanophila Cockerell. B. C. and Alta., south to Calif., Nev. and Ariz. Pollen: Apparently polylectic, visits flowers of *Argentina anserina, Ceanothus fendleri, Euphorbia, Geranium fremontii, Oreocarya nana, Pinus ponderosa, Polemonium, Potentilla arguta, P. glandulosa, Prunus melanocarpa, Ranunculus Montensis, Ribes longiflorum, Senecio perplexis, Taxaxacum officinale.*

Andrena cyanophila Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 431. ♀.

Andrena tacitula Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 262. ♂.

Taxonomy: Cockerell, 1916. Canad. Ent. 48: 253. —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704, 707. ♀, ♂ (key). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 353-357, figs. 1, 10, 64-65 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 357 (flora! relationships).

forbesii Robertson. N. S. to B. C., south to Ga., west to Wash., Oreg. and Calif. Pollen: Polylectic, apparently prefers pollens of Rosaceae and Salicaceae over other sources; visitation records include *Acer negundo, Alliaria officinalis, Amelanchier arborea, A. canadensis, Aronia melanocarpa, Astragalus, Barbarea vulgaris, Berberis vulgaris, Brauneria purpurea, Callirhoe digitata, Cardamine bulbosa, Ceanothus ovatus, Cercis canadensis, Claytonia caroliniana, C. virginica, Cornus florida, C. mas, Crataegus, Dentaria laciniata, Erythronium americanum, Euphorbia commutata, Forsythia suspensa, Fragaria virginiana, Heracleum lanatum, Hieracium, Ilex, Lappula*

heterosperma, Lepargyrea canadensis, Lomatium daucifolium, L. foeniculaceum, Lonicera, Melilotus alba, M. officinalis, Paeonia, Pastinaca sativa, Physocarpus opulifolius, Populus deltoides, Prunus americanus, P. demissa, P. melanocarpa, P. serotina, P. virginiana, Ptelea, Pyracantha, Pyrus leonis, P. malus, Ranunculus abortivus, Rhamnus lanceolatus, Rhus aromatica, R. canadensis, R. toxicodendron, Ribes gracile, Rosa, Rubus argenteus, Salix discolor, S. nigra, Sedum ternatum, Shepherdia argentea, Spiraea aruncus, S. latifolia, Symphoricarpos, Tamarix gallica, Taraxacum officinale, Thlaspi arvense, Vaccinium, Viburnum opulus, V. prunifolium, Zizia aurea.

Andrena forbesii Robertson, 1891. Amer. Ent. Soc., Trans. 18: 59. ♀.

Trachandrena indotata Viereck, 1904. Canad. Ent. 36: 158, 159. ♀, ♂.

Andrena (*Trachandrena*) *lincolni* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 13. ♀.

Andrena (*Trachandrena*) *rodecki* Cockerell, 1929. Ent. Soc. Amer., Ann. 22: 755. ♀.

Andrena (*Trachandrena*) *pyracanthae* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 194, fig. 35. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 189, 190. ♀, ♂. —Cockerell, 1931. Amer. Mus. Novitates 458: 16. ♀. (as *rodecki*). —Cockerell, 1931. Amer. Mus. Novitates 458: 17 (key, as *lincolni*). —Atwood, 1934. Canad. Jour. Res. 10: 208, 209, figs. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704, 707. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704. ♀ (key, as *lincolni*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 183-184, figs. 35-36, table 5 (redescription). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 261-267, figs. 1, 4, 24-25 (redescription, synonymy, geogr. variation).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 266-267, table 1 (floral relationships).

fuscicauda (Viereck). B. C. to Calif. and west. Nev. and Ariz (Yuma). Pollen: Apparently polylectic, visits flowers of *Arctostaphylos patula, Berberis, Ceanothus cordulatus, C. integerrimus, C. leucodermis, C. palmeri, C. soredatus, Chamaebatia foliolosa, Cryptantha intermedia, Eriodictyon californicum, Eriogonum, Gilia, Horkelia parryi, Malus, Nemophila menziesii, Pinus ponderosa, Potentilla, Prunus demissa, P. emarginata, P. ilicifolia, P. subcordata, Quercus dumosa, Rhamnus californica, R. crocea, Salix laevigata, Taraxacum denselionis.*

Trachandrena fuscicauda Viereck, 1904. Canad. Ent. 35: 159. ♀.

Andrena (*Trachandrena*) *californica* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 373. ♀, ♂.

Andrena (*Trachandrena*) *californica wickhami* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 375. ♀.

Taxonomy: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 357-361, figs. 1, 14, 66-67 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 361 (floral relationships).

heraclei Robertson. N. Y. to N. C., west to Kans. Pollen: Unknown, but visits flowers of *Camassia esculenta, Celastrus scandens, Cercis canadensis, Crataegus, Cornus, Heracleum, Pastinaca sativa, Prunus, Ptelea, Salix, Taenidia, Washingtonia longistylus.*

Andrena heraclei Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 336. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 189. ♀. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 184, fig. 35, table 5 (redescription). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 343-346, figs. 1, 3, 56-57 (redescription).

hippotes Robertson. N. S. to B. C., south to Ga., west to Wash., Oreg. and north. Calif. Pollen: Polylectic, visits a wide variety of flowers including *Acer, Aesculus glabra sargentii, Amelanchier arborea, Amorpha canescens, Angelica atropurpurea, Barbarea vulgaris, Berberis, Caltha palustris, Camassia esculenta, Ceanothus ovatus, Celastrus, Cercis canadensis, Chamaedaphne, Claytonia, Cornus mas, Crataegus mollis, Daucus carota, Dentaria laciniata, Descourainia intermedia, Echinacea angustifolia, E. purpurea, Encelia, Euphorbia, Fragaria, Fraxinus, Hieracium, Ligustrum vulgare, Lomatium triternatum, Lonicera fragrantissima, Melilotus alba, M. officinalis, Nyssa sylvatica,*

Paeonia, Pastinaca sativa, Phacelia, Physocarpus opulifolius, Potentilla anserina, Prunus americana, P. demissa, P. serotina, P. virginiana, Ptelea, Pyracantha yunannensis, Pyrus malus, Ranunculus abortivus, Rhamnus, Rhus glabra, Ribes aureum, Rosa carolina, Rubus, Salix nigra, Shepherdia argentea, Spiraea discolor, S. sorbifolia, Sphaeralcea coccinea, Symphoricarpos, Taraxacum officinale, Thlaspi arvense, Trollius laxa, Vaccinium, Viburnum dentatum, V. opulus, Zizia aurea.

Andrena hippotes Robertson, 1895. Amer. Ent. Soc., Trans. 22: 120. ♀, ♂.

Andrena (*Trachandrena*) *perforatella* Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 306. ♀.

Andrena (*Trachandrena*) *arenakensis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 177, fig. 35. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 184-185, figs. 35, 37, table 5 (redescription, synonymy). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 292-299, figs. 1, 8, 36-37 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 298, table 2 (floral relationships).

mariae Robertson. N. S. to N. W. T. and B. C., south to Ga., west to N. Mex., Utah, Idaho and Wash. Pollen: Oligolege of *Salix* including *S. babylonica, S. bebbiana, S. nigra, S. tristis,* but visits other flowers including *Amelanchier, Astragalus, Barbarea vulgaris, Cogswellia, Comandra, Crataegus mollis, Erigenia, Erigeron philadelphicus, Erythronium, Fragaria, Hackelia floribunda, Kalmia, Lomatium daucifolium, L. foeniculaceum, Pastinaca sativa, Prunus americanus, Pulsatilla, Pyrus malus, Ribes gracile, Rubus, Sisymbrium, Spiraea, Taraxacum officinale.*

Andrena mariae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 58. ♀, ♂.

Andrena sphecodina Cockerell and Casad, 1896. Ann. and Mag. Nat. Hist. (6) 18: 78. ♀, ♂.

Andrena mariae var. *concolor* Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 46. ♀, ♂.

Andrena (*Trachandrena*) *submariae* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 4. ♀.

Andrena (*Trachandrena*) *martialis* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 5. ♂.

Andrena (*Trachandrena*) *sphecodiniformis* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 6. ♂.

Andrena (*Trachandrena*) *profundiformis* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 8. ♂.

Andrena (*Trachandrena*) *stricklandi* Cockerell, 1936. Canad. Ent. 68: 275. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 189, 190. ♀, ♂. —Viereck, 1907. Ent. News 18: 284, 286. ♀, ♂ (key). —Cockerell, 1929. Ent. Soc. Amer., Ann. 22: 754 (as *martialis*). —Cockerell, 1929. Ent. Soc. Amer., Ann. 22: 754 (as *sphecodina*). —Atwood, 1934. Canad. Jour. Res. 10: 208, 210. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 187-188, figs. 35, 38, table 5 (redescription). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 299-305, figs. 1, 9, 39-41 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 305 (floral relationships).

miranda Smith. N. S. to N. J. and Pa., west to Alaska, south to N. Mex., Ariz., Nev. and Calif. (Alta and Carrville). Parasite: *Stylops* sp. Pollen: Polylectic, visits a wide variety of flowers including *Achillea millefolia, Angelica, Aralia latifolia, Argemone, Astragalus, Barbarea vulgaris, Blepharipappus, Brassica campestris, Ceanothus, Cirsium undulatum, Cornus, Crataegus, Drymocallis arguta, Euphorbia, Geranium richardsoni, Heracleum lanatum, Lappula heterosperma, Lotus corniculatus, Malvastrum, Melilotus alba, M. officinalis, Pastinaca sativa, Potentilla fruticosa, P. recta, Prunus virginiana demissa, Ranunculus septentrionalis, Ribes, Rosa arkansana, R. carolina, R. multiflora, Rubus adoratus, Rudbeckia hirta, Sanicula marilandica, Spiraea latifolia, S. sorbifolia, Symphoricarpos occidentalis, Taraxacum officinale, Vaccinium, Viburnum opulus, Waldsteinia fragarioides, Zizia aptera, Z. aurea.*

Andrena miranda Smith, 1879. Desc. New Species Hym. Brit. Mus., p. 54. ♀, ♂.

Andrena grandior Cockerell, 1897. Entomologist 30: 307. ♀.

Andrena multiplicata Cockerell, 1902. Canad. Ent. 34: 46. ♀.

Andrena multiplicatiformis Viereck, 1907. Ent. News 18: 284. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 153. ♀, ♂ (types). —Cockerell, 1906. Psyche 13: 34 (type). —Atwood, 1934. Canad. Jour. Res. 10: 208, 210. ♀, ♂ (key). —Atwood, 1934. Canad. Jour. Res. 10 (2): 208, 210 (as *grandior*). —Timberlake, 1951. *In* Linsley, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1072 (synonymy). —Mitchell, 1958. *In* Krombein, U. S. Dept. Agr., Agr. Monog. 2, First Suppl. p. 215 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 190-191, figs. 35, 38, table 5 (redescription, synonymy). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 267-273, figs. 1, 5, 26-27 (redescription).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 272-273 (floral relationships, stylopization).

nuda Robertson. Maine to Ga., west to Tex., N. Mex., Utah and Wyo. Pollen: Polylectic, although with a preference for flowers of the Rosaceae: visitation records include *Aruncus, Benzoin aestivale, Cercocarpus, Claytonia, Conium, Crataegus mollis, Erigenia, Euphorbia, Heracleum, Ilex, Lomatium dissectum, Melilotus officinalis, Myosotis, Pastinaca sativa, Penstemon, Prunus americana, P. serotina, P. virginica, Ptelea, Pyracantha, Pyrus leonis, P. malus, P. pyrus, Rhamnus lanceolata, Rhus, Rubus argutus, Salix, Sanicula, Sassafras, Staphylea, Symplocus, Taenidia, Viburnum prunifolium, Zizia.*

Andrena nuda Robertson, 1891. Amer. Ent. Soc., Trans. 18: 57. ♀.

Andrena (*Trachandrena*) *davisiana* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 6. ♂.

Andrena (*Trachandrena*) *pseudobscura* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 193, fig. 36. ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 189. ♀ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704. ♀ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 707. ♂ (key, as *davisiana*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 192-193, fig. 35 (redescription). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 333-338, figs. 1, 14, 52-53 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 337-338 (floral relationships).

quintiliformis Viereck. B. C. to Calif., east to Idaho, Nev. and Utah. Pollen: Apparently polylectic, visits flowers of *Achillea millefolia, Allium, Arctostaphylos, Ceanothus cuneatus, C. laevigatus, Chamaebatia foliolosa, Cirsium, Eriogonum, Lappula, Lomatium triternatum, Phacelia humilis, Ranunculus, Salix, Solidago californica.*

Andrena (*Trachandrena*) *quintiliformis* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 606. ♀.

Andrena (*Trachandrena*) *coactifera* Viereck, 1926. Calif. Acad. Sci., Proc. (4) 15: 399. ♀.

Taxonomy: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 278-281, figs. 1, 6, 30-31 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 281 (floral relationships).

quintilis Robertson. Wis. and Ill., west to N. Dak., S. Dak., Nebr., Colo. and Kans. Pollen: Polylectic, although exhibits a decided preference for the pollen and nectar of *Amorpha* including *A. canescens, A. fruticosa*, but visits other flowers including *Apocynum cannabinum, Chrysanthemum leucanthemum, Crataegus, Drymocallis arguta, Echinacea angustifolia, Erigeron ramosus, Pastinaca sativa, Ptelea, Pycnanthemum flexuosum, P. linifolium, Salix, Symphoricarpos, Zizia aurea.*

Andrena quintilis Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 46. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 189. ♀ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 14: 195-196, fig. 35, table 5 (redescription). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 281-284, figs. 1, 6, 32-33 (redescription).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 284 (floral relationships).

rehni Viereck. Que. and Ont., south to G., west to Wis. Pollen: Apparently polylectic, visits flowers of *Aruncus dioecium, Castanea pumila, Ceanothus, Chrysanthemum leucanthemum, Cicuta maniculata, Hydrangea, Ilex opaca, Quercus prinoides, Salix.*

Andrena rehni Viereck, 1907. Ent. News 18: 284. ♀.

Andrena (*Trachandrena*) *votula* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 204. ♀.

Taxonomy: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 349-353, figs. 1, 15, 60-63 (redescription, synonymy).

rugosa Robertson. Que. and New England, south to Ga., west to Minn. and Nebr. Pollen: Polylectic, visits flowers of *Acer, Amelanchier arborea, A. canadensis, Angelica, Astragalus, Barbarea vulgaris, Brassica arvensis, Claytonia virginica, Cornus mas, Crataegus punctata, Dentaria laciniata, Dirca, Erigenia bulbosa, Fragaria, Geranium, Hepatica, Heracleum, Isopyrum, Macrocalyx nyctelea, Melilotus officinalis, Paeonia, Pastinaca sativa, Physocarpus opulifolius, Prunus americana, P. virginiana, Ptelea, Pyracantha, Pyrus malus, Rhus, Ribes, Rosa multiflora, Rubus argutus, R. occidentalis, Salix, Sanicula, Spiraea aruncus, Symphoricarpos, Taraxacum officinale, Viburnum, Zanthoxylum, Zizia aurea.*

Andrena rugosa Robertson, 1891. Amer. Ent. Soc., Trans. 18: 58. ♀, ♂.

Andrena paenerugosa Viereck, 1907. Ent. News 18: 285. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 189, 190. ♀, ♂ (key). —Atwood, 1934. Canad. Jour. Res. 10: 208, 210. ♀, ♂ (key). —Mitchell, 1960. N. C. Expt. Sta. Tech. Bul. 141: 198-199, figs. 35-36, table 5 (redescription, synonymy). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 327-332, figs. 1, 13, 50-51 (redescription).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 332 (floral relationships).

salicifloris Cockerell. B. C. and Alta., south to Calif., Nev., Utah and Colo. Pollen: Polylectic, but with some predilection for the flowers of *Salix;* visitation records include *Acacia, Acer, Amelanchier, Arctostaphylos, Berberis, Brassica, Ceanothus, Cerastium oreophyllum, Chamaebatia foliolosa, Cicuta, Cistus, Epilobium angustifolium, Eriogonum, Geranium, Grossularia, Hackelia patens, Hieracium lanatum, Lasthenia, Lepidium, Lomatium dissectum, L. triternatum, Pastinaca sativa, Prunus demissa, P. ilicifolia, P. virginiana, Pulsatilla patens, Pyracantha yunannensis, Pyrus malus, Ranunculus californicus, Ribes lacustre, Rubus nutkana, R. ursinus, R. vitifolius, Taraxacum densileonis, T. officinalis.*

Andrena salicifloris Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 351. ♀.

Trachandrena auricauda Viereck, 1904. Canad. Ent. 35: 159, 161. ♀.

Andrena (*Trachandrena*) *tacitula* var. *grossulariae* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 9. ♂.

Andrena (*Trachandrena*) *nortoni* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 602. ♀, ♂.

Andrena (*Trachandrena*) *veris* Cockerell, 1934. Pan-Pacific Ent. 9: 156. ♀, ♂.

Taxonomy: Viereck, 1904. Canad. Ent. 36: 158, 159. ♀, ♂ (variation). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704, 707. ♀, ♂ (key, as *veris*). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 255-261, figs. 1, 3, 22-23 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 260 (floral relationships).

semipunctata Cockerell. Wash. to south. Calif., east to southeast. Utah and southwest. N. Mex. Pollen: Oligolege of *Salix* including *S. exigua, S. hindsiana, S. laevigata, S. lasiolepis, S. nigra,* but visits other flowers presumably for nectar including *Baccharis, Ceanothus soredatus, Prunus, Pyrus malus, Rhus trilobata, Sambucus, Senecio saligniifolia, Sisymbrium irio, Tamarix gallica, Taraxacum officinale.*

Andrena semipunctata Cockerell, 1902. Ann. and Mag. Nat. Hist. (7) 9: 102. ♀.

Taxonomy: Viereck, 1904. Canad. Ent. 36: 159. ♀, ♂ (key). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 311-315, figs. 1, 9, 44-45 (redescription).

Biology: Linsley, 1937. Brooklyn Ent. Soc., Bul. 32: 127 (floral relationships, adult behavior).

sigmundi Cockerell. N. B. south to Ga., west to B. C., south to Calif., Utah and N. Mex. Pollen: Oligolege of *Salix* including *S. bebbiana, S. discolor,* but visits other flowers including *Acer saccharinum, Amelanchier canadensis, Barbarea vulgaris, Ceanothus fendleri, Crataegus, Fragaria virginiana, Fraxinus, Kalmia latifolia, Lepargyrea argentea, L. canadensis, Melilotus alba, Populus, Potentilla, Prunus demissa, P. virginiana,*

Pulsatilla ludoviciana, Spiraea, Taraxacum officinale, Vaccinium angustifolium, Waldsteinia fragarioides.

Andrena sigmundi Cockerell, 1902. Canad. Ent. 34: 45. ♀.

Andrena radiatula Cockerell, 1902. Canad. Ent. 34: 46. ♀.

Andrena weedi Viereck, 1907. Ent. News 18: 284, 285. ♀, ♂.

Andrena (*Trachandrena*) *prunicola* Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 12: 375. ♀.

Andrena (*Trachandrena*) *moscovensis* Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 13. ♀.

Andrena (*Trachandrena*) *corrugata* Cockerell, 1931. Amer. Mus. Novitates 458: 9. ♀.

Taxonomy: Cockerell, 1931. Amer. Mus. Novitates 458: 17 (key, as *moscovenis*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 200-202, figs. 36, table 5 (redescription, synonymy). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 249-255, figs. 1, 2, 16-21 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 255 (floral relationships).

spiraeana Robertson. Ont. and Maine to Ga., west to Minn., Nebr. and Kans. Pollen: Polylectic, visits flowers of *Alliaria officinalis, Angelica, Aruncus, Azalea, Barbarea vulgare, Castanea pumila, Ceanothus americanus, Cornus, Crataegus, Cryptotaenia, Erigeron philadelphicus, Euphorbia commutata, Heracleum, Hydrangea, Melilotus alba, Pastinaca sativa, Physocarpus opulifolius, Ptelea, Rhus glabra, R. typhine, Rosa, Spiraea aruncus, S. latifolia, Sorbaria sorbifolia, Viburnum nudum, Zizia.*

Andrena spiraeana Robertson, 1895. Amer. Ent. Soc., Trans. 22: 120. ♀, ♂.

Andrena (*Trachandrena*) *montensis* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 191, fig. 35. ♀.

Andrena (*Trachandrena*) *unica* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 203, fig. 36. ♂.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 189, 190. ♀, ♂ (key). —Viereck, 1907. Ent. News 23: 107 (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704, 707. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 202-203, figs. 35, 38, table 5 (redescription). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 338-342, figs. 1, 11, 53-54 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 342 (floral relationships).

striatifrons Cockerell. B. C. and Alta., south to Ariz. and Calif. Pollen: Oligolege of *Salix*, but visits other flowers including *Arctostaphylos, Eriogonum, Hackelia floribunda, Lomatium, Prunus, Pyrus malus, Ranunculus, Rubus parviflorus, Symphoricarpos, Taraxacum officinale, Vaccinium.*

Andrena striatifrons Cockerell, 1897. Entomologist 30: 308. ♀.

Trachandrena pernuda Viereck, 1904. Canad. Ent. 35: 159. ♀.

Andrena trachandrenoides Viereck, 1904. Canad. Ent. 36: 190, 195. ♀, ♂.

Andrena (*Trachandrena*) *marioides* Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 601. ♀.

Andrena (*Trachandrena*) *politissima* Cockerell, 1918. Ann. and Mag. Nat. Hist. (9) 166. ♀.

Andrena dolichotricha Cockerell, 1924. Ent. News 35: 348. ♂.

Andrena (*Trachandrena*) *brevibasis* Cockerell, 1931. Amer. Mus. Novitates 458: 8. ♀.

Andrena (*Trachandrena*) *postnitens* Cockerell, 1931. Amer. Mus. Novitates 458: 15. ♀.

Taxonomy: Viereck, 1904. Canad. Ent. 36: 159. ♀ (key). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 305-311, figs. 1, 10, 42-43 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 311 (floral relationships).

virginiana Mitchell. P. E. I., Que, and Ont., south to Ga., west to Minn., Ill. and Ark. Pollen: Apparently polylectic, visits flowers of *Ceanothus americanus, Cerasus serotina, Daucus carota, Ilex verticillata, Kalmia, Melilotus alba, Pycnanthemum linifolium, Spiraea latifolia, Solidago.*

Trachandrena obscura Robertson, 1902. Amer. Ent. Soc., Trans. 35: 189. ♀. Preocc.

Andrena (*Trachandrena*) *virginiana* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 203. ♀.

Andrena (*Biareolina*) *obscurida* Warncke, 1970. Bayer. Ent., Nachr. 19: 30. N. name.

Taxonomy: Viereck, 1907. Ent. News 18: 284. ♀ (key, as *obscura*). —Cockerell, 1929. Ent. Soc. Amer., Ann. 22: 757. ♀ (as *obscura*). —LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 273-277, figs. 1, 6, 28-29 (redescription, synonymy).

Biology: LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 277 (floral relationships).

winnemuccana LaBerge. Nev., Oreg. Pollen: Unknown, but visits flowers of *Thelypodium laciniatum*.

Andrena (*Trachandrena*) *winnemuccana* LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 366, fig. 1. ♀.

zionensis LaBerge. South. Utah. Pollen: Unknown, but visits flowers of *Amelanchier*, *Salix*.

Andrena (*Trachandrena*) *zionensis* LaBerge, 1973. Amer. Ent. Soc., Trans. 99: 361, figs. 1, 68-69. ♀, ♂.

Genus ANDRENA Subgenus TYLANDRENA LaBerge

Andrena subg. *Tylandrena* LaBerge, 1964. Nebr. Univ. State Mus., Bul. 4: 312.
Type-species: *Cilissa erythrogaster* Ashmead. Orig. desig.

Revision: LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 543-605, 75 figs., 5 maps (N. Amer. spp.).

coracina LaBerge and Bouseman. South. Calif. (Kramer Hills).

Andrena (*Tylandrena*) *coracina* LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 591, figs. 1, 61-65. ♀, ♂.

erythrogaster (Ashmead). Que. to B. C., south to N. C., Ga., Ark., Okla., N. Mex. and Utah. Pollen: Apparently an oligolege of *Salix* including *S. amygdaloides*, *S. bebbiana*, *S. cordata*, *S. humilis*, *S. interior*, *S. longifolia*, *S. nigra*, *S. sericea*, but visits other flowers presumably for nectar including *Amelanchier canadensis*, *Anemone canadensis*, *Antennaria plantaginifolia*, *Aronia*, *Claytonia virginica*, *Crataegus coccinea*, *C. crus-galli*, *Descourainia intermedia*, *Heracleum lanatum*, *Lomatium foeniculaceum*, *Prunus americana*, *P. serotina*, *P. virginiana*, *Pyrus*, *Radicula obtusa*, *Rhamnus lanceolata*, *Rhus aromatica*, *R. canadensis*, *R. trilobata*, *Ribes*, *Rubus*, *Shepherdia argentea*, *Spiraea*, *Taraxacum officinale*, *Viburnum prunifolium*, *Zizia aurea*.

Cilissa erythrogaster Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 6. ♂.
Andrena perezi Robertson, 1891. Amer. Ent. Soc., Trans. 18: 51. ♀, ♂.
Andrena rhodura Cockerell, 1898. Ent. News 9: 171. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 190, 192. ♀, ♂ (key). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 704, 707. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 114-115, figs. 18-19 21, table 3 (redescription). —LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 550-556, figs. 1-2, 6-10 (redescription).

Biology: Rau, 1935. Ent. News 45: 35 (nesting habits, floral relationships).

fuscipennis LaBerge and Bouseman. Tex. (Kerrville). Pollen: Unknown, but visits flowers of *Prunus*.

Andrena (*Tylandrena*) *fuscipennis* LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 564, figs. 1, 21-25. ♀, ♂.

hallii Dunning. Nebr. and Kans., west to Wash. and Nev. Pollen: Apparently an oligolege of cruciferous flowers, especially *Stanleya pinnata*, but also visits flowers of *Brassica nigra*, *Malvastrum coccineum*, *Melilotus*, *Opuntia*, *Penstemon*, *Prunus*, *Romneya*, *Sisymbrium linifolium*.

Andrena Hallii Dunning, 1898. Canad. Ent. 30: 268. ♀.
Andrena heterura Cockerell, 1930. N. Y. Ent. Soc., Jour. 37: 445. ♀.

Taxonomy: Viereck, 1904. Canad. Ent. 36: 191. ♀ (key). —Cockerell, 1931. Amer. Mus. Novitates 458: 10. ♀. —LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 588-591, figs. 1, 4, 56-60 (redescription, synonymy).

hurdi Lanham. Calif. Pollen: Unknown, but visits flowers of *Brassica*, *Layia*. *A. waldmerei* LaBerge and Bouseman is possibly a subspecies or synonym of this species which is perhaps the most elegant N. Amer. species of the genus *Andrena*.

Andrena hurdi Lanham, 1949. Pan-Pacific Ent. 25: 33. ♀, ♂.

Taxonomy: LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 583-584, figs. 1, 46-50 (redescription).

jessicae Cockerell. N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Lesquerella gordonii*.
Andrena jessicae Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 79. ♂.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48 (key). —LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 571-574, figs. 1, 3, 31-35 (redescription).

layiae Timberlake. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Brassica, Lasthenia chrysostoma, L. minor, Layia glandulosa, Senecio californicus.*
Andrena (*Ptilandrena*) *layiae* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 381. ♀.

Taxonomy: LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 594-597, figs. 1, 3, 66-70 (redescription).

mesillae Cockerell. Tex. to Ariz. Pollen: Apparently an oligolege of *Lesquerella* including *L. gordonii, L. gracilis,* but visits other flowers including *Descourainia sophia, Phacelia, Physaria, Senecio salignus.*
Andrena mesillae Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 90. ♂.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 49. ♂. (key). —LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 584-588, figs. 1, 4, 51-55 (redescription).

perplexa Smith. Occupies a disjunct range; in the east occurs from Ont. and Conn., south to Ga., west to Minn. Iowa, Okla. and Tex.; in the west occurs from Colo. and Mont., west to B. C., Wash., Oreg. and north. Calif. (Shasta County). Pollen: Apparently polylectic, visits flowers of *Acer, Amelanchier, Aronia, Aruncus, Barbarea, Brassica, Crataegus, Crepis runcinata, Euonymus japonica, Fragaria virginiana, Geranium, Heracleum, Lomatium dissectum, Malus, Melilotus, Prunus americana, P. demissa, P. pennsylvanica, P. virginiana, Ptelea, Pyracantha, Pyrus, Rhamnus, Rhododendron, Rubus deliciosus, Salix, Senecio, Spiraea, Stellaria pubera, Stenophragma thaliana, Taraxacum officinale, Viburnum.*
Andrena perplexa Smith, 1853. Cat. Hym. Brit. Mus. v. 1, p. 148. ♀.
Andrena belfragei Cresson, 1872. Amer. Ent. Soc., Trans. 4: 256. ♀.
Andrena brunniventris Cresson, 1872. Amer. Ent. Soc., Trans. 4: 258. ♂.
Andrena viburnella Graenicher, 1903. Canad. Ent. 35: 165. ♀, ♂.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 150 (type). —Viereck, 1904. Canad. Ent. 36: 189, 194. ♀, ♂ (key, as *viburnella*). —Cockerell, 1906. Psyche 13: 10 (type). —Viereck, 1907. Ent. News 18: 365 (as *viburnella*). —Lanham, 1941. Ent. Soc. Amer., Ann. 34: 705, 708. ♀, ♂ (as *viburnella*). —Michener, 1947. Amer. Midland Nat. 38: 445. ♀, ♂ (as *viburnella*). —Lanham, 1949. Ent. News 60: 67 (as *belfragei*). —Mitchell, 1958. *In* Krombein, U. S. Dept. Agr., Agr. Monog 2, Suppl. 1: 215 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 116-117, figs. 18-19, 21, table 3 (redescription). —Stephen, 1966. Kans. Ent. Soc., Jour. 39: 51-53, fig. 1 (larva, pupa, as *viburnella*). —LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 559-564, figs. 1, 3, 16-20 (redescription, synonymy).

Biology: Parker and Boving, 1924. U. S. Natl. Mus., Proc. 64: 1 (nesting habits). —Stephen, 1966. Kans. Ent. Soc., Jour. 39: 42-51, 2 figs. (nest architecture, life history, as *viburnella*).

subaustralis Cockerell. B. C. to Calif., east to Idaho, Utah and east. N. Mex. Pollen: Oligolege of *Salix* including *S. gooddingii, S. hindsiana, S. laevigata, S. lasiolepis, S. nigra,* but visits other flowers for nectar including *Baccharis viminea, Capsella bursa-pastoris, Descourainia sophia, Hackelia floribunda, Malus, Prunus americanus, Pyrus, Ribes aureum, R. inerme, Senecio salignus, Sisymbrium irio, Tamarix, Taraxacum officinale.*
Predator: Philanthus solivagus Say.
Andrena subaustralis Cockerell, 1898. Canad. Ent. 30: 146. ♀, ♂.
Andrena viridinitens Cockerell, 1936. Pan-Pacific Ent. 12: 152. ♀.

Taxonomy: LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 556-559, figs. 1, 2, 11-15 (redescription, synonymy).

sublayiae LaBerge and Bouseman. Cent. Calif. Pollen: Unknown, but visits flowers of *Hemizonia, Layia.*

Andrena (*Tylandrena*) *sublayiae* LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 597, figs. 1, 3, 71-75. ♀, ♂.

subtilis Smith. B. C. to Calif., east to Mont., Wyo. and Colo. Pollen: Polylectic, visits flowers of *Acer macrophylla, Baccharis viminea, Brassica campestris, Calandrinia caulescens, Caragana, Conium maculatum, Crepis, Gilia, Grossularia, Hackelia floribunda, Lasthenia, Limnanthes douglasii* var. *douglasii, Lomatium dissectum, Prunus demissa, P. subcordata, Purshia tridentata, Pyracantha, Pyrus, Ranunculus californicus, Rosa, Salix lasiolepis, Senecio, Spiraea, Tamarix gallica, Taraxacum.*

Andrena subtilis Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 55. ♀.

Andrena seminigra Viereck, 1904. Canad. Ent. 36: 190. ♀.

Andrena semicyanea Cockerell, 1924. Pan-Pacific Ent. 1: 58. ♀.

Taxonomy: Morice and Cockerell, 1901. Canad. Ent. 33: 155 (type). —Cockerell, 1906. Psyche 13: 6 (type). —LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 574-580, figs. 1, 5, 36-40 (redescription, synonymy).

Biology: Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 19 (floral relationships).

waldmerei LaBerge and Bouseman. South. Calif. Pollen: Unknown, but visits flowers of *Allium haematochiton, Encelia californica, Lomatium dasycarpum, Rhus trilobata.* Possibly a subspecies or synonym of *A. hurdi* Lanham.

Andrena (*Tylandrena*) *waldmerei* LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 580, figs. 1, 41-45. ♀, ♂.

wilmattae Cockerell. Pa. to N. C., west to Wyo. and Colo. Pollen: Unknown, but visits flowers of *Amorpha canescens, Crataegus, Crepis runcinata, Erigeron, Melilotus alba, M. officinale, Prunus angustifolia, Spiraea vanhouteii, Pastinaca sativa, Viburnum lentago.*

Andrena Wilmattae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 224. ♀.

Andrena subaustraliformis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 28. ♂.

Andrena beutenmuelleri Viereck, 1916. Amer. Mus. Nat. Hist., Bul. 35: 729. ♀.

Andrena (*Bythandrena*) *acra* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 111, figs. 18, 19, 21. ♂.

Taxonomy: LaBerge and Bouseman, 1970. Amer. Ent. Soc., Trans. 96: 567-571, figs. 1, 4, 26-30 (redescription, synonymy).

Genus ANDRENA Subgenus XIPHANDRENA LaBerge

Andrena subg. *Xiphandrena* LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 504.
Type-species: *Andrena* (*Trachandrena*) *mendica* Mitchell. Monotypic and orig. desig.

Revision: LaBerge, 1971. Amer. Ent. Soc., Trans. 97: 504-507, figs. 1, 4, 54-58.

mendica Mitchell. Ill., Ohio, Tenn., Va., N. C., Ga. Pollen: Unknown, but visits flowers of *Aruncus aruncus, Ceanothus* including *C. americanus.*

Andrena (*Trachandrena*) *mendica* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 189, figs. 35-37, 40. ♀, ♂.

Genus ANDRENA Subgenus UNASSIGNED

Although some of these species have been assigned and even reassigned to some of the subgenera in *Andrena,* their correct assignments must await further studies of the genus.

agricolarum Viereck and Cockerell. Colo.

Andrena agricolarum Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 29. ♂.

albuginosa (Viereck). Oreg.

Pterandrena albuginosa Viereck, 1904. Canad. Ent. 36: 227, 228. ♀.

angustella angustella Cockerell. Calif.

Andrena angustella Cockerell, 1936. Pan-Pacific Ent. 12: 136. ♂.

angustella quercina Cockerell. Calif. (Live Oak Canyon, Redlands). Pollen: Unknown, but visits flowers of *Ceanothus, Salix.*
Andrena angustella quercina Cockerell, 1939. Ann. and Mag. Nat. Hist. (11) 3: 183. ♂.

angustifovea Viereck. B. C. to Oreg.
Andrena angustifovea Viereck, 1904. Canad. Ent. 36: 194. ♂.

atala Viereck. N. Mex.
Andrena atala Viereck, 1903. Amer. Ent. Soc., Trans. 23: 54. ♀.

Taxonomy: Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 430. ♀, ♂.

azygos Viereck. N. Mex.
Andrena (*Andrena*) *azygos* Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 550. ♂.

banksi Malloch. N. J. to Fla., west to Tex. Pollen: Unknown, but visits flowers of *Prunus angustifolia.*
Andrena banksi Malloch, 1917. Brooklyn Ent. Soc., Bul. 12: 89. ♂, ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 254-255, figs. 51, 54, 56-57, table 7 (redescription).

caeruleonitens Viereck. Calif.
Andrena caeruleonitens Viereck, 1926. Pomona Jour. Ent. Zool. 18: 1. ♂.

casadae Cockerell. N. Mex., Colo.
Andrena casadae Cockerell, 1896 Ann. and Mag. Nat. Hist. (6) 18: 83. ♂.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48. ♂ (key).

cerebrata Mitchell. N. C., Ark. Pollen: Unknown, but visits flowers of *Malus, Philadelphus, Raphanus sativa, Spiraea.*
Andrena cerebrata Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 255, figs. 51, 56, 57. ♂.

Taxonomy: Chandler, 1966. Pan-Pacific Ent. 42: 89-90. ♀.

cragini Cockerell. Kans.
Andrena cragini Cockerell, 1899. Ent. News 10: 254. ♂.

dallasiana Cockerell. Tex.
Andrena dallasiana Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 262.

didelta Viereck. N. Mex.
Andrena delta Viereck, 1903. Amer. Ent. Soc., Trans. 29: 55. ♀. Preocc.
Andrena didelta Viereck, 1908. Ent. News 19: 42. N. name.

dimorpha Mitchell. N. J., N. C., Fla.
Andrena (*Pterandrena*) *dimorpha* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 143, figs. 24-26, 28. ♀, ♂.

Taxonomy: LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 294 (subgeneric status).

dolomellea Lanham. Tex. Pollen: Unknown, but visits flowers of *Crataegus.*
Andrena dolomellea Lanham, 1949. Ent. News 60: 65. ♀, ♂.

dreisbachi Mitchell. Mich.
Andrena (*Gonandrena*) *dreisbachi* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 230. ♀.

Taxonomy: Knerer and Atwood, 1963. Canad. Ent. 95: 586, figs. 6, 8. ♂.

elongatula Viereck. Calif.
Andrena (*Andrena*) *elongatula* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 378. ♂.

enceliarum Cockerell. Ariz. Pollen: Unknown, but visits flowers of *Encelia farinosa.*
Andrena enceliarum Cockerell, 1937. Amer. Mus. Novitates 948: 13. ♂.

enocki (Cockerell). Calif.
Parandrena enocki Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 189. ♂.

hirsutula Cockerell. N. W. T. (Hay River).
Andrena hirsutula Cockerell, 1936. Canad. Ent. 68: 282. ♀.

inclinata Viereck. Calif.
Andrena (*Andrena*) *inclinata* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 559. ♀.

interrogationis Viereck and Cockerell. Colo.
Andrena interrogationis Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 35. ♂.

jennei Viereck. Wash.
Andrena (*Andrena*) *jennei* Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 561. ♂.

lauracea Robertson. Ill. Pollen: Unknown, but visits flowers of *Sassafras variifolium*.
Andrena lauracea Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 331. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 194. ♀. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 148 (redescription).

littlefieldi Viereck. Colo.
Andrena (*Andrena*) *littlefieldi* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 563. ♂.

mellitarsis Viereck. Nev.
Andrena (*Andrena*) *mellitarsis* Viereck, 1917. Amer. Ent. Soc., Trans. 43: 384. ♂.

microsoma Viereck. Pacific Northwest.
Andrena microsoma Viereck, 1904. Canad. Ent. 36: 194. ♂.

monilicornis Cockerell. N. Mex.
Andrena monilicornis Cockerell, 1896. Canad. Ent. 28: 181. ♂.

Taxonomy: Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 48. ♂ (key).

moquiorum Viereck and Cockerell. Ariz.
Andrena moquiorum Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 21. ♂.

mustelicolor Viereck. Idaho, Wash. to Calif.
Andrena mustelicolor Viereck, 1904. Canad. Ent. 35: 189, 195. ♀, ♂.

navajorum Viereck and Cockerell. N. Mex.
Andrena navajorum Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 29. ♂.

neurona Viereck. B. C., Wash.
Andrena neurona Viereck, 1904. Canad. Ent. 36: 191. ♀.

nigerrima Casad. N. Mex.
Andrena nigerrima Casad, 1896. Ann. and Mag. Nat. Hist. (6) 18: 83. ♀.

Taxonomy: Linsley, 1938. Calif. Acad. Sci., Proc. (4) 23: 265, 272. ♀ (key).

nothoscordi Robertson. Ill. (Carlinville). Pollen: Unknown, but visits flowers of *Nothoscordum bivalve*.
Andrena nothoscordi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 331. ♀.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 191. ♀ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 165 (redescription of type). —Ribble, 1968. Nebr. Univ. State Mus., Bul. 8: 333 (subgeneric position).

nubilifascia Viereck. Calif.
Andrena (*Ptilandrena*) *nubilifascia* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 597. ♀.

obscuripostica Viereck. Nev.
Andrena obscuripostica Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 568. ♀.

occidentalis Cockerell. N. Mex.
Andrena platyparia occidentalis Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 87. ♂.

oniscicolor (Viereck). Oreg.
Pterandrena oniscicolor Viereck, 1904. Canad. Ent. 36: 227, 228. ♀.

paduocorum Viereck and Cockerell. Colo.
Andrena paduocorum Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 38. ♂.

pediculihirta Viereck. Calif.
Andrena (*Ptilandrena*) *pediculihirta* Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 598. ♀.

perindotata Viereck. Wash.
Andrena indotata Viereck, 1904. Canad. Ent. 36: 190. ♀. Preocc.
Andrena perindotata Viereck, 1908. Ent. News 19: 42. N. name.

pineti Cockerell. Wyo.
Andrena nigerrima pineti Cockerell, 1931. Amer. Mus. Novitates 458: 13. ♀.

plumiscopa Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Cryptantha intermedia, Platystemon californicus.*
Andrena (Pterandrena) plumiscopa Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 376. ♀, ♂.

Taxonomy: LaBerge, 1967. Nebr. Univ. State Mus., Bul. 7: 294 (subgeneric position).

polygoni Viereck and Cockerell. Colo.
Andrena polygoni Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 18. ♂.

potentillarum Viereck. Alta. to Colo. Pollen: Unknown, but visits flowers of *Potentilla.*
Andrena (Andrena) potentillarum Viereck, 1924. Canad. Ent. 56: 79. ♀.

pulverea Viereck. Calif.
Andrena (Andrena) pulverea Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 569. ♀.

purpurina Viereck and Cockerell. Colo.
Andrena purpurina Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 16. ♀.

robertsonii Dalla Torre. Colo. and Minn. to N. S., south to Ark. and Ga. Pollen: Unknown, but visits flowers of *Apocynum, Aronia, Aruncus, Brassica, Ceanothus, Cryptotaenia, Pastinaca, Ptelea, Pyracantha, Rhus, Rubus, Taenidia, Viburnum.* Predator: *Philanthus albopilosus* Cress.
Andrena serotina Robertson, 1893. Amer. Ent. Soc., Trans. 20: 148. ♀ (♂ misdet.). Preocc.
Anthrena robertsonii Dalla Torre, 1896. Cat. Hym., v. 10, p. 149. N. name.

Taxonomy: Robertson, 1902. Amer. Ent. Soc., Trans. 28: 193. ♀, ♂ (key). —Atwood, 1934. Canad. Jour. Res. 10: 208, 209. ♀, ♂ (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 237-238, figs. 46-47, 49, table 6 (redescription).

Biology: Evans, 1975. Ent. Soc. Amer., Ann. 68: 891 (predator).

rufojugata Cockerell. Wyo.
Andrena rufojugata Cockerell, 1931. Amer. Mus. Novitates 458: 17. ♀.

sancta Viereck. Calif.
Andrena (Andrena) sancta Viereck, 1916. Acad. Nat. Sci. Phila., Proc. 68: 571. ♀.

scotoptera Cockerell. Tex.
Andrena scotoptera Cockerell, 1934. Amer. Mus. Novitates 732: 1. ♀.

stenosoma Viereck. Nev.
Andrena (Andrena) stenosoma Viereck, 1925. Amer. Ent. Soc., Trans. 51: 135. ♂.

stictigastra Viereck. Calif.
Andrena (Andrena) stictigastra Viereck, 1917. Acad. Nat. Sci. Phila., Proc. 68: 579. ♀.

Taxonomy: Linsley and MacSwain, 1961. Pan-Pacific Ent. 37: 129 (subgeneric position).

subarctica Cockerell. Alta. (Hay River).
Andrena subarctica Cockerell, 1936. Canad. Ent. 68: 282. ♀.

tetonorum Viereck and Cockerell. Nebr.
Andrena tetonorum Viereck and Cockerell, 1914. U. S. Natl. Mus., Proc. 48: 24. ♂.

trivialis Viereck. Calif.
Andrena (Andrena) trivialis Viereck, 1917. Amer. Ent. Soc., Trans. 43: 388. ♀.

variantia Linsley. B. C.
Andrena (Andrena) varia Viereck, 1924. Canad. Ent. 56: 81. ♀. Preocc.
Andrena variantia Linsley, 1951. U. S. Dept. Agr., Agr. Monog. 2: 1084. N. name.

vicinoides Viereck. B. C., Wash.
Andrena vicinoides Viereck, 1904. Canad. Ent. 36: 191. ♀.

Nomina Nuda in Andrena Fabricius

Andrena alienoides (Viereck) Smith, 1910. Ins. New Jersey, p. 690.
Andrena delawarearum (Viereck). Smith, 1910. Ins. New Jersey, p. 690.
Andrena sparsipilosa Pierce, 1908. U. S. Natl. Mus., Bul. 66: 108.
Andrena tuberculata (Ashmead) Smith, 1910. Ins. New Jersey, p. 690.

Genus MEGANDRENA Cockerell

Genus MEGANDRENA Subgenus MEGANDRENA Cockerell

Andrena subg. *Megandrena* Cockerell, 1927. Pan-Pacific Ent. 4: 42.
Type-species: *Andrena* (*Megandrena*) *enceliae* Cockerell. Monotypic.

enceliae (Cockerell). Ariz., south. Calif., deserts. Pollen: Oligolectic on flowers of *Larrea tridentata*, but visits other flowers for nectar including *Argemone platyceros*, *Aster*, *Cirsium*, *Encelia californica*, *E. farinosa*, *Eschscholzia darwinensis*, *Geraea canescens*, *Ferrocactus ancanthodes*, *Opuntia basilaris*, *O. echinocarpa*.
Andrena (*Megandrena*) *enceliae* Cockerell, 1927. Pan-Pacific Ent. 4: 43. ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 23-24, table 14 (floral relationships, sleep).

Genus MEGANDRENA Subgenus ERYTHRANDRENA Zavortink

Megandrena subg. *Erythrandrena* Zavortink, 1972. Ent. Soc. Wash., Proc. 74: 61.
Type-species: *Megandrena* (*Erythrandrena*) *mentzeliae* Zavortink. Monotypic and orig. desig.

mentzeliae Zavortink. Nev. (Spring Mts., northwest of Las Vegas). Pollen: Oligolectic on flowers of *Mentzelia tricuspis*.
Megandrena (*Erythrandrena*) *mentzeliae* Zavortink, 1972. Ent. Soc. Wash., Proc. 74: 64, figs. 1-3. ♀, ♂.

Biology: Zavortink, 1972. Ent. Soc. Wash., Proc. 74: 69-75, figs. 2-3 (floral relationships, mating, sleep).

Genus ANCYLANDRENA Cockerell

Andrena subg. *Ancylandrena* Cockerell, 1930. Pan-Pacific Ent. 7: 5.
Type-species: *Andrena* (*Ancylandrena*) *heterodoxa* Cockerell. Monotypic.

Revision: Zavortink, 1974. Calif. Acad. Sci., Occas. Papers, 109: 1-36, 6 figs. (N. Amer. spp.).

atoposoma (Cockerell). South. Calif.; Mexico (Baja California and Sonora). Pollen: Apparently collects pollen from the flowers of the leguminous genera *Lotus* and *Lupinus* including *Lotus glaber*, *L. scoparius*, *Lupinus formosus*, *L. hallii*, *L. paynei*, but visits these and other flowers for nectar including *Calochortus splendens*, *Ceanothus*, *Convolvulus*, *Cryptantha intermedia*, *Eriodictyon trichocalyx*, *Eriogonum fasciculatum*, *Gilia virgata*, *Penstemon*, *Phacelia ramosissima*, *Sphaeralcea ambigua*.
Andrena (*Ancylandrena*) *heterodoxa* Cockerell, 1930. Pan-Pacific Ent. 7: 6. ♂, ♀. Preocc.
Andrena atoposoma Cockerell, 1934. Pan-Pacific Ent. 10: 82. N. name.

koebelei (Timberlake). Southeast. Calif. and south. Nev. Pollen: Possibly oligolectic on flowers of *Dalea* including *D. fremontii*, but visits other flowers presumably for nectar including *Echinocactus*, *Oenothera refracta*, *Stanleya pinnata*.
Megandrena (*Ancylandrena*) *koebelei* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 413. ♂.

Biology: Zavortink, 1974. Calif. Acad. Sci., Occas. Papers, 109: 28 (matinal behavior).

larreae Timberlake. N. Mex. (Lordsburg), west to south. Calif. and south. Nev., deserts. Parasite: *Hexepeolus rhodogyne* Linsley and Michener? Pollen: Oligolectic on flowers of *Larrea tridentata*, but visits these flowers and others for nectar including *Dalea greggii*, *Prosopis juliflora*.
Megandrena (*Ancylandrena*) *larreae* Timberlake, 1951. U. S. Natl. Mus., Proc. 101: 411. ♀, ♂.

Biology: Zavortink, 1974. Calif. Acad. Sci., Occas. Papers 109: 23 (floral relationships). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 22-23, fig. 4, tables 2, 9, 11, 12-14 (floral relationships, parasite).

timberlakei Zavortink. Ariz. to south. Calif. and south. Nev. Pollen: Apparently polylectic, visits flowers of *Dalea fremontii*, *Eriodictyon trichocalyx*, *Hyptis emoryi*, *Larrea*

tridentata, Lepidium fremontii, Malacothrix, Mentzelia involucrata, M. tricuspis, Phacelia, Sphaeralcea ambigua, Verbesina.
Ancylandrena timberlakei Zavortink, 1974. Calif. Acad. Sci., Occas. Papers 109: 16, figs. 1, 4. ♂, ♀.

Biology: Zavortink, 1974. Calif. Acad. Sci., Occas. Papers 109: 19 (floral relationships).

Subfamily PANURGINAE

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 1-22, 54 figs. (larvae). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 6-13, figs. 7-18 (pupae). —Rozen, 1970. Amer. Mus. Novitates 2416: 1-16, 19 figs. (immature stages).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 1-44, 18 figs. (review of N. Amer. spp.).

Genus PROTANDRENA Cockerell

Protandrena Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 91.
Type-species: *Andrena maurula* Cockerell. Desig. by Sandhouse, 1943.
Austrandrena Timberlake, 1906. Psyche 13: 37.
Type-species: *Andrena modesta* Smith. Monotypic and orig. desig.
Protoandrena Cresson, 1928. Amer. Ent. Soc., Mem. 5: 58. Emend.

Revision: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 133-227, 93 figs. (N. Amer. spp.).

Taxonomy: Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 92 (tax. characters). —Cockerell, 1896. Canad. Ent. 28: 184 (tax. characters). —Timberlake, 1955. Bol. Lab. Zool. Gen. Agr. 33: 398-409 (key to females, as *Psaenythia*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 286-287, figs. 58, 67-68, table 8 (east. U. S. spp.). —Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 1 (tax. status).

amplipennis Timberlake. Ariz. (10 mi. S.W. of Patagonia). Pollen: Unknown, but visits flowers of *Croton*.
Protandrena amplipennis Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 146. ♀.

bancrofti Dunning. Ariz., N. Mex., Tex., Kans., Mo., Okla., Nebr., Colo., Wyo., Iowa, N. Dak., Ind., Ill., Wis. Pollen: Unknown, but visits flowers of *Amorpha, Asclepias, Astragalus, Baccharis, Eysenhardtia, Guardiola, Helianthus, Heterotheca, Lepidium, Medicago, Melilotus, Monarda, Petalostemon, Psoralea, Solanum, Symphoricarpos.*
Protandrena Bancrofti Dunning, 1897. Canad. Ent. 29: 264. ♀.

Taxonomy: Cockerell, 1921. Amer. Mus. Novitates 24: 13. ♀. —Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 150, figs. 4, 5, 6 (geogr. and floral records).

Biology: Chandler, 1962. Kans. Ent. Soc., Jour. 35: 314 (nest).

bicolor (Timberlake). Tex. to Ariz.; Mexico (Coahuila, Durango). Pollen: Collects pollen from flowers of the composite genus *Bahia*, but also visits flowers of *Verbesina*.
Psaenythia bicolor Timberlake, 1955. Bol. Lab. Zool. Gen. Agr. 33: 401. ♀.

Taxonomy: Rozen, 1970. Amer. Mus. Novitates 2416: 9-13, figs. 9-17 (larva, pupa). —Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 150-152, figs. 7, 8, 9. ♂.

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 17-19, fig. 6 (nesting activity, nest architecture, floral relationships). —Rozen, 1970. Amer. Mus. Novitates 2416: 6-7, fig. 2 (nest architecture, nesting habits).

bishoppi Crawford. Tex.
Protandrena bishoppi Crawford, 1916. Ent. Soc. Wash., Proc. 19: 128. ♀.

Taxonomy: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 152-153 (notes on type).

cockerelli Dunning. N. J., Ind., Ill., Iowa, Mich., Nebr., Mo., Kans., Colo., N. Mex., Tex. Pollen: Unknown, but visits flowers of *Acerates, Amphiachyris, Asclepias, Cassia, Euphorbia corollata, Gaillardia, Melilotus, Monarda, Petalostemon, Solanum, Teucrium.*
Protandrena Cockerelli Dunning, 1897. Canad. Ent. 29: 47. ♀.

Taxonomy: Cockerell, 1899. Ent. News 10: 3. ♂. —Timberlake, 1955. Bol. Lab. Zool. Gen. Agr. 33: 400 (tax. status). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 287 (tax. characters and status). —Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 156-157 (tax. characters and status).

cognata Timberlake. Ariz. (Cochise County).
Protandrena cognata Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 157. ♀.

duplonotata (Timberlake). Ariz. (Pinal Co.).; Mexico (Sonora). Pollen: Unknown, but visits flowers of *Hymenothrix*.
Psaenythia duplonotata Timberlake, 1955. Bol. Lab. Zool. Gen. Agr. 33: 407. ♀.

Taxonomy: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 159 (geogr. and floral record).

euphorbiae (Timberlake). Ariz. (Hope and Picacho Pass); Mexico (Sonora). Pollen: Unknown, but visits flowers of *Euphorbia*, including *E. capitellata*.
Psaenythia euphorbiae Timberlake, 1955. Bol. Lab. Zool. Gen. Agr. 33: 406. ♀.

Taxonomy: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 161-162, figs. 16, 17, 18. ♂.

heteromorpha (Cockerell). N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Aplopappus gracilis*, *Gutierrezia microcephala*, *Heterotheca subaxillaris*, *Verbesina encelioides*.
Andrena heteromorpha Cockerell, 1896. Canad. Ent. 28: 180. ♀, ♂.

Taxonomy: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 168-171, figs. 25, 26, 27 (redescription).

hurdi Timberlake. N. Mex. (Rodeo and 25 miles east of Steins), Ariz. (Chiricahua and Huachuca Mts.). Pollen: Unknown, but visits flowers of *Asclepias subverticillata*.
Protandrena hurdi Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 171, figs. 28, 29, 30. ♂.

kansensis Timberlake. Kans. (Douglas and Greenwood Counties). Pollen: Unknown, but visits flowers of *Amphiachyris dracunculoides*.
Protandrena kansensis Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 175, figs. 34, 35, 36. ♀, ♂.

leucopus Timberlake. Ariz. (Cochise and Pima Counties).
Protandrena leucopus Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 178, figs. 40, 41, 42. ♂.

maurula (Cockerell). Tex.
Andrena maurula Cockerell, 1896. Canad. Ent. 28: 179. ♀.

mexicanorum (Cockerell). N. Dak., Nebr. Colo. and Tex., west to Ariz.; Mexico (Chihuahua, Coahuila, Durango and Sonora). Pollen: Unknown, but visits flowers of *Asclepias*, *Kallstroemia grandiflora*, *Solanum*. *Protandrena durangoensis* Timberlake is possibly a subspecies of this.
Andrena mexicanorum Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 85. ♀
Andrena asclepiadis Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 86. ♂.

Taxonomy: Timberlake, 1955. Bol. Lab. Zool. Gen. Agr. 33: 400 (synonymy, tax. status, flower records). —Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 188-189, figs. 55, 56, 57 (tax. characters and status).

pectidis (Timberlake). Ariz., N. Mex.; Mexico (Sonora). Pollen: Unknown, but visits flowers of *Pectis papposa*, *Viguiera annua*.
Psaenythia pectidis Timberlake, 1955. Bol. Lab. Zool. Gen. Agr. 33: 405. ♀.

Taxonomy: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 191-192, figs. 58, 59, 60. ♂.

sorocula Timberlake. N. Mex. (7 miles southeast of Rodeo).
Protandrena sorocula Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 205. ♀.

sphaeralceae Timberlake. Ariz. (Cochise County). Pollen: Unknown, but visits flowers of *Sphaeralcea*.
Protandrena sphaeralceae Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 207. ♀.

swenki Crawford. Nebr.
Protandrena swenki Crawford, 1913. U. S. Natl. Mus., Proc. 45: 241. ♀.

Taxonomy: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 191-192, figs. 58, 59, 60. ♂.

texana Timberlake. Tex. (Archer, Gillespie and Throckmorton Counties). Pollen: Unknown, but visits flowers of *Teucrium laciniatum*.
Protandrena texana Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 211, figs. 76, 77, 78. ♂.

tidestromiae Timberlake. N. Mex., Ariz. Pollen: Collects pollen from flowers of *Tidestromia* including *T. lanuginosa*, but visits other flowers presumably for nectar including *Verbesina*.
Protandrena tidestromiae Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 212, figs. 79, 80, 81. ♀, ♂.

trifoliata (Cockerell). N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Baccharis glutinosa, Euphorbia capitellata, Solanum, Trifolium, Verbesina*.
Andrena trifoliata Cockerell, 1896. Canad. Ent. 28: 179. ♀.

Taxonomy: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 215-217, figs. 82, 83, 84. ♂.

verbesinae (Timberlake). West Tex. to Ariz.; Mexico (Coahuila and Durango). Pollen: Unknown, but visits flowers of *Asclepias, Baileya, Heterotheca, Pectis, Verbesina encelioides*.
Psaenythia verbesinae Timberlake, 1955. Bol. Lab. Zool. Gen. Agr. 33: 402. ♀, ♂.

Taxonomy: Timberlake, 1976. Amer. Ent. Soc., Trans. 102: 222-224, figs. 88, 89, 90 (geogr. and floral records).

Genus PANURGINUS Nylander

Panurginus Nylander, 1848. Notiser Sallskapet Flora Fauna Fenn. 1: 223.
Type-species: *Panurginus niger* Nylander. Monotypic.
Greeleyella Cockerell, 1904. Entomologist 37: 235.
Type-species: *Greeleyella beardsleyi* Cockerell. Monotypic and orig. desig.
Birkmania Viereck, 1909. Ent. Soc. Wash. Proc. 11: 50.
Type-species: *Panurginus polytrichus* Cockerell. Monotypic and orig. desig. (=*Birkmania andrenoides* Viereck).

Revision: Crawford, 1926. Ent. Soc. Wash., Proc. 28: 207-214. —Michener, 1935. Canad. Ent. 67: 275-278 (species with blackfaced males).

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 5, 10-12, figs. 17-28 (larvae).

armaticeps Cockerell. South. Calif. Pollen: Unknown, but visits flowers of *Ceanothus integerrimus, Cryptantha intermedia, Gilia integrifolia, Phacelia davidsonii, P. distans, Potentilla glandulosa, Prunus demissa, Rhamnus crocea, Salix laevigata*.
Panurginus armaticeps Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 280. "♀" = ♂.

Taxonomy: Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 322. ♂, ♀.

atramontensis Crawford. Md. to Ga., Miss. Pollen: Unknown, but visits flowers of *Polycodium*.
Panurginus atramontensis Crawford, 1926. Ent. Soc. Wash., Proc. 28: 210. ♂, ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 259-260, figs. 59-61, table 8 (redescription).

atriceps (Cresson). Idaho, Wash., Oreg., Calif. Pollen: Collects pollen from flowers of *Dowingia bella* or *D. cuspidata*, but also visits flowers of *Ceanothus dentatus, C. integerrimus, Cryptantha intermedia, Lasthenia chrysostoma, Montia perfoliata, Nemophila maculata, N. pulchella, Ranunculus, Rhamnus crocea, Rhus diversiloba, Tamarix gallica*. Predator: *Philanthus pulcher* Dalla Torre.
Calliopsis atriceps Cresson, 1878. Amer. Ent. Soc., Trans. 7: 67. ♂.

Taxonomy: Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 194. ♀. —Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 198. ♂, ♀. —Rust, 1976. Pan-Pacific Ent. 52: 165, figs. 3, 10-16 (larva).

Biology: Rust, 1976. Pan-Pacific Ent. 52: 161-166, figs. 2-9 (nest site, nest architecture, cell provisions, adult and immature habits).

beardsleyi (Cockerell). N. Dak., Nebr., Colo. Pollen: Unknown, but visits flowers of *Malvastrum*.
Greeleyella beardsleyi Cockerell, 1904. Entomologist 37: 236. ♀.

Panurginus malvastri Swenk and Cockerell, 1907. Ent. News 18: 179. ♂, ♀.

Taxonomy: Cockerell, 1906. Canad. Ent. 38: 164. ♂.

bilobatus Michener. South. Calif. Pollen: Unknown, but visits flowers of *Astragalus, Cryptantha intermedia, Gilia integrifolia, Lasthenia gracilis, Phacelia distans, P. hispida, Rhamnus crocea, R. ilicifolia, Salvia columbariae, Salix laevigata, Sisymbrium irio.*

Panurginus bilobatus Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 322. ♂, ♀.

ceanothi Michener. South. Calif. Pollen: Unknown, but visits flowers of *Ceanothus.*

Panurginus ceanothi Michener, 1935. Pan-Pacific Ent. 11: 180. ♂.

cressoniellus Cockerell. Colo., N. Mex. Predator: *Philanthus pulcher* Dalla Torre.

Calliopsis clypeata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 67. ♂. Preocc.

Panurginus cressoniellus Cockerell, 1898. Canad. Ent. 30: 29. N. name.

Panurginus cressoniellus calochorti Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 222. ♀.

?Panurginus verus Cockerell, 1901. Psyche 9: 163. ♀.

Taxonomy: Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 350. ♂, ♀. —Viereck, 1903. Amer. Ent. Soc., Trans. 29: 49. ♂. —Cockerell, 1912. Ent. News 23: 445 (synonymy).

emarginatus Michener. Calif.

Panurginus emarginatus Michener, 1935. Pan-Pacific Ent. 11: 179. ♂, ♀.

gabrielis Michener. South. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Arctostaphylos glauca, Ceanothus crassifolius, C. greggii, C. leucodermis, C. verrucosus, Rhamnus californica, R. crocea.*

Panurginus gabrielis Michener, 1935. Canad. Ent. 67: 276. ♂.

Taxonomy: Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 321 (tax. characters).

gracilis Michener. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Arctostaphylos pungens, Baccharis, Ceanothus crassifolius, C. verrucosus, Lasthenia chrysostoma, Rhamnus crocea, Salix lasiolepis, Salvia mellifera.*

Panurginus gracilis Michener, 1935. Canad. Ent. 67: 276. ♂, ♀.

ineptus Cockerell. Colo., Wash., Oreg., Utah.

Panurginus ineptus Cockerell, 1922. Amer. Mus. Novitates 36: 8. ♀.

Panurginus bakeri Crawford, 1926. Ent. Soc. Wash., Proc. 28: 213. ♂. Preocc.

Panurginus rohweri Crawford, 1932. Ent. Soc. Wash., Proc. 34: 78. N. name.

Taxonomy: Timberlake, 1971. Pan-Pacific Ent. 47: 148 (tax. status, synonymy).

maritimus Michener. Calif.

Panurginus maritimus Michener, 1935. Pan-Pacific Ent. 11: 178. ♂.

Taxonomy: Michener, 1935. Canad. Ent. 67: 277. ♀.

melanocephalus (Cockerell). Calif. Parasite: *Zodion cinereiventre* Van Duzee, *Z. nigrifrons* Krober. Pollen: Collects pollen of *Ranunculus californicus,* but visits these and other flowers for nectar.

Panurgus melanocephalus Cockerell, 1926. Pan-Pacific Ent. 3: 80. ♂, ♀.

Panurginus morrisoni Crawford, 1926. Ent. Soc. Wash., Proc. 28: 209. ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1036, figs. 86-88 (larva). —Rozen, 1966. Amer. Mus. Novitates 2259: 12, figs. 21-23 (larva).

Biology: MacSwain and Bohart, 1947. Pan-Pacific Ent. 23: 30 (parasite). —Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 20-21, 28 pl. 6 (nest, life history, mating, sex ratio, floral relationships, parasite).

nigrellus Crawford. Calif. Pollen: Unknown, but visits flowers of *Arctostaphylos, Baccharis glutinosa, Cryptantha intermedia, Lasthenia chrysostoma, Nemophila pulchella, Ranunculus californicus, Salix lasiolepis, Tamarix gallica.*

Panurginus nigrellus Crawford, 1926. Ent. Soc. Wash., Proc. 28: 210. ♂.

Taxonomy: Michener, 1935. Pan-Pacific Ent. 11: 180. ♀.

nigrihirtus Michener. Calif.

Panurginus nigrihirtus Michener, 1935. Pan-Pacific Ent. 11: 179. ♂, ♀.

occidentalis (Crawford). Calif. Pollen: Collects pollen from flowers of *Limnanthes douglasii*.
Greeleyella occidentalis Crawford, 1916. Insecutor Inscitiae Menstruus 4: 105. ♂, ♀.

Biology: Rust, 1976. Pan-Pacific Ent. 52: 159, 165-166, fig. 1 (mating behavior, pollen and nectar source).

polytrichus Cockerell. Miss., La., Tex.
Panurginus polytrichus Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 28. ♂.
Birkmania andrenoides Viereck, 1909. Ent. Soc. Wash., Proc. 11: 50. ♀.
Greeleyella resinata Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 361. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 260-262, figs. 59-61, table 8 (redescription).

potentillae (Crawford). N. J., Md., Va., N. C. Pollen: Collects pollen from the flowers of *Potentilla*, but visits these and other flowers for nectar including *Fragaria*, *Ranunculus*.
Greeleyella potentillae Crawford, 1916. Insecutor Inscitiae Menstruus 4: 104. ♂, ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 262-263, figs. 59-61, table 8 (redescription). —Rozen, 1966. Amer. Mus. Novitates 2259: 10-12, figs. 17-20 (larva). —Rozen, 1967. Amer. Mus. Novitates 2297: 28-29, figs. 12-13, table 2 (egg, larva).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 27-30, tables 1-2 (nest architecture, life history, floral relationship).

Genus PSEUDOPANURGUS Cockerell

Pseudopanurgus Cockerell, 1897. Canad. Ent. 29: 290.
Type-species: *Panurgus aethiops* Cresson. Orig. desig.
Protandrenopsis Crawford, 1903. Canad. Ent. 35: 337.
Type-species: *Panurgus aethiops* Cresson. Monotypic and orig. desig.
(=*Protandrenopsis fuscipennis* Crawford).

Revision: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 1-58, 4 plates, 56 figs. (N. Amer. spp.).

Taxonomy: Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 195-198. —Cockerell, 1922. Amer. Mus. Novitates 36: 9. —Robertson, 1922. Psyche 29: 164 (Illinois spp.). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 266-270, figs. 62, 65-66, table 8 (eastern U. S. spp.). —Rozen, 1966. Amer. Mus. Novitates 2259: 5, 7-9, figs. 8-16 (larva). —Timberlake, 1967. Amer. Mus. Novitates 2298: 1-10 (Ariz. spp.). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 1, 2 (key, tax. status).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 19-27, figs. 1-3, 6-8, tables 1-2 (nest architecture, life history, floral relationships, parasites).

aethiops (Cresson). Nebr., Kans., Colo., Tex., N. Mex., Ariz. Pollen: Collects pollen from the flowers of Compositae including *Baileya*, *Encelia*, *Grindelia*, *Helianthus*, *Heterotheca*, *Melampodium*, *Prionopsis*, *Verbesina encelioides*, but visits these and other flowers for nectar including *Asclepias*.
Panurgus aethiops Cresson, 1872. Amer. Ent. Soc., Trans. 4: 259. ♀, ♂.
Protandrenopsis fuscipennis Crawford, 1903. Canad. Ent. 35: 337. ♀.

Taxonomy: Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1098 (synonymy). —Rozen, 1966. Amer. Mus. Novitates 2259: 9 figs. 9-10 (larva). —Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 8-10 figs. 1-2 (redescription).

Biology: Hicks, 1931. Canad. Ent. 63: 172 (nest). —Rozen, 1967. Amer. Mus. Novitates 2297: 19-27, figs. 1-2, 7, tables 1-2 (nest architecture, life history, floral relationship).

Taxonomy: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 10 (pollen sources).

bradleyi Timberlake. Tex. (Blanco County).
Pseudopanurgus bradleyi Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 10, figs. 3-4. ♂.

cazieri cazieri Timberlake. Ariz. (Cochise County). Another subspecies, *P. c. coahuilensis* Timberlake, occurs in Mexico.
Pseudopanurgus cazieri cazieri Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 13, figs. 7-8. ♀, ♂.

dicksoni Timberlake. N. Mex., Ariz.; Mexico (Baja California and Sonora). Pollen: Unknown, but visits flowers of *Aplopappus, Argemone intermedia, Crotalaria pumila, Milleria quinquefolia, Pectis papposa.*
Pseudopanurgus dicksoni Timberlake, 1967. Amer. Mus. Novitates 2298: 8. ♀, ♂.

Taxonomy: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 19, figs. 15-16 (tax. characters, flower record).

fraterculus fraterculus (Cockerell). West. Tex., N. Mex.; Mexico (Aguascalientes, Coahuila, Durango and San Luis Potosi). Pollen: Unknown, but visits flowers of *Gutierrezia lucida, Tidestromia.*
Calliopsis fraterculus Cockerell, 1896. Canad. Ent. 28: 159. ♂, ♀.

Taxonomy: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 21-23 (redescription, tax. status).

fraterculus timberlakei Cockerell. Colo., N. Mex., Ariz., Calif. (San Diego County); Mexico (Baja California). Parasite: *Holcopasites arizonicus* (Linsley)?, *H. insoletus* (Linsley)? Pollen: Apparently an oligolege of the Compositae, including *Aplopappus gracilis, Baileya multiradiata, B. pleniradiata, Gutierrezia californica, G. microcephala, Heliopsis, Heterotheca subaxillaris, Hymenothrix wislizeni, Pectis papposa,* but visits these and other flowers for nectar including *Allionia, Eriogonum.*
Pseudopanurgus timberlakei Cockerell, 1931. Ent. Soc. Wash., Proc. 33: 201.

Taxonomy: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 23-24, figs. 2, 19-20 (redescription, floral and geogr. records).

Biology: Rozen, 1965. N. Y. Ent. Soc., Jour. 73: 88 (parasite). —Rozen, 1967. Amer. Mus. Novitates 2297: 19-27, figs. 1-2, tables 1-2 (nest architecture, life history, pollen source, parasite). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39 (parasites).

pectidellus Cockerell. N. Mex., Ariz.; Mexico (Chihuahua). Pollen: Apparently an oligolege of the Compositae, visits flowers of *Baileya, Pectis papposa, Verbesina.*
Pseudopanurgus pectidellus Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 26.

Taxonomy: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 32-34, figs. 33-34 (redescription, geogr. and floral records).

pectiphilus (Cockerell). N. Mex., Ariz. Pollen: Apparently an oligolege of the Compositae, visits flowers of *Baileya multiradiata, Heterotheca subaxillaris, Pectis papposa, Tidestromia lanuginosa.*
Panurginus pectiphilus Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 193. ♀.

Taxonomy: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 34-35, figs. 35-36 (redescription, geogr. and floral records).

perarmatus Timberlake. South. Ariz.; Mexico (Chihuahua and Sonora). Pollen: Apparently an oligolege of the Compositae, visits flowers of *Aplopappus gracilis, Heterotheca subaxillaris, Verbesina encelioides, Zexmenia podocephala.*
Pseudopanurgus perarmatus Timberlake, 1967. Amer. Mus. Novitates 2298: 5. ♀, ♂.

Taxonomy: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 35, figs. 37-38 (tax. characters).

perpunctatus Timberlake. N. Mex., Ariz. Pollen: Presumably an oligolege of Compositae, visits flowers of *Heterotheca, Pectis papposa.*
Pseudopanurgus perpunctatus Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 35, figs. 39-40. ♀, ♂.

rugosus (Robertson). Md. to Ga., west to Ill., Nebr., Kans., Tex. Pollen: Apparently an oligolege of the Compositae, especially the Helianthae, visits flowers of *Bidens aristosa, Helianthus annuus, H. divaricatus, H. mollis, H. petiolaris, H. subaxillaris, Heliopsis helianthoides, Pontederia cordata, Rudbeckia laciniata, R. triloba, Silphium perfoliatum, S. speciosum,* but visits flowers of *Melilotus officinalis* for nectar.
Calliopsis rugosus Robertson, 1895. Amer. Ent. Soc., Trans. 22: 121. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 269-270, figs. 62, 65-66 (redescription). —Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 38, figs. 41-42 (tax. characters, geogr. and floral records).

texanus Timberlake. Tex.; Mexico (Tamaulipas).
Pseudopanurgus texanus Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 40, figs. 45-46. ♀, ♂.

verticalis Timberlake. N. Mex., Ariz., south. Calif. (Riverside County); Mexico (Sonora). Parasite: *Holcopasites insoletus* (Linsley). Pollen: Apparently an oligolege of the Compositae; visits flowers of *Bahia absinthifolia*, *Pectis papposa*, *Verbesina encelioides*, but also visits the flowers of *Kallstroemia grandiflora* presumably for nectar.
Pseudopanurgus verticalis Timberlake, 1967. Amer. Mus. Novitates 2298: 2. ♀, ♂.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 9, figs. 11-16 (larva, as *Pseudopanurgus* sp. B). —Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 50, figs. 55-56 (tax. characters).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 27 (parasite of *Pseudopanurgus* sp. B). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39 (parasite).

Genus ANTHEMURGUS Robertson

Anthemurgus Robertson, 1902. Canad. Ent. 34: 321.
Type-species: *Anthemurgus passiflorae* Robertson. Monotypic and orig. desig.

Taxonomy: Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 1 (tax. status).

passiflorae Robertson Ill. to N. C. Pollen: Unknown, but visits flowers of *Passiflora*.
Anthemurgus passiflorae Robertson, 1902. Canad. Ent. 34: 321. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 265-266, figs. 62, 65-66 (redescription).

Genus HETEROSARUS Robertson

Heterosarus Robertson, 1918. Ent. News 29: 91.
Type-species: *Calliopsis parvus* Robertson. Monotypic and orig. desig.

Revision: Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 1-56, 8 plates, 87 figs. (N. Amer. spp.).

Taxonomy: Timberlake, 1964. Amer. Mus. Novitates 2185: 2-5 (key to spp. in Amer. north of Mexico). —Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 1, 2 (tax. status).

arizonicus (Timberlake). Ariz., N. Mex. Pollen: Unknown, but visits flowers of *Eriogonum*.
Pseudopanurgus arizonicus Timberlake, 1964. Amer. Mus. Novitates 2185: 23. ♂, ♀.

Taxonomy: Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 14, figs. 9-10 (tax. characters).

bakeri (Cockerell). Colo., N. Mex., Ariz.; Mexico (Chihuahua, Michoacan, Morelos and Puebla). Pollen: Unknown, but visits flowers of *Calochortus gunnisonii*, *Euphorbia*, *Frasera speciosa*, *Helenium hoopesii*, *Heterotheca subaxillaris*, *Linum lewisii*, *Lopezia*, *Monarda austromontana*, *Oxalis*, *Phacelia leucophylla*, *Potentilla filipes*, *P. fruticosa*, *Pseudocymopterus montanus*, *Sedum stenopetalum*, *Solidago*.
Calliopsis bakeri Cockerell, 1896. Ent. News 7: 221. ♂.

Taxonomy: Viereck, 1903. Amer. Ent. Soc., Trans. 29: 50. —Cockerell, 1910. Psyche 17: 245. ♂, ♀. —Timberlake, 1964. Amer. Mus. Novitates 2185: 7-8 (geogr. and floral records). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 15-16, figs. 13-14 (tax. characters, geogr. and floral records).

dawsoni (Timberlake). Tex., N. Mex., Colo. Pollen: Unknown, but visits flowers of an unspecified crucifer.
Pseudopanurgus dawsoni Timberlake, 1964. Amer. Mus. Novitates 2185: 10. ♀, ♂.

Taxonomy: Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 20, figs. 23-24 (tax. characters).

euphorbiae Timberlake. Ariz. (Pima County); Mexico (Chiapas, Michoacan, Morelos, Nayarit and Puebla).
Heterosarus euphorbiae Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 24, figs. 29-30. ♂, ♀.

flavotinctus (Cockerell). N. Mex., Colo., Ariz.; Mexico (Zacatecas). Pollen: Unknown, but visits flowers of *Bigelovia*, *Sphaeralcea*.
Panurginus pauper var. *flavotinctus* Cockerell, 1898. Denison. Univ. Sci. Labs., Bul. 11: 51. ♂.

Taxonomy: Cockerell, 1898. N. Mex. Univ., Bul. 1: 51. ♂. —Cockerell, 1899. Entomologist 32: 129. ♀. —Timberlake, 1964. Amer. Mus. Novitates 2185: 20-23 (redescription). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 26, figs. 33-34 (tax. characters and status).

illinoiensis (Cresson). Que. to Fla., west to Ill., Kans., Okla. and Tex. Pollen: Unknown, but visits flowers of *Amphiachyris dracunculoides*, *Bellis integrifolia*, *Chrysanthemum leucanthemum*, *Descourainia*, *Erigeron*, *Gaillardia*, *Heterotheca subaxillaris*, *Lepidium*.

Calliopsis illinoiensis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 66. ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 274, figs. 64-66, table 8 (redescription). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 30-31, figs. 43-44 (tax. status, geogr. and floral records).

nanulus (Timberlake). N. Mex., Ariz.; Mexico (Baja California, Chihuahua, Durango and Sonora). Parasite: *Holcopasites tegularis* Hurd and Linsley. Pollen: Unknown, but visits flowers of *Euphorbia*, *Physalis*, *Wislizenia refracta*.

Pseudopanurgus nanulus Timberlake, 1964. Amer. Mus. Novitates 2185: 5. ♀, ♂.

Taxonomy: Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 37, figs. 55-56 (tax. characters).

Biology: Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 26, 39 (parasite).

neomexicanus (Cockerell). N. Mex., Ariz.; Mexico (Distrito Federal, Durango, Guanajuato, Hidalgo, Mexico, Michoacan, Morelos, Puebla and Tlaxcala). Pollen: Unknown, but visits flowers of *Cacalia decomposita*, *Ceanothus*, *Erigeron*, *Geranium*, *Helenium hoopesii*, *Monarda austromontana*, *Penstemon*, *Solidago*.

Panurginus neomexicanus Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 451. ♂.
Panurginus nigrinus Viereck, 1903. Amer. Ent. Soc., Trans. 29: 50. ♀.

Taxonomy: Timberlake, 1964. Amer. Mus. Novitates 2185: 8-10 (redescription, geogr. and floral records). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 37-38, figs. 57-58 (tax. characters).

opacicollis (Timberlake). Ariz. Pollen: Unknown, but visits flowers of *Eriogonum*.

Pseudopanurgus opacicollis Timberlake, 1964. Amer. Mus. Novitates 2185: 15. ♀.

Taxonomy: Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 38 (tax. characters).

opaculus (Cockerell). Ariz. (Mud Springs, Santa Catalina Mts.).

Panurginus opaculus Cockerell, 1922. Amer. Mus. Novitates 36: 3. ♀.

Taxonomy: Timberlake, 1964. Amer. Mus. Novitates 2185: 18-20 (redescription). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 39, fig. 87 (tax. characters).

parvus (Robertson). Pa., N. C., Ga., Miss., Mo., Ill., Wis., N. Dak., Alta., Colo., N. Mex. Pollen: Unknown, but visits flowers of *Aster*, *Eulophus*, *Geranium*, *Gerardia tenuifolia*, *Gillenia*, *Monarda*, *Solidago*, *Thaspium*.

Calliopsis parvus Robertson, 1892. Amer. Nat. 26: 273. ♀, ♂.
Pseudopanurgus gerardiae Crawford, 1932. Ent. Soc. Wash., Proc. 34: 77. ♂, ♀.
Pseudopanurgus stevensi Crawford, 1932. Ent. Soc. Wash., Proc. 34: 78. ♂, ♀.
Panurginus borealis Cockerell, 1937. Canad. Ent. 69: 33. ♀.

Taxonomy: Crawford, 1932. Ent. Soc. Wash., Proc. 34: 77 (tax. characters). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 277-278, figs. 64-66, table 8 (synonymy, redescription). —Timberlake, 1964. Amer. Mus. Novitates 2185: 25 (synonymy, as *stevensi*). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 40, figs. 63-64 (synonymy, tax. characters).

pauper (Cresson). New England to Fla., west to Ill. and Mo. Pollen: Collects pollen especially from the flowers of *Ceanothus americanus*, but also visits flowers of *Rubus* presumably for nectar.

Calliopsis pauper Cresson, 1878. Amer. Ent. Soc., Trans. 7: 66. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 278-279, figs. 64-66, table 8 (redescription). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 40, figs. 65-66 (tax. characters).

Biology: Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 40 (pollen source).

pernitens (Cockerell). Ariz., N. Mex.
Panurginus pernitens Cockerell, 1922. Amer. Mus. Novitates 36: 4. ♀.

Taxonomy: Timberlake, 1964. Amer. Mus. Novitates 2185: 14-15 (redescription). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 40-41 (tax. characters).

subglaber Timberlake. Tex. (Del Rio).
Heterosarus subglaber Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 45, figs. 71-72. ♂.

townsendi (Cockerell). Tex., N. Mex., Ariz.
Calliopsis townsendi Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 152. ♂.

Taxonomy: Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 48-49, figs. 77-78. ♂, ♀ (redescription).

virginicus (Cockerell). Md. to Ga., W. Va. and Ala. Pollen: Unknown, but visits flowers of *Ceanothus, Houstonia purpurea.*
Panurginus virginicus Cockerell, 1907. Entomologist 40: 137. ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 281-282, figs. 64-66, table 8 (redescription). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 52, figs. 83-84 (tax. characters).

Genus PTEROSARUS Timberlake

Pterosarus Timberlake, 1967. Amer. Mus. Novitates 2298: 10.
Type-species: *Calliopsis rudbeckiae* Robertson. Orig. desig.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 5-8, figs. 1-8 (larvae, as *Pseudopanurgus*). —Timberlake, 1967. Amer. Mus. Novitates 2298: 19-22 (Key to spp.). —Timberlake, 1975. Calif. Univ. Pubs. Ent. 77: 1, 2 (key, tax. status).

aestivalis (Provancher). Que.
Panurgus aestivalis Provancher, 1882. Nat. Canad. 13: 205. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 271-272 (tax. characters).

albitarsis (Cresson). Conn. to Ga., west to Ill., Colo., N. Mex. and Tex., ?Calif. Pollen: Unknown, but visits flowers of *Aster ericoides villosus, Brauneria pallida, B. purpurea, Coreopsis palmata, Helianthus divaricatus, H. mollis, Lepachys pinnata, Rudbeckia hirta, R. laciniata, R. submentosa, Verbesina helianthoides.*
Panurgus albitarsis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 260. ♀, ♂.
Panurgus picipes Cresson, 1872. Amer. Ent. Soc., Trans. 4: 261. ♂.

Taxonomy: Cockerell, 1900. Canad. Ent. 32: 364. ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 266-267, figs. 62, 65-66, table 8 (synonymy, redescription). —Timberlake, 1967. Amer. Mus. Novitates 2298: 11 (tax. position).

altissimus (Cockerell). Colo.
Panurginus altissimus Cockerell, 1922. Amer. Mus. Novitates 36: 3. ♂, ♀.

andrenoides (Smith). N. B. to N. C., west to Minn. and Ill., ?N. Mex. Pollen: Unknown, but visits flowers of *Aster, Rudbeckia triloba, Solidago.* Predator: *Philanthus lepidus* Cress.
Scrapter Andrenoides Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 121. ♀.
Calliopsis asteris Robertson, 1895. Amer. Ent. Soc., Trans. 22: 121. ♀, ♂.

Taxonomy: Cockerell, 1904. Canad. Ent. 36: 303. ♀. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 272-273, figs. 64-66, table 8 (synonymy, redescription).

atricornis (Cresson). Colo., N. Mex.
Calliopsis atricornis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 67. ♂.
Panurginus atricomis (!) Viereck, 1903. Amer. Ent. Soc., Trans. 29: 50 (tax. characters).

Taxonomy: Timberlake, 1967. Amer. Mus. Novitates 2298: 11 (tax. position).

aurifodinae (Michener). South. Calif., mountains.
Pseudopanurgus aurifodinae Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 320. ♂.

barberi (Cockerell). N. Mex.
Panurginus barberi Cockerell, 1899. Entomologist 32: 129. ♂.

boylei (Cockerell). Colo., N. Mex., Ariz. Parasite: *Holcopasites insoletus* (Linsley)? Pollen: Collects pollen from the flowers of *Verbesina encelioides* .
Calliopsis boylei Cockerell, 1896. Canad. Ent. 28: 161. ♂.

Taxonomy: Cockerell, 1897. Acad. Nat. Sci., Phila., Proc. 49: 350. —Crawford, 1912. Canad. Ent. 44: 368 (tax. characters). —Rozen, 1966. Amer. Mus. Novitates 2259: 6-7, figs. 1-7 (larva).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 19-27, figs. 1-2, tables 1-2 (nest architecture, life history, parasite).

californicus (Cresson). Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Chaenactis glabriuscula, Encelia californica, Gilia multicaulis, Lasthenia californica, L. gracilis, Layia elegans, L. platyglossa, Ranunculus californicus.*
Calliopsis californicus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 67. ♂.

citrinifrons (Viereck). N. Mex.
Panurginus citrinifrons Viereck, 1903. Amer. Ent. Soc., Trans. 29: 51. ♂.

citripes (Ashmead). Colo.
Calliopsis citripes Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 5. ♂.

compositarum (Robertson). Md. to Ga., west to Ill. Pollen: Unknown, but visits flowers of *Aster, Bidens aristosa, Boltonia asteroides, Polygonum scandens, Rudbeckia triloba, Solidago nemoralis, S. ulmifolia.*
Calliopsis compositarum Robertson, 1893. Amer. Ent. Soc., Trans. 20: 274. ♀.

Taxonomy: Robertson, 1895. Amer. Ent. Soc., Trans. 22: 121. ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 273-274, figs. 64-66 (redescription).

didirupa (Cockerell). Idaho, Colo., N. Mex.
Panurginus didirupa Cockerell, 1908. Entomologist 41: 293. ♂, ♀.

expallidus (Swenk and Cockerell). Nebr.
Panurginus expallidus Swenk and Cockerell, 1907. Ent. News 18: 181. ♂.

helianthi (Mitchell). Ind. (Tippecanoe Co.). Pollen: Unknown, but visits flowers of *Helianthus annuus.*
Pseudopanurgus (*Pseudopanurgus*) *helianthi* Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 267. ♀.

horizontalis (Swenk and Cockerell). Nebr
Panurginus horizontalis Swenk and Cockerell, 1907. Ent. News 18: 183. ♂.

illustris (Timberlake). Ariz. (Chiricahua Mts.). Pollen: Unknown, but visits flowers of *Verbesina encelioides, Viguiera.*
Pseudopanurgus illustris Timberlake, 1967. Amer. Mus. Novitates 2298: 18. ♀.

innuptus (Cockerell). Alta., N. Dak., S. Dak., Nebr., Colo., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Helianthus.*
Calliopsis innuptus Cockerell, 1896. Ent. News 7: 222. "♀" = ♂.
Panurginus albitarsis var. *fortior* Cockerell, 1899. Entomologist 32: 129. ♂.
Panurginus innuptus var. *absonus* Cockerell, 1912. Ent. News 23: 446. ♂.

Taxonomy: Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 194. ♂, ♀.

irregularis (Cockerell). Colo.
Panurginus irregularis Cockerell, 1922. Amer. Mus. Novitates 36: 2. ♂.

labrosiformis distractus (Cockerell). Nebr.
Panurginus labrosiformis distractus Cockerell, 1912. Ent. News 23: 447. ♂.

labrosifromis labrosiformis (Robertson). N. C., Ga., Ill. Pollen: Unknown, but visits flowers of *Actinomeris alternifolia, Bidens aristosa, Coreopsis tripteris, Helianthus divaricatus, H. tuberosus, Heliopsis helianthoides, Rudbeckia laciniata, R. triloba, Silphium perfoliatum, Solidago canadensis.*
Panurginus labrosiformis Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 49. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 274-275, figs. 64-66, table 8 (redescription).

labrosus (Robertson). N. Y. to N. C., west to Minn. Pollen: Unknown, but visits flowers of *Helianthus divaricatus, H. tuberosus, Heliopsis, Rudbeckia lanceolata, R. triloba. Calliopsis labrosus* Robertson, 1895. Amer. Ent. Soc., Trans. 22: 122. ♀, ♂.

Taxonomy: Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 48, ♀, ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 268-269, figs. 62, 65-66, table 8 (redescription).

leucopterus (Cockerell). Colo.
Panurginus leucopterus Cockerell, 1923. Ent. News 34: 49. ♂.

lutzae (Cockerell). Colo.
Panurginus lutzae Cockerell, 1922. Amer. Mus. Novitates 36: 7. ♀.

nebrascensis muesebecki (Michener). N. C. to Fla., Miss. Pollen: Unknown, but visits flowers of *Aster, Chrysopsis, Haplopappus.*
Pseudopanurgus nebrascensis timberlakei Michener, 1947. Amer. Midland Nat. 38: 446. ♂, ♀. Preocc.
Pseudopanurgus (*Heterosarus*) *nebrascensis muesebecki* Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1100. N. name.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 276-277, fig. 65, table 8 (redescription, geogr. range).

nebrascensis nebrascensis (Crawford). Maine to N. J., west to Colo. and Alta. Pollen: Unknown, but visits flowers of *Aster, Solidago.*
Panurginus nebrascensis Crawford, 1903. Canad. Ent. 35: 335. ♂, ♀.

Taxonomy: Crawford, 1912. Canad. Ent. 44: 368 (tax. characters). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 275-276, figs. 64-66, table 8 (redescription).

nubis (Cockerell). N. Mex.
Panurginus nubis Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 193. ♀.

occidus (Timberlake). Ariz. Parasite: *Holcopasites arizonicus* (Linsley)? Pollen: *Aplopappus gracilis, Helianthus, Heterotheca subaxillaris, Verbesina encelioides.*
Pseudopanurgus (*Pterosarus*) *occidus* Timberlake, 1967. Amer. Mus. Novitates 2298: 14. ♀, ♂.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 7-8, fig. 8 (larva, as species A).

Biology: Rozen, 1965. N. Y. Ent. Soc., Jour. 73: 88 (parasite). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39 (parasite).

ornatipes (Cresson). Nebr., Colo., Tex.
Calliopsis ornatipes Cresson, 1872. Amer. Ent. Soc., Trans. 4: 260. ♂.

Taxonomy: Crawford, 1912. Canad. Ent. 44: 368. (tax. characters).

pecki (Cockerell). Alta.
Panurginus pecki Cockerell, 1937. Canad. Ent. 69: 114. ♂.

perlaevis (Cockerell). Colo., N. Mex., Ariz. Parasite: *Holcopasites insoletus* (Linsley)?
Calliopsis perlaevis Cockerell, 1896. Canad. Ent. 28: 160. ♀.

Taxonomy: Cockerell, 1922. Amer. Mus. Novitates 36: 5.

Biology: Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39 (parasite).

piercei albertensis (Cockerell). Alta.
Panurginus piercei albertensis Cockerell, 1937. Canad. Ent. 69: 33. ♀.

piercei piercei (Crawford). N. Dak., Nebr., Colo., N. Mex.
Panurginus piercei Crawford, 1903. Canad. Ent. 35: 335. ♂, ♀.

Biology: Pierce, 1904. Nebr. Univ., Studies 4: 185. —Hicks, 1936. Canad. Ent. 68: 47 (nesting habits).

porterae (Cockerell). N. Mex., Colo., Ariz.
Panurginus Porterae Cockerell, 1900. Canad. Ent. 32: 364. ♂, ♀.

pulchricornis (Cockerell). Colo.
Panurginus pulchricornis Cockerell, 1922. Amer. Mus. Novitates 36: 8. ♀.

renimaculatus (Cockerell). N. Dak., Wyo., Nebr., Colo., N. Mex., Tex.
Calliopsis renimaculatus Cockerell, 1896. Ent. News 7: 222. ♀.

Taxonomy: Swenk and Cockerell, 1907. Ent. News 18: 180. ♀ (only). —Crawford, 1915. U. S. Natl. Mus., Proc. 94: 579. ♀, ♂. —Stevens, 1919. Canad. Ent. 51: 208. ♂.

rudbeckiae (Robertson). Wis., Ill. Pollen: Unknown, but visits flowers of *Aster, Bidens aristosa, Helianthus divaricatus, Rudbeckia hirta, R. laciniata, R. submentosa, R. triloba.*

Calliopsis rudbeckiae Robertson, 1895. Amer. Ent. Soc., Trans. 22: 122. ♀, ♂.

Biology: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 279-280, figs. 64-66, table 8 (redescription).

simulans (Swenk and Cockerell). N. Dak., Nebr.

Panurginus simulans Swenk and Cockerell, 1907. Ent. News 18: 182. ♂, ♀.

solidaginis (Robertson). New England west to Ill., south to Miss. Pollen: Unknown, but visits flowers of *Bidens aristosa, Boltonia asteroides, Coreopsis tripteris, Helianthus grosse-serratus, H. tuberosus, Rudbeckia submentosa, Solidago canadensis.*

Calliopsis solidaginis Robertson, 1893. Amer. Ent. Soc., Trans. 20: 274. ♀.

Taxonomy: Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 50. ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 280-281, figs. 64-66, table 8 (redescription).

stathamae (Timberlake). Ariz. (Southwestern Research Station).

Pseudopanurgus (*Pterosarus*) *stathamae* Timberlake, 1967. Amer. Mus. Novitates 2298: 16. ♀.

stigmalis (Swenk and Cockerell). Nebr.

Panurginus stigmalis Swenk and Cockerell, 1907. Ent. News 18: 180. ♂, ♀.

vicinus (Timberlake). Ariz. (Cochise County). Pollen: Unknown, but visits flowers of *Aplopappus gracilis.*

Pseudopanurgus (*Pterosarus*) *vicinus* Timberlake, 1967. Amer. Mus. Novitates 2298: 11. ♀, ♂.

ximenesiae (Cockerell). N. Mex.

Panurginus ximenesiae Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 195. ♀.

Genus METAPSAENYTHIA Timberlake

Metapsaenythia Timberlake, 1969. Ent. News 80: 89.
Type-species: *Calliopsis abdominalis* Cresson. Orig. desig.

Taxonomy: Timberlake, 1969. Ent. News 80: 89-92 (N. Amer. spp.). —Timberlake, 1973. Calif. Univ. Pubs. Ent. 72: 1 (tax. relationships).

abdominalis abdominalis (Cresson). Tex., Kans. Pollen: Collects pollen from flowers of *Monarda,* but visits other flowers for nectar including *Aster tanacetifolius, Brazoria truncata, Dalea aurea, Gaillardia, Helianthus annuus.*

Calliopsis abdominalis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 68. ♀, ♂.

Camptopoeum semirufum Cockerell, 1937. Amer. Mus. Novitates 899: 1. ♀.

Biology: Timberlake, 1969. Ent. News 80: 90 (floral relationships).

abdominalis tricolor (Cockerell). N. J. and Pa. to Ga. Pollen: Apparently an oligolege of *Monarda* including *M. punctata.*

Calliopsis tricolor Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 151. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 270-271, figs. 62-63, 66, table 8 (redescription). —Timberlake, 1969. Ent. News 80: 90-91 (tax. status).

Genus NOMADOPSIS Ashmead

Revision: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 1-202, 218 figs., 17 maps (monograph, includes information on biology, systematics and ecology).

Taxonomy: Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 195-198 (tax. status and characters). —Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 104-107 (tax. status). —Rozen, 1959. Ent. Soc. Wash., Proc. 61: 255-259 (geogr. and floral records). —Rozen, 1966. Amer. Mus. Novitates 2259: 5, 16 (larvae). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 6-8, figs. 3-10 (pupae).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 4-54 (life history, nest architecture, adult behavior, comparative ecology, floral relationships, parasites, predators). —Rozen, 1963. Amer. Mus. Novitates 2142: 1-17, 20 figs., 2 tables (nest architecture, life history, floral relationships). —Rozen, 1967. Amer. Mus. Novitates 2297: 1-44, 18 figs. 2 tables (review).

Genus NOMADOPSIS Subgenus NOMADOPSIS Ashmead

Nomadopsis Ashmead, 1898. Psyche 8: 285.
Type-species: *Peridita zonalis* Cresson. Monotypic and orig. desig. Lapsus for *Calliopsis zonalis* Cresson.
Spinoliella subg. *Claremontiella* Cockerell, 1933. Pan-Pacific Ent. 9: 25.
Type-species: *Calliopsis zonalis* Cresson. Monotypic and orig. desig. (=*Spinoliella euxantha* Cockerell).

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 60-63 (tax. status).

cincta cincta (Cresson). Calif. (east side of Sierra Nevada, Tulare and Trinity Counties), Nevada. Pollen: Apparently an oligolege of *Calochortus* including *C. luteus*.
Calliopsis cinctus Cresson, 1879. Amer. Ent. Soc., Trans. 7: 201. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 83, figs. 94-98, map 4 (redescription, tax. status).

cincta hurdi Rozen. Calif. (Sacramento). Pollen: Collects pollen from the flowers of *Calochortus luteus*.
Nomadopsis cincta hurdi Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 85. ♂, ♀.

comptula (Cockerell). Calif. (Tulare, Inyo, and San Bernardino Counties). Pollen: Collects pollen from the flowers *Potentilla*, including *P. bolanderi* var. *bernardina*, *P. b.* var. *parryi*, *P. gracilis*, but visits these and other flowers including *Calochortus palmeri* var. *paludicola* for nectar.
Spinoliella comptula Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 284. ♀.
Spinoliella edwardsii media Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 325. ♀, ♂.
Spinoliella edwardsii bernardina Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 326. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 75-77, figs. 79-83, map 3 (redescription, synonymy).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 7, 31, 75 (nest site, mating, floral relationships).

edwardsii (Cresson). Calif., Oreg., Wash., Idaho. Pollen: Collects pollen from flowers of *Calochortus*, *Chamaebatia foliolosa*, *Potentilla* including *P. bolanderi* var. *parryi*, *P. congesta*, *P. fusca*, *P. glandulosa*, *P. tridentata*, but visits these and other flowers for nectar including *Clarkia rhomboidea*, *Eriogonum marifolium*, *Fragaria californica*, *Iris hartwegii*, *Lathyrus sulphureus*, *Spraguea umbellata*.
Calliopsis Edwardsii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 64. ♀, ♂.
Calliopsis lateralis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 65. ♀.
Spinoliella triangulifera Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 195. ♀.

Taxonomy: Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 325, ♂ (as *triangulifera*). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 77-81, figs. 4-5, 28-29, 64, 84-88, map 3 (redescription, synonymy, larva).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 6, 28-31, 81 (nest site, mating behavior, floral relationships).

linsleyi Rozen. Calif.; Mexico (Baja California). Pollen: Collects pollen from the flowers of *Eriodictyon*, including *E. angustifolium*, *E. crassifolium*, *E. parryi*, *E. trichocalyx*, but visits these and other flowers for nectar including *Arctostaphylos*, *Ceanothus*.
Nomadopsis linsleyi Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 85, figs. 6, 7, 30, 31, 53, 99-103, map 5. ♂, ♀.

obscurella (Cresson). Calif., Oreg., Ariz. (Tucson), ?Wash.; Mexico (Baja California). Pollen: Apparently oligolectic on *Eschscholzia*, especially *E. californica*, but visits other flowers

including *Agoseris glauca, Calendula, Ceanothus, Chaenactis glabriuscula, Coreopsis lanceolata, Cryptantha intermedia, Lasthenia, Layia platyglossa, L. p. breviseta, Malacothrix californica, Nemophila menziesii, Phacelia davidsonii, P. distans, P. tanacetifolia, Sida malvaeflora, Sphaeralcea.*

Calliopis obscurellus Cresson, 1879. Amer. Ent. Soc., Trans. 7: 201. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 91-93, figs. 104-108, map 7 (redescription).

Biology: Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 107 (mating). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 32, 93 (mating, floral relationships).

puellae (Cockerell). Tex., N. Mex., Ariz., Nev., Calif., Idaho.; Mexico (Baja California). Parasite: *Oreopasites vanduzeei* Cockerell. Pollen: Evidently collects pollen chiefly from the flowers of *Malacothrix* including *M. californica, M. exigua, M. glabrata,* but visits other flowers including *Anisocoma acaulis, Aster abatus, Astragalus, Baileya pleniradiata, Calycoseris wrightii, Chaenactis fremontii, Encelia farinosa, Haplopappus cooperi, H. linearifolius, Rafinesquia neomexicana.*

Spinoliella puellae Cockerell, 1933. Pan-Pacific Ent. 9: 25. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 89-91, figs. 89-93, map 6 (redescription). —Rozen, 1959. Ent. Soc. Wash., Proc. 61: 255 (geogr. records). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 8 (pupa).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 8, 31, 54, 89 (nest site, mating behavior, parasites, floral relationships).

timberlakei Rozen. Calif. (Los Angeles County), desert. Pollen: Possibly an oligolege of *Monardella exilis.*

Nomadopsis timberlakei Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 73, map 2. ♂, ♀.

zonalis sierrae Rozen. Calif. (Sierra Nevada Mts.). Parasite: *Oreopasites* sp. Pollen: Collects pollen from the flowers of *Monardella lanceolata,* but visits these and other flowers for nectar and or pollen including *Solidago californica.*

Nomadopsis zonalis sierrae Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 71-73, map 2. ♂, ♀.

Taxonomy: Rozen, 1963. Amer. Mus. Novitates 2142: 3-5, figs. 1-2, table 1 (immature stages). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 7-8, figs. 7-8 (pupa).

Biology: Rozen, 1963. Amer. Mus. Novitates 2142: 2-6 (nest site, nest architecture, floral relationships, parasite).

zonalis zonalis (Cresson). Calif. (central and south coasts). Pollen: Collects pollen from the flowers of *Monardella douglasii, M. lanceolata.*

Calliopsis zonalis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 201. ♂.

Spinoliella euxantha Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 283. ♀.

Taxonomy: Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1102 (synonymy). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 69-71, figs. 66, 74-78, map 2 (redescription).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 70-71 (floral relationships).

Genus NOMADOPSIS Subgenus MACRONOMADOPSIS Rozen

Nomadopsis subg. *Macronomadopsis* Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 93.
Type-species: *Nomadopsis micheneri* Rozen. Orig. desig.

anthidia anthidia (Fowler). Oreg., Calif. (west slope of Sierra Nevada, northern Coast Ranges, Sacramento Valley, part of San Joaquin Valley). Parasite: *Euphytomima nomiivora* James, *Oreopasites vanduzeii melanantha* Linsley. Pollen: Collects pollen from the flowers of *Trifolium* including *T. involucratum, T. melananthum, T. microcephalum, T. monanthum* var. *parvum, T. repens, T. tridentatum, T. variegatum,* but visits these and other flowers for nectar including *Eriodictyon trichocalyx, Lupinus bicolor.* Predator: *Solenopsis* sp.

Calliopsis anthidius Fowler, 1899. Psyche 8: 407. ♂ (♀ misdet.).

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 99-102, figs. 8, 9, 56, 63, 119-123, map 9 (tax. status, redescription, larva). —Rozen, 1959. Ent. Soc. Wash., Proc. 61: 258 (gender of name). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 8, figs. 9-10 (pupa).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 8-9, 32-34, 53, 101 (nest site, nest architecture, mating behavior, floral relationships, parasite, predator, larva). —Moradeshaghi and Bohart, 1968. Kans. Ent. Soc., Jour. 41: 456-473, 15 figs., 3 tables (parasite).

anthidia lutea Rozen. Calif. (east of Sierra and southern Calif.), Oreg., Idaho, Utah. Pollen: Collects pollen from the flowers of *Trifolium* including *T. involucratum*, *T. repens*.
Nomadopsis anthidius lutea Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 102, figs. 2, 3, 10, 11, 34, 35, 57, 124-128, map 9. ♂, ♀.

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 9, 34, 101 (nest site, mating behavior, floral relationships).

barri Rozen. Idaho, Oreg. Pollen: Unknown, but visits flowers of *Melilotus*.
Nomadopsis (*Macronomadopsis*) *barri* Rozen, 1959. Ent. Soc. Wash., Proc. 61: 256, figs. 1, 4. ♂, ♀.

filiorum Rozen. Calif. (Mono Co.). Pollen: Probably collects pollen from the flowers of *Trifolium*.
Nomadopsis (*Macronomadopsis*) *filiorum* Rozen, 1963. Amer. Mus. Novitates 2142: 6, figs. 3-6. ♂, ♀.

Biology: Rozen, 1963. Amer. Mus. Novitates 2142: 3-6, tables 1-2 (nest site, nest architecture, floral relationships).

micheneri Rozen. Calif. (Sierra Nevada and Trinity Mt.). Pollen: Collects pollen from the flowers of *Trifolium* including *T. gracilentum*, *T. monanthus* var. *parvum*, *T. repens*.
Nomadopsis micheneri Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 95, figs. 12, 13, 32, 33, 55, 67, 109-113, map 8. ♂, ♀.

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 9-12, 34-36, 43, 53, 98 (nest site, nest architecture, mating behavior, floral relationships).

zebrata bobbae Rozen. Ariz. (Navajo and Coconino Counties).
Nomadopsis zebrata bobbae Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 107, map 8. ♂, ♀.

zebrata zebrata (Cresson). S. Dak., Wyo., Colo., N. Mex. Pollen: Collects pollen from the flowers of *Astragalus*.
Calliopsis zebratus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 64. ♀.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 103-107, figs. 114-118, map 8 (tax. status, redescription).

Biology: Cockerell, 1915. Ent. News 26: 366 (nest site).—Hicks, 1936. Canad. Ent. 68: 47 (nest).—Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 35 (nest site).

Genus NOMADOPSIS Subgenus MICRONOMADOPSIS Rozen

Nomadopsis subg. *Micronomadopsis* Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 107.
Type-species: *Nomadopsis fracta* Rozen. Orig. desig.

australior (Cockerell). S. Dak., Nebr., Colo., Utah, N. Mex., Tex., Ariz.; Mexico (Chihuahua). Pollen: Collects pollen from the flowers of *Lepidium alyssoides*, *L. montanum*, but may also obtain pollen from the flowers of *Dithyrea wislizeni*.
Calliopsis australior Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 349. ♀ (♂ misdet.).

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 149-152, figs. 71, 182-185, map 15. ♂, ♀ (redescription). —Rozen, 1959. Ent. Soc. Wash., Proc. 61: 259 (geogr. rec.).

Biology: Custer, 1927. Psyche 34: 199 (nesting activities). —Custer, 1929. Canad. Ent. 61: 49 (nest). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 8, 152 (nest site, floral relationships).

barbata Timberlake. South. Calif., north into Central Valley. Parasite: *Oreopasites* sp. Pollen: Collects pollen from the flowers of *Phacelia* including *P. distans*, *P. tanacetifolia*, but visits these and other flowers for nectar including *Cryptantha*, *Linanthus dianthiflorus*.

Nomadopsis barbata Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 107. ♂, ♀.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 114-117, figs. 18-19, 42-43, 59, 133-136, map 11 (redescription, larva).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 8, 36, 40, 117, table 2 (nest site, nesting activity, mating behavior, floral relationships, parasite).

beamerorum Rozen. Tex. (Reeves and Pecos Counties). Pollen: Unknown, but holotype male was visiting flowers of *Prosopis*.

Nomadopsis (*Micronomadopsis*) *beamerorum* Rozen, 1963. Amer. Mus. Novitates 2142: 13, figs. 12-15. ♂, ♀.

callosa Timberlake. Tex. (El Paso Co.); Mexico (Baja California).

Nomadopsis callosa Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 110. ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 140-142, figs. 174-177, map 8 (redescription). —Rozen, 1959. Ent. Soc. Wash., Proc. 61: 259 (type).

cazieri Rozen. Calif. (San Jacinto Mts. and San Diego County).

Nomadopsis cazieri Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 135, figs. 165-169, map 14. ♂, ♀.

foleyi Timberlake. South. Calif., deserts. Pollen: Collects pollen from the flowers of *Larrea tridentata*, but visits these and other flowers for nectar including *Heliotropium*, *Nama hispida*.

Nomadopsis foleyi Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 112. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 119-121, figs. 141-144, map 10 (redescription).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 121 (floral relationships).

fracta Rozen. Calif. (widely distributed at lower altitudes). Pollen: Collects pollen from the flowers of *Eriodictyon angustifolium*, *E. californicum*, *E. crassifolium*, *E. trichocalyx*, but visits these and presumably other flowers for nectar including *Ceanothus integerrimus*, *Chaenactis*, *Chamaebatia foliolosa*, *Cryptantha intermedia*, *Erigeron divergens*, *Eriogonum fasciculatum*, *Gilia exilis*, *Mimulus fremontii*, *Nama parryi*, *Phacelia brachyloba*, *P. douglasii*.

Nomadopsis fracta Rozen, 1952. Kans. Ent. Soc., Jour. 25: 144, 4 figs. ♂, ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1036, figs. 92-98 (larva). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 111-113, figs. 36-37, 68-69, 129-132, map 10 (redescription, larva).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 36, 39, 48-50, 55, 60, 113 (mating behavior, sleep, flower relationships, voltinism).

helianthi (Swenk and Cockerell). Nebr. and N. Mex., west to Calif.; Mexico (Baja California). Parasite: *Oreopasites euphorbiae* Ckll. Pollen: Collects pollen from the flowers of *Euphorbia albomarginata*, *E. polycarpa*, but visits these and other flowers for nectar including *Cryptantha intermedia*, *Eremocarpus setigerus*, *Eriogonum fasciculatum*, *E. gracile*, *Gutierrezia sarothrae*, *Helianthus*, *Heliotropium curassavicum*, *Hemizonia paniculata*.

Spinoliella helianthi Swenk and Cockerell, 1907. Ent. News 18: 178. ♀.

Spinoliella euphorbiae Cockerell, 1925. Pan-Pacific Ent. 1: 179. ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1036, figs. 99, 106-108 (larva, as *euphorbiae*). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 133, map 13 (type). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 129-133, figs. 16-17, 40-41, 61, 65, 157-160, map 13 (as *euphorbiae*, redescription, larva). —Rozen, 1963. N. Y. Ent. Soc., Jour. 7: 142-143 (synonymy).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 11, 16-17, 37, 40, 43, 48-49, 50, 55, 59, 133 (adult activity, defecation, floral relationships, habitat, hibernation, mating behavior, sleep, parasitism, voltinism).

hesperia equina (Cockerell). Calif. (Great Valley), Nev. (Virginia City). Parasite: *Oreopasites vanduzeei* Ckll. Pollen: Collects pollen from the flowers of *Heliotropium curassavicum*, but visits these and other flowers for nectar including *Erodium cicutarium*, *Hemizonia pungens*, *Medicago sativa*.

Spinoliella equina Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 196. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 148-149 (redescription). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 6-7, figs. 5-6 (pupa).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 49, 59, 147 (flower relationships, parasite).

hesperia hesperia (Swenk and Cockerell). South. Calif. Pollen: Collects pollen from the flowers of *Heliotropium curassavicum oculatum*.

Spinoliella hesperia Swenk and Cockerell, 1907. Ent. News 18: 186. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 147-148, figs. 20-21, 44-46, 70, 178-181, map 15 (redescription).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 49, 59, 147 (floral relationships).

larreae Timberlake. South. Calif. (Colorado and Mojave Deserts). Ecology: Nest sites are established in sand dune areas. Pollen: Collects pollen from the flowers of *Larrea tridentata*.

Nomadopsis larreae Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 111. ♀.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 126-128, figs. 153-156, map 12 (redescription).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 11, 37, 41, 43, 49, 55, 128 (nest site, nest architecture, nesting activities, mating behavior, floral relationships).

macswaini Rozen. Ariz. Pollen: Evidently collects pollen from the flowers of *Wislizenia refracta*.

Nomadopsis macswaini Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 152, figs. 195-198, map 16. ♂, ♀.

meliloti (Cockerell). Tex., N. Mex., Ariz. (Willcox). Pollen: Pollen-laden females have been collected at the flowers of *Dalea scoparia*, but also visits flowers of *Melilotus*.

Calliopsis meliloti Cockerell, 1896. Canad. Ent. 28: 158. ♀.

Taxonomy: Cockerell, 1933. Pan-Pacific Ent. 9: 158. ♂, ♀. —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 138-140, figs. 170-173, map 14 (redescription). —Rozen, 1959. Ent. Soc. Wash., Proc. 61: 259 (geogr. record).

mellipes Timberlake. South. Calif. Pollen: Apparently collects pollen from the flowers of *Lotus* including *L. glaber*, *L. hamatus*, *L. salsuginosus*, *L. scoparius*, *L. strigosus*, but visits these and apparently other flowers for nectar including *Camissonia dentata*, *Encelia*.

Nomadopsis mellipes Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 109. ♂, ♀.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 125-126, figs. 149-152, map 12 (redescription).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 126 (floral relationships).

nigromaculata Timberlake. South. Calif., Ariz., deserts. Pollen: Apparently collects pollen from the flowers of *Euphorbia polycarpa* including *E. p.* var. *hirtella*, but visits other flowers including *Eriogonum trichopes*, *Pectis papposa* possibly for nectar.

Nomadopsis nigromaculata Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 115. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 133-135, figs. 161-164, map 14 (redescription).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 37-38, 50, 52, 135 (mating behavior, adult behavior, floral relationships, voltinism).

personata (Cockerell). Wash., Oreg., Idaho, Wyo. Pollen: Pollen laden females have been collected at the flowers of *Cleome lutea, C. serrulata.*
Calliopsis personatus Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 349. ♀.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 165-167, figs. 186-189, map 15 (redescription). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 7 (pupa).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 167 (floral relationships).

phaceliae Timberlake. Calif. (chiefly east side of Sierra Nevada and Mojave Desert). Pollen: Apparently collects pollen from the flowers of *Phacelia fremontii*, but visits these and other flowers for nectar including *Euphorbia albomarginata, Hesperochiron californicum, Nama demissum.*
Nomadopsis phaceliae Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 116. ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 117-119, figs. 137-140, map 11 (redescription). —Rozen, 1959. Ent. Soc. Wash., Proc. 61: 258-259 (geogr. and floral records).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 119 (floral relationships).

scitula lawae (Michener). Calif. (Inyo, Lassen and Mono Counties), Nev. (Fallon). Pollen: A female laden with pollen has been taken at the flowers of *Thelypodium brachycarpum*, others at flowers of *Cleome* and a male at the flowers of *Cleomella oocarpa.*
Spinoliella lawae Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 324. ♀.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 156-157, 159-160, map 16 (redescription).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 160 (floral relationships).

scitula scitula (Cresson). Wyo., Idaho, Utah, Colo., N. Mex.; variants occur in B. C., Oreg., northeast. Calif., northeast. Nev., Colo. and Wyo. Parasite: *Oreopasites scituli* Ckll. Pollen: Females with pollen-laden hind legs have been collected at the flowers of *Cleome serrulata, Sisymbrium altissimum.*
Calliopsis scitulus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 64. ♀.
Calliopsis pictipes Cresson, 1878. Amer. Ent. Soc., Trans. 7: 65. ♂.

Taxonomy: Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 348 (tax. characters). —Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1102 (synonymy). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 21, 154-159, figs. 72, 199-203, map 16 (redescription, tax status, larva). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 7 (pupa).

Biology: Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 440 (parasite). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 12, 40, 47, 159 (nest site, nesting activities, floral relationships.)

scutellaris scutellaris (Fowler). Wyo., Idaho, Utah, Nev., Wash., Oreg., Calif., Ariz.; Mexico (northern Baja California). Parasite: *Euphytomima nomiivora* James, *Myrmosula rutilans* (Fowler), *Oreopasites* sp. Pollen: Apparently polylectic, pollen-laden females have been collected from the flowers of *Heliotropium curassavicum, Mesembryanthemum, Sesuvium sessile, Wislizenia refracta,* alsike clover, ladino clover, carrots, but also visits other flowers including *Alyssum maritimum, Brassica incana, Chrysanthemum, Cressa truxillense, Gutierrezia sarothrae, Melilotus indica, Phacelia fremontii, Raphanus sativus, Sesuvium verrucosum, Solidago, Tamarix.* Another subspecies, *N. scutellaris peninsularis* (Cockerell), occurs in southern Baja California.
Calliopsis scutellaris Fowler, 1899. Psyche 8: 406. ♂.
Calliopsis visaliensis Fowler, 1899. Psyche 8: 406. ♀.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 20, 23, 24, 25, 27, 30, 160-165, figs. 24-25, 47-48, 62, 73, 190-194, map 17 (redescription, larva). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 7 (pupa).

Biology: Snelling, 1954. Pan-Pacific Ent. 30: 124 (parasite). —Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 12, 15, 38, 40, 48, 53-54, 164 (nest, site, nest architecture, life history, mating behavior, parasite). —Moradeshaghi and Bohart, 1968. Kans. Ent. Soc., Jour. 41: 456-473, 15 figs., 3 tables (parasite).

snellingi Rozen. Calif. (Squaw Valley). Pollen: Unknown, but visits flowers of *Salvia*.
Nomadopsis (*Micronomadopsis*) *snellingi* Rozen, 1963. Amer. Mus. Novitates 2142: 9, figs. 7-11. ♂, ♀.

trifolii Timberlake. Calif. Pollen: Collects pollen from the flowers of *Mimulus fremontii*, *Trifolium melananthum*, *T. tridentatum*, *T. variegatum*, but also visits other flowers including *Cryptantha*, *Eriodictyon*, *Salix*.
Nomadopsis trifolii Timberlake, 1952. Ent. Soc. Amer., Ann. 45: 113. ♀, ♂.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 14, 19, 23, 26, 30, 121-123, figs. 14-15, 38-39, 60, 145-148, map 12 (redescription, egg, larva).

Biology: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 10, 15, 17, 35, 40, 48-50, 123 (nest site, nest architecture, life history, mating behavior, hibernation, sleep, voltinism, floral relationships).

Genus NOMADOPSIS Subgenus UNASSIGNED

boharti Rozen. Calif. (Eldorado, Napa and Tuolumne Counties).
Nomadopsis boharti Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 171, figs. 204-208, map 7. ♂, ♀.

Taxonomy: Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 8 (pupa).

interrupta (Provancher). Ont. (Toronto).
Calliopsis interrupta Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 320. ♀.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 174. (tax. status).

quadrilineata (Provancher). Ont. (Toronto).
Calliopsis 4-lineata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 319. ♀.
Calliopsis quadrilineata Dalla Torre, 1896. Cat. Hym., v. 10, p. 174. Emend.

Taxonomy: Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 174 (tax. status).

smithi Rozen. Calif. (San Benito County). Pollen: Unknown, but visits flowers of *Cryptantha*.
Nomadopsis smithi Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 169, figs. 214-218, map 7. ♂, ♀.

solitaria Rozen. Calif. (Lassen County).
Nomadopsis solitaria Rozen, 1963. Amer. Mus. Novitates 2142: 15, figs. 16-20. ♂.

xenus Rozen. Wash., Calif. (Lake Tahoe). Pollen: Pollen-laden females have been collected from the flowers of *Phacelia*.
Nomadopsis xenus Rozen, 1958. Calif. Univ. Pubs. Ent. 15: 167, figs. 209-213. ♂, ♀.

Genus CALLIOPSIS Smith

Revision: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 753-936, 156 figs., 8 maps, 9 tables (N. and Cent. Amer. spp., includes biological information).

Taxonomy: Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 195-198 (U. S. spp.). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 287-293, figs. 58, 69-71, table 8 (eastern U. S. spp.). —Rozen, 1966. Amer. Mus. Novitates 2259: 5, 13-16, figs. 29-40 (larvae). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 8-10, figs. 11-12 (pupae).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 1-44, 18 figs., 2 tables (review).

Genus CALLIOPSIS Subgenus CALLIOPSIS Smith

Calliopsis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 128.
Type-species: *Calliopsis andreniformis* Smith. Desig. by Ashmead, 1899.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 782-816, figs. 5, 6, 8-45, maps 1-3 (redescription, included spp.).

andreniformis Smith. Southeast. Canada including the Maritime Provinces, south to Fla., west to Mont., S. Dak., Colo., Utah, Okla. and east Tex. Parasite: *Holcopasites calliopsidis* (Linsley), *H. illinoiensis* (Robertson), *Sphecodes brachycephalus* Mitchell?, *Sphecodes* sp., *Parabombylius coquilletti* (Will.)?, *Trochometridium tribulatum* Cross, *Villa*

sinuosa (Wied.). Pollen: Polylectic, known sources include *Aster ericoides villosus, Convolvulus, Desmodium marilandicum, D. paniculatum, Erigeron canadensis, Gerardia tenuifolia, Hedyotis purpurea, Lippia lanceolata, Lycopus sinuatus, Lythrum alatum, Malva neglecta, M. rotundifolia, Melilotus alba, M. officinalis, Oxalis stricta, Polygala sanguinea, Polygonum buxiforme, Psoralea onybrichis, Pycnanthemum pilosum, Trifolium pratense, T. procumbens, T. repens, Verbena bracteata, V. hastata, V. urticifolia, Verbesina helianthoides,* but visits these and other flowers for nectar including *Achillea, Ailanthus altissima, Ammania coccinea, Amorpha canescens, Anaphalis margaritacea, Asclepias, Bidens aristosa, Boltonia asteroides, Brassica, Castanea pumila, Ceanothus americanus, Chrysanthemum leucanthemum, Chrysopsis, Cleome, Coreopsis palmata, C. tripteris, Cryptotaenia canadensis, Cucumis, Dianthera americana, Epilobium, Eryngium yuccifolium, Geum album, Gillenia stipulacea, Hedeoma pulegioides, Hedyotis nigricans, Helenium, Hypericum perforatum, Lindernia dubia riparia, Lespedeza capitata, L. procumbens, L. repens, L. reticulata, Ligustrum, Medicago sativa, Nepeta cataria, Oenothera laciniata, Oxalis dillenii, Penstemon, Petalostemon candidum, Polygonum convolvulus, P. pennsylvanicum, Portulaca, Potentilla monspeliensis, P. recta, Prunella vulgaris, Prunus, Psoralea tenuiflora, P. tenuiflora floribunda, Pycnanthemum flexuosum, P. virginianum, P. lanceolatum, Raphanus sativus, Rhus glabra, Rosa, Rubus, Rudbeckia triloba, Serinea oppositifolia, Sisymbrium repandum, Solanum carolinense, Solidago canadensis, Spiranthes gracilis, Stachys palustris, Stellaria, Strophostyles pauciflora, Stylosanthes biflora, Symphoricarpos, Tamarix, Trifolium hybridum, Verbena bracteosa, Veronica spicata, Vicia.* Predator: *Philanthus gibbosus* (Fabr.), *P. politus* Say.

Calliopsis andreniformis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 128. ♀.

Calliopsis flavipes Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 128. ♂.

Calliopsis lepidus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 68. ♀.

Panurgus vernalis Provancher, 1882. Nat. Canad. 13: 204. ♀, ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1038, figs. 100-105 (larva). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 288-289, figs. 69-71, table 8 (redescription, synonymy). —Rozen, 1966. Amer. Mus. Novitates 2259: 16, fig. 40 (larva). —Yager and Rozen, 1966 Amer. Mus. Novitates 2265: 8-10, figs. 11-12 (pupa). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 786-791, figs. 5-6, 8-13, map 1 (redescription).

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 159 (nest). —Swenk, 1907. Ent. News 18: 297 (nest, parasite). —Reinhard, 1924. Ann. Rept. Smithsn. Inst. 2738: 371-373 (predator). —Robertson, 1926. Psyche 33: 118 (nest, parasite). —Hendrickson, 1930. Iowa State Coll. Jour. Sci. 4: 163 (nest). —Pearson, 1933. Ecol. Monog. 3: 387 409-411 (floral relationships). —Ainslie, 1937. Canad. Ent. 69: 97-100 (nest, floral relationships, parasite). —Lovell and Lovell, 1939. Rhodora 41: 185 (ecology). —Crandall and Tate, 1947. Amer. Soc. Agronomy, Jour. 39: 161-163 (nest site, floral relationships). —Mitchell, 1956. Elisha Mitchell Sci. Soc. 72: 207 (parasite). —Michener and Rettenmeyer, 1956. Kans. Univ. Sci. Bul. 37: 645 (age of nest site). —Montgomery, 1957. Ind. Acad. Sci., Proc. 66: 129 (ecology). —Byers, 1962. Kans. Ent. Soc., Jour. 35: 320 (ecology). —Rozen, 1966. Amer. Mus. Novitates 2244: 33 (parasite). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 895-935 figs. 144-156, tables 4-9 (nest architecture, life history, immature stages, odor production, sleep, floral relationships, parasites). —Rozen, 1967. Amer. Mus. Novitates 2297: 32-33, fig. 9, table 1 (nest architecture, life history, parasite). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39, table 1 (parasites).

empelia Shinn. Ariz. (Douglas and Mt. Lemmon).

Calliopsis (*Calliopsis*) *empelia* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 811, figs. 38-41, map 2. ♀, ♂.

helenae Shinn. Tex. (10 mi. s. Alice); Mexico (Piedras Negras, Coahuila).

Calliopsis (*Calliopsis*) *helenae* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 814, map 1. ♀.

hondurasica Cockerell. La. (Robson), Tex.; Mexico to Panama. Pollen: Unknown, but visits flowers of *Cassia, Kallstroemia hirsutissima, Lippia, Nama undulatum, Phyla strigosa, Teucrium, Trifolium repens, Verbena.*

Calliopsis hondurasica Cockerell, 1949. U. S. Natl. Mus., Proc. 98: 437. ♀.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 800-804, figs. 30-33, map 2 (redescription).

rhodophila Cockerell. N. Mex., Ariz. (Chino Valley), south. Calif. (Riverside, San Bernardino and San Diego Counties); Mexico (Durango and Zacatecas). Pollen: Unknown, but visits flowers of *Solidago, Sphaeralcea.*

Calliopsis andreniformis rhodophilus Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 350. ♂, ♀.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 796-799, figs. 22-25, map 1 (redescription).

squamifera Timberlake. Ariz. Pollen: Unknown, but visits flowers of *Baccharis glutinosa, Euphorbia, Medicago sativa.*

Calliopsis squamifera Timberlake, 1947. Pan-Pacific Ent. 23: 28. ♂.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 804-807, figs. 42-45, map 3 (redescription).

teucrii Cockerell. N. Mex., Ariz., Colo.; Mexico (Distrito Federal, Durango, Guerrero, Mexico, Michoacan, Morelos, Nuevo Leon, Oaxaca, Puebla, Queretaro, San Luis Potosi, Tlaxcala and Zacatecas). Pollen: Unknown, but visits flowers of *Asclepias, Convolvulus incanus, Heterotheca chrysopsidis, Melilotus officinalis, Oxalis, Potentilla, Stylosanthes, Taraxacum, Teucrium laciniatum.*

Calliopsis teucrii Cockerell, 1899. *In* Cockerell and Porter, Ann. and Mag. Nat. Hist. (7) 4: 412. ♀.

Genus CALLIOPSIS Subgenus PERISSANDER Michener

Calliopsis subg. *Perissander* Michener, 1942. N. Y. Ent. Soc., Jour. 50: 275.
Type-species: *Calliopsis* (*Perissander*) *anomoptera* Michener. Monotypic and orig. desig.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 816-834, figs. 7, 46-57, maps 3-4 (redescription, included spp.).

anomoptera Michener. East. N. Mex., west to south. Calif.; Mexico (Baja California and Sonora). Pollen: Polylectic, collects pollen and nectar from a variety of flowers including *Cladothrix lanuginosa, Eriogonum, Euphorbia albomarginata, E. capitellata, E. hirtella, E. pleniradiata, E. polycarpa hirtella, E. polycarpa typica, Lepidium thurberi, Tidestromia.*

Calliopsis (*Perissander*) *anomoptera* Michener, 1942. N. Y. Ent. Soc., Jour. 50: 275. ♂, ♀.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 818-823, figs. 7, 46-49, map 4 (redescription).

Biology: Krombein, 1961. Ent. News 72: 82-83 (floral relationships with *Euphorbia albomarginata*). —Shinn, 1967 Kans. Univ. Sci. Bul. 46: 823 (floral relationships).

fulgida Shinn. N. Mex. (4.8 mi. N. of Rodeo), Ariz. (5 mi. E. Portal). Pollen: Unknown, but visits flowers of *Euphorbia, Tidestromia lanuginosa.*

Calliopsis (*Perissander*) *fulgida* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 831, map 3 ♀.

gilva Shinn. Ariz. (Douglas and Pima Counties), N. Mex. (Hidalgo County). Pollen: Unknown, but visits flowers of *Euphorbia, Verbesina, Tidestromia lanuginosa.*

Calliopsis (*Perissander*) *gilva* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 829, figs. 54-57, map 4. ♀, ♂.

limbus Shinn. Ariz. (Santa Catalina Mts.), N. Mex. (Granite Pass). Pollen: Unknown, but visits flowers of *Euphorbia.*

Calliopsis (*Perissander*) *limbus* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 827, map 4. ♀, ♂.

rogeri Shinn. Ariz. (Cochise County). Pollen: Unknown, but visits flowers of *Euphorbia albomarginata, Lepidium thurberi.*

Calliopsis (*Perissander*) *rogeri* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 823, figs. 50-53, map 4. ♀, ♂.

Genus CALLIOPSIS Subgenus CALLIOPSIMA Shinn

Calliopsis subg. *Calliopsima* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 834.
Type-species: *Calliopsis rozeni* Shinn. Orig. desig.

bernardinensis Michener. South. Calif. (Riverside and San Bernardino Counties). Pollen: Apparently an oligolege of autumnal flowering Compositae including *Gutierrezia sarothrae, Heterotheca grandiflora, Senecio ionophyllus.*
Calliopsis bernardinensis Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 323. ♂, ♀.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 852-855, figs. 77-82, map 6 (redescription, floral records).

chlorops Cockerell. N. Mex., Colo., Wyo., Idaho, Utah, Nev., Ariz. Pollen: Apparently an oligolege of the Compositae; visits flowers of *Chrysopsis, Grindelia squarrosa, Haplopappus gracilis, Medicago sativa, Ratibida, Verbesina, Viguiera annua.*
Calliopsis chlorops Cockerell, 1899. *In* Cockerell and Porter, Ann. and Mag. Nat. Hist. (7) 4: 413. ♂.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 860-862, figs. 95-98, map 6 (redescription, floral records).

coloradensis Cresson. Alta. to south. Utah and south. N. Mex., east to Mississippi River, thence through east. Tex. and Gulf States to east slope of the Appalachian Mts. in N. C. Parasite: *Holcopasites arizonicus* (Linsley). Pollen: Apparently an oligolege of the Astereae and Heliantheae (Compositae); collects pollen from the flowers of *Bidens aristosa, Boltonia asteroides, Coreopsis tripteris, Rudbeckia triloba, Solidago canadensis,* but visits other flowers some of which may also serve as pollen sources including *Anthemis cotula, Aplopappus pluriflorus, Aster dumosus, A. praetus, Bidens laevis, Chrysopsis, Chrysothamnus nauseosus, Eriocarpum gracile, Grindelia perennis, G. squarrosa, Haplopappus, Helenium nudiflorum, Heterotheca subaxillaris, Macrotera, Silphium, Solidago rigida, S. serotina.*
Calliopsis coloradensis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 63. ♀, ♂.
Calliopsis coloratipes fedorensis Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 28. ♀.

Taxonomy: Cockerell, 1908. Canad. Ent. 40: 147. ♂. —Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1103 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 289-290, figs. 69-71 (redescription, floral records). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 841-846, figs. 63-66, map 5, tables 2, 3 (redescription).

Biology: Hicks, 1926. Colo. Univ., Studies 15: 223 (nest). —Robertson, 1922. Psyche 29: 169 (floral relationships). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 846 (floral relationships). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39, table 1 (parasite).

coloratipes Cockerell. N. Mex., Ariz., Utah, Nev. Pollen: Unknown, but visits flowers of *Asclepias subverticillata, Bigelovia hartwegii, B. wrightii, Chrysothamnus nauseosus consimilis, Heterotheca.*
Calliopsis flavifrons race *coloratipes* Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 52. ♂.

Taxonomy: Cockerell, 1898. Univ. N. Mex., Bul. 1: 52. ♂. —Cockerell. 1899. Entomologist 33: 64. ♀. —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 862-865, figs. 99-102, map 5 (redescription, floral records).

crypta Shinn. Ariz. (Chiricahua Mts.); Mexico (Chihuahua). Parasite: *Holcopasites stevensi* (Cwfd.). Pollen: Collects pollen from *Heterotheca subaxillaris,* but also visits the flowers of *Cirsium, Helianthus.*
Calliopsis crypta Shinn, 1965. Amer. Mus. Novitates 2211: 15, figs. 9-12. ♀, ♂.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 14, figs. 29-33 (larva). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 858-860, figs. 87-90, map 6 (redescription).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 30-31, fig. 10, tables 1-2 (nest architecture, life history, floral relationship, parasite). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39, table 1 (parasite).

deserticola Shinn. South. Calif., deserts. Pollen: Unknown, but visits flowers of *Encelia farinosa.*
Calliopsis (*Calliopsima*) *deserticola* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 865, figs. 103-106, map 5. ♀, ♂.

pectidis Shinn. west. N. Mex., Ariz., south. Calif.; Mexico (Baja California). Parasite: *Holcopasites arizonicus* (Linsley)? Pollen: Unknown, but visits flowers of *Aplopappus, Baccharis, Baileya pleniradiata, Helianthus, Heterotheca subaxillaris, Hymenothrix wislizeni, Melilotus alba, Pectis angustifolia, P. papposa, Tidestromia lanuginosa, Verbesina encelioides.*

Calliopsis pectidis Shinn, 1965. Amer. Mus. Novitates 2211: 10, figs. 5-8. ♀, ♂.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 846-850, figs. 67-71, map 6 (redescription).

Biology: Shinn, 1965. Amer. Mus. Novitates 2211: 15 (parasite). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 850, 920 (floral records, parasite). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39, table 1 (parasite).

pugionis Cockerell. South. Calif. (cismontane). Pollen: Apparently an oligolege of Compositae, visits flowers of *Chaenactis artemisiaefolia, C. glabriuscula, Coreopsis* (cultivated), *C. lanceolata, Encelia farinosa, Hemizonia wrightii, Oenothera veitchiana.*

Calliopsis pugionis Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 197. ♀.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 868-870, figs. 107-110, map 5 (redescription).

rozeni Shinn. Tex., N. Mex., Ariz.; Mexico (Chihuahua and Coahuila). Parasite: *Holcopasites stevensi* (Cwfd.)? Pollen: Collects pollen from *Heterotheca subaxillaris* primarily, but visits other flowers including *Baccharis, Baileya pleniradiata, Chamaesaracha conioides, Eriogonum gracile, Gaillardia, Helianthus, Hymenoxys odorata, Melilotus alba, Parkinsonia, Pectis papposa, Psilostrophe cooperi, Sphaeralcea emoryi, Verbesina exauria.*

Calliopsis rozeni Shinn, 1965. Amer. Mus. Novitates 2211: 2, figs. 1-4. ♀, ♂.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 14-16, figs. 34-39 (larva, as *rozeni?*). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 838-841, figs. 58-62, map 5 (redescription).

Biology: Rozen, 1965. N. Y. Ent. Soc., Jour. 73: 88 (parasite). —Rozen, 1967. Amer. Mus. Novitates 2297: 31-32, tables 1-2 (nest architecture, life history, floral relationships, parasite). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39, table 1 (parasite).

timberlakei Shinn. West. Tex., N. Mex., Ariz., Utah. Pollen: Apparently an oligolege of Compositae, visits flowers of *Bahia absinthifolia, Bigelovia, Chrysothamnus nauseosus, Gutierrezia longifolia, G. microcephala, G. sarothrae, Haplopappus spinulosus, H. wrightii.*

Calliopsis (*Calliopsima*) *timberlakei* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 850, figs. 72-76, map 7. ♀, ♂.

unca Shinn. N. Mex. (3 mi. W. Bingham). Pollen: Unknown, but visits flowers of *Baileya pleniradiata.*

Calliopsis (*Calliopsima*) *unca* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 855, figs. 83-86, map 7. ♂.

Genus CALLIOPSIS Subgenus VERBENAPIS Cockerell and Atkins

Calliopsis subg. *Verbenapis* Cockerell and Atkins, 1902. Ann. and Mag. Nat. Hist. (7) 10: 44.

Type-species: *Calliopsis verbenae* Cockerell and Porter. Monotypic.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 876-891, figs. 123-143, map 8 (redescription, included spp.).

hirsutifrons Cockerell. West. Tex. (El Paso), N. Mex.; Mexico (Chihuahua, Guanajuato, Hidalgo and Mexico).

Calliopsis hirsutifrons Cockerell, 1896. Canad. Ent. 28: 158. ♂.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 887-889, figs. 134-138. ♀, ♂ (redescription).

micheneri Shinn. Tex. (Carrizo Springs). Pollen: Unknown, but visits flowers of *Verbena cloveri.*

Calliopsis (*Verbenapis*) *micheneri* Shinn, 1967. Kans. Univ. Sci. Bul. 46: 889, figs. 139-143, map 8. ♀, ♂.

nebraskensis Crawford. N. J., Wis. west to N. Dak., S. Dak., Nebr., Colo., south to Ill., Ark. and Kans. Parasite: *Holcopasites heliopsis* (Robt.), *Sphecodes* sp.? Pollen: Apparently polylectic since mixed pollen loads from flowers of Leguminosae and Verbenaceae have been observed; visitation records include flowers of *Ambrosia, Asclepias, Medicago sativa, Verbena hastata, V. stricta, V. urticaefolia, Vernonia.*
Calliopsis verbenae var. *Nebraskensis* Crawford, 1902. Canad. Ent. 34: 240. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 291-292, figs. 69-71, table 8 (redescription). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 882-887, figs. 129-133, map 8 (redescription).

Biology: Robertson, 1914. Ent. News 25: 72 (floral relationships, as *verbenae*). —Rau and Rau, 1916. Jour. Anim. Behavior 6: 368 (nesting habits, mating). —Robertson, 1922. Psyche 29: 171 (floral relationships, as *verbenae*). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 33 (nesting habits, mating behavior, parasite). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 886-887 (summary of bionomics including floral relationships). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 39, table 1 (parasite).

verbenae Cockerell and Porter. West. Tex. to southeast. Ariz.; Mexico (Durango). Pollen: Unknown, but visits flowers of *Chamaesaracha conioides, Sphaeralcea lobata, Verbena bipinnatifida, V. macdougalli.*
Calliopsis verbenae Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 412. ♀, ♂.

Taxonomy: Shinn, 1967. Kans. Univ. Sci. Bul. 46: 878-881, figs. 123-128, map 8 (tax. status, redescription, flower records).

Nomen Nudum in Calliopsis Smith

Calliopsis bridwelli Bridwell, 1899. Kans. Acad. Sci., Trans. 16: 210.

Unplaced Taxon in Calliopsis Smith

flavifrons Smith. Va., Fla.
Calliopsis flavifrons Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 129. ♂.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 321. ♀. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 293 (tax. status). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 892 (tax. status).

Genus HYPOMACROTERA Cockerell and Porter

Hypomacrotera Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 418.
Type-species: *Hypomacrotera callops* Cockerell and Porter. Orig. desig.

Biology: Rozen, 1970. Amer. Mus. Novitates 2416: 1-16, 19 figs., table 1 (nest architecture, life history, mating habits, immature stages, nest associates).

callops callops Cockerell and Porter. Colo., N. Mex., Ariz. Parasite: *Holcopasites illinoiensis minimus* (Linsley)? Pollen: Collects pollen from the flowers of *Sphaeralcea.*
Hypomacrotera callops Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 419. ♂, ♀.

Taxonomy: Cockerell, 1937. Amer. Mus. Novitates 948: 3. —Rozen, 1970. Amer. Mus. Novitates 2416: 7-9, 15-16, figs. 3-8, 18-19 (larva, pupa).

Biology: Rozen, 1970. Amer. Mus. Novitates 2416: 2-5, table, 1 (nest architecture, nesting habits, pollen source). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 36, table 1 (parasite).

callops persimilis Cockerell. Ariz., south. Calif.; Mexico (Baja California and Sonora). Parasite: *Holcopasites illinoiensis minimus* (Linsley). Pollen: Collects pollen from the flowers of *Physalis,* but visits other flowers for nectar including *Melilotus alba, Sida hederacea.*
Hypomacrotera callops persimilis Cockerell, 1899. Entomologist 33: 64. ♀, ♂.

Biology: Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 36, table 1 (parasite).

subalpinus andradensis Cockerell. N. Mex. to south. Calif.; Mexico (Baja California and Sonora). Pollen: Collects pollen from the flowers of *Sphaeralcea* including *S. ambigua, S.*

angustifolia, *S. emoryi*, *S. orcutti*, but visits other flowers for nectar including *Baileya multiradiata*, *B. pleniradiata*.

Hypomacrotera andradensis Cockerell, 1937. Amer. Mus. Novitates 948: 3. ♀, ♂.

subalpinus subalpinus (Cockerell). N. Mex., Ariz.; Mexico (Sonora). Parasite: *Oreopasites* sp. Pollen: Collects pollen from the flowers of *Sphaeralcea* including *S. ambigua*, *S. orcutti*.

Calliopsis subalpinus Cockerell, 1894. Ent. News 5: 235. ♂.

Calliopsis semirufus Cockerell, 1896. Ent. Monthly Mag. 32: 219. ♀.

Biology: Rozen, 1970. Amer. Mus. Novitates 2416: 2-5, table 1 (nest architecture, nesting habits, pollen source, parasite).

Genus XENOPANURGUS Michener

Xenopanurgus Michener, 1952. Kans. Ent. Soc., Jour. 25: 24.
Type-species: *Xenopanurgus readioi* Michener. Orig. desig.

Taxonomy: Shinn, 1964. Ent. News 75: 73-78 (included sp.).

readioi Michener. Ariz. (Huachuca Mts.); Mexico (Toluca).

Xenopanurgus readioi Michener, 1952. Kans. Ent. Soc., Jour. 25: 25, 5 figs. ♂.

Taxonomy: Shinn, 1964. Ent. News 75: 74-78. ♀, ♂.

Genus PERDITA Smith

This is a very large genus of pollen-collecting bees that has established through its component species a predominantly oligolectic relationship with the flora of North America. Even though the genus occurs transcontinentally in southern Canada, the United States and Mexico to as far south as Central America (Guatemala), it is centered in the more arid areas of northern Mexico and adjacent southwestern United States. The nesting habits of only a few species have been studied and these, like other species of the family, make their nests in the ground, although one species, *Perdita* (*Cockerellula*) *opuntiae* Cockerell, is known to excavate its nests in sandstone. Several females of at least some species occupy a single nest, but there is no evidence of caste development.

In recognition of utilitarian advantages, the subgenera are arranged alphabetically in this catalog.

Revision: Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 25-107. —Cockerell, 1922. Amer. Mus. Novitates 33: 14 (partial key). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 345-432, 172 figs. (all subgenera except *Hexaperdita* Timberlake, *Perditella* Cockerell, *Alloperdita* Viereck, and typical *Perdita* Smith). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 247-350, figs. 173-367 (treats subgenera *Alloperdita* Viereck, *Perditella* Cockerell, *Hexaperdita* Timberlake, and *Pygoperdita* Timberlake). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 303-410, figs. 368-521 (treats *zonalis* and *halictoides* groups of subgenus *Perdita*). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 1-156, figs., 522-732 (treats *octomaculata* group of subgenus *Perdita*). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1-124, figs. 733-904, 2 text figs. (treats *ventralis* group of subgenus *Perdita*, and suppl. to Parts I-IV). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 125-388, figs. 905-1190, 77 text figs. (treats *sphaeralceae* group of subgenus *Perdita*). —Timbelake, 1968. Calif. Univ. Pubs. Ent. 49: 1-196, figs. 1191-1360, 31 text figs. (suppl. to preceding parts, bibliography, index to Parts I-VII, corrigenda). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 1-63, figs. 1361-1417 (suppl. to Parts I-VII, treats subgenera *Cockerellia*, *Epimacrotera*, *Hexaperdita*, *Pentaperdita*, *Perdita*, *Procockerellia*, *Pygoperdita*, *Xeromacrotera*).

Taxonomy: Cockerell, 1922. Amer. Mus. Novitates 33: 1-15 (west. U. S. spp., species formation). —Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 199-204 (eastern U. S. spp.). —Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 961-985 (treats spp. of the subgenera *Cockerellia*, *Cockerellula*, *Macroteropsis*, *Xerophasma*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 295-330, figs. 58, 72-79, table 9 (eastern U. S. spp.). —Rozen, 1966. Amer. Mus. Novitates 2259: 5, 16-21, figs. 41-54 (larvae). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 12 (pupae).

Biology: Linsley, 1958. Hilgardia 27: 562, tables 4, 5 (pollen sources of some subgenera). —Rozen, 1967. Amer. Mus. Novitates 2297: 1-44, 18 figs., 2 tables (review). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 24-26, figs. 5-7 (*Larrea* visiting spp.).

Genus PERDITA Subgenus ALLOMACROTERA Timberlake

Perdita subg. *Allomacrotera* Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 131.
Type-species: *Perdita stephanomeriae* Timberlake. Monotypic and orig. desig.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 5-6 (key to spp. of subgenera *Allomacrotera*, *Procockerellia*).

stephanomeriae Timberlake. Calif. (Colorado and Mojave Deserts). Pollen: Possibly an oligolege of *Stephanomeria* including *S. pauciflora*, a male has been collected at the flowers of *Dalea spinosa*.
Perdita stephanomeriae Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 404. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 60: 131-132, figs. 658, 659, 731. ♂.

Genus PERDITA Subgenus ALLOPERDITA Viereck

Perdita subg. *Alloperdita* Viereck, 1917. Amer. Mus. Nat. Hist., Bul. 37: 241.
Type-species: *Perdita novae-angliae* Viereck. Monotypic.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 348 (key). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 271-275 (redescription, key to spp.). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 393 (modification of key). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 134. —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 30.

bradleyi Viereck. N. J. to Fla. Pollen: Unknown, but visits flowers of *Batodendron*, *Crataegus*, *Hydrocotyle umbellatum*, *Ilex*, *Nyssa sylvatica*, *Pyracantha*, *Sarracenia flava*.
Perdita bradleyi Viereck, 1907. Ent. News 18: 393. ♂.

Taxonomy: Timberlake, 1928. Amer. Mus. Novitates 321: 7 (as *obscurata*). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 274, figs. 211, 212, 306 (as *obscurata*). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 394 (as *obscurata*). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 134 (type). —Mitchell, 1964. N. C. Agr. Expt. Sta. Tech. Bul. 141: 310-311, figs. 72-73, table 9 (redescription).

floridensis Timberlake. N. C. to Fla. Pollen: Unknown, but visits flowers of *Batodendron*, *Ilex glabra*, *Leucothoe*.
Perdita floridensis Timberlake, 1928. Amer. Mus. Novitates 321: 7. ♂, ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 273, 274 (key, geogr. records). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 393 (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 311, figs. 72-74, 79, table 9 (redescription).

gertschi Timberlake. Tex. (Brewster County); Mexico (Coahuila). Pollen: Unknown, but visits flowers of *Prosopis juliflora*.
Perdita (*Alloperdita*) *gertschi* Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 393, figs. 468, 469, 519. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 30-31. ♀.

mitchelli Timberlake. N. C., Fla., Ala., Miss. Pollen: Unknown, but visits flowers of *Ceanothus*, *Cyrilla racemiflora*, *Oxydendrum*.
Perdita mitchelli Timberlake, 1947. Ent. Soc. Wash., Proc. 49: 81. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 273, 274, figs. 213-214, 307 (key, geogr. records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 311-312, figs. 73-74, table 9 (redescription).

novaeangliae Viereck. Mass. to Fla. Pollen: Unknown, but visits flowers of *Batodendron*, huckleberry, *Lyonia ligustrina*.
Perdita novae-angliae Viereck, 1907. Ent. News 18: 394. ♀, ♂.
Perdita novaeangliae Viereck, 1917. Amer. Mus. Nat. Hist., Bul. 37: 241. Emend.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 273, 274, 275, figs. 219, 220, 310 (key, genitalia). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 393 (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 312-313, figs. 72-73, table 9 (redescription).

obscurata Cresson. N. C. to Tex. Parasite: *Neolarra cockerelli* (Cwfd.)? Pollen: Unknown, but visits flowers of *Batodendron, Diospyros virginiana, Stillingia sylvatica.*

Perdita obscurata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 70. ♀, ♂.

Perdita carolina Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 199. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 273, 274, figs. 215, 216, 308 (key, genitalia, geogr. and floral records, as *carolina*). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 134 (synonymy). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 313-314, figs. 72-74, 79, table 9 (synonymy, redescription).

townesi Timberlake. N. C. to Fla. Pollen: Unknown, but visits flowers of *Batodendron, Ceanothus microphyllus, Diospyros virginiana, Ilex, Nyssa sylvatica.*

Perdita townesi Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 31, figs. 1209-1210, 1308. ♂, ♀.

Genus PERDITA Subgenus COCKERELLIA Ashmead

Cockerellia Ashmead, 1898. Psyche 8: 284.
Type-species: *Perdita albipennis* Cresson. Monotypic and orig. desig. (=*Perdita hyalina* Cresson).

Philoxanthus Ashmead, 1898. Psyche 8: 285.
Type-species: *Perdita beata* Cockerell. Monotypic and orig. desig.

The species of this subgenus are found almost exclusively at flowers of Compositae, mostly of the genera *Baileya, Coreopsis, Gaillardia, Geraea, Helianthus, Ratibida, Rudbeckia* and *Verbesina*, but also occur at the flowers of *Erigeron, Heterotheca, Pectis* and *Prionopsis.*

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 971-974 (key to females of included spp.). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 347, 385-402 (key to included spp.). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 326. —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 382-383. —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 19-22 (modification of key). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 2-5 (key to spp. allied to *hilaris*).

albihirta albihirta Timberlake. South. Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Geraea canescens*, but visits the flowers of *Encelia farinosa* and *Melilotus* presumably for nectar.

Perdita albihirta albihirta Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 395, fig. 79. ♀, ♂.

albihirta geraeae Timberlake. Calif. (Colorado and Mojave Deserts), Nev. (Stateline). Pollen: Apparently an oligolege of *Geraea canescens*, but visits the flowers of *Acamptopappus sphaerocephalus* var. *hirtellus* and *Larrea tridentata* presumably for nectar.

Perdita albihirta geraeae Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 396. ♀, ♂.

albipennis albipennis Cresson. N. Dak. south to Tex., west to Wyo., Colo. and Ariz. Pollen: Unknown, but visits flowers of *Helianthus annuus, H. petiolaris, Hymenopappus, Nolina, Prionopsis ciliata.* Predator: *Philanthus ventilabris* Fabr.

Perdita(?) *albipennis* Cresson, 1868. Amer. Ent. Soc., Trans. 1: 386. ♀.

Perdita hyalina Cresson, 1878. Amer. Ent. Soc., Trans. 7: 68. ♂.

Perdita albipennis var. *helianthi* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 104. ♂, ♀.

Perdita albipennis var. *helianthi* mut. *pasonis* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 105. ♂.

Perdita lacteipennis Swenk and Cockerell, 1907. Ent. News 18: 51. ♀, ♂.

Taxonomy: Cockerell, 1899. Psyche 8: 419. ♂ (as *hyalina*). —Cockerell, 1899. Psyche 8: 419. ♂ (as *pasonis*). —Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 977-978 (geogr. and floral records, as *lacteipennis lacteipennis*). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 388, 390, 391, 398, 400 (geogr. and floral records, in part, as *albipennis, lacteipennis lacteipennis, pasonis* and *hyalina*). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 130-131 (types, synonymy, status discussed). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 20 (synonymy, status discussed).

Biology: Alcorn and Gamboa, 1975. Ariz. Acad. Sci. 10: 163 (predator).

albipennis canadensis Crawford. Alta., Idaho, N. Dak., Utah (Uinta and Wasatch Counties).
Perdita canadensis Crawford, 1912. Canad. Ent. 44: 360. ♀.

Taxonomy: Stevens, 1919. Canad. Ent. 51: 205. ♂. —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 388, 390, 398-399 (key, tax. status, as *lacteipennis canadensis*). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 130-131 (status discussed).

albipennis heliophila Cockerell. Utah, Colo., N. Mex.; Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Helianthus* including *H. annuus*.
Perdita heliophila Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 281. ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 390, 397, figs. 82, 83, 158 (tax. characters and tax. status). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 20 (tax. characters). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 2 (tax. characters).

albipennis pallidipennis Graenicher. Ind. and Wis., west to east. Kans. and Nebr. Pollen: Unknown, but visits flowers of *Helianthus annuus*.
Perdita pallidipennis Graenicher, 1910. Canad. Ent. 42: 101. ♀, ♂.

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 978 (tax. characters and status, as *lacteipennis pallidipennis*). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 388, 390, 399 (key, geogr. records). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 131 (status discussed). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 302-303, table 9 (redescription).

beata beata Cockerell. Tex. (Davis Mts. and El Paso), N. Mex. (Las Cruces and Mesilla Park). Pollen: Unknown, but visits flowers of *Verbesina encelioides*. Another subspecies, *Perdita beata signata* Timberlake, occurs in Mexico (Chihuahua, Coahuila and Durango).
Perdita beata Cockerell, 1895. Psyche 1 (sup.): 10. ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 386, 391 (key, geogr. and floral record). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 130 (tax. status).

bequaerti bequaerti Viereck. N. J. to Fla., west to Minn. and Miss. Pollen: Unknown, but visits flowers of *Bidens*, *Helianthus divaricatus*, *Physalis lanceolata*, *P. virginiana*.
Perdita (*Cockerellia*) *bequaerti* Viereck, 1917. Amer. Mus. Nat. Hist., Bul. 37: 241. ♀, ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 397, figs. 80, 157 (tax. characters). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 300, figs. 72-74, 79, table 9 (redescription).

bequaerti indianensis Cockerell. Ind. (Gary and Lafayette), Okla. (South McAlester), Tenn. (Knoxville).
Perdita pallidipennis indianensis Cockerell, 1922. Amer. Mus. Novitates 33: 2. ♂, ♀.
Perdita (*Cockerellia*) *wickhami* Cockerell, 1922. Amer. Mus. Novitates 33: 13. ♀.

Taxonomy: Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 204 (tax. status). —Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 976 (tax. characters, synonymy). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 388, 390, 397 (key, tax. status, geogr. range). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 302, fig. 72 (status discussed).

coreopsidis collaris Cockerell. N. Mex.; Mexico (Chihuahua).
Perdita verbesinae collaris Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 281. ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 389, 390, 401 (key, redescription).

coreopsidis coreopsidis Cockerell. Kans., Tex.; Mexico (Coahuila). Pollen: Unknown, but visits flowers of *Gaillardia* which it apparently prefers, but also has been taken at the flowers of *Coreopsis* and *Monarda punctata coryi*.
Perdita coreopsidis Cockerell, 1906. Entomologist 39: 126. ♀, ♂.

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 983-984 (geogr. and floral records). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 389, 390, 401 (key, geogr. and floral records). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 4 (key).

coreopsidis kansensis Timberlake. Kans. (Grove and Ford Counties), Tex. (Van Horn), N. Mex. (Roosevelt County), Utah (Iron County). Pollen: Unknown, but visits flowers of *Gaillardia*.
Perdita coreopsidis kansensis Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 984. ♀, ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 389, 390, 401 (key, geogr. range). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 20 (geogr. records).

coreopsidis obscurior Timberlake. Gulf Coast of Tex. (Galveston to Brownsville, but a male has been taken inland at Lytle, Atacosa County). Pollen: Unknown, but visits flowers of *Gaillardia*.
Perdita coreopsidis obscurior Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 984. ♀, ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 389, 390, 401 (key, geogr. records).

fracticincta Timberlake. Tex. (Sarita). Pollen: Unknown, but visits flowers of *Coreopsis*.
Perdita fracticincta Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 976. female.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 388, 397 (key).

hilaris Timberlake. Utah (Dixie State Park), N. Mex. (San Juan County). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus*.
Perdita hilaris Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 21, figs. 1207, 1208, 1307. ♂.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 2-3. ♀.

imbellis Timberlake. Ariz. (Coconino County).
Perdita imbellis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 21, figs. 1205, 1206, 1306. ♂.

incana Timberlake. Tex. (Culberson County), N. Mex. (Quay County).
Perdita incana Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 383. ♀, ♂.

lepachidis lepachidis Cockerell. Kans., Tex., Colo., N. Mex. Pollen: Unknown, but visits flowers of *Ratibida tagetes*.
Perdita lepachidis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 106. ♂.

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 982-983. ♀. —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 389, 391, 401 (key). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 4 (key).

lepachidis levifrons Timberlake. Tex. (Brownsville).
Perdita lepachidis levifrons Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 983. ♀, ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 389, 391, 401 (key).

lingualis Cockerell. Nebr., Kans., Tex., N. Mex., Colo., Utah; Mexico (Tamaulipas). Pollen: Apparently an oligolege of *Helianthus* including *H. annuus*, *H. petiolaris*, but may also visit other large flowered Compositae.
Perdita albipennis var. *lingualis* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 105. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 130, 131 (tax. status). —Michener, 1963. Kans. Ent. Soc., Jour. 36: 117-118, figs. 2-6 (prepupa). —Rozen, 1966. Amer. Mus. Novitates 2259: 21, figs. 52-54 (larva). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 12, figs. 17-18 (pupa). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 4 (key).

Biology: Michener, 1963. Kans. Ent. Soc., Jour. 36: 114-118, 6 figs. (nest architecture, colonial behavior, floral relationships).

luculenta Timberlake. South. Calif. (Imperial County).
Perdita luculenta Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 19. ♀.

perpulchra flavidior Timberlake. Kans., (Barton and Rice Counties), Tex. (Somervel County). Pollen: Unknown, but visits flowers of *Aphanostephus skirrhobasis*, *Heterotheca subaxillaris*, *Rudbeckia bicolor*.
Perdita perpulchra flavidior Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 975. ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 395. —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 327 (geogr. and floral records).

perpulchra perpulchra Cockerell. Tex. (El Paso), N. Mex. (Mesilla Valley), Ariz. (Holbrook and Tucson); Mexico (Aguascalientes and Durango). Pollen: Unknown, but visits flowers of *Asclepias*, *Baileya*, *Haplopappus heterophylla*, *Verbesina encelioides*.
Perdita perpulchra Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 99. ♀.

Perdita baileyae Cockerell, 1909. Canad. Ent. 41: 151. ♂.

Taxonomy: Cockerell, 1897. Ann. Mag. and Nat. Hist. (6) 19: 398. ♂. —Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 975 (tax. characters). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 387, 389, 395 (key, tax. characters). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 327 (synonymy, tax. status).

perpulchra punctissima Timberlake. Tex. (Bexar, Wood, Robertson, Lamar Counties). Pollen: Unknown, but visits flowers of *Heterotheca subaxillaris*.
Perdita perpulchra punctissima Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 327. ♀, ♂.

pulchella Timberlake. Tex. (Carrizo Springs).
Perdita pulchella Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 393. ♀.

purpurascens Timberlake. Tex. Pollen: Unknown, but visits flowers of *Aster tanacetifolius, Brazoria truncata, Gaillardia, Monarda*.
Perdita purpurascens Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 328. ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 382-383. ♀ (tax. characters, geogr. and floral records).

scopata Timberlake. Gulf Coast of Tex. (Galveston to Brownsville). Pollen: Unknown, but visits flowers of *Coreopsis, Helianthus annuus*.
Perdita scopata Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 980. ♀, ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 401, fig. 88 (tax. characters).

shinnersi Timberlake. Tex. Pollen: Unknown, but visits flowers of *Brazoria truncata, Coreopsis basalis, Gaillardia, Hymenopappus artemisaefolius, Monarda*.
Perdita shinnersi Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 326. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 383 (geogr. and floral records).

tricincta Timberlake. South. Tex. (Cameron, Hidalgo and Starr Counties). Pollen: Unknown, but visits flowers of *Helianthus annuus*. This may prove to be a race of *Perdita albipennis* Cress.
Perdita tricincta Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 978. ♀, ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 388, 390, 400, fig. 86 (key, tax. status).

utahensis Cockerell. N. Mex. (Rodeo), Ariz. (Tucson), southwest. Utah, south. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Pectis papposa, Tidestromia, Verbesina encelioides*.
Perdita utahensis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 106. ♀.

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 974. ♂. —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 387, 391, 394, figs. 76, 155 (tax. characters, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 20 (geogr. and floral records).

verbesinae Cockerell. Tex. (Barstow), N. Mex. (Deming and Las Cruces), Ariz. (Douglas, Portal, Tucson and Santa Rita Mts.); Mexico (Chihuahua). Pollen: Usually visits flowers of *Verbesina encelioides*, but has been recorded from the flowers of *Helianthus*.
Perdita verbesinae Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 102. ♀, ♂.
Perdita verbesinae mut. *intermedia* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 103. ♀.
Perdita verbesinae mut. *nigrior* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 103. ♀.
Perdita verbesinae mut. *cyanella* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 104. ♂.
Perdita verbesinae mut. *maculata* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 104. ♂.

Taxonomy: Cockerell, 1899. Psyche 8: 323 (color variation). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 388, 391, 397, fig. 81 (key, tax. characters, geogr. and floral records).

Genus PERDITA Subgenus COCKERELLULA Strand

Perdita subg. *Lutziella* Cockerell, 1922. Amer. Mus. Novitates 47: 1. Preocc.
Type-species: *Perdita* (*Lutziella*) *opuntiae* Cockerell. Monotypic and orig. desig.
Perdita subg. *Cockerellula* Strand, 1932. Folia Zool. Hydrobiol. Riga 4: 196. N. name.

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 963-968 (tax. characters, key to included spp.). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 346, 354-356 (key to included spp., tax. characters). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 122-123 (key to males of included spp.). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 2 (modified key to males).

bidenticauda Timberlake. Tex. (Big Bend Park). Pollen: Unknown, but visits flowers of *Opuntia*.
Perdita bidenticauda Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 965. ♂, ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 356, figs. 13, 14, 122 (tax. characters, key). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 122 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 2 (key).

knulli Timberlake. Tex. (Davis Mts.). Pollen: Unknown, but the female allotype bears dark brown pollen, with spherical and moderately fine grains.
Perdita knulli Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 123, figs. 652, 653, 728. ♂, ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 2. ♂ (key).

laticauda Timberlake. Tex. (Dryden); Mexico (Coahuila). Pollen: Unknown, but visits flowers of *Chamaesaracha conioides*, *Gaillardia*, *Gilia acerosa*.
Perdita laticauda Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 967. ♂, ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 356, figs. 15, 16, 123 (tax. characters, key). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 122. ♂ (key).

lobata Timberlake. Tex. (Hidalgo and Starr Counties). Pollen: Unknown, but visits flowers of *Opuntia*.
Perdita lobata Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 967. ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 354, 356, figs. 17, 18, 124 (tax. characters, key). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 122. ♂, ♀ (tax. characters, key).

opuntiae Cockerell. Colo., Wyo., S. Dak. (Pine Ridge). Ecology: Nests in soft sandstone rocks of the Laramie formation. Pollen: Collects pollen from the flowers of *Opuntia*.
Perdita (*Lutziella*) *opuntiae* Cockerell, 1922. Amer. Mus. Novitates 47: 2. ♂, ♀.

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 964 (key). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 354, 355, figs. 9, 10, 120 (tax. characters, key). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 122. ♂ (key)

Biology: Custer, 1928. Psyche 35: 67-84 (nesting habits). —Custer, 1929. Canad. Ent. 61: 49 (nesting habits). —Custer, 1929. Psyche 36: 293 (nesting habits).

Genus PERDITA Subgenus EPIMACROTERA Timberlake

Perdita subg. *Epimacrotera* Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 377.
Type-species: *Perdita ainsliei* Crawford. Orig. desig.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 378-379 (key to included spp.). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 380 (modified key to included spp.). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 129 (tax. characters, relationship to *Glossoperdita*). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 92-93 (revised key to included spp.). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 14-15 (key to males).

ainsliei Crawford. Iowa, N. Mex. (Bernalillo County).
Perdita ainsliei Crawford, 1932. Ent. Soc. Wash., Proc. 34: 74. ♂, ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 378, 379, figs. 55, 56, 144 (key, tax. characters). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 380 (key, geogr. record). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 93 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 14 (key).

biguttata Timberlake. Ariz. (Cochise County). Pollen: Unknown, but visits flowers of *Eriogonum abertianum* var. *neomexicanum*, *Euphorbia*.
Perdita biguttata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 95. ♀.
Perdita parvula Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 15, figs. 1202, 1304. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 15 (synonymy in footnote).

binotata Timberlake. Ariz.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Physalis*.
Perdita binotata Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 385, figs. 73, 74, 153. ♀, ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 93 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 14 (key).

crassula Timberlake. N. Mex. (Las Cruces), Ariz. (Willcox). Pollen: Unknown, but visits flowers of *Euphorbia*.
Perdita crassula Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 381, figs. 462, 463, 516. ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 93-94. ♀ (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 14 (key).

diversa Timberlake. Tex. (El Paso); Mexico (Coahuila, Nuevo Leon). Pollen: Unknown, but visits flowers of *Coldenia greggii*.
Perdita diversa Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 384, figs. 69, 70, 151. ♂, ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 15, 19 (key).

euphorbiae Timberlake. Ariz. (Picacho Pass); Mexico (Sonora). Pollen: Unknown, but visits flowers of *Euphorbia, Kallstroemia*.
Perdita euphorbiae Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 380, figs. 59, 60, 146. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 130 (geogr. and floral records). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 93 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 15, 17 (key, geogr. record).

namatophila Timberlake. Calif. (Riverside County). Pollen: Unknown, but visits flowers of *Nama demissum*.
Perdita namatophila Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 379, figs. 57, 58, 145. ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 380 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 15 (key).

nanula Timberlake. Ariz. (Douglas). Pollen: Unknown, but visits flowers of *Euphorbia albomarginata*.
Perdita nanula Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 129. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 93 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 15, 16. ♂ (key).

nigrocaerulea Timberlake. Calif. (Oro Grande Wash). Pollen: Unknown, but visits flowers of *Salazaria mexicana*.
Perdita nigrocaerulea Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 382, figs. 65, 66, 149. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 15 (key).

peculiaris Timberlake. Tex. (Terrell County). Pollen: Unknown, but visits flowers of *Chamaesaracha conioides*.
Perdita peculiaris Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 970. ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 384, figs. 71, 72, 152 (tax. characters). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 15 (key).

polycarpae Timberlake. South. Calif.; Mexico (Baja California). Pollen: Possibly an oligolege of *Euphorbia* including *E. polycarpa*, but also visits flowers of *Pectis papposa*.
Perdita polycarpae Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 381, figs. 61, 62, 147. ♂, ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 14 (key).

Genus PERDITA Subgenus GLOSSOPERDITA Cockerell

Glossoperdita Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 43.
Type-species: *Glossoperdita pelargoides* Cockerell. Monotypic.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 347, 392-394 (redescription, key to included spp.). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 379 (key to included spp.).

blaisdelli Timberlake. Calif. (Calaveras County).
Perdita blaisdelli Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 373. ♀.

giliae Timberlake. Ariz. Pollen: Unknown, but visits flowers of *Gilia*, possibly *G. aggregata*.
Perdita giliae Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 374, figs. 51, 52, 141. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 379 (key).

hurdi Timberlake. South. Calif., Ariz.; Mexico (Sonora). Ecology: Cuts unopened flowers of *Proboscidea* in order to obtain pollen. Pollen: Collects pollen from the flowers of *Proboscidea althaeafolia*, *P. arenaria*.
Perdita hurdi Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 324, figs. 283, 284, 335. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 379 (key). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 127-128 (tax. characters, geogr. and floral records).

Biology: Hurd and Linsley, 1963. Kans. Ent. Soc., Jour. 36: 248-252, 5 figs. (corolla cutting habits, floral relationships).

navarretiae angusticeps Timberlake. Calif. (Tuolumne County).
Perdita navarretiae angusticeps Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 128. ♂, ♀.

navarretiae navarretiae Timberlake. Calif. (Mariposa County). Pollen: Unknown, but visits flowers of *Navarretia viscidula*.
Perdita navarretiae Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 379, figs. 460, 461, 515. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 128 (tax. status).

navarretiae powelli Timberlake. Calif. (Nevada County).
Perdita navarretiae powelli Timberlake, 1962. Calif. Univ. Pubs. Ent. 91. ♂, ♀.

pelargoides (Cockerell). South. Calif. (cismontane). Pollen: Unknown, but visits flowers of *Hugelia virgata*, *Navarretia atractyloides*.
Glossoperdita pelargoides Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 43. ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 373, figs. 49, 50, 140. ♂. —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 379 (key).

Genus PERDITA Subgenus HESPEROPERDITA Timberlake

Perdita subg. *Hesperoperdita* Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 374.
Type-species: *Perdita ruficauda* Cockerell. Orig. desig.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 375 (key to included spp.).

pyrifera Cockerell. Calif. (Pleyto, Monterey County).
Perdita pyrifera Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 192. ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 376, fig. 142. ♂.

trisignata ornata Timberlake. North. Calif. Pollen: Possibly an oligolege of *Lotus*, visits flowers of *L. glaber*, *L. nevadensis*, *L. strigosus* var. *hirtellus*.
Perdita ruficauda ornata Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 377. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 127 (tax. status).

trisignata trisignata Cockerell. South. Calif.; Mexico (Baja California). Pollen: Possibly an oligolege of *Lotus* including *L. americanus*, *L. argophyllus*, *L. davidsonii*, *L. scoparius*, *L. strigosus*, but also visits other flowers including *Cryptantha*, *Heteromeles*.
Perdita trisignata Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 76. ♀.
Perdita ruficauda Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 44. ♀.

Taxonomy: Cockerell, 1922. U. S. Natl. Mus., Proc. 60: 17. ♀, ♂ (as *ruficauda*). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 375, 376 (key, type). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 375, 376, figs. 53, 54, 143 (key, tax. characters, geogr. and floral records, as *ruficauda*). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 127 (synonymy).

Genus PERDITA Subgenus HETEROPERDITA Timberlake

Perdita subg. *Heteroperdita* Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 365.
Type-species: *Perdita rhodogastra* Timberlake. Orig. desig.

The species of this subgenus apparently collect pollen exclusively from flowers of the boraginaceous genera *Coldenia* and *Heliotropium*.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 347, 366 (key to included spp.). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 126 (modified key to included spp.). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 10-11 (key to females of included spp.).

arenaria Timberlake. Ariz. (Yuma), Nev. (Washoe County), south. Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Coldenia* including *C. nuttallii*, *C. palmeri*.
Perdita arenaria Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 368, figs. 39, 40, 135. ♂, ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 126 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11, 13 (key, geogr. and floral records).

bellula Timberlake. South. Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Coldenia* including *C. palmeri*, *C. plicata*.
Perdita bellula Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 369, figs. 41, 42, 136. ♂, ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11 (key).

coldeniae Timberlake. South. Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Coldenia* including *C. palmeri*, but visits flowers of *Pectis papposa* presumably for nectar.
Perdita coldeniae Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 368, figs. 37, 38, 134. ♂, ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11 (key).

frontalis Timberlake. South. Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Coldenia* including *C. plicata*, but visits flowers of *Eriogonum deserticola* presumably for nectar.
Perdita frontalis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 12. ♀.

maculosa Timberlake. South. Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Coldenia* including *C. plicata*.
Perdita maculosa Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 378, fig. 514. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 126 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11 (key).

optiva Timberlake. South. Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Coldenia* including *C. palmeri*.
Perdita optiva Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 371, figs. 47, 48, 139. ♂ (♀ misdet.).

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 13. ♂ (tax. status, as *sexfasciata*).

rhodogastra Timberlake. South. Calif. (Colorado Desert). Pollen: Apparently collects pollen from the flowers of *Coldenia palmeri* and *Heliotropium oculatum*, but visits these and other flowers for nectar including *Pectis papposa*, *Pluchea sericea*.
Perdita rhodogastra Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 367, figs. 35, 36, 133. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11 (key).

scutellaris Timberlake. Southern Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Coldenia* including *C. plicata*, but visits the flowers of *Eriogonum deserticola* presumably for nectar.
Perdita scutellaris Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 89, figs. 829, 830, 893, text fig. B. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11 (key).

sexfasciata Timberlake. Ariz. (Yuma County), south. Calif. (Riverside and San Bernardino Counties). Pollen: Apparently an oligolege of *Coldenia* including *C. palmeri*, but visits these and other flowers for nectar including *Cryptantha*, *Nama*.
Perdita sexfasciata Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 370, figs. 43, 44, 137. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11, 13. ♀ (key).

trifasciata Timberlake. Tex. (Dryden), N. Mex. (White Sands); Mexico (Coahuila).
Perdita trifasciata Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 969. ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 366, 370, figs. 45, 46, 138. ♀. —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11, 14 (key).

vesca Timberlake. Nevada (Wadsworth). Pollen: Possibly an oligolege of *Coldenia*, visits flowers of *C. nuttallii*.
Perdita vesca Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11, figs. 1199, 1200, 1303. ♀, ♂.

wasbaueri Timberlake. South. Calif. (Colorado Desert). Pollen: Apparently an oligolege of *Coldenia plicata*.
Perdita wasbaueri Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 126, figs. 656, 657, 730. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 11 (key).

Genus PERDITA Subgenus HEXAPERDITA Timberlake

Perdita subg. *Hexaperdita* Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 416.
Type-species: *Perdita ignota* Cockerell. Orig. desig.

These bees are exclusively oligoleges of the family Compositae.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 348 (key). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 247-252 (key to included spp.).

agasta Timberlake. Tex. (Hidalgo Co.).
Perdita agasta Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 389. ♀.

alexi Timberlake. Tex. (College Station), Kans. (Barber County). Pollen: Unknown, but visits flowers of *Helianthus petiolaris*, *Heterotheca subaxillaris*.
Perdita alexi Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 26. ♀.

asteris Cockerell. West. Tex., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Aplopappus*, *Aster canescens*, *Chrysopsis*, *Heterotheca subaxillaris*, *Nolina microcarpa*, *Verbesina encelioides*.
Perdita asteris Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 93. ♀.
Perdita vespertilio Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 95. ♂.
Perdita crassiceps Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 97. ♂.
Perdita vagans Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 101. ♂.
Perdita mellina Cockerell, 1900. Entomologist 33: 62. ♂.

Taxonomy: Cockerell, 1906. Entomologist 39: 148. ♀ (as *vespertilio*). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 249, 258 (key, tax. characters, geogr. and floral records). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 389-390 (tax. characters, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 27 (synonymy, geogr. and floral records).

bebbiae Timberlake. Calif. (San Diego County). Pollen: Unknown, but visits flowers of *Bebbia juncea*.
Perdita bebbiae Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 255, figs. 179, 180, 292. ♀, ♂.

bishoppi bishoppi Cockerell. N. C. to Fla., west to Tex. Pollen: Unknown, but visits flowers of *Heterotheca latifolia*, *H. subaxillaris*, *Isopappus divaricatus*.
Perdita bishoppi Cockerell, 1906. Entomologist 39: 148. ♀, ♂.

Taxonomy: Cockerell, 1922. Amer. Mus. Novitates 33: 7. —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 249, 250, 261, figs. 193, 194, 299 (key, tax. characters, geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 303-304, figs. 72-74, 79, table 9 (redescription).

bishoppi planorum Timberlake. Kans., Tex. Pollen: Unknown, but visits flowers of *Heterotheca latifolia*, *H. subaxillaris*, *Isopappus divaricatus*.
Perdita bishoppi planorum Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 261. ♀, ♂.

blatchleyi Timberlake. Fla. (Dunedin). Pollen: Unknown, but visits flowers of *Chrysopsis*.
Perdita blatchleyi Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 201. ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 248, 258 (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 304, fig. 72, table 9 (redescription).

boltoniae boltoniae (Robertson). Ill., La., Miss. Pollen: Unknown, but visits flowers of *Boltonia*.
Perditella boltoniae Robertson, 1902. Canad. Ent. 34: 321. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 249, 252, 265 (key, tax. characters, geogr. records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 304-305, fig. 73, table 9 (redescription).

boltoniae chrysopsina Timberlake. N. J. to Fla. Pollen: Unknown, but visits flowers of *Chrysopsis mariana, Coreopsis, Erigeron, Gerardia, Haplopappus.*
Perdita chrysopsina Timberlake, 1928. Hawaii. Ent. Soc., Proc. 7: 155. ♂, ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 250, 252, 265, figs. 199, 200, 302 (key, tax. characters). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 305-306, figs. 72, 74, table 9 (redescription).

callicerata Cockerell. Tex. to south. Calif.; Mexico (Chihuahua, Durango). Pollen: Unknown, most frequently has been collected at the flowers of *Baileya multiradiata*, but also visits flowers of *Baileya pleniradiata, Baccharis, Dithyrea wislizenii, Haplopappus.*
Perdita callicerata Cockerell, 1896. N. Y. Ent. Soc., Jour. 4: 206. Nomen nudum, validated by Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 153. male.
Perdita callicerata var. *chrysoceras* Cockerell, 1897. N. Mex. Agr. Expt. Sta., Bul. 24: 43. ♂.
Perdita callicerata var. *leucura* Cockerell, 1909. Canad. Ent. 41: 152. ♀.
Perdita lutzi Cockerell, 1922. Amer. Mus. Novitates 33: 7. ♀.

Taxonomy: Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 354. ♀. —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 247, 248, 250, 255, figs. 181, 182, 293 (key, tax. characters, geogr. and floral records).

cambarella cambarella Cockerell. Tex. Pollen: Unknown, but visits flowers of *Heterotheca subaxillaris, Isopappus divaricatus.*
Perdita cambarella Cockerell, 1906. Entomologist 39: 150. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 248, 251, 256-257 (key, tax. characters, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 29 (color variation, geogr. records).

cambarella platyura Cockerell. Kans., Tex., N. Mex. Pollen: Unknown, but visits flowers of *Heterotheca latifolia, Isopappus divaricatus.*
Perdita platyura Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 547. ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 248, 251, 257, figs. 183, 184, 294. ♂ (key, tax. characters, geogr. and floral records).

cara Timberlake. Tex. (Reeves County). Pollen: Unknown, but visits flowers of *Prosopis.*
Perdita cara Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 388, figs. 466, 467, 518. ♂.

compacta Timberlake. Ariz. (Graham County). Pollen: Unknown, but visits flowers of *Pectis papposa.*
Perdita compacta Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 9. ♀.

fedorensis Cockerell. Tex. (Lee County).
Perdita fedorensis Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 280. ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 249, 259 (key).

foveata brachycephala Timberlake. Tex. Pollen: Unknown, but visits flowers of *Aphanostephus skirrhobasis, Aster tanacetifolius, Coreopsis basalis.*
Perdita foveata brachycephala Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 266. ♀, ♂.

foveata foveata Timberlake. Fla. (Dade and Pasco Counties), Tex. (Montgomery County), Ark. (Sevier and Scott Counties), Kans. (Reno County). Pollen: Unknown, but visits flowers of *Coreopsis tinctoria, Hymenopappus.*
Perdita foveata foveata Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 265, figs. 201, 202, 303. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 392 (geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 307, figs. 72-74, 79, table 9 (redescription).

foveata persimilis Timberlake. Tex. (Comanche County), N. Mex. (Chaves County).
Perdita foveata persimilis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 267. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 29 (geogr. record).

georgica Timberlake. N. C. to Fla., west to Miss. Pollen: Unknown, but visits flowers of *Aster, Chrysopsis mariana, C. microcephala, Haplopappus, Heterotheca, Isopappus.*
Perdita georgica Timberlake, 1928. Hawaii. Ent. Soc., Proc. 7: 158. ♂, ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 249, 251, 257, figs. 185, 186, 295 (key, tax. characters, geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 307-308, figs. 72-74, table 9 (redescription).

graenicheri Timberlake. Fla. (Miami). Pollen: Unknown, but visits flowers of *Chrysopsis tracyi.*
Perdita graenicheri Timberlake, 1947. Ent. Soc. Wash., Proc. 49: 82. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 249, 252, 264, figs. 197, 198, 301 (key). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 308-309, figs. 72, 73, table 9 (redescription).

heterothecae heterothecae Cockerell. Ariz., Utah (San Juan County), south. Calif. (Colorado Desert), Mexico (Baja California). Pollen: Unknown, but visits flowers of *Aster tephrodes, Grindelia, Gutierrezia californica, G. sarothrae, Heliotropium curassavicum, Heterotheca grandiflora, H. subaxillaris, Tamarix.*
Perdita heterothecae Cockerell, 1900. Entomologist 33: 62. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 248, 251, 260-261, figs. 191, 192, 298 (key, tax. characters, geogr. and floral records). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 10 (geogr. and floral records).

heterothecae trizonata Timberlake. Ariz. (Willcox). Pollen: Unknown, but visits flowers of *Aster intricatus, Euphorbia.*
Perdita heterothecae trizonata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 96. ♀, ♂.

ignota basalis Timberlake. Tex. (Hidalgo County); Mexico (Tamaulipas).
Perdita ignota basalis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 391. ♀, ♂.

ignota crawfordi Cockerell. Colo., Nebr., Kans., Okla., Mo. Pollen: Unknown, but visits flowers of *Chrysopsis, Grindelia, Heterotheca subaxillaris, Isopappus divaricatus, Prionopsis ciliata, Sideranthus rubiginosus.*
Perdita crawfordi Cockerell, 1901. Entomologist 34: 190. ♂, ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 262-263, figs. 195, 196, 300 (tax. characters, geogr. and floral records).

ignota ignota Cockerell. Tex., Colo., Ariz.; Mexico (Chihuahua and Zacatecas). Pollen: Unknown, but visits flowers of *Baccharis, Chrysopsis rutteri, Erigeron, Heterotheca, Sideranthus, Solidago.*
Perdita ignota Cockerell, 1896. Ent. Monthly Mag. 32: 220. ♀.

Taxonomy: Cockerell, 1907. Colo. Univ., Studies 4: 247. ♀, ♂. —Cockerell, 1922. Amer. Mus. Novitates 33: 7 (tax. characters). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 250, 252, 262 (key, tax. characters, geogr. and floral records). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 10 (geogr. record).

ignota isopappi Timberlake. East. Tex., La. Pollen: Unknown, but visits flowers of *Aphanostephus skirrhobasis, Aster tanacetifolius, Chrysanthemum, Chrysopsis nuttallii, Grindelia, Helenium tenuifolium, Heterotheca latifolia, H. pilosa, H. subaxillaris, Isopappus divaricatus, Prionopsis ciliata, Xanthisma texanum* var. *drummondii.*
Perdita isopappi Timberlake, 1928. Hawaii. Ent. Soc., Proc. 7: 152. ♂, ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 249, 252, 263-264 (key, tax. characters, geogr. and floral records).

nubila Timberlake. Fla., Ark., Kans. Pollen: Unknown, but visits flowers of *Erigeron ramosus.*
Perdita nubila Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 392. ♀, ♂.

Taxonomy: Timberlkake, 1968. Calif. Univ. Pubs. Ent. 49: 29 (geogr. records).

pratti Cockerell. Tex., Okla., Kans. Pollen: Unknown, but visits flowers of *Helenium, Helianthus cucumerifolius, H. petiolaris, Heterotheca latifolia, H. subaxillaris.*
Perdita pratti Cockerell, 1906. Entomologist 39: 125. ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 248, 250, 252-253, figs. 173, 174, 289. ♂ (key, tax. characters, geogr. and floral records).

xanthisma Cockerell. Wyo., Nebr., Kans., Tex., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Aplopappus divaricatus, A. subruginosus, Croton monanthogynus, Grindelia, Gutierrezia, Helianthus annuus, Heterotheca pilosa, H. subaxillaris, Isopappus divaricatus, Prionopsis ciliata, Sideranthus, Xanthisma texanum.*
Perdita xanthismae Cockerell, 1905. Ent. News 16: 331. ♀.
Perdita xanthismae sideranthi Cockerell, 1906. Entomologist 39: 178. ♀.
Perdita xanthisma Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 29. Emend.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 247, 249, 251, 258-259, figs. 187, 188, 296. ♀, ♂ (key, tax. characters, synonymy, geogr. and floral records). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 390 (geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 29-30 (geogr. and floral records).

Genus PERDITA Subgenus MACROTERA Smith

Macrotera Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 130.
Type-species: *Macrotera bicolor* Smith. Monotypic.

The species of this subgenus are apparently oligoleges of *Opuntia*.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 346, 352-353 (tax. characters, key to included spp.). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 375-378 (key to included spp.).

crassa Timberlake. Tex. (Sutton and Gillespie Counties). Pollen: Unknown, but possibly an oligolege of *Opuntia*.
Perdita crassa Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 376, figs. 456, 457, 512. ♀, ♂.

texana ablusa Timberlake. N. Mex., Tex. Pollen: Collects pollen from flowers of *Opuntia phaeacantha* var. *major*.
Perdita texana ablusa Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 376. ♀, ♂.

Biology: Barrows, Chabot, Michener and Snyder, 1976. Kans. Ent. Soc., Jour. 49: 275-279, 4 figs. (mating behavior, foraging, floral relationship, variation in head width, as *texana*).

texana texana (Cresson). Tex. (Bastrop, Gonzales, Lee and possibly Travis Counties). Pollen: Unknown, but visits flowers of *Opuntia*.
Macrotera texana Cresson, 1878. Amer. Ent. Soc., Trans. 7: 70. ♀.
Macrotera megacephala Cresson, 1878. Amer. Ent. Soc., Trans. 7: 71. ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 353, figs. 5, 6, 118 (tax. characters). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 375, 376 (tax. characters, status, synonymy).

Genus PERDITA Subgenus MACROTERELLA Timberlake

Perdita subg. *Macroterella* Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 360.
Type-species: *Perdita mortuaria* Timberlake. Orig. desig.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 346, 361 (key to included spp.). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 7-8 (key to females of included spp.; key to males of *carinata, mortuaria, opacella*).

carinata Timberlake. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Eriogonum, Eschscholzia minutiflora, Ferrocactus acanthodes.*
Perdita carinata Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 9, figs. 1197, 1198, 1302. ♀, ♂.

mellea Timberlake. Ariz., south. Calif. (Colorado Desert); Mexico (Baja California and Sonora). Pollen: Apparently an oligolege of *Euphorbia* including *E. polycarpa, E. p.* var. *hirtella.*
Perdita mellea Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 364, figs. 33, 34, 132. ♂, ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 125 (geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 7 (key).

mortuaria Timberlake. South. Calif., Ariz.; deserts. Pollen: Unknown, but visits flowers of *Echinocereus engelmanni, Eriogonum inflatum, Eschscholzia californica, E. minutiflora* var. *darwinensis, Eucnide urens, Larrea tridentata, Prosopis juliflora.*
Perdita mortuaria Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 362, figs. 27, 28, 129. ♂, ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 324 (tax. characters, geogr. record, variation). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 126 (geogr. and floral record, variation). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 7, 8, 10 (key, geogr. and floral records).

nigrella Timberlake. South. Calif.; deserts. Pollen: Unknown, but visits flowers of *Phacelia* including *P. crenulata.*
Perdita nigrella Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 362, figs. 29, 30, 130. ♂, ♀.

Taxonomy: Timberlake, 1968 Calif. Univ. Pubs. Ent. 49: 7 (key).

opacella Timberlake. Ariz. (Grand Canyon), Utah (Moab). Pollen: Unknown, but visits flowers of *Cleome lutea, Stanleya.*
Perdita opacella Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 324. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 7, 8, figs. 3, 1195, 1196, 1301, 1353. ♂.

solitaria Cockerell. N. Mex. (Organ Mts.), Ariz. (Santa Catalina Mts.).
Perdita solitaria Cockerell, 1896. N. Y. Ent. Soc., Jour. 4: 206. Nomen nudum.
Perdita solitaria Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 152. ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 361, 365 (key, geogr. records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 7 (key).

tristella Timberlake. South. Calif. (Riverside County). Pollen: Unknown, but visits flowers of *Calochortus splendens, Eriogonum fasciculatum, Hugelia virgata, Sphaeralcea.*
Perdita tristella Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 363, figs. 31, 32, 131. ♂, ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 7 (key).

Genus PERDITA Subgenus MACROTEROPSIS Ashmead

Macroteropsis Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 85.
Type-species: *Perdita latior* Cockerell. Monotypic and orig. desig.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 346, 356-357 (redescription, key to included spp.). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 87 (key to males of included spp.).

arcuata arcuata Fox. Calif. (San Benito County); Mexico (Baja California). Pollen: Apparently an oligolege of *Sphaeralcea.*
Perdita arcuata Fox, 1893. Calif. Acad. Sci., Proc. (2) 4: 18. ♂.

Taxonomy: Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 54 (tax. characters). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 357, 358 (key, tax. characters, tax. status). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 87 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 4 (geogr. and floral record).

arcuata dinognatha Cockerell. Ariz. (Tempe), Nev. (Charleston Mts.), south. Calif.; deserts. Pollen: Apparently collects pollen only from the flowers of *Sphaeralcea ambigua*, but visits other flowers for nectar including *Encelia frutescens, Eriogonum fasciculatum* var. *polifolium.*
Perdita dinognatha Cockerell, 1922. U. S. Natl. Mus., Proc. 60 (18): 19. ♂.

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 968 (tax. status, geogr. and floral records). —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 357, 359, figs. 21, 22, 126. ♀ (key, geogr. and floral records).

echinocacti Timberlake. Ariz.; Mexico (Sinaloa and Sonora). Pollen: Unknown, but visits flowers of *Antigonon leptopus, Jacquemontia, Kallstroemia grandiflora.*
Perdita echinocacti Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 360, figs. 25, 26, 128. ♂, ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 125 (geogr. and floral records). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 87 (key).

haplura Cockerell. Tex. (Terrell and Val Verde Counties), N. Mex. (Lincoln County). Pollen: Unknown, but visits flowers of *Sphaeralcea angustifolia* var. *cuspidata*.
Perdita haplura Cockerell, 1922. U. S. Natl. Mus., Proc. 60 (18): 19. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 124 (type). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 87-89, text fig. A. ♂. —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 4 (geogr. and floral records).

latior Cockerell. N. Mex., Ariz., Nev. (Charleston Mts.). Pollen: Apparently an oligolege of *Sphaeralcea* including *S. angustifolia*, but also visits flowers of *Sida hederacea* presumably for nectar.
Perdita latior Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 53. ♂, ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 357, 359, figs. 23, 24, 127. —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 87 (key).

magniceps Timberlake. N. Mex. (Luna County). Pollen: Unknown, but visits flowers of *Sphaeralcea*.
Perdita magniceps Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 124, figs. 654, 655, 729. ♂.

portalis Timberlake. N. Mex. (Deming), Ariz. (Cochise and Coconino Counties); Mexico (Zacatecas). Pollen: Apparently an oligolege of *Sphaeralcea*.
Perdita portalis Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 357, figs. 19, 20, 125. ♂, ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 323. ♂ (variation). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 125 (geogr. and floral record). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 87. ♂ (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 4 (geogr. record).

robertsi Timberlake. Tex. (Val Verde County). Pollen: Possibly collects pollen from the flowers of *Opuntia*.
Perdita robertsi Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 6, fig. 2. ♀.

Genus PERDITA Subgenus PENTAPERDITA Cockerell and Porter

Perdita subg. *Pentaperdita* Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 415. Type-species: *Perdita albovittata* Cockerell. Monotypic.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 347, 404-406 (redescription, key to included spp.). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 329 (modified key to included spp.). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 384-385 (key to spp. allied to *melanochlora*). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 22-24 (key to females of included spp.).

albovittata Cockerell. N. Mex., Ariz., south. Calif. (Colorado and Mojave Deserts); Mexico (Chihuahua, Coahuila, Durango). Pollen: Unknown, but visits flowers of *Aplopappus spinulosus, Baileya multiradiata, B. pleniradiata, Cevallia sinuata, Coldenia greggii, Eriogonum inflatum, Gutierrezia californica, G. lucida, Haplopappus acradenius, H. gracilis, Pectis papposa, Physalis, Stephanomeria, Verbesina encelioides*.
Perdita albovittata Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 15. ♀.
Perdita laticeps Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 98. ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 405, 406, 411, figs. 105, 106, 168 (key, geogr. and floral records, possible synonymy). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23, 24 (synonymy, geogr. and floral record).

amoena Timberlake. Ariz. (Cochise and Santa Cruz Counties), Utah (Washington County); Mexico (Sonora).
Perdita amoena Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 330, figs. 287, 288, 336. ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 385, 386. ♀ (key). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 132 (geogr. record). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23, 24 (key, geographic records).

annexa Timberlake. N. Mex. (Pecos and Santa Fe). Pollen: Unknown, but visits flowers of *Hymenoxys richardsoni*.
Perdita annexa Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 133. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23, 24. ♀ (key).

bradleyana Timberlake. Tex. (Eagle Pass and El Paso); Mexico (Zacatecas).
Perdita bradleyana Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 409, figs. 99, 100, 165. ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 329. ♀. —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 385 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23, 25 (key, geogr. record). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 7 (geogr. record).

chrysophila chrysophila Cockerell. Tex. (Culberson County). N. Mex. (Hollywood, Organ and Pecos), Ariz. (Safford); Mexico (Hidalgo, San Luis Potosi and Zacatecas). Pollen: Unknown, but visits flowers of *Flourensia, Hymenoxys, Picradenia floribunda, Verbesina encelioides, Zaluzania globosa.* Another subspecies, *Perdita chrysophila quadricincta* Timberlake, occurs in Mexico (Nuevo Leon).
Perdita chrysophila Cockerell, 1896. N. Y. Ent. Soc., Jour. 4: 206. ♂.
Perdita nigrifacies Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 406 ♀.

Taxonomy: Cockerell, 1904. Entomologist 37: 6. ♂. —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 406, figs. 93, 94, 162 (key, type). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 386-387 (tax. characters, as *nigrifacies*). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 132-133, figs. 660, 661, 732. ♂ (redescription). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 95-96 (tax. characters, as *nigrifacies*). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23, 25 (key, synonymy, geogr. and floral records).

coahuilensis Timberlake. Tex. (El Paso); Mexico (Coahuila).
Perdita coahuilensis Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 409, figs. 101, 102, 166. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 329, 330 (key, geogr. record). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 385 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 24 (key).

idahoensis Timberlake. Idaho (Cassia County), Calif. (Inyo County). Pollen: Unknown, but visits flowers of *Chrysothamnus, Gutierrezia microcephala.*
Perdita idahoensis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 385, figs. 464, 465, 517. ♂, ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23 (key). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 9 (geogr. and floral record).

mandibularis Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Unknown, but visits flowers of *Bebbia juncea, Chaenactis carphoclinia, Dalea, Geraea canescens.*
Perdita mandibularis Timberlake, 1954. calif. Univ. Pubs. Ent. 9: 411, figs. 107, 108, 169. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23 (key).

melanochlora Cockerell. Ariz. (Santa Rosa Valley and Tucson), south. Calif. (Colorado and Mojave Deserts), Nev. (Arden and Charleston Mts.). Pollen: Unknown, but visits flowers of *Baileya multiradiata, Bebbia juncea, Chrysothamnus, Encelia farinosa, Sphaeralcea, Viguiera deltoides, V. nevadensis.*
Perdita melanochlora Cockerell, 1922. Amer. Mus. Novitates 33: 7. ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 405, 406, 408, figs. 97, 98, 164. ♀, ♂. —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 329 (key). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 385 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23 (key). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 9 (geogr. records).

nigroviridis Timberlake. Tex. Pollen: Unknown, but visits flowers of *Gaillardia pulchella, Helenium, Helianthus annuus.*
Perdita nigroviridis Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 407, figs. 95, 96, 163. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 386 (geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 23, 26 (key, geogr. and floral record).

Genus PERDITA Subgenus PERDITA Smith

Perdita Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 128.
Type-species: *Perdita halictoides* Smith. Monotypic.
Neoperdita Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 85.

Type-species: *Perdita zebrata* Cresson. Monotypic and orig. desig.

Perdita subg. *Geoperdita* Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 415.
Type-species: *Perdita chamaesarachae* Cockerell. Monotypic.

Perdita subg. *Tetraperdita* Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 415.
Type-species: *Perdita sexmaculata* Cockerell. Monotypic and orig. desig.

Zaperdita Robertson, 1918. Ent. News 29: 91.
Type-species: *Perdita maura* Cockerell. Monotypic and orig. desig.

This is the largest subgenus of *Perdita*. Six groups of species are currently recognized and, although some of these groups have been divided into subgroups in the existing classification, no attempt has been made to reflect these subsidiary units in this catalog. The six recognized species groups are arranged in accordance with the current classification of this subgenus.

Revision: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 303-365 (*zonalis* group). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 365-374 (*halictoides* group). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 1-121 (*octomaculata* group). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 135 (*halictoides* group). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1-86 (*ventralis* group). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1, 97-101 (*zonalis* group). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1, 101-102 (*halictoides* group). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1, 102-106 (*octomaculata* group). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 106-107 (*valida* group). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 1, 125-362 (*sphaeralceae* group). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 40-57 (*zonalis* group). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 57-62 (*halictoides* group). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 62-95 (*octomaculata* group). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 95-112 (*ventralis* group). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 112-161 (*sphaeralceae* group). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 11-56 (suppl. studies on the species of the subgenus *Perdita*).

Species Group Zonalis

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 303-315 (tax. characters, key to included spp.). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1, 97-101 (tax. characters, modified key to included spp.). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 40-43 (suppl. key to included spp.). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 11-13 (suppl. key to included spp.).

accepta Timberlake. Oreg. (Crook County).
Perdita accepta Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 340. ♀.

adjuncta Timberlake. Nev. (Austin), Calif. (Modoc County), Oreg. (Lake County), Idaho (Bingham, Cassia and Elmore Counties). Pollen: Unknown, but visits flowers of *Chrysothamnus*.
Perdita adjuncta Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 327, figs. 390, 391, 479. ♀, ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 97 (key).

aemula aemula Timberlake. Oreg., Utah. Pollen: Unknown, but visits flowers of *Chrysothamnus, Solidago*.
Perdita aemula Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 330, figs. 396, 397, 482. ♂, ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 98 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 42 (key).

aemula quadrifasciata Timberlake. Calif. (Mono County). Pollen: Unknown, but visits flowers of *Chrysothamnus*.
Perdita aemula quadrifasciata Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 43. ♀, ♂.

affecta Timberlake. Ariz. (Tuba City). Pollen: Unknown, but visits flowers of *Artemisia filifolia*.
Perdita affecta Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 14. ♀.

albopicta Timberlake. Utah (Millard County). Pollen: Unknown, but visits flowers of *Chrysothamnus*.
Perdita albopicta Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 341. ♀.

ampla Timberlake. N. Mex. (McKinley and San Juan Counties). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus, Senecio.*
Perdita ampla Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 14. ♀.

baccharidis Cockerell. Ariz. (Maricopa and Pima Counties), Calif. (Riverside and Imperial Counties). Pollen: Apparently an oligolege of *Baccharis* including *B. emoryi, B. sarothroides.*
Perdita baccharidis Cockerell, 1900. Entomologist 33: 61. ♀.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 309, 313, 352-353, figs. 428, 429, 498. ♀, ♂ (redescription). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 44 (geogr. and floral records).

basinicola Timberlake. Nev. (Churchill County), Calif. (Inyo County).
Perdita basinicola Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 44, figs. 1213, 1214, 1310. ♂, ♀.

chrysothamni Timberlake. Calif. (Mojave Desert). Pollen: Apparently an oligolege of *Chrysothamnus nauseosus.*
Perdita chrysothamni Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 319, figs. 374, 375, 473. ♀, ♂.

ciliata Timberlake. North. Calif., Oreg., Idaho. Pollen: Unknown, but visits flowers of *Aster, Chrysothamnus nauseosus, Eriogonum, Gutierrezia, Haplopappus, Heterotheca grandiflora, Lessingia glandulifera, Melilotus alba, Senecio douglasii, Solidago occidentalis.* Predator: *Philanthus pacificus arizonae* Dunning.
Perdita interserta ciliata Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 334, figs. 404, 405, 486. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 43, 45 (key, tax. status, geogr. records, variation).

confinis Timberlake. Calif. (Mono County).
Perdita confinis Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 15. ♀.

crassihirta Timberlake. Wash. (Chelan County).
Perdita crassihirta Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 46. ♀.

craterognatha Timberlake. Calif. (Mono County).
Perdita craterognatha Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 46, figs. 1215, 1216, 1311. ♀, ♂.

depressa Timberlake. Utah (Monument Valley), Ariz. (Havasu Canyon). Pollen: Unknown, but visits flowers of *Cleome jonesii.*
Perdita depressa Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 48, figs. 7, 1217, 1218, 1312. ♀, ♂.

dicksoni Timberlake. Calif. (Inyo County). Pollen: Unknown, but visits flowers of *Chrysothamnus albidus.*
Perdita dicksoni Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 328, figs. 392, 393, 480. ♀, ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 97 (key).

dubia dubia Cockerell. Colo. (Garfield and Pitkin Counties), Ariz. (Yavapai County). Pollen: Unknown, but visits flowers of *Gutierrezia microcephala, G. sarothrae.*
Perdita dubia Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 75. ♂.
Perdita fraterna Timberlake, 1929. N. Y. Ent. Soc., Jour. 39: 123. ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 306, 312, 329, figs. 394, 395, 481. ♀, ♂ (redescription, key, as *fraterna*). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 43, 50 (key, tax. status). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 16-17 (tax. status, synonymy).

dubia parilis Timberlake. Ariz. (Coconino and Mohave Counties), Utah, Nev. (Clark County), Idaho (Cassia and Franklin Counties), Wyo. (Franklin County). Pollen: Unknown, but visits flowers of *Aplopappus, Chrysothamnus, Eriogonum, Gutierrezia.*
Perdita parilis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 342, figs. 414, 415, 491. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 42, 43, 52 (key, geogr. and floral records). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 17-18 (tax. status).

ericameriae Timberlake. South. Calif. (Los Angeles and Riverside Counties). Pollen: Unknown, but visits flowers of *Aplopappus palmeri* var. *pachylepis*, *Gutierrezia californica*, *Lepidospartum squamatum*.
Perdita ericameriae Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 317, figs. 372, 373, 472. ♀, ♂.

festiva Timberlake. Utah (Emery County).
Perdita festiva Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 321. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 98 (key).

foleyi Timberlake. Calif. (Kern and Tulare Counties). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus*.
Perdita foleyi Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 347, figs. 418, 419, 493. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 50 (geogr. and floral record).

haigi Timberlake. Nev. (Churchill County).
Perdita haigi Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 100, figs. 833, 834, 895. ♀, ♂.

impunctifrons Timberlake. Calif. (Inyo and San Bernardino Counties).
Perdita impunctifrons Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 355. ♀.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 18 (geogr. record).

interserta Cockerell. South. Calif. (cismontane and Mojave Desert). Pollen: Unknown, but visits flowers of *Aplopappus palmeri* var. *pachylepis*, *A. veneta* var. *vernonioides*, *Baccharis emoryi*, *Chrysothamnus nauseosus*, *Eschscholzia californica*, *Lepidospartum squamatum*, *Polygonum lopathifolium*, *Rhus diversiloba*, *Satureja occidentalis*, *Solidago occidentalis*.
Perdita interserta Cockerell, 1922. U. S. Natl. Mus., Proc. 60 (18): 20. ♀.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 307, 311, 312, 333-334, figs. 402, 403, 485. ♂, ♀ (key, tax. characters, tax. status, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 45 (tax. status).

irregularis Timberlake. N. Mex. (McKinley County). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus*.
Perdita irregularis Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 18, figs. 1367, 1368, 1402. ♀, ♂.

isocomae Timberlake. Calif. (Riverside). Pollen: Unknown, but visits flowers of *Aplopappus venetus* var. *vernonioides*, *Baccharis emoryi*, *Polygonum lopanthifolium*, *Solidago occidentalis*.
Perdita isocomae Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 335, figs. 408, 409, 488. ♂, ♀.

lepidosparti lepidosparti Timberlake. Calif. (Mojave Desert and Lassen County), Nev. (Washoe County), Idaho (Bingham, Cassia, Fremont and Owyhee Counties). Pollen: Unknown, but visits flowers of *Chrysothamnus*, *Eriogonum heermannii*, *Gutierrezia lucida*, *Lepidospartum squamatum*, *Tetradymia comosa*.
Perdita lepidosparti lepidosparti Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 325, figs. 386, 387, 478. ♂, ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 98 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 50 (geogr. and floral records).

lepidosparti novella Timberlake. South. Calif. (San Bernardino and San Gabriel Mts.).
Perdita lepidosparti novella Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 326, figs. 388, 389. ♀, ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 98 (key).

lompocensis Timberlake. Calif. (Lompoc).
Perdita lompocensis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 337, figs. 410, 411, 489. ♂, ♀.

melanderi Timberlake. Calif. (Morro Bay).
Perdita melanderi Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 50, fig. 8. ♀.

munda Timberlake. Utah, Ariz. (Apache County).
Perdita munda Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 340. ♀.

nigrocincta Timberlake. Calif. (Mono County).
Perdita nigrocincta Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 351. ♀.

obispoensis Timberlake. Calif. (San Luis Obispo County).
Perdita obispoensis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 335, figs. 406, 407, 487. ♂.

oregonensis expleta Timberlake. Calif. (Sierra Nevada Mts.). Pollen: Unknown, but visits flowers of *Chrysothamnus*.
Perdita oregonensis expleta Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 99. ♀.

oregonensis oregonensis Timberlake. Wash. and Idaho, south to Calif. and Nev. Pollen: Unknown, but visits flowers of *Chrysothamnus viscidiflorus*, *Gutierrezia*.
Perdita oregonensis Timberlake, 1929. Pan-Pacific Ent. 6: 52. ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 306, 311, 320-321, figs. 378, 379, 475. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 98 (key, tax. status). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 41, 52 (geogr. and floral records).

pallidiventris Timberlake. Calif. (Fresno County). Pollen: Unknown, but visits flowers of *Eriogonum fasciculatum*.
Perdita pallidiventris Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 99. ♀.

placida Timberlake. Calif. (Inyo County).
Perdita placida Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 339. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 42 (key).

polita Timberlake. Calif. (Kings, Tulare and Stanislaus Counties). Pollen: Unknown, but visits flowers of *Hemizonia pungens*.
Perdita polita Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 332, figs. 400, 401, 484. ♀, ♂.

primula Timberlake. Calif. (Indio). Pollen: Unknown, but visits flowers of *Melilotus alba*.
Perdita primula Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 347, figs. 420, 421, 494. ♂.

proxima Timberlake. Calif. (Mohave Desert). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus*, *C. n. consimilis*, *Cleomella obtusifolia*, *Haplopappus acradenius*, *Solidago occidentalis*.
Perdita proxima Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 322, figs. 380, 381, 476. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 52 (geogr. and floral records).

punctifrons Timberlake. Calif. (Los Angeles and San Bernardino Counties). Pollen: Unknown, but visits flowers of *Lessingia germanorum* var. *glandulifera*.
Perdita punctifrons Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 350, figs. 426, 427, 497. ♀, ♂.

repens Timberlake. Calif. (Mt. Hamilton). Pollen: Unknown, but visits flowers of *Haplopappus arborescens*.
Perdita repens Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 19, figs. 1369, 1370, 1403. ♂.

rivalis Timberlake. Calif. (San Bernardino, San Gabriel and Sierra Nevada Mts.), Nev. (Daggett Pass). Pollen: Unknown, but visits flowers of *Aster adscendens*, *A. canescens*, *Erigeron divergens*, *E. foliolosus* var. *stenophyllus*, *Gayophytum heterozygos*, *G. nuttallii*.
Perdita rivalis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 349, figs. 424, 425, 496. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 43, 52 (key, geogr. and floral records).

scotti Timberlake. Calif. (Inyo, Los Angeles and Kern Counties). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus*.
Perdita scotti Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 338, figs. 412, 413, 490. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 53 (geogr. and floral records).

similis pascoensis Timberlake. Wash. (Pasco).
Perdita similis pascoensis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 324, figs. 384, 385. ♂, ♀.

similis similis Timberlake. Oreg., Idaho, and Wyo., south to N. Mex., Ariz. and south. Calif. (Inyo, Riverside and Imperial Counties). Pollen: Unknown, but visits flowers of

Chrysothamnus nauseosus, C. viscidiflorus, Cleome serrulata, Erigeron, Gutierrezia sarothrae, Haplopappus heterophyllus, Prosopis juliflora.
Perdita similis similis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 323, figs. 382, 383, 477. ♀, ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 22 (collection site). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 41, 53 (key, geogr. records, floral preferences).

ocia Timberlake. Calif. (Inyo County).
Perdita socia Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 42, 43, 53-54, plate figs. 1219, 1220, 1313. ♀, ♂.

stottleri Cockerell. Sask., south to N. Mex. west to Idaho, Nev. and Calif. (Mono County). Pollen: Unknown, but visits flowers of *Aster, Chrysothamnus graveolens, C. g.* var. *glabrata, C. nauseosus, Gutierrezia sarothrae, Solidago missouriensis.*
Perdita stottleri Cockerell, 1896. N. Y. Ent. Soc., Jour. 4: 205. ♀.
Perdita stottleri flavida Swenk and Cockerell, 1907. Ent. News 18: 58. ♀, ♂.

Taxonomy: Cockerell, 1904. Entomologist 37: 6. ♂. —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 304, 310, 315 (tax. characters, key, geogr. and floral records). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 304, 306, 310, 315-316, figs. 368, 369, 470 (tax. characters, key, geogr. and floral records, as *stottleri flavida*). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 98 (key, as *stottleri flavida*). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 54 (synonymy, geogr. and floral records).

subvestita Timberlake. N. Mex. (Citron County), Ariz. (Coconino County), Utah (Kane County). Pollen: Unknown, but visits flowers of *Aplopappus gracilis, Chrysothamnus viscidiflorus, Gutierrezia microcephala.*
Perdita subvestita Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 55, figs. 1221, 1222, 1314. ♀, ♂.

swezeyi Timberlake. Calif., Nev. (Ormsby County). Pollen: Unknown, but visits flowers *Chrysothamnus, Erigeron ramosus.*
Perdita swezeyi Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 348, figs. 422, 423, 495. ♀, ♂.

taeniata Timberlake. N. Mex. (McKinley and San Juan Counties). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus, Senecio longi.*
Perdita taeniata Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 20, figs. 1371, 1372, 1404. ♀, ♂.

toschiae Timberlake. Nev. (Douglas County).
Perdita toschiae Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 56. ♀.

townsendi Cockerell. N. Mex. (Otero and Rio Arriba Counties), Ariz. (Apache County). Pollen: Unknown, but visits flowers of *Aster, Chrysothamnus, Haplopappus heterophyllus.*
Perdita townsendi Cockerell, 1896. N. Y. Ent. Soc., Jour. 4: 204. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 305, 310, 320, figs. 376, 377, 474 (tax. characters, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 56 (geogr. and floral records).

vestita Timberlake. Utah (Grand and Kane Counties), Ariz. (Coconino County). Pollen: Unknown, but visits flowers of *Chrysothamnus, Gutierrezia.*
Perdita vestita Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 316, figs. 370, 371, 471. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 41, 42, 57 (key, geogr. and floral records).

zonalis aequalis Timberlake. Oreg., northern Calif., ?Nev., ?Mont. Pollen: Unknown, but visits flowers of *Chrysothamnus* including *C. nauseosus speciosus, Solidago.*
Perdita zonalis aequalis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 344. ♀, ♂.

zonalis bernardina Timberlake. Calif. (Bear Valley and Santa Ana Canyon in San Bernardino Mts.). Pollen: Unknown, but visits flowers of *Aster canescens, Chrysothamnus nauseosus, C. viridulus, C. viscidiflorus, Eriogonum molestum* var. *davidsonii, E. wrightii* var. *subscaposum, Gutierrezia californica, G. lucida, Solidago californica.*
Perdita zonalis bernardina Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 345, figs. 416, 417, 492. ♀, ♂.

zonalis monticola Timberlake. Calif. (Sierra, Shasta, Nevada, Plumas and Placer Counties). Pollen: Unknown, but visits flowers of *Chrysothamnus, Solidago.*
Perdita zonalis monticola Timberlake, 1958 Calif. Univ. Pubs. Ent. 14: 345. ♀, ♂.

zonalis pallescens Timberlake. Calif. Pollen: Unknown, but visits flowers of *Gutierrezia lucida, Haplopappus acradenius.*
Perdita zonalis pallescens Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 344. ♀, ♂.

zonalis zonalis Cresson. Calif. (Riverside and Kern Counties). Pollen: Unknown, but visits flowers of *Eriogonum, Gutierrezia californica, Lepidospartum squamatum.*
Perdita zonalis Cresson, 1879. Amer. Ent. Soc. Trans. 7: 202. ♀.

Taxonomy: Timberlake, 1929. Pan-Pacific Ent. 6: 49. ♀, ♂. —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 308, 313, 343-344 (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 41, 43 (key).

Species Group Halictoides

The species of this group collect pollen from flowers of the solanaceous genera *Physalis* and *Chamaesaracha*, but visit these and other flowers for nectar.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 365-367 (tax. characters, key to included spp.). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1 (key). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 57-59 (key to included spp.).

beameri Timberlake. Tex. Pollen: Collects pollen from the flowers of *Chamaesaracha* including *C. conioides*, but visits other flowers for nectar including *Astragalus, Gilia acerosa, Physalis lobata.*
Perdita beameri Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 276, figs. 56, 1041, 1042, 1164. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 57, 59 (key, geogr. and floral records).

chamaesarachae Cockerell. N. Mex. (Albuquerque, High Rolls, Las Vegas, Roswell and Santa Fe), Ariz. (Cochise and Yavapai Counties); Mexico (Durango). Pollen: Apparently collects pollen from the flowers of *Chamaesaracha coronopus*, but visits other flowers including *Physalis.*
Perdita chamaesarachae Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 65. ♂, ♀.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 367, 371, figs. 450, 451, 509 (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 58, 59 (key).

fidissima Timberlake. Tex. (Kenedy County). Pollen: Unknown, but visits flowers of *Parkinsonia.*
Perdita fidissima Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 59. ♀.

halictoides Smith. Wis., Mich. and Ind., west to N. Dak., Colo., and Tex.; Fla. Pollen: Unknown, but visits flowers of *Euphorbia nuttallii, Gaillardia, Monarda punctata* var. *occidentalis, Physalis heterophylla, P. lanceolata, Solidago.*
Perdita halictoides Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 128. ♀.
Perdita sexmaculata var. *punctata* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 71. ♀.
Perdita maura Cockerell, 1901. Entomologist 34: 191. ♂, ♀.
Perdita bisignata Cockerell, 1922. Amer. Mus. Novitates 33: 11. ♀.

Taxonomy: Cockerell, 1904. Canad. Ent. 36: 303. —Timberlake, 1928. Hawaii. Ent. Soc., Proc. 7: 155. —Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 268 (tax. characters, as *maura*). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 366, 367, 370-371, figs. 448, 449, 508 (redescription, key, geogr. and floral records, as *maura*). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 366, 371. ♀ (key, redescription). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 135 (synonymy, geogr. records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 318-319, figs. 76-79, table 9 (redescription, synonymy). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 57, 58 (key).

lenis Timberlake. Tex., N. Mex., Ariz., Calif. (Indio). Pollen: Unknown, but visits flowers of *Baileya multiradiata, Chamaesaracha conioides, Physalis heterophylla, Verbesina encelioides.*
Perdita lenis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 372, figs. 452, 453, 510. ♀, ♂.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 19, figs. 47-49 (larva). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 58, 59 (key). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 22 (geogr. and floral records).

levigata Timberlake. Colo. (Fremont County). Pollen: Unknown, but visits flowers of *Physalis.*
Perdita levigata Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 60, figs. 1225, 1226, 1316. ♂.

missionis Timberlake. Tex.; Mexico (Tamaulipas, San Luis Potosi). Pollen: Unknown, but visits flowers of *Chamaesaracha conioides, Lesquerella, Physalis lobata.*
Perdita missionis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 369, figs. 446, 447, 507. ♂,♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 58 (key).

physalidis Timberlake. Calif. (Riverside County), Ariz. (Continental). Pollen: Unknown, but visits flowers of *Physalis*, including *P. crassifolia.*
Perdita physalidis Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 374, figs. 454, 455, 511. ♀,♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 58, 59, 61 (key, geogr. and floral records).

rozeni Timberlake. Calif. (Colorado Desert); Mexico (Baja California and Sonora). Pollen: Unknown, but visits flowers of *Boerhaavia, Dalea mollis.*
Perdita rozeni Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 61, figs. 1227, 1228, 1317. ♀, ♂.

sexmaculata sexmaculata Cockerell. Ariz., N. Mex., Tex., Kans., Colo.; Mexico (Chihuahua, Durango, Hidalgo). Pollen: Unknown, but visits flowers of *Astragalus, Chamaesaracha conioides, C. coronopus, Phacelia piperi, Physalis lobata, Prosopis, Scutellaria, Sphaeralcea albicaulis, Thelesperma gracile.* Another subspecies, *Perdita sexmaculata octonaria* Timberlake, occurs in Baja California, Mexico.
Perdita sexmaculata Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 12. ♀.
Perdita anograe Cockerell, 1902. Amer. Nat. 36: 812. ♂.

Taxonomy: Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 416. ♀, ♂. —Timberlake, 1929. N. Y. Ent. Soc., Jour. 37: 118. ♂. —Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1095 (synonymy). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 366, 367-369, figs. 444, 445, 506 (key, redescription). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 101 (tax. status). —Rozen, 1966. Amer. Mus. Novitates 2259: 20-21, fig. 51 (larva, as *sexmaculata?*). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 58 (key).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 38-40, figs. 16, 18, table 1 (nest architecture, life history).

Species Group Octomaculata

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 1-22 (tax. characters, key to included spp.). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 62-67 (suppl. key to included spp.). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 22-25 (suppl. key to included spp.).

abdominalis Timberlake. South. Calif. (Colorado Desert); Mexico (Baja California). Pollen: Unknown, but visits flowers of *Aplopappus, Heliotropium curassavicum, Pectis papposa.*
Perdita abdominalis Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 38, figs. 550, 551, 667. ♀,♂.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 26 (geogr. and floral records).

affinis Cresson. Colo., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Aplopappus gracilis, Grindelia inornata, G. squarrosa, Helianthus petiolaris, Solidago.*
Perdita affinis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 69. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 11, 21, 108-109, figs. 636, 637, 720 (redescription, geogr. and floral records).

albipes Timberlake. Tex. (Big Bend National Park).
Perdita albipes Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 102, figs. 837, 838, 897. ♂.

apacheorum Timberlake. N. Mex. (Hidalgo County), Wyo. (Johnson County), Ariz. (Cochise and Mohave Counties). Pollen: Unknown, but visits flowers of *Asclepias, Baccharis, Euphorbia, Grindelia squarrosa, Gutierrezia sarothrae, Heterotheca.*
Perdita apacheorum Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 99. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 67-68. ♂ (geogr. and floral records).

aperta Timberlake. N. Mex. (Lincoln County), Ariz. (Navajo County). Pollen: Unknown, but visits flowers of *Gutierrezia microcephala, Lepidium montanum.*
Perdita aperta Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 68, figs. 9, 1231, 1232, 1319. ♂.

aplopappi Timberlake. Ariz., Utah (Beaver and Washington Counties). Pollen: Unknown, but visits flowers of *Aplopappus gracilis, Eriogonum, Gutierrezia microcephala.*
Perdita aplopappi Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 98, figs. 626, 627, 715. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 69 (geogr. and floral record).

aridella Timberlake. Utah, Ariz. (Navajo County). Pollen: Unknown, but visits flowers of *Gutierrezia sarothrae, Helianthus.*
Perdita aridella Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 81, figs. 600, 601, 702. ♀, ♂.

atriventris Timberlake. Tex. (Calvert). Pollen: Unknown, but visits flowers of *Heterotheca subaxillaris.*
Perdita atriventris Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 111, figs. 640, 641, 722. ♂.

beatula Timberlake. Nev. (Churchill, Humboldt and Washoe Counties). Pollen: Unknown, but visits flowers of *Sphaeralcea.*
Perdita beatula Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 22, figs. 522, 523, 662. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 62, 69-70. ♀ (geogr. and floral records).

bigeloviae Cockerell. Tex. (El Paso County), N. Mex., Colo. (Bent and Logan Counties). Pollen: Unknown, but visits flowers of *Aplopappus heterophyllus, A. pleuriflorus.*
Perdita bigeloviae Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 87. ♂, ♀.
Perdita fasciata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 57. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 7, 15, 71-72, figs. 588, 589, 696 (redescription). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 70 (synonymy, geogr. and floral records).

biparticeps Cockerell. N. Mex. Pollen: Unknown, but visits flowers of *Pectis papposa.*
Perdita biparticeps Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 84. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 121 (tax. characters). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 66, 70. ♂ (type, redescription).

bridwelli Timberlake. Ariz. (Yuma County), south. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Sphaeralcea* including *S. emoryi, S. orcuttii.*
Perdita bridwelli Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 34, figs. 542, 543, 673. ♀, ♂.

bruneri Cockerell. Tex. to Man. and Alta. east of Rocky Mts. Pollen: Unknown, but visits flowers of *Aplopappus divaricatus, Boltonia asteroides, Cleome serrulata, Grindelia squarrosa, Solidago altissima, S. rigida.*
Perdita bruneri Cockerell, 1897. Ent. News 8: 23. ♂ (♀ misdet.).
Perdita Cockerelli Crawford, 1906. Canad. Ent. 38: 282. ♂, ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 11, 21, 101-103, figs. 628, 629, 716 (redescription, geogr. and floral records).

butleri Timberlake. Ariz. (Gila Bend and Salome). Pollen: Unknown, but visits flowers of *Hymenothrix wislizeni, Pectis papposa.*
Perdita butleri Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 96, figs. 624, 625, 714. ♀, ♂.

chloris Timberlake. Ariz. (Yuma County), Nev. (Churchill and Lyon Counties), Calif. (Imperial and Inyo Counties). Pollen: Unknown, but visits flowers of *Dalea polyadenia*, *Sphaeralcea*.
Perdita chloris Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 64, figs. 576, 577, 690. ♀, ♂.

claripennis Timberlake. N. Mex. (Dona Ana County).
Perdita claripennis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 71. ♀.

cognata Timberlake. Wyo. (Sweetwater County), Utah (Grand County). Pollen: Unknown, but visits flowers of *Chrysothamnus*.
Perdita cognata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 93, figs. 616, 617, 710. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 67, 71-72. ♀, ♂ (redescription, key, tax. status, geogr. and floral records).

congrua Timberlake. Tex. (Marathon). Pollen: Unknown, but visits flowers of *Gutierrezia*.
Perdita congrua Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 26, figs. 1373, 1374, 1405. ♂.

consobrina consobrina Timberlake. N. C., S. C. Pollen: Unknown, but visits flowers of *Chrysopsis*, *Gerardia*, *Haplopappus*, *Heterotheca*, *Kuhnistera*.
Perdita consobrina Timberlake, 1928. Amer. Mus. Novitates 321: 3. ♀.

Taxonomy: Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 202-203. ♂. —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 21, 109-111, figs. 638, 639, 721. ♀, ♂ (redescription). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 315, figs. 76-79, table 9 (redescription).

consobrina lepida Timberlake. Fla. (Dunedin, Lake Worth).
Perdita consobrina lepida Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 203. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 21, 111. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 315-316 (redescription).

croceipes Timberlake. N. Mex. (Eddy and Socorro Counties), Ariz. (Mohave and Yavapai Counties), Utah (Kane County). Pollen: Unknown, but visits flowers of *Baileya*, *Gutierrezia* including *G. microcephala*.
Perdita croceipes Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 72, figs. 590, 591, 697. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 64, 66, 72-73. ♀ (key, geogr. and floral records).

crotonis caerulea Timberlake. Utah (St. George), Nev. (Glendale). Pollen: Apparently an oligolege of *Croton* including *C. longipes*.
Perdita crotonis caerulea Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 47. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 73 (key).

crotonis crotonis Cockerell. N. Mex., Ariz. (Maricopa County); Mexico (Chihuahua). Pollen: Apparently an oligolege of *Croton*.
Perdita crotonis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 64. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 5, 17, 43-44, figs. 558, 559, 681 (redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 73 (key).

crotonis cucullata Timberlake. Calif. (Anza). Pollen: Apparently an oligolege of *Croton* including *C. californicus*.
Perdita crotonis cucullata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 46. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 73 (key).

crotonis decipiens Timberlake. Tex. (Victoria).
Perdita crotonis decipiens Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 48. ♀, ♂.

crotonis dilucida Timberlake. Ariz., possibly Kans. and Nebr. Pollen: Presumably an oligolege of *Croton*, but visits flowers of *Euphorbia*.
Perdita crotonis dilucida Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 47. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 73 (key).

crotonis juabensis Timberlake. Utah (Juab County). Pollen: Apparently an oligolege of *Croton*, visits flowers of *C. texensis*.
Perdita crotonis juabensis Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 103. ♀, ♂.

crotonis leucoptera Timberlake. South. Calif. (Riverside, San Diego and San Bernardino Counties). Pollen: Apparently an oligolege of *Croton californicus*, but also visits flowers of *Hoffmanseggia* presumably for nectar.
Perdita crotonis leucoptera Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 45. ♀, ♂.

crotonis perpicta Timberlake. Nebr., N. Mex. (Arriba County). Pollen: Presumably an oligolege of *Croton*, but visits flowers of *Eriogonum, Euphorbia marginata.*
Perdita crotonis perpicta Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 74. ♀, ♂.

crotonis subnitens Timberlake. Kans. (Reno County). Pollen: Apparently an oligolege of *Croton*, visits flowers of *C. monanthogynus.*
Perdita crotonis subnitens Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 48. ♀.

crotonis titusi Timberlake. Calif. (Chino).
Perdita crotonis titusi Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 46. ♀, ♂.

crotonis undecimalis Cockerell. N. Mex. (San Miguel County). Pollen: Presumably an oligolege of *Croton*, visits flowers of *Croton* sp.
Perdita crotonis undecimalis Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 281. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 5, 45. ♀ (key, redescription).

dalyi Timberlake. Tex. (El Paso). Pollen: Unknown, but visits flowers of *Haplopappus heterophyllus.*
Perdita dalyi Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 119. ♀.

dilecta Timberlake. Utah (Kane County), Tex. (El Paso).
Perdita dilecta Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 40, figs. 554, 555, 679. ♀, ♂.

discreta Timberlake. N. C. (coastal plains and sand dunes). Pollen: Unknown, but visits flowers of *Haplopappus.*
Perdita discreta Timberlake, 1954. Ent. News 65: 14. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 22, 115-116, figs. 646, 647, 725. ♂, ♀ (key, redescription, geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 76, 77 table 9 (redescription).

dolichocephala Swenk and Cockerell. Nebr., Kans., Colo. (Weld County). Pollen: Unknown, but visits flowers of *Amorpha canescens, Boltonia asteroides, Euphorbia, Helianthus petiolaris, H. subrhomboideus, Heterotheca subaxillaris.*
Perdita dolichocephala Swenk and Cockerell, 1907. Ent. News 18: 54. ♀.
Perdita wunderi Cockerell, 1922. Amer. Mus. Novitates 33: 10. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 19, 116-117, figs. 648, 649, 726. ♀, ♂ (redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 74 (synonymy, tax. characters).

electa Timberlake. Wyo (Sweetwater County). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus.*
Perdita electa Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 86. ♀.

elegans Timberlake. Calif. (Colorado Desert), Ariz. (Yuma). Pollen: Unknown, but visits flowers of *Abronia, Larrea tridentata, Palafoxia linearis, Pectis papposa.*
Perdita elegans Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 55, figs. 568, 569, 686. ♀, ♂.

fallax Cockerell. Tex. to Ariz., north to Nebr. and Mont. Pollen: Unknown, but visits flowers of *Baileya, Eriogonum, Grindelia, Gutierrezia, Helianthus* including *H. petiolaris, Heterotheca, Verbesina encelioides.* Predator: *Philanthus crabroniformis* Smith, *P. pacificus arizonae* Dunning.
Perdita fallax Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 90. ♀.
Perdita erigeronis Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 398. ♂.
Perdita fallax fontis Cockerell, 1922. Amer. Mus. Novitates 33: 9. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 11, 20, 106-108, figs. 634, 635, 719 (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 65, 74-75 (key, synonymy, variation, geogr. and floral records).

flavicauda Timberlake. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Larrea tridentata, Melilotus, Nama hispidum, Sphaeralcea.*
Perdita flavicauda flavicauda Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 39. ♀ (Misspelled *flavicanda flavicanda* in key, p. 4).

Perdita flavicauda formosa Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 40. ♀ (Misspelled *flavicanda formosa* in key, p. 4).

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 63, 66, 75-76, figs. 1233, 1234, 1320. ♂, ♀ (key, synonymy, tax. characters, geogr. and floral records).

flaviceps Timberlake. Nev. (Las Vegas).
Perdita flaviceps Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 37, figs. 548, 549, 676. ♂.

flavifrons Timberlake. N. Mex. (Carrizozo), Utah (Lucia), south. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Chrysothamnus, Gutierrezia microcephala.*
Perdita flavifrons Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 76, figs. 1235, 1236, 1321. ♂.

fuscipes Timberlake. N. Mex. (Arch in Roosevelt County).
Perdita fuscipes Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 77. ♀.

gerardiae Crawford. N. C., Fla., Miss. Pollen: Apparently an oligolege of *Gerardia* including *G. fasciculata, G. purpurea.*
Perdita gerardiae Crawford, 1932. Ent. Soc. Wash., Proc. 34: 75. ♂, ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 13, 18, 68, figs. 582, 583, 693. ♀, ♂ (redescription). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 317, figs. 76-79, table 9 (redescription).

gerhardi dallasiana Cockerell. Tex. Pollen: Unknown, but visits flowers of *Aster tanacetifolius, Dalea aurea, Helianthus annuus, Monarda citriodora, M. punctata.*
Perdita dallasiana Cockerell, 1906. Entomologist 39: 178. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 13, 14, 15, 28-29. ♀, ♂ (redescription, tax. status, geogr. and floral records).

gerhardi gerhardi Viereck. Wis., Ill., Ind. Pollen: Unknown, but visits flowers of *Monarda punctata.*
Perdita gerhardi Viereck, 1904. Ent. News 15: 21. ♀, ♂.
Perdita gerhardi arenicola Timberlake, 1929. N. Y. Ent. Soc., Jour. 37: 119. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 2, 3, 13, 27-28 (redescription, synonymy, geogr. range). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 317-318 (redescription, as *gerhardi gerhardi* and *g. arenicola*).

gerhardi monardae Viereck. N. J., Va., Fla. Pollen: Unknown, but visits flowers of *Monarda punctata.*
Perdita monardae Viereck, 1904. Ent. News 15: 22. ♀, ♂.

Taxonomy: Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 204 (tax. status). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 7, 15, 28 (redescription). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 318, figs. 76, 77, table 9 (redescription).

gutierreziae Cockerell. Colo., Tex., N. Mex., Ariz., Calif. (Mojave Desert). Pollen: Unknown, but visits flowers of *Baileya pleniradiata, Chrysothamnus, Gutierrezia lucida, G. microcephala, Haplopappus acradenius, H. heterophyllus, Solidago confinis, Sphaeralcea.*
Perdita gutierreziae Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 85. ♂.

Taxonomy: Swenk and Cockerell, 1907. Ent. News 18: 56. ♂, ♀. —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 8, 16, 74-76, figs. 594, 595, 699. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 65, 77-78 (tax. status, geogr. and floral records).

halli Timberlake. Calif. (Palm Springs).
Perdita halli Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 89, figs. 612, 613, 708. ♀, ♂.

hirsuta Cockerell. N. Mex., Ariz. (Willcox). Pollen: Unknown, but visits flowers of *Dalea* including *D. scoparia.*
Perdita hirsuta Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 79. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 8, 18, 66, figs. 580, 581, 692. ♀, ♂ (redescription).

hirtella Timberlake. Utah (Wasatch County).
Perdita hirtella Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 78, fig. 10. ♀.

hirticeps apicata Timberlake. Calif. (Colorado and Mojave Deserts), Ariz. (Mohave County), Utah (Cornish and Oak City). Pollen: Collects pollen from flowers of *Stephanomeria* including *S. exigua, S. pauciflora*, but visits these and other flowers for nectar including *Malacothrix glabrata*.
Perdita hirticeps apicata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 59. ♀, ♂.
Perdita hirticeps candidipennis Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 60. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 79 (tax. characters, as *hirticeps apicata* and *h. candidipennis*). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 28 (synonymy, geogr. and floral record).

hirticeps hirticeps Timberlake. Calif. (cismontane). Pollen: Collects pollen from the flowers of *Stephanomeria* including *S. exigua, S. e.* var. *coronaria, S. virgata*, but visits these and other flowers for nectar including *Coreopsis lanceolata, Hemizonia*.
Perdita hirticeps hirticeps Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 58, figs. 570, 571, 687. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 79 (tax. characters, variation).

hirticeps luteocincta Timberlake. Calif. (Antioch). Pollen: Unknown, but visits flowers of *Gutierrezia californica*.
Perdita hirticeps luteocincta Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 60. ♀.

indioensis Timberlake. Calif. (Indio). Parasite: *Neolarra vigilans* (Ckll.). Pollen: Unknown, but visits flowers of *Haplopappus acradenius*.
Perdita indioensis Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 54, figs. 566, 567, 685. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 63 (key).

idonea Timberlake. Utah, Ariz. (Coconino County). Pollen: Unknown, but visits flowers of *Gutierrezia*.
Perdita idonea Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 79, figs. 1237, 1238, 1322. ♀, ♂.

jonesi Cockerell. Tex., Kans. Pollen: Unknown, but visits flowers of *Dalea aurea, Monarda citriodora, M. punctata, Petalostemon multiflorum*.
Perdita jonesi Cockerell, 1906. Entomologist 39: 177. ♀, ♂.
Perdita birkmanni Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 282. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 22, 114-115, figs. 644, 645, 724 (redescription, synonymy, geogr. and floral records).

knowltoni Timberlake. Utah (Moab). Pollen: Unknown, but visits flowers of *Chrysothamnus*.
Perdita knowltoni Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 51, figs. 562, 563, 683. ♀ (♂ misdet.).

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 63, 80 (key, tax. status, geogr. and floral record).

labergei Timberlake. Kans. (Hutchinson). Pollen: Unknown, but visits flowers of *Euphorbia*.
Perdita labergei Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 41, figs. 556, 557, 680. ♀, ♂.

lasiogastra Timberlake. Tex. (Cameron County), N. Mex. (San Miguel County), Colo. (Moffat County). Pollen: Unknown, but visits flowers of *Pectis papposa*.
Perdita lasiogastra Timberlake, 1929. N. Y. Ent. Soc., Jour. 37: 115. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 9, 20, 84-86, figs. 606, 607, 705. ♀, ♂ (key, redescription, geogr. and floral records).

laticincta Swenk and Cockerell. N. Dak., Nebr., Kans., Wyo., N. Mex. Pollen: Unknown, but visits flowers of *Amorpha canescens, Haplopappus ciliatus, Helianthus petiolaris, Melilotus*.
Perdita laticincta Swenk and Cockerell, 1907. Ent. News 18: 52. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 8, 20, 76, figs. 596, 597, 700. ♀, ♂ (key, redescription, geogr. and floral records).

luteiceps Cockerell. Colo. (Conejos, Garfield and Routt Counties), Wyo. (Fremont County). Pollen: Unknown, but visits flowers of *Gutierrezia*.
Perdita luteiceps Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 74. ♂.

Taxonomy: Timberlake, 1928. N. Y. Ent. Soc., Jour. 37: 112. ♂, ♀. —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 3, 14, 36-37, figs. 544, 545, 674. ♀, ♂ (key, redescription, geogr records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 81 (geogr. and floral records).

luteola Cockerell. Nebr., Colo., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Chrysothamnus, Gutierrezia sarothrae, Haplopappus heterophyllus.*
Perdita luteola Cockerell, 1894. Ent. News 5: 328. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 2, 13, 23-24, figs. 526, 527, 664 (key, geogr. and floral records).

maculigera var. **bilineata** Timberlake. Ill., Mo., Kans., Nebr., S. Dak.
Perdita maculipennis var. *bilineata* Timberlake, 1929. N. Y. Ent. Soc., Jour. 37: 121. ♀, ♂.

Taxonomy: Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 204 (tax. status). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 3, 14, 33 (tax. status, tax. characters, key, geogr. records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 320, figs. 76, 77, table 9 (tax. characters).

maculigera maculigera Cockerell. Tex. (Southmost), N. Mex. (Las Cruces). Pollen: Unknown, but visits flowers of *Salix*.
Perdita maculigera Cockerell, 1896. Ent. News 7: 255. ♂.

Taxonomy: Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 204 (tax. status). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 3, 14, 32-33 (key, redescription, geogr. and floral records).

maculigera maculipennis Graenicher. Minn., Wis., Mich., Ill., Iowa, Kans., Tex. (Anderson and Robertson Counties). Parasite: *Euphyto pollinaris* Reinhard. Pollen: Collects pollen from flowers of *Salix nigra* although has been listed as collecting pollen from flowers of *Melilotus alba*, visits other flowers presumably for nectar including *Erigeron philadelphicus.*
Perdita maculipennis Graenicher, 1910. Canad. Ent. 42: 102. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 9, 14, 33-34, figs. 540, 541, 671, 672. ♀, ♂ (key, redescription, geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 320-321, figs. 75, 77, table 9 (redescription). —Rozen, 1966. Amer. Mus. Novitates 2259: 19-20 (larva). —Yager and Rozen, 1966. Amer. Mus. Novitates 2265: 12 (pupa).

Biology: Michener and Ordway, 1963. Kans. Ent. Soc., Jour. 36: 34-45, 10 figs. (nest architecture, life history, immature stages, flight behavior, pollen source, parasite).

maculipes Cockerell. N. Mex. (Las Cruces). Pollen: Unknown, but visits flowers of *Haplopappus heterophyllus.*
Perdita maculipes Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 87. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 121 (tax. characters). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 65, 81-82 (key, redescription of type).

media Timberlake. Calif. (Colorado and Mojave Deserts). Pollen: Unknown, but visits flowers of *Gutierrezia lucida, Haplopappus acradenius, Solidago confinis.*
Perdita media Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 73, figs. 592, 593, 698. ♀, ♂.

melanostoma albocincta Timberlake. N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Baileya, Gutierrezia, Haplopappus spinulosus.*
Perdita albocincta Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 78. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 63, 83-84 (geogr. and floral records).

melanostoma melanostoma Swenk and Cockerell. Idaho, Utah, Colo., Nebr., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Chrysothamnus, Gutierrezia* including *G. sarothrae.*
Perdita melanostoma Swenk and Cockerell, 1907. Ent. News 18: 57. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 8, 78 (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 63, 65, 82-83, figs. 11, 1241, 1242, 1324. ♂ (key, redescription, geogr. and floral records).

mesillensis Timberlake. N. Mex. (Mesilla Park). Pollen: Unknown, but visits flowers of *Gutierrezia lucida, Pectis papposa.*
Perdita mesillensis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 84, figs. 1243, 1244, 1325. ♂.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 28 (tax. characters, synonymy).

microsticta Timberlake. Kans. (Scott County).
Perdita microsticta Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 89. ♀.

mimula Timberlake. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Haplopappus acradenius.*
Perdita mimula Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 53. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 63 (key).

nuda Cockerell. N. Mex., Ariz., Colo., Utah, Idaho (Franklin County). Parasite: *Megaselia, Sphecodes* sp. near *fragariae* Ckll. Pollen: Apparently collects pollen only from vernal and autumnal flowering Compositae including *Chrysothamnus, Erigeron, Grindelia* including *G. squarrosa.*
Perdita nuda Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 93. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 119. ♀ (redescription, key). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 104-105, figs. 839, 840, 898. ♂, ♀ (geogr. and floral records). —Torchio, 1975. Kans. Ent. Soc., Jour. 48: 266-275, 277-278, figs. 1-18, 26, 27 (immature stages).

Biology: Torchio, 1975. Kans. Ent. Soc., Jour. 48: 257-279, 27 figs. (nest architecture, life history, nest associates).

numerata hesperia Timberlake. South. Calif. (Colorado Desert); Mexico (Baja California). Pollen: Unknown, but visits flowers of *Geraea canescens, Larrea tridentata, Melilotus, Prosopis, Tamarix.*
Perdita numerata hesperia Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 62. ♀, ♂.

numerata numerata Cockerell. Tex., N. Mex., Ariz. (Phoenix), ?Calif. (Needles). Pollen: Unknown, but visits flowers of *Actinea, Prosopis, Salix.*
Perdita numerata Cockerell, 1895. Amer. Ent. Soc., Trans. 22: 296. ♀.

Taxonomy: Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 281. ♂. —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 6, 15, 60-62, figs. 572, 573, 688 (key, redescription, tax. status, geogr. and floral records).

occidua Timberlake. Ariz. (Oak Creek Canyon).
Perdita occidua Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 120. ♀.

occlusa Timberlake. Ariz. (Walnut Canyon near Flagstaff).
Perdita occlusa Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 85, figs. 1245, 1246, 1326. ♂.

octomaculata octomaculata (Say). N. B. south to Ga., west to Minn., Ill. and Miss. Pollen: Unknown, but visits flowers of *Aster ericoides, A. puniceus, Bidens, Boltonia, Eupatorium, Euthamia, Lycopus, Monarda, Solidago.*
Panurgus 8-maculatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 350. ♂, ♀.
Perdita octomaculata Dalla Torre, 1896. Cat. Hym., v. 10, p. 173. Emend.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 22, 111-113, figs. 642, 643, 723 (key, redescription, geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 321-322, figs. 76-79, table 9 (redescription, geogr. range, floral records).

octomaculata terminata Cockerell. N. Dak., Nebr., Kans., Iowa, Ill., Ark., Miss. Pollen: Unknown, but visits flowers of *Aster azureus, A. multiflorus, A. saliciflorus, Solidago canadensis, S. rigida.*
Perdita octomaculata terminata Cockerell, 1922. Amer. Mus. Novitates 33: 8. ♂, ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 22, 113-114 (key, tax. characters, geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 322 (tax. characters, geogr. range).

ordinata Timberlake. Ariz. (Cochise and Navajo Counties), N. Mex. (Hidalgo and Socorro Counties), Utah (Cache and Washington Counties). Pollen: Unknown, but visits flowers of *Baileya pleniradiata, Dithyrea* including *D. wislizenii, Heterotheca subaxillaris, Pectis papposa.*
Perdita ordinata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 105, figs. 841, 842, 899. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 67, 86, fig. 12 (key, geogr. and floral records). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 28-29. ♂, ♀ (geogr. and floral records).

paroselae Timberlake. South. Calif. (Colorado Desert). Pollen: Possibly an oligolege of *Dalea*, visits flowers of *Dalea californica, D. emoryi.*
Perdita paroselae Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 65, figs. 578, 579, 691. ♀, ♂.

pectidis Cockerell. N. Mex., Ariz. (Salome). Pollen: Unknown, but visits flowers of *Kallstroemia, Pectis papposa, Sesuvium verrucosum, Wedeliella.*
Perdita pectidis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 83. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 9, 19, 91-92, figs. 614, 615, 709. ♀, ♂ (key, tax. characters, geogr. and floral records).

percincta Timberlake. Utah (Skull Rock Pass, 6,100ft.), Ariz. (Coconino County). Pollen: Unknown, but visits flowers of *Aster, Gutierrezia microcephala, Wislizenia refracta.*
Perdita percincta Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 86. ♀.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 30-31, figs. 1379, 1380, 1408. ♂, ♀ (key, redescription, geogr. and floral records).

perixantha Timberlake. Ariz. (Navajo County).
Perdita perixantha Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 23, figs. 524, 525, 663. ♂.

perpallida citrinella Graenicher. Wis., Minn., N. Dak., Nebr., Alta. Pollen: Unknown, but visits flowers of *Petalostemon purpureum, P. villosum.*
Perdita citrinella Graenicher, 1910. Canad. Ent. 42: 103. ♀.

Taxonomy: Crawford, 1912. Canad. Ent. 44: 359. ♂, ♀. —Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 204 (tax. status). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 3, 14, 26-27 (key, tax. characters, geogr. and floral records).

perpallida perpallida Cockerell. Man., Minn., N. Dak., Nebr., Kans., N. Mex. Pollen: Apparently an oligolege of vernal and autumnal flowering Compositae, visits flowers of *Amorpha canescens, Helenium autumnale, Petalostemon candidum, P. oligophyllum, P. villosum, Solidago occidentalis.*
Perdita perpallida Cockerell, 1901. Entomologist 34: 190. ♀, ♂.

Taxonomy: Swenk and Cockerell, 1907. Ent. News 18: 57. —Stevens, 1919. Canad. Ent. 51: 207. ♀, ♂ (tax. characters, floral records). —Timberlake, 1952. Ent. Soc. Wash., Proc. 54: 204 (tax. status). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 2, 13, 25-26, figs. 532, 533, 667. ♀, ♂ (key, redescription, geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 322 (tax. status).

phymatae Cockerell. N. Mex., Ariz., Utah. Pollen: Unknown, but visits flowers of *Bahia absinthifolia, Baileya pleniradiata, Gutierrezia lucida, G. microcephala, Haplopappus heterophyllus, Pectis papposa.* Predator: *Phymata* sp.
Perdita phymatae Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 12. ♀.
Perdita nitidella Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 16. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 9, 92-93 (key, redescription, geographic, floral and predator records). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 70-71, figs. 586, 587, 695. ♂ (as *nitidella*). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 64, 85. ♀ (key, redescription, as *nitidella*). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 65 (key). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 31 (synonymy, geogr. range, tax. characters).

picturata Timberlake. Tex. (Victoria and Aransas Counties).
Perdita picturata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 50, figs. 560, 561, 682. ♀, ♂.

plucheae Timberlake. Calif. (Colorado Desert), Ariz.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Pluchea sericea, Tamarix gallica.*
Perdita plucheae Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 69, figs. 584, 585, 694. ♀, ♂.

polygonellae Timberlake. N. C. (Coastal Plain). Pollen: Unknown, but visits flowers of *Polygonella polygama.*
Perdita polygonellae Timberlake, 1954. Ent. News 65: 12. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 4, 16, 40, figs. 552, 553, 678 (key, tax. characters). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 323, figs. 76-79, table 9 (redescription).

prionopsidis Timberlake. Kans. (Reno and Montgomery Counties). Pollen: Unknown, but visits flowers of *Boltonia asteriodes, Haplopappus ciliatus, Helianthus petiolaris, Heterotheca subaxillaris.*
Perdita prionopsidis Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 104, figs. 632, 633, 718. ♀, ♂.

rectangulata Cockerell. Colo., Idaho, Ariz. (Holbrook). Pollen: Unknown, but visits flowers of *Chrysothamnus, Gutierrezia sarothrae, Solidago.*
Perdita rectangulata Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 72. ♀ (♂ misdet.).

Taxonomy: Stevens, 1919. Canad. Ent. 51: 207. ♂, ♀ (as *martini*). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 3, 9, 16, 82-83, figs. 602, 603, 703. ♀, ♂ (key, redescription, geogr. and floral records, in part *martini*). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 64, 65, 87-88 (key, tax. characters and tax. status).

reperta Timberlake. N. Mex. (Quemado), Ariz. (Navajo County), Colo. (Alamosa County). Pollen: Unknown, but visits flowers of *Chrysothamnus* including *C. viscidiflorus.* Predator: *Philanthus* sp.
Perdita reperta Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 88, figs. 13, 1247, 1248, 1327. ♀, ♂.

retusa Timberlake. Ariz. (Mohave and Yuma Counties), Calif. (Colorado and Mojave Deserts). Pollen: Unknown, but visits flowers of *Chrysothamnus paniculatus, Haplopappus.*
Perdita retusa Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 86, figs. 608, 609, 706. ♀, ♂.

rhodura Cockerell. Ariz., N. Mex., Nebr. (Sioux County). Pollen: Unknown, but visits flowers of *Gutierrezia sarothrae, Haplopappus, Zinnia grandiflora.*
Perdita rhodura Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 511. ♀, ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 6, 15, 52-53, figs. 564, 565, 684. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 63, 66 (key).

scitula antiochensis Timberlake. Calif. (Antioch, Oakley). Pollen: Unknown, but visits flowers of *Eriogonum, Gutierrezia californica, Heterotheca grandiflora, Lessingia glandulifera.*
Perdita scitula antiochensis Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 80, figs. 598, 599, 701. ♀, ♂.

scitula scitula Timberlake. Calif. (Inyo County). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus* var. *gnaphalodes.*
Perdita scitula scitula Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 79. ♀, ♂.

sedulosa Timberlake. N. Mex. (Socorro County). Pollen: Unknown, but visits flowers of *Baileya pleniradiata.*
Perdita sedulosa Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 31. ♀.

sejuncta Timberlake. N. Mex. (Socorro County), Utah (Wah Wah Mts.); Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Gutierrezia microcephala.*
Perdita sejuncta Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 90. ♀.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 32 (geogr. record).

senecionis Cockerell. N. Mex. (Las Cruces). Pollen: Unknown, but visits flowers of *Senecio douglasii.*
Perdita senecionis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 94. ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 11, 100-101. ♀ (redescription, key).

separata Timberlake. Tex. (Zapata County).
Perdita separata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 106. ♀.

snowii Cockerell. Colo. (Boulder, Costilla and Moffat Counties), Ariz. (Holbrook). Pollen: Unknown, but visits flowers of *Aster, Grindelia, Gutierrezia*.
Perdita snowii Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 73. ♀.

Taxonomy: Cockerell, 1910. Psyche 17: 244. ♂. —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 9, 20, 83-84, figs. 604, 605, 704. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 64, 91 (tax. characters, key).

solidaginis Cockerell. Colo. (White Rocks, near Boulder). Pollen: Unknown, but visits flowers of *Solidago*.
Perdita solidaginis Cockerell, 1922. Amer. Mus. Novitates 33: 12. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 316-317 (tax. characters). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 66, 91-92. ♂ (key, redescription of type specimen).

stepheni Timberlake. Tex. (Dimmit County). Pollen: Unknown, but visits flowers of *Monarda punctata*.
Perdita stepheni Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 29, figs. 536, 537, 669. ♂.

submedia Timberlake. Ariz. (Apache County). Pollen: Unknown, but visits flowers of *Chrysothamnus*.
Perdita submedia Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 32. ♀.

swenki Crawford. N. Y. (Long Island), Mich., Ill., Wis., Minn., N. Dak., Nebr., Alta. Pollen: Unknown, but visits flowers of *Chrysopsis, Grindelia, Helianthus maximillianii, Liatris, Solidago juncea, S. rigida*.
Perdita swenki Crawford, 1915. Insecutor Inscitiae Menstruus 3: 109. ♂, ♀.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 10, 19, 103-104, figs. 630, 631, 717. ♀, ♂ (key, redescription, geogr. and floral records). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 324, figs. 76-78, table 9 (redescription). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 33 (geogr. records).

tacita Timberlake. Idaho (Owyhee County).
Perdita tacita Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 93. ♀.

translineata Timberlake. Tex. (Brazos and Van Zandt Counties), N. Mex. (Socorro County). Pollen: Unknown, but visits flowers of *Baileya pleniradiata, Eriogonum multiflorum, Haplopappus divaricatus, Heterotheca subaxillaris*.
Perdita translineata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 93, figs. 618, 619, 711. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 65, 67, 94. ♀, ♂ (key, redescription, geogr. and floral records).

tridentata Stevens. N. Dak., Nebr., Kans. Pollen: Unknown, but visits flowers of *Haplopappus, Helianthus petiolaris*.
Perdita tridentata Stevens, 1919. Canad. Ent. 51: 206. ♂.

Taxonomy: Stevens, 1921. Canad. Ent. 53: 66. ♀. —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 12, 21, 118-119, figs. 650, 651, 727. ♀, ♂ (key, redescription, geogr. and floral records).

trifida Timberlake. Calif. (Mojave Desert). Pollen: Unknown, but visits flowers of *Baccharis emoryi, Haplopappus acradenius*.
Perdita trifida Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 37, figs. 546, 547, 675. ♂.

trimaculata Timberlake. South. Calif. (Colorado and Mojave Deserts), Ariz. (Mohave County). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus, C. paniculatus, Gutierrezia lucida*.
Perdita trimaculata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 62, figs. 574, 575, 689. ♀, ♂.

truncatella Timberlake. Ariz. (Snowflake).
Perdita truncatella Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 94, figs. 1251, 1252, 1329. ♂.

variegata pura Timberlake. Tex., Kans. (Garden City). Pollen: Unknown, but visits flowers of *Monarda punctata* var. *occidentalis*.
Perdita variegata pura Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 31. ♀, ♂.

variegata variegata Timberlake. Kans. Pollen: Unknown, but so far has been collected exclusively at the flowers of *Monarda* including *M. punctata* var. *occidentalis*.
Perdita variegata variegata Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 30, figs. 538, 539, 670. ♀, ♂.

versuta Timberlake. Tex. (Kingsville).
Perdita versuta Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 105, figs. 843, 844, 900. ♂.

xanthochroa Timberlake. Colo. (Moffat County), Utah (Juab and Uinta Counties), Idaho (Owyhee County). Pollen: Unknown, but visits flowers of *Sphaeralcea ambigua*, *Stanleya pinnata*.
Perdita xanthochroa Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 24, figs. 530, 531, 666. ♀, ♂.

xanthodes Timberlake. Calif. (Mohave Desert). Pollen: Unknown, but visits flowers of *Gutierrezia lucida*, *Haplopappus cooperi*.
Perdita xanthodes Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 24, figs. 528, 529, 665. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 63 (key). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 33 (geogr. and floral records).

xanthops Timberlake. Wyo. (Carbon County).
Perdita xanthops Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 33, figs. 1381, 1382, 1409. ♀, ♂.

Species Group Ventralis

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1, 2-14 (key, tax. characters, key to included spp.). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 95-97 (suppl. key to included spp.).

acaciae Timberlake. South. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Acacia greggii*, *Agave consociata*, *A. deserti*.
Perdita acaciae Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 61, figs. 799, 800, 878. ♀, ♂.

albata Timberlake. Ariz. (Navajo County). Pollen: Unknown, but visits flowers of *Mentzelia pumila*.
Perdita albata Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 97. ♀.

amplipennis Timberlake. Calif. mts. (Inyo and Mono Counties). Pollen: Unknown, but visits flowers of *Eriogonum fasciculatum*, *Stanleya pinnata*, and presumably *Dalea*.
Perdita amplipennis Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 30, figs. 751, 752, 854. ♀, ♂.

austini Cockerell. N. Mex. Pollen: Unknown, but visits flowers of *Baileya pleniradiata*, *Gutierrezia microcephala*, *G. sarothrae*, *Haplopappus*.
Perdita austini Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 13. ♂.
Perdita aeneifrons Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 91. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 10, 40-41, figs. 769, 770, 863. ♂ (redescription). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 125. ♂, ♀ (synonymy). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 96, 97, 98-99 ♀, ♂ (key, redescription, geogr. and floral records).

bicuspidariae Timberlake. South. Calif. (Colorado Desert). Pollen: Collects pollen from the flowers of *Mentzelia involucrata*, but also visits flowers of *Hyptis emoryi* presumably for nectar.
Perdita bicuspidariae Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 20, figs. 741, 742, 849. ♂, ♀.

brevihirta Timberlake. Ariz. (Maricopa County), Wyo. (Fremont County). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus*, *Pectis papposa*.
Perdita brevihirta Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 41, figs. 771, 772, 864. ♀, ♂.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 34 (geogr. and floral records).

claypolei australior Timberlake. Calif. (San Diego and Los Angeles Counties). Pollen: Unknown, but visits flowers of *Adenostoma fasciculatum*, *Eriogonum fasciculatum*, *Hemizonia fasciculata*, *Heteromeles arbutifolia*, *Opuntia*.
Perdita claypolei australior Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 68. ♀, ♂.

claypolei claypolei Cockerell. South. Calif. (cismontane). Pollen: Collects pollen from the flowers of *Eriogonum* including *E. elongatum*, *E. fasciculatum*, *E. gracile*, *E. wrightii* var *subscaposum*, *E. umbellatum*, but visits these and other flowers for nectar including *Eriastrum virgatum*.
Perdita claypolei Cockerell, 1901. Canad. Ent. 33: 281. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 6, 13, 66-68, figs. 805, 806, 881. ♀, ♂ (key, redescription, geogr. and floral records).

claypolei limatula Timberlake. Calif. (Kern County) to Oreg., and Nev. (Douglas County). Pollen: Collects pollen from the flowers of *Eriogonum* including *E. elatum*, *E. fasciculatum*, *E. gracile*, *E. heermannii*, *E. inflatum*, *E. latifolium*, *E. nudum*, *E. vimineum*, *E. virgatum*, *E. wrightii* var. *subscaposum*, but visits these and other flowers for nectar including *Achillea millefolium*, *Brickellia*, *Cirsium*, *Solidago*.
Perdita claypolei limatula Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 68. ♀, ♂.

clypeata clypeata Timberlake. South. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Eriogonum inflatum*.
Perdita clypeata clypeata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 79, figs. 817, 818, 887. ♀, ♂.

clypeata immaculata Timberlake. Ariz. (near Mesa), south. Calif. (Desert Center and Hayfield). Pollen: Unknown, but visits flowers of *Eriogonum inflatum*.
Perdita clypeata immaculata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 80. ♀, ♂.

colei Timberlake. Calif. (San Bernardino Mts. and vicinity). Pollen: Unknown, but visits flowers of *Chorizanthe staticoides*, *Chrysothamnus nauseosus*, *Gutierrezia lucida*, *Lepidospartum squamatum*, *Solidago confinis*.
Perdita colei Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 48, figs. 783, 784, 870. ♀, ♂.

crandalli Timberlake. Ariz. (Pima and Pinal Counties). Pollen: Unknown, but visits flowers of *Petalonyx thurberi*.
Perdita crandalli Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 38. ♀.

dasylirii Cockerell. Western Tex. to Ariz. Pollen: Unknown, but visits flowers of *Acacia*, *Agave palmeri*, *Amorpha fruticosa*, *Asclepias galioides*, *Ceanothus*, *Dasylirion wheeleri*, *Euphorbia albomarginata*, *Mertensia franciscana*, *Nolina microcarpa*, *Rudbeckia laciniata*, *Salix taxifolia*, *Sapindus saponaria*.
Perdita dasylirii Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 539. "♀" = ♂ (♂ misdet.).
Perdita nolinae Cockerell, 1922. Amer. Mus. Novitates 33: 11. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 5, 12, 55-57, figs. 793, 794, 875. ♀, ♂ (key, redescription, geogr. and floral records).

dimidiata Timberlake. Ariz. (Pinal County); Mexico (Baja California). Pollen: Unknown, but visits flowers of *Sesuvium verrucosum*.
Perdita dimidiata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 39, figs. 767, 768, 862. ♂.

distans Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Unknown, but visits flowers of *Eriogonum* including *E. reniforme*, *E. thomasii*.
Perdita distans Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 73, figs. 811, 812, 884. ♀, ♂.

erythropyga Timberlake. South. Calif. (Colorado Desert). Pollen: Collects pollen of *Dalea* including *D. californica*, *D. emoryi*, but also visits other flowers for nectar including *Cryptantha angustifolia*, *Isomeris arborea*, *Larrea tridentata*.
Perdita erythropyga Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 42, figs. 773, 774, 865. ♀, ♂.

exilis Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Collects pollen from *Petalonyx thurberi*.
Perdita exilis Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 36, figs. 763, 764, 860. ♂, ♀.

fulvicauda Timberlake. South. Calif. (Colorado Desert); Mexico (Baja California). Pollen: Unknown, but visits flowers of *Baileya pleniradiata, Coldenia plicata, Dalea mollis, Larrea tridentata, Melilotus, Nama hispidum, Phacelia distans, Prosopis juliflora, Verbena.*
Perdita fulvicauda Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 43, figs. 775, 776, 866. ♀, ♂.

gentilis Timberlake. Nev. (Churchill and Washoe Counties), Ariz. (Vermillion Cliffs). Pollen: Unknown, but visits flowers of *Eriogonum.*
Perdita gentilis Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 78. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 96, 97, 109-110. ♀, ♂ (key, geogr. and floral record).

glabrella Timberlake. Ariz. (Continental).
Perdita glabrella Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 104. ♀.

glabrescens Timberlake. Calif. (Inyo County).
Perdita glabrescens Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 38, figs. 765, 766, 861. ♀, ♂.

grandiceps Cockerell. N. Mex. (Alamogordo, La Cueva and Las Cruces). Pollen: Unknown, but visits flowers of *Fallugia paradoxa, Solidago.*
Perdita grandiceps Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 96. ♂.

Taxonomy: Cockerell, 1899. Canad. Ent. 31: 256. ♀. —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 3, 10, 32-33, figs. 757, 758, 857. ♀, ♂ (key, redescription, geogr. and floral records).

holoxantha Timberlake. Utah (Grand and Washington Counties), Ariz. (Holbrook). Pollen: Unknown, but visits flowers of *Mentzelia pumila, Poleomintha incana.*
Perdita holoxantha Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 17, figs. 737, 738, 847. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 95, 96, 100. ♀, ♂ (key, geogr. and floral records).

inornata Timberlake. Calif. (Clark Mt. and Panamint Mts.), Nev. (Charleston Mts.), Ariz. (Grand Canyon, south rim). Pollen: Unknown, but visits flowers of *Agave deserti, Cowania stansburiana, Eriodictyon.*
Perdita inornata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 49, figs. 787, 788, 872. ♀, ♂.

jucunda Timberlake. Calif., Nev. (Churchill County), Ariz. (Painted Desert). Pollen: Collects pollen from the flowers of *Eriogonum,* including *E. aureum, E. fasciculatum, E. gracile, E. inflatum, E. molestum* var. *davidsonii, E. nudum,* but also visits other flowers for nectar including *Chorizanthe staticoides, Gutierrezia lucida, Lepidospartum squamatum.*
Perdita jucunda Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 64, figs. 803, 804, 880. ♀, ♂.

kanabensis Timberlake. Utah (Kanab), Ariz. (Coconino County). Pollen: Unknown, but visits flowers of *cleomella, Eriogonum corymbosum.*
Perdita kanabensis Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 34, figs. 1383, 1384, 1410.

labrata Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Evidently collects pollen from the flowers of *Eriogonum* including *E. fasciculatum* var. *polifolium,* but also visits other flowers presumably for nectar including *Larrea tridentata.*
Perdita labrata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 81, figs. 821, 822, 889, 901. ♀, ♂.

lateralis daleae Timberlake. Calif. (Inyo and Panamint Mts.). Pollen: Apparently an oligolege of *Larrea tridentata,* but visits other flowers presumably for nectar including *Chaenactis, D. fremontii, D. f.* var. *johnsonii, Eriogonum fasciculatum, E. inflatum.*
Perdita lateralis daleae Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 29. ♀, ♂.

lateralis lateralis Timberlake. Calif. (Colorado Desert), Ariz. (Maricopa, Pinal and Yuma Counties). Pollen: Apparently an oligolege of *Larrea tridentata,* but also visits other flowers presumably for nectar including *Chaenactis, Dalea californica, Eriogonum fasciculatum, Hyptis emoryi, Prosopis juliflora.*
Perdita lateralis lateralis Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 27, figs. 749, 750, 853. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 25 (floral relationships).

lucens Timberlake. South. Calif. (Mojave Desert), Nev. (Churchill County). Pollen: Possibly an oligolege of *Eriogonum*, visits flowers of *E. fasciculatum*, *E. inflatum*, *E. mohavense*, *E. nodosum*.
Perdita lucens Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 71, figs. 809, 810, 883. ♀, ♂.

lunulata Timberlake. Ariz. (Apache and Navajo Counties). Pollen: Collects pollen from the flowers of *Mentzelia pumila*, but also visits the flowers of *Eriogonum aureum* presumably for nectar.
Perdita lunulata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 22. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 96, 101. ♀, ♂ (tax. status, key, geogr. and floral relationships).

melanops Timberlake. South. Calif. (Santa Rosa Mts.). Pollen: Unknown, but visits flowers of *Physalis crassifolia*.
Perdita melanops Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 105. ♀.

melanura Timberlake. Ariz. (Grand Canyon).
Perdita melanura Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 52. ♀.

mentzeliae Cockerell. Colo. (Antonita and Trinidad), N. Mex., Ariz., (Cochise, Greenlee and Navajo Counties). Pollen: Collects pollen from the flowers of *Mentzelia pumila*.
Perdita mentzeliae Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 60. ♂, ♀.
Perdita pallidior Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 61. ♂, ♀.
Perdita pulchrior Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 62. ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 3, 10, 24-26, figs. 745, 746, 851. ♀, ♂ (key, redescription, synonymy, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 101 (geogr. and floral records).

Biology: Linsley and Hurd, 1959. Ent. News 70: 64, 65, 67 (floral relationships).

mentzeliarum Cockerell. West. Tex. to Ariz.; Mexico (Baja California and Chihuahua). Pollen: Apparently an oligolege of *Mentzelia pumila*, but visits flowers of *Bahia absinthifolia* for nectar.
Perdita mentzeliarum Cockerell, 1897. N. Mex. Agr. Expt. Sta., Bul. 24: 43. ♀, ♂.
Perdita mentzeliarum var. *lauta* Cockerell, 1905. Entomologist 38: 145. ♀, ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 3, 9, 23-24, figs. 743, 744, 850. ♀, ♂ (key, redescription, synonymy, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 101 (geogr. and floral records).

michelbacheri Timberlake. Ariz. (Maricopa County); Mexico (Baja California). Pollen: Unknown, but visits flowers of *Acacia*, *Carnegiea gigantea*.
Perdita michelbacheri Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 60, figs. 797, 798, 877. ♀, ♂.

nasuta galacticoptera Timberlake. Calif. (Inyo and Panamint Mts.). Pollen: Apparently an oligolege of *Eriogonum*, visits flowers of *E. inflatum*.
Perdita nasuta galacticoptera Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 76. ♀, ♂.

nasuta nasuta Timberlake. South. Calif. (Colorado and Mojave Deserts), Nev. (Clark County), Ariz. (Mohave, Pinal and Yuma Counties). Pollen: Apparently an oligolege of *Eriogonum*, visits flowers of *E. trichopes*.
Perdita nasuta nasuta Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 74, figs. 813, 814, 885. ♀, ♂.

nasuta obscurescens Timberlake. Ariz., N. Mex. (Las Cruces). Pollen: Apparently an oligolege of *Eriogonum*, visits flowers of *E. thomasii*, *E. trichopes*.
Perdita nasuta obscurescens Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 76. ♀, ♂.

nigridia Timberlake. Calif. (Colorado and Mojave Deserts), Ariz. (Mohave County); Mexico (Baja California). Pollen: Apparently collects pollen only from the flowers of *Mentzelia* including *M. albicaulis*, *M. involucrata*, *M. pumila*, *M. tricuspis*, but visits these and apparently other flowers for nectar including *Encelia farinosa*, *Eriogonum fasciculatum*, *Eucnide urens*.
Perdita nigridia Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 18, figs. 777, 778, 867. ♂, ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 101 (geogr. and floral record).

nodosicornia Timberlake. Calif. (Coalinga).
Perdita nodosicornia Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 110, fig. 1360. ♂.

pectoralis Timberlake. Ariz. (Vermillion Cliffs). Pollen: Unknown, but visits flowers of *Eriogonum*.
Perdita pectoralis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 111, figs. 1265, 1266, 1336. ♂.

perplexa Timberlake. N. Mex. (Catron County). Pollen: Unknown, but visits flowers of *Mentzelia*.
Perdita perplexa Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 19, figs. 739, 740, 848. ♀ (♂ misdet.).

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 101 (tax. status).

polytropica obsoleta Timberlake. Ariz. (Maricopa, Pima and Pinal Counties). Pollen: Polylectic, visits flowers of *Acacia*, *Carnegiea gigantea*, *Cercidium*, *Echinocactus*.
Perdita polytropica obsoleta Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 59. ♀, ♂.

polytropica polytropica Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Polylectic, visits a wide variety of flowers including *Acacia greggii*, *Agave deserti*, *Asclepias subulata*, *Carnegiea gigantea*, *Croton californicus*, *Dalea spinosa*, *Encelia farinosa*, *Echinocactus*, *Eriogonum inflatum*, *Ferrocactus acanthodes*, *Hyptis emoryi*, *Larrea tridentata*, *Olneya tesota*, *Opuntia*, *Prosopis juliflora*.
Perdita polytropica polytropica Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 57, figs. 795, 796, 876. ♀, ♂.

punctifera Cockerell. Ariz., south. Calif. (Blythe); Mexico (Baja California). Pollen: Collects pollen from the flowers of *Mentzelia pumila*, but also visits the flowers of *Gossypium thurberi* presumably for nectar.
Perdita punctifera Cockerell, 1914. Ent. Soc. Wash., Proc. 16: 32. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 3, 9, 26-27, figs. 747, 748, 852. ♀, ♂ (key, redescription, geogr. and floral records).

rehni praeclara Timberlake. Ariz. (Southwestern Research Station).
Perdita rehni praeclara Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 106, fig. 14. ♀.

rehni rehni Cockerell. N. Mex., western Tex.; Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Dasylirion wheeleri*, *Nolina*.
Perdita Rehni Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 131. ♀ (= male).

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 8, 12, 50-52, figs. 789, 790, 873. ♀, ♂ (key, redescription, geogr. and floral records).

rhois reducta Cockerell. Calif. (South Coast Ranges). Pollen: Apparently polylectic, visits a wide variety of flowers including *Adenostoma fasciculatum*, *Eriodictyon parryi*, *Eriogonum fasciculatum*, *Heteromeles arbutifolia*, *Rhus laurina*.
Perdita rhois mut. *reducta* Cockerell, 1901. Canad. Ent. 33: 283. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 6, 54-55. ♀, ♂ (key, redescription, geogr. and floral records).

rhois rhois Cockerell. South. Calif. (chiefly cismontane); Mexico (Baja California). Pollen: Polylectic, visits a wide variety of flowers for pollen and nectar including *Acacia greggii*, *Adenostoma fasciculatum*, *A. sparsifolium*, *Agave deserti*, *Alyssum maritimum*, *Baccharis emoryi*, *B. viminea*, *Chrysanthemum*, *Eriogonum fasciculatum*, *E. f.* var. *polifolium*, *E. gracile*, *Euphorbia albomarginata*, *Gutierrezia californica*, *Haplopappus linearifolius*, *Heliotropium oculatum*, *Heteromeles arbutifolia*, *Lotus scoparius*, *Mentha*, *Nolina parryi*, *Polygonum lapanthifolium*, *Prunus ilicifolia*, *Rhamnus californicus*, *Rhus laurina*, *Rhus ovata*, *Schinus molle*.
Perdita rhois Cockerell, 1901. Canad. Ent. 33: 282. ♀.
Perdita hypoxantha Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 13: 424. ♂.

Taxonomy: Timberlake, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1094 (synonymy). —Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 6, 12, 53-54, figs. 791, 792, 874. ♀, ♂ (key, redescription, geogr. and floral records).

semicrocea Cockerell. N. Mex. (Dona Ana, Otero and San Miguel Counties), Ariz. (Willcox). Pollen: Unknown, but visits flowers of *Aster, Bahia absinthifolia, Gutierrezia sarothrae, Haplopappus, Solidago.*
Perdita semicrocea Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 13. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 4, 9, 35-36, figs. 761, 762, 859. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 96, 101 (key, geogr. and floral record).

semilutea Timberlake. Calif. (Box Canyon in Riverside County). Pollen: Unknown, but visits flowers of *Eriogonum thomasii.*
Perdita semilutea Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 81, figs. 819, 820, 888. ♂.

snellingi Timberlake. South. Calif. (Kern and Inyo Counties). Pollen: Presumably an oligolege of vernal and autumnal flowering Compositae, visits flowers of *Chrysothamnus nauseosus consimilis, Cleome, Eriogonum heermannii, Euphorbia albomarginata, Gutierrezia lucida, G. microcephala, Rosa californica, Solidago spectabilis.*
Perdita snellingi Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 46, figs. 781, 782, 869. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 106-107 (tax. characters, geogr. and floral records).

sodalis Timberlake. South. Calif. (Santa Rosa Mts.). Pollen: Unknown, but visits flowers of *Hyptis emoryi.*
Perdita sodalis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 101, figs. 1255, 1256, 1331. ♂.

stabilis Timberlake. Ariz. (Douglas).
Perdita stabilis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 102, figs. 1257, 1258, 1332. ♂.

subfasciata Cockerell. N. Mex. Ariz., Utah (Juab County), Nev. (White Pine County), Calif. (Inyo County Mts.). Pollen: Apparently an oligolege of vernal and autumnal flowering Compositae, visits flowers of *Chrysothamnus nauseosus, C. viscidiflorus, Gutierrezia lucida, G. microcephala.*
Perdita subfasciata Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 512. ♀.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 4, 11, 45-46, figs. 779, 780, 868. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 107 (geogr. and floral records).

thermophila thermophila Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Possibly an oligolege of *Eriogonum,* visits flowers of *E. deserticola, E. hirtella, E. inflatum, E. reniforme, E. thomasii.*
Perdita thermophila thermophila Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 77, figs. 815, 816, 886. ♀, ♂.

thermophila trilobata Timberlake. Ariz., south. Calif. (Mojave Desert). Pollen: Possibly an oligolege of *Eriogonum,* visits flowers of *Baileya, Eriogonum deflexum, E. densum, E. deserticola, E. trichopes.*
Perdita thermophila trilobata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 78. ♀, ♂.

timberlakei Cockerell. South. Calif. (cismontane and adjacent desert areas). Pollen: Evidently depends mostly upon the pollen and nectar of *Eriogonum gracile,* but also visits flowers of *Brassica, Eriogonum fasciculatum, E. mohavense, E. virgatum.*
Perdita timberlakei Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 194. ♀, ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 6, 13, 70-71, figs. 807, 808, 882. ♀, ♂ (key, redescription, geogr. and floral records).

varleyi niveipennis Timberlake. Calif. (San Benito County). Pollen: Apparently an oligolege of *Eriogonum* including *E. inflatum.*
Perdita varleyi niveipennis Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 86. ♀, ♂.

varleyi varleyi Timberlake. South. Calif. (Mojave Desert, western margin). Pollen: Apparently an oligolege of *Eriogonum,* visits flowers of *E. fasciculatum* var. *polifolium, E. inflatum.*
Perdita varleyi varleyi Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 85, figs. 825, 826, 891, 904. ♂, ♀.

vicina Timberlake. Nev. (Charleston Mts.). Pollen: Unknown, but visits flowers of *Fallugia paradoxa*.
Perdita vicina Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 31, figs. 753, 754, 855. ♂.

viridinotata Timberlake. N. Mex. (Alamogordo).
Perdita viridinotata Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 16, figs. 735, 736, 846. ♀, ♂.

wheeleri Timberlake. Ariz. (Grand Canyon). Pollen: Unknown, but possibly may visit flowers of *Mentzelia*.
Perdita wheeleri Timberlake, 1928. Amer. Mus. Novitates 321: 5. ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 10, 32, figs. 755, 756, 856. ♂ (redescription, possible pollen source).

wootonae Cockerell. N. Mex., Colo., Kans., Nebr. Pollen: Apparently an oligolege of *Mentzelia* including *M. decapetala*, *M. nuda*, but visits other flowers presumably for nectar including *Eriogonum effusum*, *Tragopogon porrifolius*.
Perdita wootonae Cockerell, 1898. Ent. News 9: 215. ♀, ♂.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 2, 8, 15-16, figs. 733, 734, 845. ♀, ♂ (key, redescription, geogr. and floral records).

xanthoxyli Timberlake. Tex. (Corpus Christi State Park); Mexico (Puebla). Pollen: Unknown, but visits flowers of *Xanthoxylon*.
Perdita xanthoxyli Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 107, figs. 15, 1261, 1262, 1334. ♀, ♂.

xerophila discrepans Timberlake. Nev. (Clark County). Pollen: Possibly an oligolege of *Eriogonum*, visits flowers of *E. fasciculatum*, *E. trichopes*.
Perdita xerophila discrepans Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 84, figs. 823, 824, 890. ♀, ♂.

xerophila fuscicornis Timberlake. Calif. (Inyo County Mts.). Pollen: Possibly an oligolege of *Eriogonum*, visits flowers of *E. inflatum*, *Larrea tridentata*.
Perdita xerophila fuscicornis Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 84, fig. 903. ♀, ♂.

xerophila xerophila Timberlake. Ariz. (Yuma County), south. Calif. (Colorado Desert). Pollen: Possibly an oligolege of *Eriogonum*, visits flowers of *E. inflatum*, *E. trichopes*.
Perdita xerophila xerophila Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 82, fig. 902. ♀, ♂.

yosemitensis Timberlake. Calif. (Sierra Nevada Mts.). Pollen: Possibly an oligolege of *Eriogonum*, visits flowers of *E. nudum*, *E. wrightii*.
Perdita yosemitensis Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 63, figs. 801, 802, 879. ♂, ♀.

Species Group Sphaeralceae

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 1 (key). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 126-158 (key to included spp.). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 38-42 (suppl. key to included spp.).

adustiventris Timberlake. South. Calif. (Parker Dam); Mexico (Baja California: Angel de la Guardia Island). Pollen: Unknown, but visits flowers of *Eucnide urens*, *Mentzelia hirsutissima*.
Perdita adustiventris Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 166. ♀.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 42-43, figs. 5, 1385, 1386, 1411. ♂ (geogr. and floral records).

albiventris Timberlake. Tex. (Pecos County). Pollen: Unknown, but the type specimen bears a load of fine, mealy fulvous pollen, probably leguminaceous.
Perdita albiventris Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 294, fig. 60. ♀.

albofasciata Timberlake. N. Mex. (Santa Fe). Pollen: Unknown, but visits flowers of *Tamarix gallica*.
Perdita albofasciata Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 152. ♀.

ambigua Timberlake. Nev. (Lander and Washoe Counties), Calif. (Siskiyou County). Pollen: Unknown, but visits flowers of *Chrysothamnus nauseosus* var. *consimilis*, *Cirsium lanceolatum*.
Perdita ambigua Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 311. ♀.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 54-55. ♂ (geogr. and floral records).

amicula Timberlake. Ariz. (Willcox). Pollen: Unknown, but visits flowers of *Aplopappus hartwegi*.
Perdita amicula Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 295. ♀.

ancoralis Timberlake. South. Calif. (Boyd Desert Research Center).
Perdita ancoralis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 155. ♀.

ashmeadi ashmeadi Cockerell. Tex. (Brownsville); Mexico (Sonora). Pollen: Unknown, but visits flowers of *Prosopis*.
Perdita ashmeadi Cockerell, 1899. Ann. and Mag. Nat. Hist. (7) 8: 492. ♀.
Perdita exclamans atramentata Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 96. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 141, 158, 324-325, figs. 1069, 1070, 1178. ♀, ♂ (key, redescription, synonymy, geogr. and floral records).

ashmeadi simulans Timberlake. South. Calif. (Colorado Desert), ?Ariz. (Sentinel); Mexico (Baja California). Pollen: Unknown, but visits flowers of *Geraea canescens*, *Larrea tridentata*, *Prosopis juliflora*.
Perdita ashmeadi simulans Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 326, figs. 1071, 1072, 1179. ♂.

ashmeadi vierecki Cockerell. West. Tex., N. Mex. (Alamogordo), Ariz. Pollen: Unknown, but visits flowers of *Mimosa*, *Prosopis*.
Perdita Vierecki Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 129. ♀, ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 141, 158, 325-326. ♀, ♂ (key, redescription, tax. status, geogr. and floral records).

assimilis Timberlake. Calif. (Fresno County). Pollen: Unknown, but visits flowers of *Melilotus*.

Perdita assimilis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 228, figs. 37, 987, 988, 1137. ♀, ♂.

atrata Timberlake. Calif. (Colorado and Mojave Deserts). Pollen: Unknown, but visits flowers of *Camissonia brevipes*, *C. dentata* var. *parishii*, *Chaenactis stevioides*, *Mentzelia affinis*, *M. albicaulis*, *M. veatchiana*, *Sphaeralcea ambigua*.
Perdita atrata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 163, figs. 3, 911, 912, 1009. ♀, ♂.

barri Timberlake. Idaho (Midvale). Pollen: Unknown, but visits flowers of *Phacelia*.
Perdita barri Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 251, figs. 1013, 1014, 1150. ♂.

blanda Timberlake. N. Mex. (Albuquerque).
Perdita blanda Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 358. ♀.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 137, 262 (key, tax. status).

calloleuca calloleuca Cockerell. N. Mex., Colo., Utah, Ariz. Pollen: Unknown, but visits flowers of *Artemisia filifolia*, *Chrysothamnus*, *Cleome lutea*, *Eriogonum*, *Salsola kali*, *Tamarix*, *Trifolium*, *Wislizenia refracta*.
Perdita calloleuca Cockerell, 1922. Amer. Mus. Novitates 33: 12. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 140, 154, 298-300, figs. 63, 1059, 1060, 1173. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1966. Calif. Univ. Pubs. Ent. 66: 43 (geogr. and floral records).

calloleuca convergens Timberlake. N. Mex. (Virden), Ariz. (Graham and Yuma Counties), Nev. (Clark County). Pollen: Unknown, but visits flowers of *Atriplex canescens*, *Chenopodium oblongifolium*, *Euphorbia*, *Suaeda*, *Wislizenia refracta*.
Perdita calloleuca convergens Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 300. ♀, ♂.

chihuahua Timberlake. N. Mex. (Rodeo); Mexico (Chihuahua and Zacatecas).
Perdita chihuahua Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 203, figs. 955, 956, 1121. ♀, ♂.

chionostoma Timberlake. Calif. (Fresno County). Pollen: Unknown, but visits flowers of *Melilotus*.
Perdita chionostoma Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 240, figs. 43, 1001, 1002, 1144. ♀, ♂.

cleomellae Cockerell. Calif. (Mojave Desert). Pollen: Apparently an oligolege of *Cleomella* including *C. obtusifolia*.
Perdita cleomellae Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 193. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 309, 315, 353-354, figs. 430, 431, 499. ♀, ♂ (key, redescription, geogr. and floral records).

cochiseana Timberlake. Ariz. (Douglas). Pollen: Unknown, but visits flowers of *Euphorbia*.
Perdita cochiseana Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 43. ♀.

compta Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Unknown, but most likely source is *Eriastrum;* visits flowers of *Cryptantha intermedia, Eriastrum virgatum, Eriogonum reniforme, E. trichopes, Lepidium fremontii, Malacothrix glabrata, Stillingia paucidentata*.
Perdita compta Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 236, figs. 41, 997, 998, 1142. ♀, ♂.

confusa Timberlake. West. Tex., N. Mex., Ariz.; Mexico (Chihuahua). Pollen: Apparently an oligolege of *Lepidium* including *L. alyssoides, L. montanum, L. thurberi*.
Perdita confusa Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 247, figs. 46, 1007, 1008, 1147. ♀, ♂.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2259: 19, fig. 50 (larva, as questionably this species).

Biology: Rozen, 1967. Amer. Mus. Novitates 2297: 38, fig. 15, table 1 (nest architecture, life history, floral association).

covilleae Timberlake. Ariz., Utah (St. George), Nev. (Las Vegas), south. Calif. (Colorado and Mojave Deserts); Mexico (Baja California). Pollen: Oligolege of *Larrea tridentata*, also visits other flowers for nectar including *Heliotropium curassavicum, Prosopis*.
Perdita covilleae Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 361, figs. 438, 439, 503. ♀, ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 139, 262 (key).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 24, fig. 5 (intrafloral ecology).

cruciferarum Timberlake. Nev. (Battle Mountain). Pollen: Unknown, but visits flowers of an unidentified Cruciferae.
Perdita cruciferarum Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 140, figs. 24, 25, 1291, 1292, 1349. ♀, ♂.

cushmani Timberlake. Tex. (Brewster and Hudspeth Counties); Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Gutierrezia, Prosopis juliflora*.
Perdita cushmani Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 222, figs. 979, 980, 1133. ♀, ♂.

cuspidata Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Collects pollen from the flowers of *Nama demissum, Phacelia distans*, but visits other flowers for nectar including *Oenothera*.
Perdita cuspidata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 231, figs. 39, 991, 992, 1139. ♀, ♂.

dammersi Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Collects pollen from flowers of *Malacothrix* including *M. glabrata*, but visits these and other flowers for nectar including *Chaenactis fremontii, Stephanomeria exigua*.
Perdita dammersi Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 169, figs. 7, 919, 920, 1103. ♀, ♂.

davidsoni Timberlake. South. Calif.
Perdita davidsoni Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 235, figs. 995, 996, 1141. ♂.

deltophora Timberlake. Tex. Pollen: Unknown, but visists flowers of *Chamaesaracha conioides, Physalis lobata, Prosopis.*

Perdita deltophora Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 207, figs. 25, 959, 960, 1123. ♀, ♂.

dentata Timberlake. South. Calif. (Colorado Desert). Pollen: Possibly an oligolege of *Phacelia* including *P. distans*, but visits other flowers presumably for nectar including *Acacia greggii, Geraea canescens, Krameria canescens, Larrea tridentata.*

Perdita dentata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 165, figs. 4, 913, 914, 1100. ♀, ♂.

difficilis Timberlake. Tex. (Brewster County), N. Mex. (Dona Ana and Eddy Counties), Ariz., south. Calif. (Colorado and Mojave Deserts); Mexico (Baja California). Pollen: Apparently an oligolege of *Prosopis* including *P. juliflora*, but visits flowers of other desert shrubs presumably for nectar including *Cercidium floridum, Larrea tridentata, Mimosa* and also has been collected at the flowers of *Melilotus.*

Perdita difficilis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 323, figs. 1067, 1068, 1177. ♂, ♀.

digna Timberlake. Calif. (Quincy).

Perdita digna Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 310. ♀.

discors Timberlake. South. Calif. (Thousand Palms).

Perdita discors Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 361. ♀.

dispar Timberlake. Tex. (Starr and Webb Counties); Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Condalia lycioides, Croton, Prosopis juliflora.*

Perdita dispar Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 220, figs. 33, 997, 998, 1132. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 43: 136 (geogr. and floral record).

distincta Timberlake. Oreg. (Baker County), Calif. (Sierra County). Pollen: Unknown, but visits flowers of *Eriogonum.*

Perdita distincta Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 174, figs. 10, 925, 926, 1106. ♂.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 45-46. ♀.

drymariae Timberlake. N. Mex. (Dona Ana and Hidalgo Counties), Mich. (Baraga County); Mexico (San Luis Potosi). Pollen: Unknown, but visits flowers of *Drymaria holosteoides, Tidestromia lanuginosa.*

Perdita drymariae Timberlake, 1960. *In* Mitchell, N. C. Agr. Expt. Sta. Tech. Bul. 141: 324. ♀, ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 129, 148, 201-202, figs. 22, 951, 952, 1119. ♀, ♂ (key, tax. characters, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 112, 134 (key, geogr. and floral record).

emarginata Timberlake. Ariz. (Tucson), south. Calif. (Desert Center). Pollen: Unknown, but visits flowers of *Dalea.*

Perdita emarginata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 304. ♀.

eremica Timberlake. Ariz. (Maricopa and Pinal Counties), south. Calif. (Colorado and Mojave Deserts). Pollen: Apparently an oligolege of *Larrea tridentata*, but visits other flowers including *Dalea californica, D. fremontii* var. *johnsonii, D. f.* var. *saundersii, D. schottii, Eriogonum inflatum, Funastrum hirtellum, Hyptis emoryi, Nama demissum.*

Perdita eremica Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 268, figs. 54, 1033, 1034, 1160. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 25 (floral relationships).

eremophila Timberlake. South. Calif. (Mojave Desert). Pollen: Possibly an oligolege of *Phacelia* including *P. distans, P. fremontii*, but visits other flowers including *Haplopappus cooperi, Lepidium fremontii.*

Perdita eremophila Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 238, figs. 42, 999, 1000, 1143. ♀, ♂.

eriastri Timberlake. South. Calif. (cismontane). Pollen: Collects pollen from the flowers of *Eriastrum* including *E. virgatum*, but visits other flowers for nectar including *Cryptantha intermedia*, *Eriogonum fasciculatum*, *Gilia*.
Perdita eriastri Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 233, figs. 40, 993, 994, 1140. ♀, ♂.

eriastri var. **fusciventris** Timberlake. South. Calif. (Palm Springs). Pollen: Collects pollen from flowers of *Eriastrum virgatum*. A specimen similar to the holotype has been collected in Arroyo Seco, Los Angeles County at the flowers of *Eriodictyon parryi*.
Perdita eriastri var. *fusciventris* Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 235. ♀.

eucnides eucnides Timberlake. Calif. (Inyo County), Nev. (Churchill County). Pollen: Polylectic, collects pollen from the flowers of *Cowania mexicana* var. *stansburiana*, *Dalea polyadenia*, *Eucnide urens*, *Larrea tridentata*, but also visits other flowers including *Eriogonum inflatum* possibly for nectar.
Perdita eucnides eucnides Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 301, figs. 64, 1061, 1062, 1174. ♂, ♀.

eucnides platyzona Timberlake. Ariz. (Yuma County), south. Calif. (Colorado Desert); Mexico (Baja California). Pollen: Polylectic, visits flowers of *Acacia greggii*, *Larrea tridentata*, *Pluchea sericea*, *Sesuvium verrucosum*.
Perdita eucnides platyzona Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 304. ♀, ♂.

euzonata Timberlake. Ariz. (Painted Desert). Pollen: Unknown, but visits flowers of *Eriogonum aureum*.
Perdita euzonata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 295. ♀.

exclamans Cockerell. West. Tex. to south. Calif. (Colorado and Mojave Deserts) and south Nev. (Clark County); Mexico (Baja California and Sonora). Pollen: Collects pollen from the flowers of *Prosopis*, but also visits other flowers presumably for nectar including *Baccharis*, *Cercidium floridum*, *Dithyrea wislizeni*, *Larrea tridentata*, *Melilotus*, *Mimosa*, *Phoradendron*.
Perdita nitidella var. *exclamans* Cockerell, 1895. Psyche 1 (sup.): 5. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 141, 157, 158, 320-323, figs. 70, 1065, 1066, 1176. ♂, ♀ (key, redescription, geogr. and floral records).

exigua becki Timberlake. Nev. (Nye and White Pine Counties).
Perdita exigua becki Timberlake, 1971 Calif. Univ. Pubs. Ent. 66: 44. ♀, ♂.

exigua exigua Timberlake. Calif. (Hallelujah Junction).
Perdita exigua Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 278, figs. 1043, 1044, 1165. ♀, ♂.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 44 (tax. status).

eximia Timberlake. Ariz. (Maricopa and Yuma Counties), south. Calif. (Colorado and Mojave Deserts), Nev. (Esmeralda County). Pollen: Possibly an oligolege of *Phacelia* including *P. crenulata*, but visits a variety of other flowers including *Acacia greggii*, *Camissonia clavaeformis*, *Cryptantha angustifolia*, *Cercidium floridum*, *Dalea schottii*, *Encelia*, *Eriogonum inflatum*, *E. thomasii*, *Heliotropium curassavicum*, *Isomeris arborea*, *Larrea tridentata*, *Prosopis juliflora*.
Perdita eximia Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 255, figs. 49, 1019, 1020, 1153. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 145 (key).

eysenhardtiae Timberlake. Tex. (Alpine), Ariz. (Cochise and Santa Cruz Counties); Mexico (Distrito Federal, Durango and Hidalgo). Pollen: Unknown, but visits flowers of *Baccharis glutinosa*, *Eysenhardtia polystachya*.
Perdita eysenhardtiae Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 215. ♀.

falcata Timberlake. Calif. (Inyo County). Pollen: Unknown, but visits flowers of *Dalea fremontii*, *Encelia farinosa*, *Gilia*, *Sphaeralcea*.
Perdita falcata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 161, figs. 2, 909, 910, 1098. ♀, ♂.

flavipes Timberlake. South. Calif. (Colorado and Mojave Deserts); Mexico (Baja California). Pollen: Apparently an oligolege of *Larrea tridentata*, but visits other flowers including *Heliotropium curassavicum*, *Prosopis juliflora*.
Perdita flavipes Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 259, figs. 50, 1023, 1024, 1155. ♂, ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 24 (floral relationships).

florissantella Cockerell. Colo., N. Mex. (Taos County). Pollen: Collects pollen from the flowers of *Lepidium jonesi*, but visits other flowers presumably for nectar including *Chenopodium album*, *Eriogonum umbellatum*, *Phacelia*.
Perdita florissantella Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 440. ♂, ♀.
Perdita lepidii Cockerell, 1907. Entomologist 40: 266. ♀.
Perdita opacifrons Timberlake, 1929. N. Y. Ent. Soc., Jour. 37: 113. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 137, 151, 242-244, figs. 44, 1003, 1004, 1145. ♀, ♂ (key, redescription, synonymy, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 139 (key).

foxi Cockerell. N. Mex. (Santa Fe).
Perdita foxi Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 18. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 152, 317. ♂ (key, redescription).

gemella Timberlake. Calif. (Apple Valley and Deep Creek on Mojave Desert). Pollen: Unknown, but visits flowers of *Eriodictyon trichocalyx*.
Perdita gemella Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 200, figs. 949, 950, 1118. ♂.

geminata Timberlake. N. Mex. (Otero County). Pollen: Unknown, but visits flowers of *Larrea tridentata*.
Perdita geminata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 251, figs. 1015, 1016, 1151. ♀, ♂.

genalis genalis Timberlake. South. Calif. (Colorado and Mojave Deserts). Pollen: Unknown, but visits flowers of *Acacia greggii*, *Cercidium floridum*, *Larrea tridentata*, *Prosopis juliflora*.
Perdita genalis genalis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 359, figs. 76, 1093, 1094, 1190. ♀, ♂.

genalis panamintensis Timberlake. Calif. (Panamint Mts.). Pollen: Unknown, but visits flowers of *Larrea tridentata*, *Prosopis juliflora*, *Stanleya pinnata*.
Perdita genalis panamintensis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 360. ♀, ♂.

gracilis Timberlake. Calif. (Lone Pine). Pollen: Unknown, but visits flowers of *Malacothrix*.
Perdita gracilis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 309. ♀.

greggiae Timberlake. Tex. (Reeves County), N. Mex. (Eddy County). Pollen: Unknown, but visits flowers of *Lepidium montanum*, *Lesquerella gordonii*, *Nerisyrenia camporum*.
Perdita greggiae Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 142, figs. 1293, 1294, 1350. ♀, ♂.

heliotropii heliotropii Cockerell. Tex. (El Paso) west to south. Calif. (Colorado and Mojave Deserts), Nev. (Lyon County), Utah (St. George).; Mexico (Baja California, Sonora, Chihuahua). Pollen: Collects pollen from the flowers of *Heliotropium* including *H. curassavicum*, but visits these and other flowers for nectar including *Larrea tridentata*, *Salix*, *Tamarix*.
Perdita heliotropii Cockerell, 1900. Entomologist 33: 63. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 309, 314, 364-365, figs. 442, 443, 505, 521. ♀, ♂ (key, tax. characters, tax. status, geogr. and floral records). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 139, 262 (key, tax. characters). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 116, 148 (key, tax. characters, geogr. record).

heliotropii perducta Timberlake. Central Calif. Pollen: Collects pollen from the flowers of *Heliotropium curassavicum*, but also visits flowers of *Stanleya pinnata* presumably for nectar.
Perdita heliotropii perducta Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 365. ♀, ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 139, 262 (key, geogr. and floral record).

humilis Timberlake. N. Mex. (Mesilla Park). Pollen: Unknown, but visits flowers of *Dithyrea wislizeni*.
Perdita humilis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 156. ♀.

imberbis Timberlake. Calif. (Sierra and Siskiyou Counties). Pollen: Unknown, but visits flowers of *Erigeron*.
Perdita imberbis Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 139, fig. 23. ♀.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 46-47, figs. 1387, 1388, 1412. ♂, ♀ (key, geogr. and floral record).

impigra Timberlake. Tex. (San Jacinto County).
Perdita impigra Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 157, fig. 31. ♀.

impressa Timberlake. Ariz. (Apache County). Pollen: Unknown, but visits flowers of *Eriogonum aureum*.
Perdita impressa Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 153. ♀.

incompta Timberlake. Tex. (Southmost). Pollen: Unknown, but visits flowers of *Lippia*.
Perdita incompta Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 208, figs. 26, 961, 962, 1124. ♀, ♂.

infelix Timberlake. Nebr. (Harrison).
Perdita infelix Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 314. ♀.

innotata Timberlake. Ariz. (Maricopa and Yuma Counties), south. Calif. (Colorado and Mojave Deserts). Pollen: Possibly an oligolege of *Prosopis* including *P. juliflora*, but also visits flowers of *Nama hispidum*.
Perdita innotata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 333, figs. 1081, 1082, 1184. ♀, ♂.

insequens Timberlake. South. Calif. (Piute Butte in Mojave Desert). Pollen: Unknown, but visits flowers of *Chaenactis brachypappa*.
Perdita insequens Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 146, fig. 27. ♀.

koebelei concinna Timberlake. South. Calif. (Colorado and Mojave Deserts), Ariz. (Mohave and Yuma Counties). Pollen: Apparently an oligolege of *Mentzelia* including *M. involucrata*, *M. tricuspis*, but also visits flowers of *Eucnide urens*, *Hyptis emoryi*.
Perdita koebelei concinna Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 161, figs. 907, 908. ♂, ♀.
Perdita masoni Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 306. ♀.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 47 (synonymy, geogr. and floral records).

koebelei koebelei Timberlake. Calif. (Inyo County). Pollen: Collects pollen from the flowers of *Eucnide urens*, *Mentzelia*, but also visits other flowers presumably for nectar including *Argemone platyceras*, *Encelia farinosa*, *Eriogonum inflatum*, *Phacelia calthifolia*, *Stephanomeria*.
Perdita koebelei koebelei Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 159, figs. 1, 905, 906, 1097. ♂, ♀.

krombeini Timberlake. Fla. (Lee County).
Perdita krombeini Timberlake, 1960. *In* Mitchell, N. C. Agr. Expt. Sta. Tech. Bul. 141: 327. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 144, 167, figs. 915, 916, 1101. ♂ (key, tax. characters).

leucogastra Timberlake. Tex. (Terrell County). Pollen: Unknown, but visits flowers of *Gilia acerosa*.
Perdita leucogastra Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 280, figs. 1045, 1046, 1166. ♀, ♂.

leucosticta Timberlake. South. Calif. (San Jacinto Mts. and environs). Pollen: Possibly an oligolege of *Eriastrum virgatum*, but visits other flowers including *Eriogonum fasciculatum*, *Gilia exilis*, *Layia platyglossa*.
Perdita leucosticta Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 224, figs. 34, 981, 982, 1134. ♀, ♂.

linsleyi Timberlake. South. Calif. (Los Angeles and Ventura Counties). Pollen: Unknown, but visits flowers of *Chaenactis, Euphorbia albomarginata, Lasthenia chrysostoma.*
Perdita linsleyi Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 199, figs. 21, 947, 948, 1117. ♀, ♂.

luciae decora Timberlake. Ariz. (Maricopa, Pima and Yuma Counties), Nev. (Clark County), south. Calif. (Colorado Desert); Mexico (Baja California and Sonora). Pollen: Polylectic, especially flowers of *Larrea tridentata* and *Prosopis juliflora*, but also visits a wide variety of other flowers including *Acacia greggii, Baileya pleniradiata, Cercidium floridum, Cryptantha angustifolia, C. intermedia, Nama hispidum, Psilostrophe cooperi, Sphaeralcea emoryi.*
Perdita luciae decora Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 336, fig. 73. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 25 (floral relationships).

luciae luciae Cockerell. Tex. (Pecos County), N. Mex. (Las Cruces), Ariz. (Cochise, Maricopa and Pima Counties); Mexico (Sonora). Pollen: Unknown, but visits flowers of *Medicago sativa, Mimosa, Prosopis.*
Perdita luciae Cockerell, 1899. Ann. and Mag. Nat. Hist. (7) 3: 494. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 141, 156, 157, 334-336, figs. 72, 1083, 1084, 1185 (key, tax. status, redescription, geogr. and floral records).

lycii Timberlake. Ariz. (Pima County). Pollen: Unknown, but visits flowers of *Lycium.*
Perdita lycii Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 305, fig. 65. ♀.

macneilli Timberlake. Calif. (Santa Clara County).
Perdita macneilli Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 312. ♀.

macswaini Timberlake. Tex. (Cameron and Harligen Counties), N. Mex. (Eddy County). Pollen: Unknown, but visits flowers of *Coreopsis douglasii, Gaillardia, Monarda citriodora, Prosopis.*
Perdita macswaini Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 289, figs. 1053, 1054, 1170. ♀, ♂.

macswaini var. flavolineata Timberlake. Tex. (Hidalgo County).
Perdita macswaini var. *flavolineata* Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 290. ♂.

martini Cockerell. West. Tex., N. Mex. (Dona Ana County). Pollen: Unknown, but visits flowers of *Sesuvium verrucosum.*
Perdita martini Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 14. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 140, 155, 287, figs. 58, 1051, 1052, 1169. ♀, ♂ (key, tax. status, redescription, geogr. and floral records).

melanogastra Timberlake. Calif. (Tulare County).
Perdita melanogastra Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 313, fig. 67. ♀.

mimosae Timberlake. Tex., N. Mex. (Eddy County). Pollen: Unknown, but visits flowers of *Mimosa, Phacelia popei, Prosopis.*
Perdita mimosae Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 270, figs. 1035, 1036, 1161. ♀, ♂.

modestissima Timberlake. Nev. (Battle Mountain). Pollen: Unknown, but holotype is labeled from an undetermined species of Cruciferae.
Perdita modestissima Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 147, fig. 28. ♀.

munita Timberlake. Ariz. (Cochise County); Mexico (Durango). Pollen: Unknown, but visits flowers of *Chamaesaracha coronopus, Eriogonum, Physalis.*
Perdita munita Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 205, figs. 24, 957, 958, 1122. ♀, ♂.

nigricornis Timberlake. Ariz. (Cochise and Pima Counties); Mexico (Sonora). Pollen: Apparently may collect pollen from the flowers of *Prosopis.*
Perdita nigricornis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 331, figs. 1077, 1078, 1182. ♂.

nigroaenea Timberlake. Utah (Kane County). Pollen: Unknown, but visits flowers of *Gutierrezia microcephala.*
Perdita nigroaenea Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 158. ♀.

nigroclypeata Timberlake. Colo. (Alamosa and Rio Grande Counties).
Perdita nigroclypeata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 314, fig. 69. ♀.

obliqua Timberlake. Ark. (Garland County), Ariz., south. Calif. (Colorado Desert); Mexico (Baja California and Sonora). Pollen: Apparently polylectic, visits flowers of *Acacia, Carnegiea gigantea, Cercidium, Dalea spinosa, Eriogonum trichopes, Medicago sativa, Prosopis, Wislizenia refracta.*
Perdita obliqua Timberlake, 1928. Pan-Pacific Ent. 5: 26. ♀.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 134, 144, 148, 218-219, figs. 975, 976, 1131. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 48 (geogr. record).

obscurella Timberlake. N. Mex. (Hidalgo and Socorro Counties), Ariz. (Cochise and Pima Counties); Mexico (Chihuahua). Pollen: Unknown, but visits flowers of *Baileya pleniradiata, Boerhaavia, Euphorbia albomarginata.*
Perdita obscurella Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 202, figs. 23, 593, 594, 1120. ♀, ♂.

omani Timberlake. Calif. (Bakersfield).
Perdita omani Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 296, fig. 62. ♀.

oreophila Timberlake. Calif. (Tuolumne County). Pollen: Unknown, but visits flowers of a Compositae.
Perdita oreophila Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 244. ♀.

ovaliceps Timberlake. N. Mex. (Eddy County), Ariz. (Maricopa and Mohave Counties), Nev. (Clark County), south. Calif. (Colorado and Mojave Deserts). Pollen: Unknown, but visits flowers of *Chaenactis carphoclinia, C. stevioides* var. *brachypappa, Encelia farinosa, Gerrea canescens, Larrea tridentata.*
Perdita ovaliceps Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 265, figs. 52, 1029, 1030, 1158. ♂.
Perdita luctuosa Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 266, fig. 53. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 150-151 (synonymy, geogr. records).

pallidipes Timberlake. Ariz. (Maricopa and Pima Counties), south. Calif. (Colorado Desert); Mexico (Sonora). Pollen: Unknown, but visits flowers of *Prosopis juliflora.*
Perdita pallidipes Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 332, figs. 1079, 1080, 1183. ♂.

panocheana Timberlake. Calif. (Fresno County). Pollen: Unknown, but visits flowers of *Heliotropium oculatum.*
Perdita panocheana Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 274, figs. 1039, 1040, 1163. ♀, ♂.

parryellae Timberlake. Ariz. (Navajo County). Pollen: Unknown, but visits flowers of *Parryella filifolia.*
Perdita parryellae Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 48, figs. 1389, 1390, 1413. ♀, ♂.

placens Timberlake. Ariz. (Willcox).
Perdita placens Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 124, figs. 1273, 1274, 1340. ♂.

planifrons Timberlake. Calif. (Mono County).
Perdita planifrons Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 148. ♀.

propinqua Timberlake. Calif. (Ventura County). Pollen: Unknown, but visits flowers of *Linanthus aureus, Phacelia douglasii.*
Perdita propinqua Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 226, figs. 35, 983, 984, 1135. ♀, ♂.

prosopidis Timberlake. Ariz. (Yuma County), south. Calif. (Colorado and Mojave Deserts); Mexico (Baja California). Pollen: Possibly an oligolege of *Prosopis juliflora*, but visits other flowers for nectar including *Melilotus.*
Perdita prosopidis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 318, figs. 69, 1063, 1064, 1175. ♀, ♂.

puncticeps Timberlake. Calif. (Palm Springs).
Perdita puncticeps Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 49. ♀.

punctosignata flava Timberlake. Tex. west. to Ariz.; Mexico (Baja California, Chihuahua, Coahuila, Sonora and Sinaloa). Pollen: Apparently an oligolege of *Prosopis*, but also visits other flowers presumably for nectar including *Gutierrezia, Medicago, Sapindus saponaria.*

Perdita punctosignata flava Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 354. ♀, ♂.

punctosignata punctosignata Cockerell. N. Mex. (Dona Ana and Otero Counties), Ariz., Calif. (Colorado Desert); Mexico (Baja California and Sonora). Pollen: Apparently an oligolege of *Prosopis.*

Perdita punctosignata Cockerell, 1895. Psyche 7 (supp.): 6. ♂.

Perdita howardi Cockerell, 1899. Ann. and Mag. Nat. Hist. (7) 3: 492. ♀, ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 142, 157, 351-353, figs. 75, 1087, 1088, 1187. ♀, ♂ (key, redescription, synonymy, geogr. and floral records).

punctosignata sulphurea Timberlake. Ariz., south. Calif. (Colorado and Mojave Deserts, also San Benito County), Nev. (Clark County), Utah (Washington County); Mexico (Baja California). Pollen: Apparently an oligolege of *Prosopis*, but also visits other flowers presumably for nectar including *Acacia greggii, Cercidium floridum, Larrea tridentata, Melilotus.*

Perdita punctosignata sulphurea Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 353. ♀, ♂.

punctulata Timberlake. South. Calif. (Colorado and Mojave Deserts), Ariz. (Yuma); Mexico (Baja California and Sonora). Pollen: Oligolege of *Larrea tridentata*, but also visits other flowers for nectar including *Baccharis emoryi, Cercidium floridum, Lasthenia chrysostoma, Melilotus, Prosopis juliflora.*

Perdita punctulata Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 362, figs. 440, 441, 504. ♂, ♀.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 139, 262 (key).

Biology: Hurd and Linsley, 1975. Calif. Univ. Pubs. Ent. 193: 24-25, fig. 6 (floral relationships).

pusilla Timberlake. South. Calif. (western margin of Mojave Desert).

Perdita pusilla Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 257, figs. 1021, 1022, 1154. ♀, ♂.

quadraticeps Timberlake. Ariz. (Patagonia).

Perdita quadraticeps Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 213, figs. 29, 969, 970, 1128. ♂.

replicans Timberlake. Calif. (San Luis Obispo County).

Perdita replicans Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 149, fig. 29. ♀.

richardsi Timberlake. California (Apple Valley in the Mojave Desert).

Perdita richardsi Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 227. ♂.

salicis coloradana Timberlake. Colo. (Delta and Garfield Counties).

Perdita salicis coloradana Timberlake, 1929. N. Y. Ent. Soc., Jour. 37: 111. ♀.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 340, 341. ♀ (key, redescription, geogr. records).

salicis euxantha Timberlake. Idaho (Idaho and Nez Perce Counties), Oreg. (near Corvallis).

Perdita salicis euxantha Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 349. ♀, ♂.

salicis hirsutior Timberlake. Calif. (Olancha). Pollen: Presumably an oligolege of *Salix*, visits the flowers of *S. exigua.*

Perdita salicis hirsutior Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 346. ♀, ♂.

salicis imperialis Cockerell. Wash. (Asotin, Spokane, Walla Walla and Whitman Counties), Idaho (Blaine, Canyon, Nez Perce and Twin Falls Counties), Oreg. (Umatilla and Walloun Counties), Utah (Cache, Iron, Juab and Washington Counties), south. Calif. (Colorado and Mojave Deserts), Ariz. (Maricopa and Pima Counties), Colo. (Archuleta County). Pollen: Presumably an oligolege of *Salix*, including *S. gooddingii*, but visits other flowers apparently for nectar including *Acacia greggii, Asparagus, Daucus carota, Prosopis, Sisymbrium.*

Perdita exclamans imperialis Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 193. ♀.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 340, 342-343. ♀, ♂ (key, redescription, geogr. and floral records).

salicis laeta Timberlake. South. Calif. (Needles). Pollen: Presumably an oligolege of *Salix*, visits flowers of *Prosopis juliflora*.
Perdita salicis laeta Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 347. ♀, ♂.

salicis monoensis Timberlake. Calif. (Eldorado and Mono Counties). Pollen: Presumably an oligolege of *Salix*, visits flowers of *S. sessilifolia*.
Perdita salicis monoensis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 345. ♀, ♂.

salicis occidentalis Timberlake. South. Calif. (cismontane, except one population at Helendale on Mojave Desert). Pollen: Apparently an oligolege of *Salix* including *S. exigua*, *S. gooddingii*, *S. nigra*, but visits other flowers presumably for nectar including *Alyssum maritimum*, *Cryptantha microphylla* var. *lepida*, *Funastrum heterophyllum*, *Ligustrum*, *Pyracantha*.
Perdita salicis occidentalis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 343. ♀, ♂.

salicis personata Timberlake. South. Calif. (San Diego County). Pollen: Presumably an oligolege of *Salix*, visits flowers of *S. laevigata*.
Perdita salicis personata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 344. ♀, ♂.

salicis salicis Cockerell. Colo., N. Mex. (Las Cruces); Mexico (Chihuahua). Pollen: Presumably an oligolege of *Salix*.
Perdita salicis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 80. ♀, ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 138, 141, 157, 338-341, figs. 1085, 1086, 1186. ♀, ♂ (key, redescription, geogr. and floral records).

salicis sublaeta Timberlake. Oreg. (Hood River and The Dalles).
Perdita salicis sublaeta Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 348. ♀, ♂.

salicis subtristis Cockerell. Colo. (Archuleta and Chaffee Counties), Utah (Grand County). Pollen: Apparently an oligolege of *Salix*.
Perdita subtristis Cockerell, 1933. Canad. Ent. 65: 234. ♀.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 135, 339, 341-342. ♀, ♂ (key, redescription, geogr. and floral records).

salicis tristis Timberlake. Calif. (San Joaquin Valley). Pollen: Apparently an oligolege of *Salix*, visits flowers of *S. hindsiana* and also *Populus*.
Perdita salicis tristis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 345, fig. 74. ♀, ♂.

salviae Timberlake. South. Calif. (Colorado Desert). Pollen: Collects pollen from the flowers of *Salvia vaseyi*.
Perdita salviae Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 184, figs. 935, 936, 1111. ♀, ♂.

sandhouseae Timberlake. Ariz. (Apache County). Pollen: Unknown, but visits flowers of *Gutierrezia*.
Perdita sandhouseae Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 171, figs. 8, 921, 922, 1104. ♂.

schlingeri Timberlake. Nev. (Emigrant Pass).
Perdita schlingeri Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 258. ♀.

semicaerulea Cockerell. Tex. to Ariz.; Mexico (Chihuahua and Coahuila). Pollen: Oligolege of *Larrea tridentata*, visits both the spring and late summer and fall blooms of this plant from which it obtains pollen and nectar, but also visits flowers of *Prosopis* presumably for nectar only.
Perdita semicaerulea Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 64. ♀.
Perdita quadrangularis Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 129. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 131, 150, 186-188, figs. 14, 937, 938, 1112. ♀, ♂ (key, redescription, synonymy, geogr. and floral records).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 25 (floral relationships).

sexnotata Timberlake. South. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Coldenia palmeri*, *Eschscholzia parishii*.
Perdita sexnotata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 307, fig. 66. ♀.

sidae Cockerell. N. Mex. (Mesilla); Mexico (Durango). Pollen: Unknown, but visits flowers of *Sida hederacea*.
Perdita sidae Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 353. ♀, ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 128, 132, 148, 263-264, figs. 51, 1025, 1026, 1156. ♂ (key, redescription). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 50. ♀ (redescription, geogr. record).

sonorensis Cockerell. Ariz. (Yuma County), south. Calif. (Colorado and Mojave Deserts); Mexico (Baja California and Sonora). Pollen: Oligolege of *Prosopis* including *P. juliflora*, *P. pubescens*, but also visits flowers of *Encelia farinosa*, *Eucnide urens*, *Heliotropium curassavicum*, *Melilotus*, *Peucephyllum schottii*, *Pluchea sericea*.
Perdita sonorensis Cockerell, 1899. Ann. and Mag. Nat. Hist. (7) 3: 493. ♀.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 136, 138, 152, 272-274, figs. 55, 1037, 1038, 1162. ♀, ♂ (key, redescription, geogr. and floral records).

speciosa Timberlake. Ariz. (Coconino County). Pollen: Unknown, but visits flowers of *Wislizenia refracta*.
Perdita speciosa Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 51, figs. 1391, 1392, 1414. ♂.

sphaeralceae alticola Cockerell. N. Mex., Ariz. (Cochise and Coconino Counties). Pollen: Possibly an oligolege of *Sphaeralcea*, visits flowers of *S. lobata*, but also visits flowers of *Heterotheca subaxillaris*.
Perdita sphaeralceae race *alticola* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 68. ♀, ♂.
Perdita sphaeralceae race *alticola* mut. *suffusa* Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 68. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 154, 178-179, fig. 11. ♀, ♂ (key, geogr. and floral records).

sphaeralceae sphaeralceae Cockerell. Tex. (Hudspeth County), N. Mex. (Dona Ana and Luna Counties); Mexico (Chihuahua, San Luis Potosi and Zacatecas). Pollen: Possibly an oligolege of *Sphaeralcea* including *S. angustifolia*, but visits other flowers including *Cologania*, *Gutierrezia lucida*, *Haplopappus heterophyllus*, *Mentzelia*, *Solidago canadensis*.
Perdita sphaeralceae Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 66. ♀, ♂.
Perdita pellucida Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 88. ♂.
Perdita sphaeralceae var. *ridens* Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 547. ♂.

Taxonomy: Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 121 (tax. status, as *pellucida*). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 127, 154, 176-178. ♀, ♂ (key, redescription, synonymy, geogr. and floral records).

stathamae eluta Timberlake. Ariz. (Salt River Mts.).
Perdita stathamae eluta Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 358. ♀, ♂.

stathamae stathamae Timberlake. N. Mex. (Alamogordo), Ariz. (Chihuahua and Sonora Deserts), south. Calif. (Colorado Desert); Mexico (Baja California and Sonora). Pollen: Unknown, but visits flowers of *Acacia greggii*, *Prosopis juliflora*.
Perdita stathamae stathamae Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 365, figs. 1091, 1092, 1189. ♀, ♂.

stenopyga Timberlake. Calif. (Inyo County). Pollen: Unknown, but visits flowers of *Chaenactis*, *Mentzelia affinis*.
Perdita stenopyga Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 229, figs. 38, 989, 990, 1138. ♀, ♂.

sternalis Timberlake. South. Tex. (Cameron and Galveston Counties). Pollen: Unknown, but visits flowers of *Coreopsis douglasii*, *Heliotropium*, *Rubus*.
Perdita sternalis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 291, figs. 1055, 1056, 1171. ♀, ♂.

sulphuripes Timberlake. Calif. (near Palm Springs, also Slate Mts., Inyo County). Pollen: Unknown, but visits flowers of *Malacothrix*.
Perdita sulphuripes Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 267, figs. 1031, 1032, 1159. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 151. ♂ (geogr. and floral record).

tarda Cockerell. N. Mex. (Las Cruces). Pollen: Unknown, but visits flowers of *Gutierrezia microcephala*.
Perdita tarda Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 85. ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 146, 151, 279-280 (redescription of type specimen).

tenebrosa Timberlake. Ariz. (Chiricahua Mts.).
Perdita tenebrosa Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 131. ♀.

tessellata Timberlake. Idaho (Elmore County), Nev. (Battle Mountain). Pollen: Unknown, but visits flowers of *Chaenactis*, *Tetradymia*.
Perdita tessellata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 264, figs. 1027, 1028, 1157. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 113, 117, 151-152, fig. 30. ♀, ♂ (key, redescription, geogr. and floral records).

thelypodii Timberlake. Calif. (Inyo and Los Angeles Counties). Pollen: Unknown, but visits flowers of *Cleomella obtusifolia*, *Thelypodium brachycarpum*.
Perdita thelypodii Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 354, figs. 432, 433, 500. ♀, ♂.

tortifoliae fremonti Timberlake. South. Calif. (Mohave Desert), Nev. (Clark County), Utah (Washington County). Pollen: Collects pollen from the flowers of *Lepidium fremontii*.
Perdita fremonti Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 250, figs. 1011, 1012, 1149. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 143 (tax. status, geogr. and floral records).

tortifoliae tortifoliae Cockerell. Colo. (Florissant and Wilkerson Pass), N. Mex. (Rio Arriba County). Pollen: Presumably collects pollen from the flowers of *Lepidium jonesii*, but also visits flowers of *Bigelovia tortifoliae*, *Eriogonum umbellatum*, *Ranunculus eremogenes*.
Perdita tortifoliae Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 440. ♀.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 132, 144, 245-247, figs. 45, 1005, 1006, 1146. ♀, ♂ (key, redescription, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 143 (tax. status, geogr. and floral record).

triangulifera Timberlake. West. Tex. to south. Calif., deserts. Pollen: Apparently an oligolege of *Prosopis*, but visits other flowers presumably for nectar including *Acacia greggii*, *Cercidium floridum*, *Dithyrea wislizeni*, *Melilotus*, *Mimosa*, *Phoradendron*, *Tamarix*.
Perdita triangulifera Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 328, figs. 71, 1075-1076, 1181. ♀, ♂.

trinotata Timberlake. Tex. Pollen: Unknown, but visits flowers of *Lesquerella gordonii*, *Nama hispidum*, *Nerisyrenia camporum*.
Perdita trinotata Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 249, figs. 47, 1009, 1010, 1148. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 115, 116, 144-145, fig. 26. ♀, ♂ (key, redescription, geogr. and floral records).

veris Timberlake. Ariz. (Pima County). Pollen: Collects pollen from the flowers of *Nama hispidum*, but visits other flowers for nectar including *Teucrium cubense depressum*.
Perdita veris Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 137, figs. 21, 1289, 1290, 1348. ♀ ♂.

vidua Timberlake. Tex. (El Paso County). Pollen: Unknown, but visits flowers of *Gossypium*.
Perdita vidua Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 309. ♀.

vittata conformis Timberlake. Nev. (Lincoln County).
Perdita vittata conformis Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 284. ♀, ♂.

vittata tricolor Timberlake. South. Calif. (Mojave Desert and south. San Joaquin Valley). Pollen: Unknown, but visits flowers of *Cleomella obtusifolia*, *Wislizenia refracta*. The typical subspecies, *Perdita vittata vittata* Cockerell, occurs in Mexico (Baja California).
Perdita vittata tricolor Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 283. ♂, ♀.

werneri Timberlake. Ariz. (Springerville).
Perdita werneri Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 154, figs. 1297, 1298, 1352. ♂.

wilmattae miricornis Cockerell. Wyo. (Green River), Colo. (Mesa and Moffat Counties), Utah (Carbon County), Ariz. (Grand Canyon). Pollen: Unknown, but visits flowers of *Cleome*, *Engelmannia pinnatifida*, *Phacelia*, *Stanleya pinnata*.
Perdita miricornis Cockerell, 1922. Amer. Mus. Novitates 33: 9. ♂, ♀.
Perdita miricornis var. *leucorhina* Cockerell, 1922. Amer. Mus. Novitates 33: 10. ♀.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 310, 314, 360. ♂, ♀ (key, redescription, tax. status, geogr. and floral records). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 245 (tax. status). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 145 (key).

wilmattae stanleyae Timberlake. Utah (Grand, Uintah and Washington Counties), Nev., Calif. (Inyo County). Pollen: Unknown, but visits flowers of *Asclepias*, *Cleome lutea*, *Mentzelia*, *Prunus*, *Stanleya pinnata*, *Thelypodium laciniatum*.
Perdita stanleyae Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 253, figs. 48, 1017, 1018, 1152. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 145 (key, tax. status, geogr. record).

wilmattae wilmattae Cockerell. Colo., Utah, Nev. (Humboldt County). Pollen: Unknown, but visits flowers of *Cleome lutea*, *Engelmannia*, *Phacelia alba*, *Stanleya pinnata*.
Perdita wilmattae Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 441. ♂, ♀.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 310, 314, 359-360, figs. 436, 437, 502. ♂, ♀ (key, redescription, tax. status, geogr. and floral records). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 137, 245 (key, floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 145 (key).

wislizeniae Timberlake. N. Mex. (Luna County), Ariz. (Cochise County); Mexico (Chihuahua). Pollen: Apparently an oligolege of *Wislizenia refracta*, but also visits flowers of *Cleome*, *Eriogonum thomasii*, *Lepidium*.
Perdita wislizeniae Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 284, figs. 57, 1049, 1050, 1168. ♀, ♂.

zebrata flavens Timberlake. Nev., Oreg., Idaho, Wyo., Utah, Colo., Calif. (Inyo County). Pollen: Apparently collects pollen only from the flowers of *Cleome* including *C. lutea*, *C. serrulata*, but visits other flowers for nectar including *Engelmannia pinnatifida*, *Phacelia*, *Salsola kali*.
Perdita zebrata flavens Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 357. ♀, ♂.

Taxonomy: Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 138, 153, 262 (key, geogr. and floral record).

zebrata zebrata Cresson. N. Dak., Nebr. and N. Mex., west to Idaho, Nev. and Ariz. Parasite: *Neolarra pruinosa* Ashmead. Pollen: Collects pollen from the flowers of *Cleome* including *C. serrulata*, but visits other flowers presumably for nectar including *Haplopappus heterophyllus*, *Helianthus petiolaris*, *Nolina microcarpa*, *Solidago*.
Perdita zebrata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 69. ♀ (part).
Perdita canina Cockerell, 1895. Acad. Nat. Sci. Phila., Proc. 47: 17. ♂.
Perdita bakerae Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 69. ♂, ♀.

Taxonomy: Cockerell, 1903. *In* Viereck, Amer. Ent. Soc., Trans. 29: 51. —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 310, 313, 356-357, figs. 434, 435, 501 (key, tax. characters, tax. status, synonymy, geogr. and floral records). —Timberlake, 1964. Calif. Univ. Pubs. Ent. 28: 138, 153, 262 (key, geogr. range). —Rozen, 1966. Amer. Mus. Novitates 2259: 17-19, figs. 41-46 (larva). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 118, 150, figs. 1295, 1296, 1351. ♂ (key, variation, geogr. records).

Biology: Custer, 1929. Canad. Ent. 61: 49 (nesting habits with description of larva). —Rozen, 1967. Amer. Mus. Novitates 2297: 34-38, figs. 2, 4, 11, 14, tables 1-2 (nest architecture, life history, pollen source, parasite).

Species Group Valida

This species may be better placed in a new genus related to *Perdita*.

Taxonomy: Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 106 (tax. characters).

valida Timberlake. N. Mex. (Mesilla).
Perdita valida Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 106. ♀.

Genus PERDITA Subgenus PERDITELLA Cockerell

Perdita subg. *Perditella* Cockerell, 1899. Psyche 8: 312.
Type-species: *Perdita larreae* Cockerell. Orig. desig. (=*Perdita laneae* Cockerell).

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 348 (key). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 267-268 (redescription, key to included spp.).

cladothricis Cockerell. West. Tex., N. Mex., Ariz.; Mexico (Baja California, San Luis Potosi, Sonora and Zacatecas). Pollen: Possibly an oligolege of *Tidestromia* including *T. lanuginosa*, but visits other flowers presumably for nectar including *Gutierrezia microcephala*, *Haplopappus wrightii*, *Medicago sativa*, *Pectis papposa*.
Perdita cladothricis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 82. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 268, 270, figs. 207, 208, 305 (male genitalia, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 30 (geogr. records).

larreae Cockerell. N. Mex., Ariz., South. Calif.; Mexico (Baja California, Chihuahua and Coahuila). Pollen: Collects pollen from the flowers of *Larrea tridentata*, but visits these and other flowers for nectar including *Aplopappus heterophyllus*, *Asclepias*, *Baccharis glutinosa*, *Croton californicus*, *Dalea*, *Dicraurus*, *Eriogonum reniforme*, *Euphorbia polycarpa*, *Pectis papposa*, *Tamarix*.
Perdita larreae Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 62. ♂.
Perdita larrearum Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 63. ♀.
Perdita larreae var. *modesta* Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 355. ♂.
Perdita laneae Cockerell, 1899. Psyche 8: 312. Error for *larreae*.

Taxonomy: Timberlake, 1928. Amer. Mus. Novitates 321: 11. ♀. —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 268, figs. 203, 204, 304 (tax. characters, synonymy, geogr. and floral records). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 134 (variation, geogr. and floral records).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 25-26, fig. 7 (floral relationships).

marcialis Cockerell. West. Tex. to south. Calif., Nev.; Mexico (Coahuila, Sonora). Pollen: Collects pollen from the flowers of *Larrea tridentata* and possibly also from other flowers including *Aloysia wrightii*, *Chrysothamnus paniculatus*, *Eriogonum fasciculatum* var. *polifolium*, *Phacelia*, *Salvia vaseyi*.
Perdita marcialis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 62. ♂.
Perdita phaceliae Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 450. ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 268, 269-270, figs. 205, 206 (key, redescription, geogr. and floral records). —Timberlake, 1960. Calif. Univ. Pubs. Ent. 17: 134-135 (synonymy).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 26 (floral relationships).

minima Cockerell. Ariz., South. Calif.; Mexico (Baja California). Pollen: Collects pollen from the flowers of *Euphorbia* including *E. albomarginata*, *E. polycarpa*, *E. p.* var. *hirtella*, but visits these and other flowers for nectar including *Croton californicus*, *Eriogonum gracile*, *Gutierrezia*.
Perdita minima Cockerell, 1923. Amer. Mus. Novitates 66: 4. ♀.

Taxonomy: Cockerell, 1925. Pan-Pacific Ent. 1: 179. ♂. —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 268, 270, figs. 209, 210 (key, redescription, geogr. and floral records).

Genus PERDITA Subgenus PROCOCKERELLIA Timberlake

Perdita subg. *Procockerellia* Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 402.
Type-species: *Perdita albonotata* Timberlake. Orig. desig.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 5-7 (key to spp. of subgenera *Procockerellia*, *Allomacrotera*).

albonotata Timberlake. South. Calif. (Colorado and Mojave Deserts), Ariz. (Mohave County), Utah (Cache and Washington Counties); Mexico (Sonora). Pollen: Collects pollen from the flowers of *Stephanomeria* including *S. exigua*, *S. pauciflora*, but visits other flowers presumably for nectar including *Agave deserti*, *Chaenactis glabriuscula*, *Eriogonum plumatella*.
Perdita albonotata Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 403, figs. 91, 92, 161. ♀, ♂.

brachyglossa Timberlake. Ariz. (Coconino County). Pollen: Unknown, but visits flowers of *Thelesperma*.
Perdita brachyglossa Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 6. ♀.

excellens Timberlake. Utah (Grand and Washington Counties), Ariz. (Coconino County). Pollen: Unknown, but visits flowers of *Cleome lutea*.
Perdita excellens Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 384. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 22. ♂.

moabensis Timberlake. Utah (Moab).
Perdita moabensis Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 7. ♀.

Genus PERDITA Subgenus PSEUDOMACROTERA Timberlake

Perdita subg. *Pseudomacrotera* Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 349.
Type-species: *Perdita turgiceps* Timberlake. Orig. desig.

turgiceps Timberlake. Calif. (Colorado and Mojave Deserts), Ariz., (Maricopa Mts.); Mexico (Baja California). Pollen: Apparently an oligolege of *Larrea tridentata*, but visits a wide variety of other flowers for nectar including *Acacia greggii*, *Cercidium floridum*, *Cowania stansburiana*, *Cryptantha angustifolia*, *C. barbigera*, *Dalea californica*, *D. fremontii*, *D. schottii*, *Datura meteloides*, *Encelia farinosa*, *Eriodictyon crassifolium*, *Eriogonum inflatum*, *E. trichopes*, *Eschscholzia*, *Eucnide urens*, *Hyptis emoryi*, *Larrea tridentata*, *Lasthenia*, *Nama hispida*, *Prosopis juliflora*.
Perdita turgiceps Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 350, figs. 3, 4, 116, 117. ♂, ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 26 (floral relationships).

Genus PERDITA Subgenus PYGOPERDITA Timberlake

Perdita subg. *Pygoperdita* Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 275.
Type-species: *Perdita interrupta* Cresson. Orig. desig.

Although several of the species visit flowers of the Compositae, especially *Layia* and *Malacothrix*, most members of this subgenus visit flowers of other families, such as the Rosaceae, Papaveraceae, Rhamnaceae and Liliaceae.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 275-284 (key to included spp.).

Species Group Interrupta

associata Timberlake. Calif. (San Benito County).
Perdita associata Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 32. ♀.

aureovittata aureovittata Cockerell. South. Calif. (cismontane, south of San Gabriel Mts.). Pollen: Unknown, but visits flowers of *Layia*, *Malacothrix californica* var. *glabrata*.
Perdita (*Cockerellia*) *aureovittata* Cockerell, 1916. Canad. Ent. 48: 391. ♀.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 391 (tax. status). —Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 276, 281, 285, figs. 221, 222, 311, 337. ♀, ♂ (redescription, new status, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 33 (geogr. range).

aureovittata maderensis Timberlake. Calif. (Madera County). Pollen: Unknown, but presumably visits flowers of *Malacothrix californica*.
Perdita aureovittata maderensis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 286. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 33 (geogr. range).

aureovittata soluta Timberlake. Calif. (South Coast and Peninsular Ranges). Pollen: Unknown, but visits flowers of *Agoseris auriantiaca, A. heterophylla, Encelia actoni, Linanthus aureus, Malacothrix californica*.
Perdita soluta Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 394, fig. 520. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 33 (tax. status, geogr. range).

aureovittata stenozona Timberlake. Calif. (San Benito and San Luis Obispo Counties). Pollen: Unknown, but visits flowers of *Chaenactis glabriuscula, Malacothrix californica*.
Perdita aureovittata stenozona Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 286. ♀, ♂.

fieldi Timberlake. South. Calif. (Monterey to San Diego County). Pollen: Unknown, but visits flowers of *Adenostoma fasciculatum, Calochortus splendens, Eriogonum fasciculatum*.
Perdita fieldi Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 291, figs. 227, 228, 315, 340. ♀, ♂.

inflexa Timberlake. Calif. (Riverside County). Pollen: Unknown, but visits flowers of *Eschscholzia multiflora* var. *darwinensis*.
Perdita inflexa Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 298, figs. 237, 238, 345, 346. ♂.

interrupta interrupta Cresson. South. Calif. (cismontane). Pollen: Collects pollen from the flowers of *Eschscholzia californica*, but visits other flowers for nectar including *Baccharis emoryi, Coreopsis californica, Cryptantha intermedia, Lasthenia chrysostoma, Lepidospartum squamatum, Sisymbrium irio, Solidago occidentalis, Tamarix gallica;* also has been taken at the flowers of *Yucca*, but since these flowers are not attractive to bees, the plant in question was presumably *Nolina parryi*.
Perdita interrupta Cresson, 1878. Amer. Ent. Soc., Trans. 7: 70. ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 277, 282, 292, figs. 229, 230, 316, 341. ♀, ♂ (redescription, tax. status, geogr. and floral records).

interrupta kernensis Timberlake. Calif. (Kern County). Pollen: Unknown, but visits flowers of *Cryptantha*.
Perdita interrupta kernensis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 293. ♀, ♂.

interrupta vernalis Timberlake. Calif. (San Diego County).
Perdita interrupta vernalis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 293. ♀, ♂.

layiae excisa Timberlake. South. Calif. (cismontane). Pollen: Unknown, but visits flowers of *Chaenactis glabriuscula, Layia platyglossa*.
Perdita layiae excisa Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 288. ♀, ♂.

layiae layiae Cockerell. Calif. (San Miguel Island). Pollen: Unknown, but visits flowers of *Layia platyglossa*.
Perdita layiae Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 152. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 277, 281, 288, figs. 223, 224, 313, 338 (redescription).

malacothricis Timberlake. South. Calif. deserts, Nev. (Clark County), Ariz. (Tucson). Pollen: Unknown, but visits flowers of *Aster, Baileya multiradiata, B. pleniradiata, Calycoseris parryi, Chaenactis fremontii, Hymenoclea salsola, Larrea tridentata, Malacothrix californica* var. *glabrata, Stephanomeria exigua, S. pauciflora*.
Perdita malacothricis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 289, figs. 225, 226, 314, 339. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 36 (geogr. and floral records).

malacothricis var. **unica** Timberlake. Calif. (Riverside County).
Perdita malacothricis var. *unica* Timberlake, 1962. Calif. Univ. Pubs. Ent. 28: 96. ♀.

micheneri micheneri Timberlake. South. Calif. (cismontane); Mexico (Baja California). Pollen: Unknown, but visits flowers of *Ceanothus cordulatus, C. greggii, C. leucodermis, C.*

orcuttii, Cryptantha intermedia, C. micrantha, C. muricata, Eriophyllum confertiflorum, Eschscholzia californica, Rhamnus crocea, Rhus ovata.
Perdita micheneri micheneri Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 294, figs. 231, 232, 317, 342. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 36 (geogr. record).

micheneri rhamnophila Timberlake. Calif. (Rock Creek in San Gabriel Mts.). Pollen: Unknown, but visits flowers of *Rhamnus crocea.*
Perdita micheneri rhamnophila Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 295. ♂.

mucronata Timberlake. Calif. (Riverside County); desert. Pollen: Unknown, but visits flowers of *Camissonia brevipes, Eschscholzia minutiflora* var. *darwinensis.*
Perdita mucronata Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 297, figs. 235, 236, 318, 344. ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 36. ♀.

nitens Timberlake. Calif. (Mendocino, San Benito, Santa Barbara and Stanislaus Counties). Pollen: Unknown, but visits flowers of *Eriogonum, Eschscholzia californica, Mimulus fremontii, Phacelia.*
Perdita nitens Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 295, figs. 233, 234, 343. ♀, ♂.

quadrisignata Timberlake. Calif. Pollen: Unknown, but visits flowers of *Baccharis, Ceanothus, Clarkia, Coreopsis bigelovii, Cryptantha muricata, Eriophyllum confertiflorum, Eschscholzia californica, Layia platyglossa, Plagiobothrys nothofulvus, Prunus subcordata, Rhamnus crocea, Salix.*
Perdita quadrisignata Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 296. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 39. ♂.

transversa Timberlake. Oreg. (Jackson County).
Perdita transversa Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 287, figs. 312. ♂.

vandykei Timberlake. Calif. (Monterey County).
Perdita vandykei Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 286. ♀, ♂.

Species Group Californica

Biology: Linsley, 1958. Hilgardia 27: 562, table 5 (oligolecty).

argemones Timberlake. Ariz. (Maricopa, Pima and Pinal Counties). Pollen: Unknown, but visits flowers of *Argemone.*
Perdita argemones Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 309, figs. 261, 262, 327, 358. ♀, ♂.

arizonica Timberlake. Ariz. (Oak Creek Canyon). Pollen: Apparently collects pollen from the flowers of *Calochortus.*
Perdita arizonica Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 310, figs. 263, 264, 328, 359. ♀, ♂.

bilobata Timberlake. Calif. (Inyo and San Bernardino Counties). Pollen: Unknown, but visits flowers of *Calochortus aureus, C. kennedyi, Haplopappus cooperi.*
Perdita bilobata Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 305, figs. 253, 254, 354. ♀, ♂.

bispinata Timberlake. Calif. (San Bernardino and Riverside Counties). Pollen: Unknown, but visits flowers of *Calochortus kennedyi, Haplopappus cooperi.*
Perdita bispinata Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 303, figs. 249, 250, 323, 352. ♀, ♂.

bohartorum Timberlake. Calif. (Mono County).
Perdita bohartorum Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 319, figs. 275, 276, 365. ♀, ♂.

californica californica (Cresson). Coastal Calif. (Mt. Diablo, southward); Mexico (Baja California). Pollen: Apparently collects pollen from the flowers of *Calochortus* including *C. concolor, C. kennedyi, C. luteus, C. plummerae, C. splendens, C. venustus, C. weedii,* but visits other flowers for nectar including *Cryptantha, Eriogonum fasciculatum, Eriophyllum confertiflorum, Grindelia, Opuntia.*
Macrotera californica Cresson, 1878. Amer. Ent. Soc., Trans. 7: 71. ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 280, 282, 301-302. ♀. —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 34 (tax. status, geogr. range).

californica inopina Timberlake. Calif. (Inyo County).
Perdita californica inopina Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 33. ♀.

calochorti Timberlake. Calif. (San Bernardino and Inyo Counties). Pollen: Unknown, but visits flowers of *Calochortus nuttallii*.
Perdita calochorti Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 299, figs. 239, 240, 320, 347. ♀, ♂.

coalingensis Timberlake. Calif. (Coalinga). Pollen: Unknown, but visits flowers of *Eschscholzia californica*.
Perdita coalingensis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 313. ♀.

cowaniae Timberlake. Calif. (Inyo County). Pollen: Unknown, but visits flowers of *Calochortus kennedyi* var. *munzii*, *Cowania stansburiana*.
Perdita cowaniae Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 315, figs. 269, 270, 331, 362. ♀, ♂.

digressa Timberlake. Ariz. (Tucson), Calif. (Granite Mts., San Bernardino County). Pollen: Unknown, but visits flowers of *Baileya multiradiata*, *Chaenactis*.
Perdita digressa Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 34, figs. 1211, 1212, 1309, 1354. ♂, ♀.

distropica Timberlake. Calif. (South Coast Ranges). Pollen: Collects pollen from the flowers of *Calochortus* including *C. clavatus*, *C. luteus*, *C. splendens*, *C. venustus* and *Eschscholzia californica*, but visits other flowers for nectar including *Adenostoma*, *Eriogonum*.
Perdita distropica Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 312, figs. 265, 266, 329, 360. ♀, ♂.

duplonotata Timberlake. Utah (Garfield County), Nev. (Charleston Mts.), Calif. (San Bernardino County). Pollen: Unknown, but visits flowers of *Fallugia paradoxa*, *Isomeris arborea*.
Perdita duplonotata Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 307, figs. 257, 258, 356. ♀, ♂.

eriogoni Cockerell. Colo. Pollen: Unknown, but visits flowers of *Eriogonum umbellatum*.
Perdita eriogoni Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 621. ♀, ♂.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 279, 284, 322-323, figs. 279, 280, 367 (tax. characters). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 35-36. ♂ (color variation).

fallugiae Timberlake. Nev. (Charleston Mts.). Pollen: Unknown, but visits flowers of *Calochortus flexuosus*, *Fallugia paradoxa*, *Hymenoxys cooperi*.
Perdita fallugiae Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 314, figs. 267, 268, 330, 361. ♀, ♂.

leucostoma Timberlake. Calif. (Kern and Inyo Counties). Pollen: Unknown, but visits flowers of *Calochortus leichtlinii*, *Haplopappus linearifolius*.
Perdita leucostoma Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 300, figs. 241, 242, 321, 348. ♀, ♂.

macrostoma Cockerell. Calif. Pollen: Apparently collects pollen from the flowers of *Calochortus*.
Perdita macrostoma Cockerell, 1922. U. S. Natl. Mus., Proc. 60 (18): 18. ♂, ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 278, 283, 304, figs. 251, 252, 324, 353 (tax. characters).

mohavensis mohavensis Timberlake. South. Calif. deserts. Pollen: Probably collects pollen mainly from the flowers of *Eschscholzia*, but visits flowers of *Amsinckia intermedia*, *Argemone platyceras*, *Calochortus aureus*, *Calycoseris wrightii*, *Chaenactis stevioides* var. *brachypappa*, *Encelia farinosa*, *Eschscholzia californica*, *E. glyptosperma*, *E. minutiflora* var. *darwinensis*, *E. parishii*, *Haplopappus cooperi*, *Hyptis emoryi*, *Larrea tridentata*, *Monardella exilis*, *Salix*, *Salvia*.
Perdita mohavensis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 306, figs. 255, 256, 325, 355. ♀, ♂.

mohavensis pimana Timberlake. Ariz. (Pima County). Pollen: Unknown, but visits flowers of *Baileya*.
Perdita mohavensis pimana Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 36. ♀.

montereyensis Timberlake. Calif. (Monterey, San Benito and San Luis Obispo Counties). Pollen: Collects pollen from the flowers of *Calochortus splendens*, *C. venustus* and *Eschscholzia californica*, but visits other flowers for nectar including *Eriogonum*, *Rhamnus crocea*.
Perdita montereyensis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 302, figs. 245, 246, 350. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 36 (color variation, geogr. and floral record).

mormonica Timberlake. Utah (Garfield and Tooele Counties). Pollen: Unknown, but visits flowers of *Sphaeralcea*.
Perdita mormonica Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 311. ♀.

Taxonomy: Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 10 (color variation).

nebrascensis Swenk and Cockerell. Nebr., (Neligh, Antelope County). Pollen: Unknown, but visits flowers of *Helianthus*.
Perdita nebrascensis Swenk and Cockerell, 1907. Ent. News 18: 53. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 395-396 (key, tax. status).

nevadensis culbertsoni Timberlake. Calif. (Tulare, Santa Cruz Counties, Yosemite Natl. Pk.).
Perdita nevadensis culbertsoni Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 318. ♀, ♂.

nevadensis molina Timberlake. Calif. (San Bernardino Mts.).
Perdita nevadensis molina Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 318, figs. 273, 274, 364. ♀, ♂.

Taxonomy: Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 396 (key).

nevadensis nevadensis Cockerell. B. C. to north. Calif. Pollen: Unknown, but visits flowers of *Eriogonum*.
Perdita nevadensis Cockerell, 1896. Acad. Nat. Sci. Phila., Proc. 48: 58. ♀.
Perdita nigricollis Timberlake, 1929. Pan-Pacific Ent. 6: 54. ♀.

Taxonomy: Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 279, 284, 316-318, figs. 271, 272, 332, 363. ♀, ♂ (redescription, synonymy).

obtusa Timberlake. Calif. (Tulare County).
Perdita obtusa Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 37. ♀.

pulliventris Timberlake. Calif. (Tuolumne County).
Perdita pulliventris Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 38. ♀.

robustula Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Acacia greggii*, *Agave deserti*, *Argemone corymbosa*, *A. platyceras*, *Cryptantha utahensis*, *Encelia farinosa*, *Eriogonum inflatum*, *Eschscholzia minutiflora* var. *darwinensis*, *Prosopis juliflora*, *Stanleya pinnata*.
Perdita robustula Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 308, figs. 259, 260, 326, 357. ♀, ♂.

santaclarensis Timberlake. Calif. (Santa Clara County).
Perdita santaclarensis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 314. ♀.

tularensis Timberlake. Calif. (Alpine, Tuolumne, and Mariposa Counties, south to Tehachapi Pass). Pollen: Unknown, but visits flowers of *Calochortus luteus*, *C. venustus*.
Perdita tularensis Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 303, figs. 247, 248, 351. ♀, ♂.

wyomingensis sculleni Timberlake. Oreg., Wash.
Perdita sculleni sculleni Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 320, figs. 277, 278, 333, 366. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 40 (tax. status, key).

wyomingensis segona Timberlake. Utah, Wyo., Nev. Pollen: Unknown, but visits flowers of *Calochortus nuttallii*.
Perdita sculleni segona Timberlake, 1956. Calif. Univ. Pubs. Ent. 11: 322. ♀, ♂.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 40 (tax. status, key).

wyomingensis wyomingensis Cockerell. Wyo. (Teton County). Predator: *Philanthus pulcher* Dalla Torre.
Perdita wyomingensis Cockerell, 1922. Amer. Mus. Novitates 33: 13. ♀.

Taxonomy: Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 40 (type, tax. status, key).

Genus PERDITA Subgenus XEROMACROTERA Timberlake

Perdita subg. *Xeromacrotera* Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 412.
Type-species: *Macrotera cephalotes* Cresson. Orig. desig.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 347 (key).

cephalotes (Cresson). Nev., Calif. (Kern and San Bernardino Counties), Ariz. (Coconino County). Pollen: Unknown, but visits flowers of *Chrysothamnus*, *Gutierrezia lucida*.
Macrotera cephalotes Cresson, 1878. Amer. Ent. Soc., Trans. 7: 71. ♂.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 413, figs. 109, 110, 170 (male genitalia, geogr. and floral records). —Timberlake, 1968. Calif. Univ. Pubs. Ent. 49: 22 (geogr. and floral record). —Timberlake, 1971. Calif. Univ. Pubs. Ent. 66: 7 (geogr. and floral record).

Genus PERDITA Subgenus XEROPHASMA Cockerell

Xerophasma Cockerell, 1923. Amer. Mus. Novitates 66: 1.
Type-species: *Perdita bequaertiana* Cockerell. Monotypic and orig. desig.
(=*Xerophasma bequaerti* Cockerell).

These species are apparently crepuscular and obtain pollen only from the flowers of *Oenothera*.

Taxonomy: Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 346, 348-349 (redescription, key to included spp.).

bequaertiana Cockerell. Tex. (El Paso and Howard Counties), N. Mex. (Albuquerque). Pollen: Collects pollen from the flowers of *Oenothera*.
Xerophasma bequaerti Cockerell, 1923. Amer. Mus. Novitates 66: 2. ♀. Preocc.
Perdita bequaertiana Cockerell, 1951. *In* Michener, *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1089. N. name.

Taxonomy: Timberlake, 1953. Kans. Univ. Sci. Bul. 35: 962-963. ♂. —Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 349, figs. 1, 2, 115 (key). —Timberlake, 1958. Calif. Univ. Pubs. Ent. 14: 375 (geogr. record).

pallida Timberlake. Calif. (Colorado Desert), Ariz. (Yuma). Ecology: Attracted to artificial lights near dusk through early evening. This species was readily observed in flight at Borrego and Hopkins Well on the Colorado Desert by shining automobile headlights on the patches of *Oenothera* being visited by this species. Commencing about nightfall many males and some females were attracted to the lights of gasoline lanterns. Activity at the flowers continued well into the darkness of early evening. These observations were made in sand dune areas and suggest the possibility that this species may be arenophilous in its choice of nesting sites. Pollen: Collects pollen from the flowers of *Oenothera deltoides*, *O. trichocalyx*, but visits these and other flowers for nectar including *Trichostema*.
Perdita pallida Timberlake, 1954. Calif. Univ. Pubs. Ent. 9: 349. ♀, ♂.

Nomen Nudum in Perdita

Perdita excisa Timberlake, 1928. Amer. Mus. Novitates 321: 10.

Family HALICTIDAE

This is among the largest and most widely distributed families of bees. All three of its subfamilies occur in the Nearctic Region, but only the Dufoureinae and the Halictinae are well represented by numerous species.

Revision: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 515-521, figs. (spp. of eastern U. S.).

Biology: Sakagami and Michener, 1962. The Nest Architecture of the Sweat Bees. Kansas Univ. Press, 135 pp., 181 figs. —Torchio, Rozen, Bohart and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 145-146, table 1 (biological differences among subfamilies).

Subfamily DUFOUREINAE

Although this subfamily is chiefly Holarctic in distribution, it is also represented in the Ethiopian, Oriental and Neotropical regions by at least one or more species. It is absent in the Australian Region. Many, if not most of the species, are apparently highly restricted in their intrafloral relationships and thus oligolecty is a relatively common phenomenon of this subfamily.

Taxonomy: Michener, 1965. Ent. Soc. Amer., Ann. 58: 321-326, 28 figs. (generic review).

Genus DUFOUREA Lepeletier

Taxonomy: Bohart, 1947. Ent. Soc. Amer., Ann. 40: 692-704. —Bohart, 1948. Ent. Soc. Amer., Ann. 41: 119-136. —Bohart, 1949. Ent. Soc. Amer., Ann. 42: 55-62.

Genus DUFOUREA Subgenus DUFOUREA Lepeletier

Dufourea Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 227.
Type-species: *Dufourea minuta* Lepeletier. Desig. by Richards, 1935.

convergens Bohart. Calif. (San Diego Co.).
Dufourea convergens Bohart, 1949. Ent. Soc. Amer., Ann. 42: 59. ♂.

leachi Timberlake. Calif. (Humboldt and Mendocino Cos.). Pollen: Unknown, but visits flowers of *Brodiaea*.
Dufourea leachi Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 398. ♂.

viridis Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Eschscholzia californica*, *Platystemon californicus*.
Dufourea (*Dufourea*) *viridis* Timberlake, 1941. Ent. Soc. Amer., Ann. 34: 39. ♂, ♀.

Genus DUFOUREA Subgenus HALICTOIDES Nylander

Halictoides Nylander, 1848. Notiser Sallskapet Faune Flora Fenn., v. 1, p. 195.
Type-species: *Halictoides dentiventris* Nylander. Desig. by Cockerell and Porter, 1899.

Halictoides subg. *Epihalictoides* Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 420.
Type-species: *Panurgus marginatus* Cresson. Monotypic.

Halictoides subg. *Parahalictoides* Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 420.
Type-species: *Halictoides campanulae* Cockerell. Orig. desig.

Conohalictoides Viereck, 1904. Ent. News 15: 245.
Type-species: *Panurgus novaeangliae* Robertson. Monotypic and orig. desig. (=*Conohalictoides lovelli* Viereck).

Neohalictoides Viereck, 1904. Ent. News 15: 261.
Type-species: *Panurgus maurus* Cresson. Monotypic and orig. desig.

Cryptohalictoides Viereck, 1904. Ent. News 15: 261.
Type-species: *Cryptohalictoides spiniferus* Viereck. Monotypic and orig. desig.

Mimulapis Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 162.
Type-species: *Mimulapis versatilis* Bridwell. Monotypic and orig. desig.

Betheliella Cockerell, 1924. Ent. News 35: 169.
Type-species: *Betheliella calochorti* Cockerell. Monotypic.

Halictoides subg. *Cephalictoides* Cockerell, 1924. Psyche 31: 244.
Type-species: *Halictoides paradoxus* Morawitz. Monotypic and orig. desig.

afasciata Bohart. Oreg., Calif. Pollen: Unknown, but visits flowers of *Trifolium*.
Dufourea afasciata Bohart, 1948. Ent. Soc. Amer., Ann. 41: 130. ♂, ♀.

australis australis (Michener). South. Calif. Pollen: Unknown, but visits flowers of *Chaenactis, Encelia farinosa, Erigeron foliosus, Eriophyllum, Lasthenia gracilis.* A third subspecies occurs in Baja California.
Halictoides australis Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 398. ♂.

australis dammersi Timberlake. South. Calif. (deserts).
Dufourea (*Halictoides*) *dammersi* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 407. ♂.

bernardina (Michener). Calif. Pollen: Unknown, but visits flowers of *Agoseris aurantiaca, Erodium, Gilia capitata, Nemophila integrifolia, Lasthenia chrysostoma, Phacelia douglasii.*
Halictoides bernardina Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 401. ♂, ♀.

boregoensis (Michener). Ariz., Calif. Pollen: Collects pollen from flowers of *Camissonia* including *C. campestris, C. clavaeformis, C. pallida halli, C. refracta, C. scapoidea,* but also visits flowers of *Abronia villosa, Cryptantha barbigera, C. dumetorum, Larrea tridentata, Malacothrix californica, Malva pusilla, Nama demissum, Phacelia fremontii.*
Halictoides boregoensis Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 398. ♂.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 19 (floral relationships). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 76 (floral relationships). —Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 41 (floral relationships).

brevicornis Timberlake. Calif. Pollen: Unknown, but visits flowers of *Cryptantha intermedia, Linanthus dianthiflorus, Sphaenosciadium capitellatum.*
Dufourea (*Halictoides*) *brevicornis* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 403. ♂, ♀.

calientensis Timberlake. Calif. Pollen: Unknown, but visits flowers of *Coreopsis bigelovii, Eschscholzia californica, Gilia tricolor, Nemophila, Oenothera, Plagiobothrys nothofulvus, Prunus subcordata.*
Dufourea (*Halictoides*) *calientensis* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 405. ♂, ♀.

californica (Michener). Calif. Pollen: Unknown, but visits flowers of *Lasthenia.*
Halictoides californicus Michener, 1935. Pan-Pacific Ent. 11: 181. ♂.

calochorti calochorti (Cockerell). Calif. Pollen: Possibly an oligolege of *Calochortus,* visits flowers of *C. caeruleus* var. *maweanus.*
Betheliella calochorti Cockerell, 1924. Ent. News 35: 170. ♂.

calochorti sculleni (Cockerell). Oreg. Pollen: Possibly an oligolege of *Calochortus.*
Betheliella calochorti sculleni Cockerell, 1937. Canad. Ent. 69: 33. ♂.

campanulae (Cockerell). Wash. Pollen: Unknown, but visits flowers of *Calochortus, Campanula.*
Halictoides campanulae Cockerell, 1897. Canad. Ent. 29: 289. ♂.

crassipes (Cockerell). Oreg.
Halictoides crassipes Cockerell, 1924. Psyche 31: 243. ♂.

cuprea Bohart. Calif. Pollen: Unknown, but visits flowers of *Gilia, Nemophila, Phacelia.*
Dufourea cuprea Bohart, 1948. Ent. Soc. Amer., Ann. 41: 119. ♂, ♀.

davidsoni (Cockerell). Calif. Pollen: Unknown, but visits flowers of *Eriogonum nudum, Gayophytum nuttallii, G. ramosissimum.*
Halictoides davidsoni Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 140. ♂.

Taxonomy: Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 199. ♂, ♀.

dentipes Bohart. Calif. Parasite: *Neopasites fulviventris* (Cress.)? Pollen: Unknown, but apparently oligolege of *Calochortus albus, C. monophyllus;* also visits *Clarkia rhomboidea, Hypochoeris glabra, Wyethia angustifolia.*
Dufourea dentipes Bohart, 1948. Ent. Soc. Amer., Ann. 41: 132. ♂, ♀.

Biology: Torchio, Rozen, Bohart and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 144 (parasite).

desertorum Timberlake. South. Calif. (deserts). Pollen: Unknown, but visits flowers of *Eschscholzia* including *E. minutiflora* var. *darwinensis.*
Dufourea (*Halictoides*) *desertorum* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 408. ♂, ♀.

dilatipes Bohart. Alta., Mont.
Dufourea dilatipes Bohart, 1948. Ent. Soc. Amer., Ann. 41: 135. ♂, ♀.

echinocacti Timberlake. South. Calif. (deserts). Pollen: Apparently an oligolege of *Echinocactus* including *E. acanthodes, E. cylindraceus.*
Dufourea (*Halictoides*) *echinocacti* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 399. ♂, ♀.

fallugiae (Cockerell). N. Mex. Pollen: Possibly an oligolege of *Fallugia.*
Halictoides fallugiae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 359. ♀.

femorata Bohart. Calif. Pollen: Presumably oligolege of *Gilia* including *G. capitata, G. tricolor,* but also visits flowers of *Collinsia, Cryptantha, Layia glandulosa, Nemophila, Salvia.*
Dufourea femorata Bohart, 1947. Ent. Soc. Amer., Ann. 40: 701. ♂, ♀.

fimbriata fimbriata (Cresson). Colo., N. Mex., Ariz., Calif. (high mountains). Pollen: Apparently an oligolege of *Potentilla* including *P. glandulosa,* but also visits flowers of *Penstemon.*
Panurgus fimbriatus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 63. ♀.
Halictoides Harveyi Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 223. ♀.

fimbriata sierrae (Michener). Calif. (Sierra Nevada and White Mts.). Pollen: Unknown, but visits flowers of *Ranunculus.*
Halictoides harveyi sierrae Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 397. ♀.

gilia Bohart. Calif. (16 mi. E. Mt. Hamilton). Pollen: Unknown, but visits flowers of *Gilia.*
Dufourea gilia Bohart, 1947. Ent. Soc. Amer., Ann. 40: 692. ♂, ♀.

holocyanea (Cockerell). Oreg., Calif. Pollen: Unknown, but visits flowers of *Ceanothus, Symphoricarpos.*
Halictoides holocyaneus Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 199. ♂.

impunctata Bohart. Calif. ("So. Cal.").
Dufourea impunctata Bohart, 1949. Ent. Soc. Amer., Ann. 42: 58. ♂.

latifrons Timberlake. South. Calif. (deserts). Pollen: Collects pollen from flowers of *Camissonia* including *C. brevipes, C. clavaeformis.*
Dufourea (*Halictoides*) *latifrons* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 409. ♂.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 19 (floral relationships).

linanthi Timberlake. South. Calif. Pollen: Apparently an oligolege of *Linanthus* including *L. aureus, L. dianthiflorus, L. lemmonii,* but also visits flowers of *Malacothrix glabrata.*
Dufourea (*Halictoides*) *linanthi* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 402. ♂, ♀.

longiceps Bohart. Calif. (Panamint Mts.). Pollen: Unknown, but visits flowers of *Phacelia.*
Dufourea longiceps Bohart, 1948. Ent. Soc. Amer., Ann. 41: 128. ♂, ♀.

macswaini Bohart. Calif. Pollen: Unknown, but visits flowers of *Clarkia cylindrica, C. dudleyana, C. purpurea.*
Dufourea macswaini Bohart, 1969. Pan-Pacific Ent. 45: 57. ♂, ♀.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 49 (floral relationships).

malacothricis Timberlake. N. Mex., Ariz. and Calif. (deserts). Pollen: Presumably an oligolege of *Malacothrix* including *M. californica, M. glabrata,* but also visits flowers of *Anisocoma acaulis, Camissonia pallida hallii, Cryptantha barbigera, Eschscholzia minutiflora* var. *darwinensis, Phacelia fremontii.*
Dufourea (*Halictoides*) *malacothricis* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 406. ♂, ♀.

Biology: Torchio, Rozen, Bohart and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 141-142 (nest architecture, provisioning, development).

marginata halictella Michener. Wyo., Utah, Colo., N. Mex. Pollen: Unknown, but visits flowers of the Compositae including *Helianthus.*
Panurgus halictulus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 63. ♂. Preocc.
Dufourea (*Halictoides*) *marginata halictella* Michener, 1951. *In* Muesebeck, Krombein, Townes, U. S. Dept. Agr., Agr. Monog. 2: 1132. N. name.

Taxonomy: Cockerell, 1922. Amer. Mus. Novitates 40: 3.

marginata marginata (Cresson). Minn., Wis. and Ill. to Miss., west to Alta., Colo. and Utah. Pollen: Collects pollen from flowers of *Helianthus annuus*, but also visits flowers of *Bidens aristosa*, *Erigeron macranthus*.
Panurgus marginatus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 62. ♀.
Panurgus autumnalis Robertson, 1895. Amer. Ent. Soc., Trans. 22: 121. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 516-518, figs.

Biology: Stephen, Bohart and Torchio, 1969. The biology and external morphology of bees, p. 122 (floral relationships).

maura (Cresson). N. Dak., Wyo., Idaho, Nebr., Colo., N. Mex. Pollen: Unknown, but visits flowers of *Campanula*. Predator: *Philanthus pulcher* Dalla Torre.
Panurgus maurus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 61. "♀" = ♂.

monardae (Viereck). Wis., Mich., Ill. and Tenn. Pollen: Oligolege of labiates, collects pollen from flowers of *Agastache foeniculum*, *Monarda* including *M. fistulosa*.
Conohalictoides monardae Viereck, 1924. Ent. Soc. Wash., Proc. 26: 14. ♂, ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 518-519, figs.

Biology: Bouseman, 1976. Kansas Ent. Soc., Jour. 49: 531-532 (floral relationships).

mulleri (Cockerell). Wyo., Calif., Ariz. Parasite: *Eurystylops* sp., *Neoposites cressoni* Cwfd. Pollen: Oligolege of *Phacelia* including *P. affinis*, *P. distans*, *P popei* var. *arizonica*, *P. ramosissima*, *P. tanacetifolia*, but also visits flowers of *Camissonia brevipes*, *Cryptantha* including *C. intermedia*, *Nemophila*.
Halictoides mulleri Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 190. ♀.

Taxonomy: Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 24. ♂. —Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 400. ♀, ♂.

Biology: Torchio, Rozen, Bohart and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 132-138, figs. 1-6 (nest architecture, provisioning and development, adult activity, pollen source, parasites).

nemophilae (Michener). Calif. Pollen: Presumably an oligolege of *Phacelia* including *P. davidsonii*, but also visits flowers of *Montia perfoliata*, *Nemophila integrifolia*.
Halictoides nemophilae Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 400. ♂, ♀.

neocalifornica Bohart. Calif.
Dufourea neocalifornica Bohart, 1947. Ent. Soc. Amer., Ann. 40: 697. ♂.

novaeangliae (Robertson). Mo. and Mich. east to N. J. and Maine. Pollen: Unknown, but visits flowers of *Fagopyrum* and *Pontederia*.
Panurgus novae-angliae Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 339. ♂.
Conohalictoides lovelli Viereck, 1904. Ent. News 15: 245. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 519-520, figs. (redescription).

nudicornis Timberlake. South. Calif. (deserts). Pollen: Presumably an oligolege of Onagraceae including *Camissonia clavaeformis*, *C. c. aurantiaca*, *C. piersonii*, *Oenothera deltoides*, but also visits flowers of *Eschscholzia*, *Phacelia crenulata*.
Dufourea (*Halictoides*) *nudicornis* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 412. ♀, ♂.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 19 (floral relationships).

oenotherae Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Camissonia bistorta*.
Dufourea (*Halictoides*) *oenotherae* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 413. ♂.

oryx (Viereck). B. C., Colo., Ariz., N. Mex.
Halictoides (*Parahalictoides*) *oryx* Viereck, 1903. Amer. Ent. Soc., Trans. 29: 48. ♂.

Taxonomy: Cockerell, 1916. Ent. News 27: 62. ♀.

pectinipes Bohart. Calif. Pollen: Unknown, but visits flowers of *Gilia*, *Mimulus* including *M. layneae*.
Dufourea pectinipes Bohart, 1948. Ent. Soc. Amer., Ann. 41: 126. ♂, ♀.

pulchricornis (Cockerell). N. Mex., Ariz. Pollen: Oligolege of *Lesquerella*, including *L. gordonii*.
Halictoides pulchricornis Cockerell, 1916. Ent. News 27: 63. ♂, ♀.

Biology: Torchio, Rozen, Bohart and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 142-143 (nest architecture, provisioning, development, adult activity).

rhamni (Michener). South. Calif. Pollen: Unknown, but visits flowers of *Camissonia bistorta*, *Cryptantha intermedia*, *Dendromecon rigida*, *Eschscholzia californica*, *Rhamnus*, *Plagiobothrys*.
Halictoides rhamni Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 394. ♂, ♀.

sandhouseae arida Bohart. South. Calif. Pollen: Unknown, but visits flowers of *Phacelia*.
Dufourea sandhouseae arida Bohart, 1949. Ent. Soc. Amer., Ann. 42: 61. ♂, ♀.

sandhouseae sandhouseae (Michener). Calif.; Mexico (Baja California). Pollen: Unknown, but visits a wide variety of flowers including *Arenaria douglasii*, *Agoseris heterophylla*, *Calandrinia menziesii*, *Camissonia bistorta*, *C. cheiranthifolia*, *C. clavaeformis aurantiaca*, *C. parishii*, *Chaenactis*, *Coreopsis californica*, *Cryptantha intermedia*, *Convolvulus occidentalis*, *Dendromecon rigida*, *Encelia farinosa*, *Erodium botrys*, *Eschscholzia californica*, *Gilia multicaulis*, *G. tricolor*, *Hesperochiron californicus*, *Lasthenia chrysostoma*, *Layia elegans*, *L. platyglossa*, *Lessingia*, *Linanthus aureus*, *Lomatium*, *Malacothrix californica*, *Nemophila menziesii*, *Phacelia*, *Prunus andersonii*, *Salvia columbariae*, *Sisymbrium irio*, *Stenotopsis linearifolius*.
Halictoides sandhouseae Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 328. ♂, ♀.

saundersi (Cockerell). Calif. (Central Valley). Pollen: Unknown, but visits flowers of *Camissonia campestris*.
Halictoides saundersi Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 189. ♀, ♂.

scabricornis Bohart. Calif., Oreg., Utah. Pollen: Unknown, but visits flowers of *Gayophytum*, *Symphoricarpos*. Predator: *Philanthus pacificus arizonae* Dunning, *P. pulcher* Dalla Torre.
Dufourea scabricornis Bohart, 1949. Ent. Soc. Amer., Ann. 42: 57. ♂, ♀.

scintilla (Cockerell). South. Calif. Pollen: Presumably an oligolege of *Camissonia* including *C. bistorta*, *C. campestris*, *C. cheiranthifolia*, *C. contorta*, *C. dentata*, *C. micrantha*, *C. pallida hallii*, *C. sierrae*, *C. veitchiana*, but also visits flowers of *Clarkia*, *Cryptantha intermedia*, *C. muricata*, *Coreopsis californica*, *Eschscholzia californica*, *Euphorbia albomarginata*, *Phacelia douglasii*, *Plagiobothrys*, *Trifolium variegatum*.
Diandrena scintilla Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 50. ♀.
Halictoides eschscholtziae Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 393. ♂, ♀.

Biology: Linsley, MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 71: 41-42 (floral relationships).

spilura (Cockerell). Calif. Pollen: Unknown, but visits flowers of *Eriogonum nudum*, *Gayophytum*, *Oenothera*.
Halictoides spilurus Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 200. ♀.

spinifera (Viereck). Calif., Nev. Pollen: Unknown, but visits flowers of *Arenaria kingii*, *Sidalcea apicata*, *Trifolium monanthum*.
Cryptohalictoides spiniferus Viereck, 1904. Ent. News 15: 261. ♂.

Taxonomy: Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 199. ♂, ♀. —Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 402. ♀.

subdavidsoni Bohart. Calif. Pollen: Unknown, but visits flowers of *Gayophytum diffusum*.
Dufourea subdavidsoni Bohart, 1949. Ent. Soc. Amer., Ann. 42: 55. ♂, ♀.

tarsata Bohart. Calif. Pollen: Unknown, but visits flowers of *Cryptantha*, *Gilia*, *Linanthus parviflorus*, *Lupinus*, *Nemophila*.
Dufourea tarsata Bohart, 1947. Ent. Soc. Amer., Ann. 40: 698. ♂, ♀.

timberlakei Bohart. Calif. (Mt. Pinos).
Dufourea timberlakei Bohart, 1947. Ent. Soc. Amer., Ann. 40: 700. ♂.

tinsleyi (Cockerell). N. Mex.
Halictoides tinsleyi Cockerell, 1898. Canad. Ent. 30: 52. ♀.

trochantera Bohart. Wash., Oreg., Wyo., Utah, Calif. Parasite: *Neopasites* sp. Pollen: Oligolege of *Phacelia* including *P. leucophylla, P. pringlei,* but also visits flowers of *Calochortus venustus.*

Dufourea trochantera Bohart, 1948. Ent. Soc. Amer., Ann. 41: 121. ♂, ♀.

Biology: Torchio, Rozen, Bohart and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 138-141 (nest architecture, provisioning, development, adult activity, pollen source, parasite).

truncata Timberlake. South. Calif. Pollen: Presumably an oligolege of *Camissonia* including *C. bistorta, C. dentata, C. veitchiana,* but also visits flowers of *Astragalus, Coreopsis californica, Cryptantha intermedia.*

Dufourea (*Halictoides*) *truncata* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 410. ♂, ♀.

tularensis Timberlake. Calif. (Three Rivers). Pollen: Unknown, but visits flowers of *Anisocoma acaulis, Eschscholzia californica, Layia glandulosa, Phacelia distans, P. douglasii.*

Dufourea (*Halictoides*) *tularensis* Timberlake, 1941. Ent. Soc. Amer., Ann. 34: 41. ♂, ♀.

tuolumne Bohart. Calif. Pollen: Unknown, but visits flowers of *Cryptantha, Gilia, Linanthus filipes, L. montanus, Lomatium.*

Dufourea tuolumne Bohart, 1947. Ent. Soc. Amer., Ann. 40: 694. ♂, ♀.

vanduzeei Bohart. Calif. (Monterey Co.).

Dufourea vanduzeei Bohart, 1947. Ent. Soc. Amer., Ann. 40: 696. ♂.

vandykei Bohart. Calif. Pollen: Unknown, but visits flowers of *Sphaeralcea ambigua.*

Dufourea vandykei Bohart, 1948. Ent. Soc. Amer., Ann. 41: 124. ♂, ♀.

vernalis Timberlake. Calif. (deserts). Pollen: Evidently polylectic, usually visits flowers of *Eschscholzia* including *E. minutiflora, E. parishii,* but also visits other flowers including *Argemone, Camissonia brevipes, C. clavaeformis, C. refracta, Malacothrix glabrata, Mentzelia involucrata, Phacelia distans.*

Dufourea (*Halictoides*) *vernalis* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 400. ♂, ♀.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 19 (floral relationships).

versatilis rubriventris Michener. Calif.; Mexico (Baja California). Pollen: Oligolege of *Mimulus* including *M. diffusus, M. fremontii, M. guttatus, M. layneae, M. montioides, M. moschatus, M. primuloides, M. suksdorfi,* but also visits flowers of *Gilia, Nemophila.*

Mimulapis versatilis rufiventris Timberlake, 1941. Ent. Soc. Amer., Ann. 34: 38. ♀, ♂. Preocc.

Dufourea (*Halictoides*) *rubriventris* Michener, 1951. *In* Muesebeck, Krombein, Townes, U. S. Dept. Agr., Agr. Monog. 2: 1133. N. name.

versatilis versatilis (Bridwell). South. Calif. Pollen: Apparently an oligolege of *Mimulus,* but visits flowers of *Gilia achillaefolia, G. splendens.*

Mimulapis versatilis Bridwell, 1919. Hawaii. Ent. Soc., Proc. 4: 163. ♂, ♀.

virgata (Cockerell). Calif. Pollen: Collects pollen from flowers of *Camissonia boothii,* but visits a wide variety of flowers including *Amsinckia, Brodiaea capitata, Camissonia campestris, Convolvulus villosus, Coreopsis bigelovii, C. californica, Cryptantha intermedia, C. muricata, Descurainia sophia, Encelia californica, E. farinosa, Eriophyllum lanatum, Eschscholzia californica, Euphorbia albomarginata, Gilia achillaefolia, G. multicaulis, G. tenuifolia, G. tricolor diffusa, Hesperochiron, Layia elegans, L. glandulosa, Linanthus aureus, Lotus scoparius, Lupinus, Malacothrix, Nemophila, Phacelia douglasii, Plagiobothrys nothofulvus, Platystemon, Salvia columbariae, Stenotopsis linearifolius, Trifolium.*

Halictoides virgatus Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 191. ♀, ♂.

Taxonomy: Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 140.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 19 (floral relationships).

viridescens (Crawford). Calif.

Halictoides viridescens Crawford, 1916. Insecutor Inscitiae Menstruus 4: 139. ♂.

Genus MICRALICTOIDES Timberlake

Dufourea subg. *Micralictoides* Timberlake, 1939. Ent. Soc. Amer., Ann. 32: 397.
Type-species: *Halictoides ruficaudus* Michener. Orig. desig.

Revision: Bohart, 1942. Pan-Pacific Ent. 18: 119-123.

altadenae (Michener). South. Calif. Pollen: Unknown, but visits flowers of *Chaenactis glabriuscula*, *Eriophyllum confertiflorum*.
Halictoides altadenae Michener, 1936. Ann. and Mag. Nat. Hist. (10) 19: 395. ♀, ♂.

mojavensis Bohart. South. Calif. Pollen: Unknown, but visits flowers of *Chaenactis brachypappa*, *Gilia multicaulis*, *Eschscholzia californica*, *Lasthenia gracilis*, *Layia platyglossa*, *Malacothrix californica*, *M. glabrata*, *Phacelia fremontii*, *Salvia columbariae*.
Micralictoides mojavensis Bohart, 1942. Pan-Pacific Ent. 18: 120. ♂, ♀.

ruficaudus (Michener). Calif. Pollen: Apparently an oligolege of *Eschscholzia californica*, but also visits flowers of *Gilia multicaulis*, *Nemophila menziesii*.
Halictoides ruficaudus Michener, 1936. Ann. and Mag. Nat. Hist. (10) 19: 397. ♀.

Genus PROTODUFOUREA Timberlake

Protodufourea Timberlake, 1955. Pan-Pacific Ent. 31: 105.
Type-species: *Protodufourea wasbaueri* Timberlake. Orig. desig.

Revision: Timberlake, 1955. Pan-Pacific Ent. 31: 105-108.

parca Timberlake. Calif. (Riverside Co.). Pollen: Oligolege of *Phacelia* including *P. distans*, *P. hispida*.
Protodufourea parca Timberlake, 1955. Pan-Pacific Ent. 31: 106. ♂.

wasbaueri Timberlake. Calif. (San Benito Co.). Pollen: Oligolege of *Emmenanthe penduliflora*.
Protodufourea wasbaueri Timberlake, 1955. Pan-Pacific Ent. 31: 107. ♂, ♀.

Genus CONANTHALICTUS Cockerell

Revision: Timberlake, 1961. Pan-Pacific Ent. 37: 145-160.
Biology: Rozen and McGinley, 1976. Amer. Mus. Novitates 2602: 1-6, 3 figs.

Genus CONANTHALICTUS Subgenus CONANTHALICTUS Cockerell

Halictus subg. *Conanthalictus* Cockerell, 1901. Ent. News 12: 209.
Type-species: *Halictus* (*Conanthalictus*) *conanthi* Cockerell. Monotypic.

conanthi (Cockerell). N. Mex. Pollen: Unknown, but visits flowers of *Nama hispidum*.
Halictus (*Conanthalictus*) *conanthi* Cockerell, 1901. Ent. News 12: 208. ♀.

cotullensis Crawford. Tex. (Cotulla).
Conanthalictus cotullensis Crawford, 1907. N. Y. Ent. Soc., Jour. 16: 182. ♀, ♂

Genus CONANTHALICTUS Subgenus PHACELIAPIS Michener

Conanthalictus subg. *Phaceliapis* Michener, 1942. N. Y. Ent. Soc., Jour. 50: 277.
Type-species: *Conanthalictus bakeri* Crawford. Orig. desig.

bakeri Crawford. South. Calif. Pollen: Unknown, but visits flowers of *Phacelia distans*, *P. tanacetifolia*.
Conanthalictus Bakeri Crawford, 1907. Invertebrata Pacifica 1: 197. ♀.

caerulescens Timberlake. Calif. (Riverside Co.), Nev. Pollen: Unknown, but visits flowers of *Phacelia crenulata*, *P. distans*.
Conanthalictus caerulescens Timberlake, 1961. Pan-Pacific Ent. 37: 148. ♂, ♀.

cockerelli Timberlake. Calif. (San Bernardino Co.). Pollen: Unknown, but visits flowers of *Eriodictyon*, *Phacelia fremontii*.
Conanthalictus cockerelli Timberlake, 1961. Pan-Pacific Ent. 37: 155. ♂, ♀.

deserticola Timberlake. South. Calif. (Imperial and Riverside Cos.). Pollen: Unknown, but visits flowers of *Camissonia brevipes, Nama demissum.*
Conanthalictus deserticola Timberlake, 1961. Pan-Pacific Ent. 37: 152. ♂. Described under heading *Conanthalictus namatophilus* Timberlake, new species which is a printer's error according to Timberlake *in litt.;* also see Pan-Pacific Ent. 40: 200, 1964.

macrops Cockerell. South. Calif. (San Gabriel and San Bernardino Mts.). Pollen: Unknown, but visits flowers of *Malacothrix, Phacelia davidsonii, P. douglasii, Yucca whipplei.*
Conanthalictus macrops Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 51. ♂.

mentzeliae Timberlake. South. Calif. (San Bernardino, Kern, and Inyo Cos.), Nev. Pollen: Unknown, but visits flowers of *Malacothrix, Mentzelia affinis, M. albicaulis, M. micrantha, Phacelia.*
Conanthalictus mentzeliae Timberlake, 1961. Pan-Pacific Ent. 37: 156. ♂, ♀.

minor Timberlake. South. Calif. (San Bernardino, Riverside and Inyo Cos.). Pollen: Unknown, but visits flowers of *Camissonia clavaeformis, Nama demissum, Phacelia.*
Conanthalictus minor Timberlake, 1961. Pan-Pacific Ent. 37: 151. ♂, ♀. Described under heading *Conanthalictus deserticola* Timberlake, new species which is a printer's error according to Timberlake *in litt.;* also see Pan-Pacific Ent. 40: 200, 1964.

namatophilus Timberlake. South. Calif. (Imperial, Riverside and San Bernardino Cos.). Pollen: Unknown, but visits flowers of *Camissonia clavaeformis, Lotus scoparius, Nama demissum, Phacelia* aff. *fremontii.*
Conanthalictus namatophilus Timberlake, 1961. Pan-Pacific Ent. 37: 153. ♂, ♀. Described under heading *Conanthalictus minor* Timberlake, new species which is a printer's error according to Timberlake *in litt.;* also see Pan-Pacific Ent. 40: 200, 1964.

nigricans Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Cryptantha intermedia, Emmenanthe, Phacelia brachyloba, P. distans, P. douglasii, P. grandiflora, P. minor.*
Conanthalictus nigricans Timberlake, 1961. Pan-Pacific Ent. 37: 149. ♂, ♀.

seminiger Michener. South Calif. Pollen: Collects pollen from flowers of *Emmenanthe penduliflora,* but also visits flowers of *Rhamnus crocea.*
Conanthalictus seminiger Michener, 1937. Ann. and Mag. Nat. Hist. 10 (19): 326. ♀.

wilmattae Cockerell. South. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Phacelia distans, Prosopis juliflora.*
Conanthalictus wilmattae Cockerell, 1936. Amer. Mus. Novitates 831: 2. ♀.

Genus SPHECODOSOMA Crawford

Sphecodosoma Crawford, 1907. N. Y. Ent. Soc., Jour. 15: 182.
Type-species: *Sphecodosoma pratti* Crawford. Monotypic and orig. desig.

Taxonomy: Timberlake, 1961. Pan-Pacific Ent. 37: 158-160 (as subgenus).

dicksoni (Timberlake). South. Calif., Tex. (Davis Mts); Mexico (Durango). Pollen: Unknown, but visits flowers of *Coldenia, Nama demissum, N. hispidum.*
Conanthalictus dicksoni Timberlake, 1961. Pan-Pacific Ent. 37: 158. ♀.

pratti Crawford. Tex. Pollen: Unknown, but visits flowers of *Lesquerella.*
Sphecodosoma pratti Crawford, 1907. N. Y. Ent. Soc., Jour. 15: 183. ♀, ♂.

Genus MICHENERULA Bohart

Michenerula Bohart, 1965. Ent. Soc. Amer., Ann. 58: 320.
Type-species: *Michenerula beameri* Bohart. Monotypic and orig. desig.

beameri Bohart. Tex. (Marathon). Pollen: Unknown, but visits flowers of *Nama hispidum.*
Michenerula beameri Bohart, 1965. Ent. Soc. Amer., Ann. 58: 320. ♂, ♀.

Genus XERALICTUS Cockerell

Xeralictus Cockerell, 1927. Pan-Pacific Ent. 4: 41.
Type-species: *Xeralictus timberlakei* Cockerell. Monotypic.

Taxonomy: Eickwort, 1969. Ent. Soc. Amer., Ann. 62: 654 (subfamilial assignment).

timberlakei Cockerell. Calif. (Colorado Desert). Pollen: Oligolege of *Mentzelia involucrata*, but also visits other flowers for nectar including *Mohavea confertiflora*, *Phacelia crenulata*, *P. distans*.
Xeralictus timberlakei Cockerell, 1927. Pan-Pacific Ent. 4: 42. ♂.

Subfamily NOMIINAE

Members of this subfamily are especially numerous in the Old World tropics including those of the Australian Region. They are relatively poorly represented in the Holarctic Region. Only the widespread genus *Nomia* is present in the Nearctic Region and apparently all of the species are polyleges, obtaining their pollen and nectar from the flowers of a wide variety of both native and introduced plants. However, some of the species (e.g., *Nomia nevadensis* Cresson and *N. triangulifera* Vachal) appear to collect pollen only from the flowers of the Compositae. At least one of the species, the alkali bee (*N. melanderi* Cockerell), is an exceptionally valuable pollinator of alfalfa (*Medicago sativa*) and has been managed successfully in artificial nesting sites so as to enhance the pollination of this important agricultural crop.

Genus NOMIA Latreille

Genus NOMIA Subgenus NOMIA Latreille

Nomia Latreille, 1804. Nouv. Dict. Hist. Nat., v. 24, p. 182.
Type-species: *Andrena curvipes* Fabricius. Monotypic.
Nitocris Rafinesque, 1815. Analyse de la nature, p. 123. Proposed unnecessarily for *Nomia* Latreille.

This subgenus is found only in the Old World.

Genus NOMIA Subgenus CURVINOMIA Michener

Nomia subg. *Paranomia* Friese, 1897. Festschr. fuenfzig. bestehene Ver. Schles. Insektenk. Breslau, p. 48. Preocc.
Type-species: *Nomia chalybeata* Smith. Desig. by Cockerell, 1910.
Nomia subg. *Paranomina* Michener, 1944. Amer. Mus. Nat. Hist., Bul. 82: 251. N. name. Preocc.
Nomia subg. *Curvinomia* Michener, 1944. Amer. Mus. Nat. Hist., Bul. 82: 251.
Type-species: *Nomia californiensis* Michener. Monotypic and orig. desig. (=*Nomia tetrazonata* Cockerell).

Revision: Ribble, 1965. Kansas Univ. Sci. Bul. 45: 277-309, figs. (N. Amer. spp.).

Taxonomy: Ribble, 1968. Wyo. Univ. Agr. Expt. Sta., Sci. Monog. 11: 15-18 (tax. notes, geogr. and floral records).

angustitibialis Ribble. Southeastern Ariz. to Guerrero, Mex. Pollen: Unknown, but visits flowers of *Baccharis glutinosa*, *Condalia lycioides*, *Larrea tridentata*, *Melilotus alba*.
Nomia (*Curvinomia*) *angustitibialis* Ribble, 1965. Kansas Univ. Sci. Bul. 45: 292. ♂, ♀.

fedorensis Cockerell. Southwestern Kans., Okla., Tex., south to Veracruz, Mexico. Pollen: Unknown, but visits flowers of *Cassia*, *Dalea grisea*, *Gaillardia*, *Helianthus*, *Mimosa*, *Rhynchosia americana*, *Tephrosia virginiana*.
Nomia fedorensis Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 6: 277. ♀, ♂.

Biology: Cockerell, 1934. Amer. Mus. Novitates 697: 4 (nest).

foxii Dalla Torre. Colo. (Denver), S. Dak. (Big Stone City). Senior synonym of either *Nomia universitatis* Cockerell or *N. tetrazonata* Cockerell, see Hurd and Linsley, 1974. Ent. Soc. Wash., Proc. 76: 198.
Nomia punctata Fox, 1893. Ent. News, 4: 135. ♀. Preocc.
Nomia foxii Dalla Torre, 1896. Cat. Hym., v. 10, p. 167. N. name.

Taxonomy: Hurd and Linsley, 1974. Ent. Soc. Wash., Proc. 76: 198 (tax. status).

maneei Cockerell. N. J., N. C. to Fla. west to Okla. and Ala. Parasite: *Pseudomethoca vanduzeei* Bradley. Pollen: Unknown, but visits flowers of *Asclepias tuberosa*,

Desmodium ciliare, Eriogonum baileyi, Galactia, Lespedeza capitata, L. repens, Phaseolus polystachios, Strophostyles.

Nomia maneei Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 6: 276. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 508, figs. (redescription).

mesillensis Cockerell. South. Colo., Utah, Ariz., N. Mex., Tex., south to Jalisco, Mexico. Pollen: Polylege of a wide variety of flowers including *Aloysia wrightii, Asclepias linaria, A. subverticillata, Baccharis glutinosa, Cevallia sinuata, Cirsium, Cleome jonesi, C. serrulata, Crotalaria pumila, Croton, Crusea subulata, Eriogonum abertianum, E. annuum, Eysenhardtia polystacha, Gossypium, Guardiola tulocarpa, Gutierrezia sarothrae, Haplopappus, Helianthus annuus, Koeberlinia spinosa, Larrea tridentata, Lepidium thurberi, Lotus wrightii, Medicago sativa, Melilotus alba, M. officinalis, Mentzelia pumila, Nolina, Petalostemon candidum, Psoralea tenuifolia, Solanum elaeagnifolium, S. rostratum, Verbesina encelioides.* Predator: *Blepharepium secabile* (Walk.), *Mallophora bromleyi* Curran.

Nomia mesillensis Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 2: 334. ♀.

Taxonomy: Hurd and Linsley, 1974. Ent. Soc. Wash., Proc. 76: 198-199 (tax. status).

tetrazonata tetrazonata Cockerell. South. Calif. and Nev. to N. Mex. south into Mexico (Baja California and Sonora). Pollen: Polylege of a wide variety of flowers including *Acacia, Allionia incarnata, Antigonon, Asclepias, Astragalus preussii, Baccharis glutinosa, B. sarothroides, Boerhaavia, Cercidium floridum, Chrysothamnus, Cissus trifoliata, Cleome, Cleomella longipes, Colubrina, Condalia lycioides, Croton californicus, Cuscuta, Dalea, Encelia farinosa, Eriogonum fasciculatum, E. heermannii, E. inflatum, E. nodosum, Euphorbia, Glycine max, Gossypium, Gutierrezia sarothrae, Heliotropium curassavicum, Heterotheca subaxillaris, Hymenothrix wislizenii, Hyptis emoryi, Kallstroemia grandiflora, Larrea tridentata, Lepidium thurberi, Lotus scoparius, Medicago sativa, Melaleuca, Melilotus alba, Nolina parryi, Pectis papposa, Penstemon palmeri, Philbertia heterophylla, Prosopis juliflora, Sapindus saponaria, Solanum elaeagnifolium, S. rostratum, Stanleya pinnata, Tamarix gallica, Verbesina encelioides, Wislizenia refracta, Zea mays.*

Nomia tetrazonata Cockerell, 1910. U. S. Natl. Mus., Proc. 38: 297. ♂.

Nomia moctezumae Crawford, 1911. U. S. Natl. Mus., Proc. 39: 618. ♀.

Nomia californiensis Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 318. ♀.

tetrazonata uvaldensis Cockerell. N. Mex., Tex.; Mexico. Pollen: Unknown, but visits flowers of *Acacia greggii, Baccharis glutinosa, Cercidium texanum, Melilotus alba, Parkinsonia aculeata, Prosopis juliflora, Solanum elaeagnifolium, Teucrium cubense.*

Nomia uvaldensis Cockerell, 1930. *In* Cockerell and Blair, Amer. Mus. Novitates 433: 13. ♀.

Nomia zabriskii Cockerell and Blair, 1930. Amer. Mus. Novitates 433: 13. ♂.

Nomia parksi Cockerell, 1934. Amer. Mus. Novitates 697: 7. ♀.

universitatis Cockerell. N. Dak. to Tex. between Mississippi River and Rocky Mts. Pollen: Unknown, but visits flowers of *Amorpha canescens, Astragalus gracilis, Dalea, Medicago sativa, Melilotus alba, M. officinalis, Petalostemon purpureum, Psoralea tenuiflora, Rudbeckia, Symphoricarpos occidentalis.* Predator: *Diogmites angustipennis* Loew.

Nomia universitatis Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 2: 334. ♂.

Genus NOMIA Subgenus ACUNOMIA Cockerell

Nomia subg. *Acunomia* Cockerell, 1930. *In* Cockerell and Blair, Amer. Mus. Novitates 433: 11.

Type-species: *Nomia nortoni* Cresson. Orig. desig.

Revision: Ribble, 1965. Kansas Univ. Sci. Bul. 45: 282-283, 309-359, figs. (N. Amer. spp., includes summary of biological literature).

Taxonomy: Ribble, 1968. Wyo. Univ. Agr. Expt. Sta., Sci. Monog. 11: 1-15 (alkali bee and related species, including summary of biological literature).

howardi Crawford. South. Utah, south to South. Calif. and southwestern Ariz.; Mexico (Baja California). Pollen: Polylege of a wide variety of flowers including *Acacia greggii, Aster spinosus, Carthamnus tinctorius, Cucumis melo, Gossypium, Heliotropium curassavicum, Isocoma veneta, Lippia lanceolata, Medicago sativa, Melilotus alba, Phyla nodiflora, Pluchea sericea, Prosopis pubescens, Salix exigua, Tamarix gallica, T. petandra.* Predator: *Imparipes americanus* (Banks).

Nomia howardi Crawford, 1911. U. S. Natl. Mus., Proc. 39: 617. ♀.
Nomia howardi vanduzeei Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 540. ♀.
Nomia californica peninsularis Cockerell, 1930. *In* Cockerell and Blair, Amer. Mus. Novitates 433: 12.

Biology: Linsley, 1946. Jour. Econ. Ent. 6: 18-29 (pollination).

melanderi Cockerell. Centr. Wash. to South. Calif., east to Wyo. Introduced into S. Dak. (Brookings and Hecla) and B. C. (Ashcroft and Kamloops). Parasite: *Dasymutilla vesta* (Cress.)?, *Euphytomima nomiivora* James, *Heterostylum robustum* O. S., *Nemognatha* sp., *Nomada suavis* Cress., *Physocephala texana* (Will.), *Physoconops fronto* (Will.), *Pseudomethoca propinqua* (Cress.)?, *Zodion obliquefasciatum* (Macq.), *Zonitis atripennis flavida* LeC. Pollen: Polylege of a wide variety of plants especially the Leguminosae including alfalfa, but also visits the flowers of *Achillea, Allium, Apium graveolens, Asclepias speciosa, A. subverticillata, Aster, Astragalus, Baccharis emoryi, Berula erecta, Beta vulgaris, Brassica geniculata, B. incana, Centromadia pungens, Chrysothamnus nauseosus, Cirsium, Citrullus vulgaris, Cleome lutea, C. serrulata, Convolvulus arvense, Coreopsis, Crepis glauca, C. runcinata, Cressa cretica, Croton californicus, Cuscuta salina, Daucus carota, Dipsacus, Eremocarpus setigerus, Erigeron, Eriogonum, Eschscholzia californica, Gossypium, Grindelia, Haplopappus acradenius, Helianthus, Heliotropium curassavicum, Hemizonia pungens, Lippia lanceolata, Lotus americanus, L. purshianus, Melilotus alba, M. indica, Mentha spicata, Phyla lanceolata, Pluchea camphorata, P. sericea, Polygonum lapathifolium, Ribes, Salsola kali, Sicyos, Sisymbrium altissimum, Solanum elaeagnifolium, S. tuberosum, Solidago occidentalis, Tamarix gallica, Tribulus terrestris, Trifolium hybridum, T. pratense, T. repens, Wislizenia refracta, Zea mays.* Predator: Badgers, blackbirds, *Cicindela haemorrhagica* LeC., *C. pusillus* Say, *Efferia straminea* (Will.), *Formica fusca* Linn., *Imparipes americanus* (Banks), magpies, meadowlarks, *Microtus* sp., *Mus musculus* Linn., *Pogonomyrmex occidentalis* (Cress.), robins, skunks, English sparrows, starlings, weasels.

Nomia melandri Cockerell, 1906. Canad. Ent. 38: 279. ♀. *Lapsus calami.*
Nomia melanderi Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 2: 334. Emend.
Nomia californica Cockerell, 1910. U. S. Natl. Mus., Proc. 38: 296. ♀.
Nomia acus Cockerell, 1910. U. S. Natl. Mus., Proc. 38: 296. ♂.
Nomia melanderi paysoni Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 621. ♂.

Taxonomy: Michener, 1953. Kansas Univ. Sci. Bul. 35: 1031, figs. (larva).

Biology: Stephen and Evans, 1960. Oreg. Agr. Expt. Sta. Tech. Bul. 52: 1-39, 5 figs, 2 tables (life history, parasites, associates). —Frick, 1962. Ent. Soc. Amer., Ann. 55: 5-15 (ecology, parasite). —Hackwell and Stephen, 1966. Pan-Pacific Ent. 42: 196-200 (eclosion and duration of larval development). —Ribble, 1968. Wyo. Univ. Agr. Expt. Sta., Sci. Monog. 11: 2-11 (summary of literature). —Cross and Bohart, 1969. Kansas Ent. Soc., Jour. 42: 195-219, 6 figs., 5 tables (phoretic behavior of associated mites). —Telford, Johansen and Eves, 1972. Mededel. Fakult. Landbouwwetensch. Gent 37: 776-783 (management practices and insecticide poisoning). —Parker and Potter, 1974. Environ. Ent. 3: 739-743, 5 figs. (introduction and establishment). —Batra, 1976. Kans. Ent. Soc., Jour. 49: 18-22, 2 tables (comparative efficiency in alfalfa pollination). —Mayer and Johansen, 1976. Ent. Soc. Amer., Bul. 22: 423-425 (bibliography).

nortoni cressoni Westwood. Ariz. (Santa Cruz Co.), south to Puebla, Mexico. Pollen: Unknown, but visits flowers of *Asclepias, Dalea, Eysenhardtia polystacha, Stachys bigelovii.*
Nomia Cressoni Westwood, 1875. Ent. Soc. London, Trans., p. 218. ♂.

nortoni nortoni Cresson. Penn., south to Fla., west to Idaho, Colo. and N. Mex.; Mexico (Coahuila). Pollen: Polylege of a wide variety of flowers including *Amorpha fruticosa,*

Aster, Borreria, Brazoria truncata, Callirhoe leiocarpa, Cassia cinerea, C. fasciculata, Cirsium altissimum, C. vulgare, Clethra, Coreopsis cardaminefolia, Dalea aurea, D. multiflora, Desmodium paniculatum, Engelmannia pinnatifida, Eryngium yuccifolium, Euipomoea, Euphorbia marginata, Gaillardia, Gossypium, Grindelia squarrosa, Helenium autumnale, Helianthus maximiliani, Ligustrum, Lycium halimifolium, Marrubium vulgare, Medicago sativa, Melilotus alba, Mentha longifolia, Monarda citriodora, M. punctata, Oenothera biennis, Petalostemon microphyllum, P. purpureum, Phacelia, Polygonum, Pontederia cordata, Prosopis, Pycnanthemum flexuosum, P. virginianum, Ratibida columnifera, R. pinnata, Rhus copalina, Solanum rostratum, S. torryei, Solidago rigida, Verbena officinalis, Yucca glauca.

Nomia nortoni Cresson, 1868. Amer. Ent. Soc., Trans. 1: 385. ♀, ♂.

Nomia nortoni var. *plebeia* Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 6: 276. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 510, figs. (redescription).

Biology: Cockerell, 1934. Amer. Mus. Novitates 697: 7. —Ribble, 1965. Kansas Univ. Sci. Bul. 45: 316-318 (nesting habits, parasites, predators).

Genus NOMIA Subgenus EPINOMIA Ashmead

Epinomia Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 88.
Type-species: *Nomia triangulifera* Vachal. Monotypic and orig. desig. (=*Nomia persimilis* Cockerell).

Revision: Cross, 1958. Kansas Univ. Sci. Bul. 38: 1261-1301, 4 figs. (included spp., contains biological information).

micheneri Cross. South. Ariz. and Tex., south to Jalisco and Guanajuato, Mexico. Pollen: Unknown, but males visit flowers of *Eysenhardtia polystachya, Guardiola tulocarpa, Helianthus.*

Nomia (*Epinomia*) *micheneri* Cross, 1958. Kansas Univ. Sci. Bul. 38: 1273. ♂, ♀.

nevadensis angelesia Cockerell. Oreg., Calif., Nev.; Mexico (extreme northwest Baja California). Parasite: *Rhipiphorus epinomiae* Linsley and MacSwain. Pollen: Polylege of a wide variety of flowers including *Aster spinosa, Brassica incana, Calendula, Centromadia pungens, Chrysothamnus, Coreopsis lanceolata, Croton californicus, Erigeron canadense, E. linifolius, Eriogonum fasciculatum, E. gracile, Grindelia camporum, Gnaphalium beneolens, Gutierrezia californica, G. sarothrae, Haplopappus palmeri, H. vernonioides, Helianthus gracilentus, Heterotheca grandiflora, Lepidospartum squamatum, Lippia filiformis, Lotus americanus, Marrubium vulgare, Medicago sativa, Melilotus alba, Pectis papposa, Pluchea camphorata, Polygonum lapathifolium, Senecio douglasii, Solidago occidentalis, Stephanomeria exigua, S. virgata, Tamarix gallica, Trichostema, Wislizenia refracta.*

Nomia arizonensis angelesia Cockerell, 1910. U. S. Natl. Mus., Proc. 38: 293. ♂.

Taxonomy: Michener, 1953. Kansas Univ. Sci. Bul. 35: 1029, figs. (larva).

nevadensis arizonensis Cockerell. Utah, Ariz., south. Calif. (Colorado Desert), N. Mex., south to Jalisco, Mexico. Pollen: Polylege of a wide variety of flowers including *Asclepias, Baccharis glutinosa, Chrysothamnus, Cleome serrulata, Eriogonum, Euphorbia, Eysenhardtia polystacha, Grindelia squarrosa, Guardiola tulocarpa, Gutierrezia microcephala, G. sarothrae, Haplopappus acradenius, H. spinulosus, Helianthus, Hymenothrix wislizeni, Hymenoxys, Lygodesmia juncea, Pectis papposa, Psilostrophe cooperi, Solanum elaeagnifolium, Sphaeralcea, Verbesina encelioides, Wislizenia refracta.* Predator: *Philanthus ventilabris* Fabr.

Nomia arizonensis Cockerell, 1899. Entomologist, 32: 128. ♂.

Biology: Alcock and Gamboa, 1975. Ariz. Acad. Sci. 10: 163 (predator).

nevadensis bakeri Cockerell. Fla. west to Wyo., Colo., N. Mex.; Mexico (Tamaulipas). Parasite: *Rhipiphorus nomiae* Rivnay. Pollen: Polylege of a wide variety of flowers including *Aster, Bidens involucrata, Boltonia asteroides, Chrysopis microcephala, Coreopsis, Dalea lanata, Grindelia, Haplopappus, Helenium, Heterotheca, Isopappus, Melilotus alba, Prionopsis, Prosopis, Solidago, Thelesperma gracile, Verbesina encelioides.*

Nomia bakeri Cockerell, 1898. Entomologist, 31: 32. ♂.

Nomia pattoni Cockerell, 1910. U. S. Natl. Mus., Proc. 38: 292. ♀, ♂.
Nomia bakeri var. *rufibasis* Cockerell, 1930. *In* Cockerell and Blair, Amer. Mus. Novitates 433: 14.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 512-513, figs. (redescription).

Biology: Hicks, 1926. Colo. Univ., Studies 15: 222. —Cockerell, 1934. Amer. Mus. Novitates 697: 4. —Kerfoot, 1964. Kansas Ent. Soc., Jour. 37: 152-157, 1 fig.

nevadensis nevadensis Cresson. Nev. (Nye and White Pine Cos.).
Nomia nevadensis Cresson, 1874. Amer. Ent. Soc., Trans. 5: 101. ♀, ♂.

triangulifera Vachal. N. Dak., Minn. and Ill. west to Utah and N. Mex. Parasite: *Rhipiphorus solidaginis* (Pierce), *Triepeolus mesillae* Cockerell. Pollen: Unknown, but visits flowers of *Bidens involucrata, Cleome serrulata, Gilia, Grindelia squarrosa, Helianthus annuus, H. lenticularis, H. maximiliani, H. petiolaris, Medicago sativa, Polygonum, Rudbeckia trilobata, Silphium perfoliatum, Solidago, Vernonia.*
Nomia triangulifera Vachal, 1897. Misc. Ent. 5: 9. ♂.
Nomia persimilis Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 50, 72. ♀, ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 513-515, figs. (redescription).

Biology: Pierce, 1904. Nebr. Univ., Studies, 4: 181 (habits, parasite). —Rau, 1929. Psyche 36: 243. —Cross and Bohart, 1960. Kansas Univ. Sci. Bul. 41: 761-792.

Genus NOMIA Subgenus DIEUNOMIA Cockerell

Eunomia Cresson, 1875. *In* Wheeler, Rpt. Geog. Geol. Expl. Survey west of 100th Meridian, v. 5, p. 722. Preocc.
Type-species: *Eunomia marginipennis* Cresson. Desig. by Cockerell, 1910. (=*Nomia heteropoda kirbii* Smith).
Dieunomia Cockerell, 1899. Entomologist 32: 14. N. name.
Monia(!) Howard, 1901. Insect Book, pl. IV, figs. 34, 38.

Revision: Blair, 1935. N. Y. Ent. Soc., Jour. 43: 201-214, pl. XVI.

apacha Cresson. Nebr., Colo., N. Mex., Tex.
Nomia? apacha Cresson, 1868. Amer. Ent. Soc., Trans. 1: 386. ♀.

bolliana bolliana Cockerell. N. Mex., Tex.
Nomia bolliana Cockerell, 1910. Ann. and Mag. Nat. Hist. 8 (5): 259. ♀.

Taxonomy: Cockerell, 1910. U. S. Natl. Mus., Proc. 38: 295. ♀, ♂.

bolliana helenii Cockerell. Tex.
Nomia bolliana helenii Cockerell, 1936. Amer. Mus. Novitates 831: 2. ♀.

heteropoda heteropoda Say. Man., Minn., Wis., Ill., Ind., Ohio south to Md., Ga., Fla. and Miss. Pollen: Unknown, but visits flowers of *Bidens bipinnata, Eupatorium, Helenium, Helianthus.*
Nomia? heteropoda Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 349. ♂.
Andrena valida Say, 1837. Boston Jour. Nat. Hist. 1: 393. ♀.
Nomia heteropoda validescens Blair, 1935. N. Y. Ent. Soc., Jour. 43: 206. ♂.
Nomia heteropoda subvalida Blair, 1935. N. Y. Ent. Soc., Jour. 43: 206. ♀.

Taxonomy: Cockerell, 1934. Amer. Mus. Novitates 697: 4. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 507-508, figs. (redescription).

heteropoda kirbii Smith. Ga. and Fla. west to South. Calif., north to Colo., Nebr., and Ill., south to Tex. and Mexico; apparently incorrectly recorded from Brazil. Pollen: Unknown, but visits flowers of *Helianthus.*
Nomia Kirbii Smith, 1865. Ent. Soc. London, Trans. (3) 2: 398. ♂.
Eunomia marginipennis Cresson, 1875. *In* Wheeler, Rpt. Geog. Geol. Expl. Survey west of 100th Meridian, v. 5, p. 722. ♀, ♂.
Nomia heteropoda var. *semivalida* Cockerell, 1934. Amer. Mus. Novitates 697: 5. ♂.
Nomia heteropoda var. *atripennis* Cockerell, 1934. Amer. Mus. Novitates 697: 6. ♀, ♂.
Nomia heteropoda semirubra Cockerell, 1934. Amer. Mus. Novitates 697: 6. ♀, ♂.
Nomia heteropoda var. *subvalidior* Blair, 1935. N. Y. Ent. Soc., Jour. 43: 208. ♀.

Taxonomy: Westwood, 1875. Ent. Soc. London, Trans. p. 217. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 508 (tax. characters).

mesillae (Cockerell). Colo., N. Mex., Tex.
Dieunomia mesillae Cockerell, 1899. Entomologist 32: 266. ♂.

Taxonomy: Cockerell, 1930. Amer. Mus. Novitates 433: 10. ♂, ♀.

xerophila (Cockerell). Colo., Utah, N. Mex., Ariz.
Dieunomia xerophila Cockerell, 1899. Entomologist 32: 265. ♂, ♀.

Genus NOMIA Subgenus UNASSIGNED

tacita Cameron. N. Mex. Probably not Nearctic.
Nomia tacita Cameron, 1902. Amer. Ent. Soc., Trans. 28: 376. ♂.

Nomen Nudum in Nomia Latreille

Nomia birkmanii Birkman, 1899. Ent. News 23: 244.

Subfamily HALICTINAE

This very large, diverse and nearly cosmopolitan subfamily of bees exhibits both solitary behavior and nearly every degree of sociality ranging from subsocial through communal, semisocial to eusocial behavior. Most of the species nest in the ground, but some nest in pre-existing holes in wood and sometimes in rotten or decaying wood.

Although the species of this subfamily are known to visit the flowers of a great variety of plants for pollen and nectar, some groups of species are oligolectic (e.g., *Hemihalictus* and *Sphecodogastra*). Since much of the floral information recorded in the literature is in need of critical evaluation, no attempt has been made to list the floral records for the majority of the species in this subfamily. Partial summaries of the floral records or comments about them may be found in a number of studies including Mitchell (1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 332-506), Moldenke and Neff (1974. Origin and Structure of Ecosystems (IBP) Tech. Rpt. 74-75: 9-135), Ordway (1966. Kansas Univ. Sci. Bul. 46: 509-624), Roberts (1969. Kansas Univ. Sci. Bul. 48: 689-719), and Robertson (1928. Flowers and insects, Carlinville, Ill., 221 pp.).

Taxonomy: Eickwort and Fischer, 1963. Ent. Soc. Amer., Ann. 56: 348-354 (hind tibial spurs). —Eickwort, 1969. Ent. Soc. Amer., Ann. 62: 652-660 (classification and nest architecture).

Biology: Michener, 1958. Ecology 39: 207-217 (distribution of nests in earth banks). —Michener and Lange, 1958. Science 127: 1046-1047 (primitive social behavior). —Hamilton, 1964. Jour. Theoret. Biol. 7: 17-52 (genetical evolution). —Michener, 1964. Ins. Sociaux 11: 317-342 (reproductive efficiency). —Lin, 1964. Ins. Sociaux 11: 187-192 (parasitism as a factor in the evolution of social behavior). —Batra, 1966. Indian Jour. Ent. 28: 375-393. —Knerer and Atwood, 1966. Science 152: 1262-1263 (polymorphism). —Knerer and Atwood, 1966. Canad. Ent. 98: 1337-1339 (nest architecture and taxonomy). —Knerer and Atwood, 1967 (1966). Ent. Soc. Ontario, Proc. 97: 103-110 (parasitization). —Knerer and Plateaux-Quenu, 1966. Acad. Sci. Paris, Compt. Rend. 263: 1622-1625 (cell coverings). —Knerer and Plateaux-Quenu, 1966. Acad. Sci. Paris, Compt. Rend. 263: 1759-1761 (polymorphism). —Knerer and Plateaux-Quenu, 1966. Acad. Sci. Paris, Compt. Rend. 263: 2014-2017 (polygyny). —Michener, 1966. Animal Behav. 14: 126-129 (worker interaction). —Knerer and Plateaux-Quenu, 1967. Acad. Sci. Paris, Compt. Rend. 264: 1-3 (life history). —Knerer and Plateaux-Quenu, 1967. Acad. Sci. Paris, Compt. Rend. 264: 651-653 (production of lining). —Knerer and Plateaux-Quenu, 1967. Acad. Sci. Paris, Compt. Rend. 264: 1096-1099 (male production). —Plateaux-Quenu, 1967. Soc. Ent. France, Ann. (n. s.) 3: 859-866 (social evolution). —Batra, 1968. Kansas Ent. Soc., Jour. 41: 120-133 (behavior in nests). —Bonelli, 1969. Soc. Ent. Italiana, Bol. 48: 68-78 (social evolution). —Knerer, 1969. Internatl. Union Study Social Insects VI Congr. Bern, Proc. pp. 101-107 (social structure). —Knerer, 1969. Science 164: 429-430 (brood care). —Knerer, 1969. Ent. News 80: 141-147 (nest architecture and defense). —Knerer, 1969. Canad. Jour. Zool. 47: 925-930 (synergistic evolution). —Houston, 1970. Australian Jour. Zool. 18: 345-351 (male soldier caste). —May, 1970. Science 170: 651-652 (brood care). —Batra, 1970. Science 170: 652 (brood care). —Plateaux-Quenu, 1972. La Biologie des abeilles primitives. Masson *et* Cie, Paris, 200 pp.

—Bell and Hawkins, 1974. Jour. Compar. Physiol. 93: 183-193 (intraspecific agonistic interactions). —Barrows, 1975. Ins. Sociaux 22: 307-332, 12 figs., 2 tables (mating behavior). —Barrows, 1976. Kans. Ent. Soc., Jour. 49: 105-119, 2 figs., 3 tables (mating behavior). —Waddington, 1976. Psyche 83: 112-118 (foraging patterns at flowers of *Convolvulus arvensis*).

Morphology: Eickwort and Fischer, 1963. Ent. Soc. Amer., Ann. 56: 348-354, 18 figs. (tibial spurs). —Lello, 1971. Kansas Ent. Soc., Jour. 44: 14-20 (sting apparatus).

Tribe AUGOCHLORINI

Taxonomy: Eickwort, 1969. Ent. Soc. Amer., Ann. 62: 652-653 (classification and nest architecture). —Eickwort, 1969. Kansas Univ. Sci. Bul. 48: 325-524, 418 figs., 3 tables (generic classification).

Genus AUGOCHLOROPSIS Cockerell

Genus AUGOCHLOROPSIS Subgenus AUGOCHLOROPSIS Cockerell

Augochlora subg. *Augochloropsis* Cockerell, 1897. Canad. Ent. 29: 4.
Type-species: *Augochlora* (*Augochloropsis*) *subigmita* Cockerell. Orig. desig. (=*Augochlora ignita* Smith).

This subgenus is found only south of the United States.

Genus AUGOCHLOROPSIS Subgenus PARAUGOCHLOROPSIS Schrottky

Augochloropsis subg. *Paraugochloropsis* Schrottky, 1906. Ztschr. System. Hym. Dipt. 6: 312.
Type-species: *Augochloropsis* (*Paraugochloropsis*) *lycorias* Schrottky. Monotypic.
Augochlora subg. *Tetrachlora* Schrottky, 1909. Deut. Ent. Ztschr., p. 481.
Type-species: *Halictus multiplex* Vachal. Monotypic.
Paraugochlora Schrottky, 1910. Deut. Ent. Ztschr., p. 540.
Type-species: *Augochlora spinolae* Cockerell. Orig. desig.
Rivalisia Strand, 1921. Arch. Naturges. Abt. A, 87: 270.
Type-species: *Rivalisia metallica* Strand. Monotypic.
Augochlora subg. *Glyptobasis* Moure, 1941. Arq. Zool. Estado Sao Paulo 2: 48. Preocc.
Type-species: *Augochlora* (*Glyptobasis*) *chloera* Moure. Orig. desig.
Glytobasia Moure, 1941. Arq. do Mus. Paranaense 1: 98. N. name.
Augochloropsis subg. *Glyptochlora* Moure, 1958. N. Y. Ent. Soc., Jour. 66: 188. This subgenus has questionably been placed as a synonym of *Paraugochloropsis*.
Type-species: *Megalopta ornata* Smith. Orig. desig.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 463-469 (spp. of United States). —Eickwort, 1969. Kansas Univ. Sci. Bul. 48: 414-416 (generic synonymy and tax. characters).

anonyma (Cockerell). Coastal Plains, N. C. to Fla. Pollen: Polylege, visiting flowers of *Baccharis, Bidens, Cirsium, Erigeron, Helenium, Hypericum, Ilex, Linaria, Melilotus, Metopium, Ocimum, Polygonum, Pycnanthemum, Rhus, Rubus, Trifolium.*
Augochlora anonyma Cockerell, 1922. U. S. Natl. Mus., Proc. 60: 15. ♂.

metallica fulgida (Smith). Mich. to New England, south to La. and Fla. Pollen: Polylege, visiting flowers of *Aronia, Aster, Azalea, Barbarea, Chrysanthemum, Cornus, Eryngium, Fragaria, Geranium, Hypericum, Ilex, Linaria, Melilotus, Rhus, Rubus, Solidago, Taxaracum.*
Augochlora fulgida Smith, 1853. Cat. Hym. Brit. Mus. v. 1, p. 79. ♀.
Augochlora lucidula Smith, 1853. Cat. Hym. Brit. Mus. v. 1, p. 81. ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 465 (tax. characters and status).

metallica metallica (Fabricius). New England and Ont., south to Fla. and Ariz.; Mexico to Panama and Colombia (Gorgona Island). Pollen: Polylege, visiting flowers of *Apocynum*,

Arabis, Aralia, Aronia, Asclepias, Aster, Bidens, Blephilia, Brassica, Cacalia, Cassia, Caulophyllum, Ceanothus, Celastrus, Cercis, Chrysanthemum, Cicuta, Circaea, Claytonia, Coreopsis, Cornus, Crataegus, Cornuta grandifloria, Cuphea balsamona, Diospyros, Dodecatheon, Erigenia, Eryngium, Eupatorium, Fragaria, Geranium, Gerardia, Gnaphalium, Gonolobus, Haplopappus, Hydrangea, Hydrophyllum, Hypericum, Ilex, Lepachys, Lippia, Lycopus, Malva, Melilotus, Nepeta, Osmorrhiza, Parthenium, Petalostemon, Polygonum, Polytaenia, Prunus, Pycnanthemum, Rhamnus, Rhus, Ribes, Rosa, Rubus, Sagittaria, Salix, Sanicula, Scrophularia, Smilacina, Solidago, Specularia, Smyphoricarpos, Taenidia, Thaspium, Tilia, Trifolium, Verbascum, Verbena, Veronica, Zanthoxyllum, Zizia. Predator: *Philanthus gibbosus* (Fabr.), *P. solivagus* Say.

Andrena metallica Fabricius, 1793. Ent. syst. 2: 309. ♀.
Augochlora cuprea Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 79. ♀.
Augochlora viridula Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 81. ♂.
Augochlora fervida Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 81. ♂.
Augochlora cleomis Titus, 1901. Canad. Ent. 33: 135. ♀, ♂.
Halictus (Augochlora) chorisis Vachal, 1903. Misc. Ent. 11: 136. ♀.
Halictus (Augochlora) viridissimus Viereck, 1910. *In* Smith, N. J. State Mus., Ann. Rpt. 1909: 688. N. name; proposed to replace *viridula* Smith, preoccupied in *Halictus*.
Augochlora fulvofimbriata Friese, 1916. Stettin. Ent. Ztg. 77: 315. ♀.

Taxonomy: Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 88-90 (redescription, as *fulvofimbriata*). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 465-466, fig. 110 (tax. characters, synonymy). —Moure, 1960. Studia Ent. 3: 102-103 (notes on type, synonymy).

sumptuosa (Smith). Maine to Fla., west to S. Dak., Colo., Ariz., and Tex. Pollen: Polylege, visiting flowers of *Asclepias, Berlandiera, Bidens, Clethra, Crataegus, Eriogonum, Eryngium, Helianthus, Hypericum, Melilotus, Silphium, Stachys, Vaccinium.*

Augochlora sumptuosa Smith, 1853. Cat. Hym. Brit. Mus., vol. 1, p. 82. ♀.
Augochlora humeralis Patton, 1879. U. S. Geol. Geog. Survey, Bul. 5: 365. ♀, ♂.
Agapostemon caeruleus Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 7. ♀.
Halictus pattoni Vachal, 1903. Misc. Ent. 11: 132. N. name. Preocc.
Augochlora sumptuosa bolliana Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 31. ♀.
Augochlora lacustris Cockerell, 1922. U. S. Natl. Mus., Proc. 60 (18): 14. ♀.
Augochlora floridica Cockerell, 1922. U. S. Natl. Mus., Proc. 60 (18): 14. ♂.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 466-467, 469, figs. 110, 111 (redescription, synonymy).

Biology: Smith, 1898. Ent. News 9: 157, 320. —Smith, 1901. N. Y. Ent. Soc., Jour. 9: 52. —Michener and Lange, 1959. Amer. Mus. Novitates 1924: 36.

Genus AUGOCHLORA Smith

Genus AUGOCHLORA Subgenus AUGOCHLORA Smith

Augochlora Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 73.
Type-species: *Halictus purus* Say. Desig. by Cockerell, 1923.
Oxystoglossa Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 83.
Type-species: *Oxystoglossa decorata* Smith. Monotypic.
Odontochlora Schrottky, 1909. La Plata Mus., Rev. 16: 14.
Type-species: *Augochlora muelleri* Cockerell. Orig. desig.

The species of this subgenus nest in dead wood either in pre-existing burrows of other insects or in soft rotting wood.

Taxonomy: Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 59 (generic status). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 456-458 (spp. of eastern U. S.). —Eickwort, 1969. Kansas Univ. Sci. Bul. 48: 420-422 (tax. characters).

Biology: Eickwort and Eickwort, 1973. Kansas Ent. Soc., Jour. 46: 17-22, figs. (nests).

azteca (Vachal). South. Tex.; Mexico.
Halictus (*Oxystoglossa*) *azteca* Vachal, 1911. Misc. Ent. 19: 45, 110. ♀.

nigrocyanea Cockerell. South. Tex.; Mexico to Panama.
Augochlora nigrocyanea Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 144. ♀.

pura mosieri Cockerell. South. Fla. Pollen: Polylege, visiting flowers of *Bidens, Cattleya, Flaveria, Hamelia, Melaleuca, Psychotrea, Salix, Sida.*
Augochlora mosieri Cockerell, 1922. U. S. Natl. Mus., Proc. 60: 15. ♀.

pura pura (Say). Que. and Maine to Minn., south to Tex. and Fla. Parasite: *Rhipiphorus schwarzi* LeC., *R. stylopoides* Newm.? Pollen: Polylege, visits a wide variety of flowers including *Acer, Agastache, Althaea, Amelanchier, Arabis, Aruncus, Asclepias, Aster, Barbarea, Bidens, Blephilia, Cacalia, Caulophyllum, Cercis, Chaerophyllum, Cicuta, Coreopsis, Cornus, Cryptotaenia, Diospyros, Dirca, Evonymus, Fragaria, Geranium, Gerardia, Haplopappus, Heliopsis, Helianthus, Houstonia, Hydrangea, Ilex, Lippia, Ludwigia, Malus, Malva, Melilotus, Osmorrhiza, Padus, Polemonium, Polygonum, Prunus, Ranunculus, Rhamnus, Rhus, Rudbeckia, Rubus, Salix, Smilacina, Solidago, Smyphoricarpos, Taenidia, Teucrium, Thaspium, Tradescantia, Vaccinium, Verbena, Verbesina, Vernonia, Vitis, Zizia.* Predator: *Philanthus gibbosus* (Fabr.), *P. lepidus* Cress., *P. solivagus* Say.
Halictus purus Say, 1837. Boston Jour. Nat. Hist. 1: 395. ♀, ♂.
Augochlora festiva Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 80. ♀.
Augochlora Robertsoni Cockerell, 1897. Canad. Ent. 29: 69. ♀.
Augochlora Banksiella Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 533. ♀.
Halictus astios Vachal, 1911. Misc. Ent. 19: 44. ♀.
Halictus astios var.(?) *fuscatipes* Vachal, 1911. Misc. Ent. 19: 45. ♀.
Halictus asaphes Vachal, 1911. Misc. Ent. 19: 49. ♀.
Augochlora palmarum Cockerell, 1922. U. S. Natl. Mus., Proc. 60 (18): 15. ♀, ♂.

Taxonomy: Michener, 1953. Kansas Univ. Sci. Bul. 35: 1028, figs. 57-59, 64 (larva).

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 32. —Blackman and Stage, 1924. N. Y. State Col. Forestry, Syracuse Univ. Tech. Pub. 17: 197. —Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 223. —Stockhammer, 1961. North Central Branch, Ent. Soc. Amer., Proc. 16: 17-18. —Stockhammer, 1966. Kansas Ent. Soc., Jour. 39: 157-192 (nesting habits, life cycle). —May and Stockhammer, 1968. Kansas Ent. Soc., Jour. 41: 339-341, 1 fig. (induced nesting in cellulose powder). —May, 1972. Kansas Ent. Soc., Jour. 45: 439-449, 4 figs. (water uptake during larval development). —Barrows, 1973. Kansas Ent. Soc., Jour. 46: 496-499 (induced soil nesting). —May, 1973. Kansas Ent. Soc., Jour. 46: 301-310, 6 tables (brood cell recognition). —Barrows, 1974. Fla. Entomologist 57: 189-193 (aggregation behavior). —May, 1974. Kansas Ent. Soc., Jour. 47: 504-516, 5 figs. (nature and origin of brood cell linings).

Genus AUGOCHLORA Subgenus OXYSTOGLOSSELLA Eickwort

Augochlora subg. *Oxystoglossella* Eickwort, 1969. Kansas Univ. Sci. Bul. 48: 422.
Type-species: *Augochlora* (*Oxystoglossella*) *cordiaefloris* Cockerell. Orig. desig.

All the members of this subgenus which have been studied have been found to construct their nests in the ground.

Taxonomy: Eickwort, 1969. Kansas Univ. Sci. Bul. 48: 422-423.

Biology: Eickwort and Eickwort, 1972. Kansas Ent. Soc., Jour. 45: 18-45 (life history, larva, pupa).

aztecula Cockerell. South. Tex.; Mexico.
Augochlora aztecula Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 534. ♀.

Genus AUGOCHLORA Subgenus UNKNOWN

obliqua Provancher. B. C. (Vancouver).
Augochlora obliqua Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 318. ♀.

Genus AUGOCHLORELLA Sandhouse

Augochlorella Sandhouse, 1937. Wash. Acad. Sci., Jour. 27: 66.
Type-species: *Augochlora gratiosa* Smith. Orig. desig.
Oxystoglossidia Moure, 1943. Rev. Ent. 14: 473.
Type-species: *Oxystoglossidia uraniella* Moure. Orig. desig.

Revision: Ordway, 1966. Kansas Univ. Sci. Bul. 509-624, 92 figs., 3 tables (spp. north of Mexico). —Eickwort, 1969. Kansas Univ. Sci. Bul. 48: 424-426 (generic classification).

Biology: Ordway, 1961. North Central Branch, Ent. Soc. Amer., Proc. 16: 17. —Ordway, 1964. Kansas Ent. Soc., Jour. 37: 139-152. (parasite). —Eickwort, 1966. Kansas Ent. Soc., Jour. 39: 410-429. (phoretic mite).

aurata (Smith). N. C., Ga., Fla., Ala., Tex.; Mexico. Pollen: Polylege, visiting flowers of *Aster, Cirsium, Citrus, Crataegus, Lythrum, Opuntia, Polygonum, Rubus, Viburnum.*
Augochlora aurata Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 82. ♀.
Augochlora austrina Robertson, 1893. Amer. Ent. Soc., Trans. 20: 147. ♀.

bracteata Ordway. Northeast. Tex., south into eastern Mexico (Hidalgo).
Augochlorella bracteata Ordway, 1966. Kansas Univ. Sci. Bul. 46: 570. ♀, ♂.

gratiosa (Smith). N. J. and D. C., south to Fla., east to Tex. Pollen: Polylege, visiting flowers of *Aster, Ampelopsis, Asclepias, Berteroa, Bidens, Callicarpa, Cassia, Chrysobalanus, Chrysopsis, Cirsium, Citrus, Clethra, Crataegus, Crotonopsis, Cunila, Erigeron, Eryngium, Galactia, Gerardia, Gossypium, Helianthus, Hypericum, Ilex, Ixora, Jacquemontia, Lepidium, Malva, Melilotus, Oenothera, Opuntia, Piriqueta, Polygala, Polygonum, Pterocaulon, Pycnothymus, Rhus, Rubus, Sabal, Senecio, Solidago, Taraxacum, Teucrium, Vaccinium, Verbena, Warea.*
Augochlora gratiosa Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 80. ♀.

neglectula neglectula (Cockerell). Ariz., N. Mex., Tex., south to Panama. Pollen: Polylege, visiting flowers of *Acacia, Aesculus, Baccharis, Ceanothus, Chilopsis, Chrysanthemum, Chrysopsis, Dalea, Descurainia, Echinocactus, Erigeron, Eschscholzia, Fendlera, Gaillardia, Gossypium, Gutierrezia, Helenium, Heterotheca, Lepidium, Manzanita, Melilotus, Opuntia, Penstemon, Prunus, Pyrus, Rosa, Senecio, Sida, Sisymbrium, Sphaeralcea, Ungnadia.* The subspecies *Augochlorella neglectula maritima* Ordway occurs in the sand dunes along the west coast of Mexico.
Augochlora neglectula Cockerell, 1897. N. Mex. Agr. Expt. Sta. Bul. 24: 43. ♀, ♂.
Augochlora dimissa Cockerell, 1923. U. S. Natl. Mus., Proc. 63: 5. ♀.

persimilis (Viereck). Pa., west to Minn., south to Ga., Ala., La., and Tex. Parasite: *Myrmilloides grandiceps* (Blake), *Pseudomethoca frigida* (Sm.), *Sphecodes pimpinellae* Robt. Pollen: Polylege, visits a great variety of flowers including *Achillea, Agastache, Ailanthus, Alisma, Althaea, Ammannia, Amorpha, Antennaria, Anthemis, Aphanes, Apocynum, Arabis, Asclepias, Asparagus, Aster, Barbarea, Bidens, Blephilia, Borago, Brassica, Callirhoe, Camassia, Campanula, Capsella, Cardamine, Cassia, Ceanothus, Celastrus, Cerastium, Chrysanthemum, Chrysopsis, Cichorium, Cirsium, Citrullus, Claytonia, Convolvulus, Coreopsis, Cornus, Cotoneaster, Crataegus, Cucurbita, Daucus, Descurainia, Diospyros, Echinacea, Erigeron, Erysimum, Eupatorium, Euphorbia, Fragaria, Geranium, Geum, Gnaphalium, Gutierrezia, Hedeoma, Helenium, Helianthus, Heliopsis, Heterotheca, Heuchera, Houstonia, Hypoxis, Ipomoea, Justicia, Kolkwitzia, Krigia, Lepidium, Lespedeza, Lippia, Lobelia, Lotus, Ludwigia, Lycopus, Malva, Medicago, Melilotus, Monarda, Nepeta, Nothoscordum, Oenothera, Oxalis, Paeonia, Parosela, Parthenium, Passiflora, Pastinaca, Petalostemon, Phacelia, Plantago, Polemonium, Polygonum, Polytaenia, Potentilla, Prunus, Psoralea, Pycnanthemum, Ranunculus, Raphanus, Rhus, Rorippa, Rosa, Rubus, Rudbeckia, Sabatia, Sagittaria, Salix, Salvia, Senecio, Sida, Silphium, Sisyrinchium, Smilacina, Smilax, Solidago, Specularia, Stellaria, Symphoricarpos, Taenidia, Taraxacum, Thaspium, Tradescantia, Trifolium, Valerianella, Verbena, Verbesina, Vernonia, Veronica, Viburnum, Zigadenus, Zizia.* Predator: *Philanthus bilunatus* Cress., *P. gibbosus* (Fabr.), *P. lepidus* Cress., *P. politus politus* Say, *P. solivagus* Say.
Augochlora similis Robertson, 1893. Amer. Ent. Soc., Trans. 20: 146. ♀, ♂. Preocc.

Halictus (*Oxystoglossa*) *persimilis* Viereck, 1910. *In* Smith, N. J. State Mus., Ann. Rpt. 1909: 688. N. name.

Halictus xystris Vachal, 1911. Misc. Ent. 19: 50. ♀.

Biology: Pearson, 1933. Ecol. Monog. 3: 386, 396 (as *Oxystoglossa similis*). —Ordway, 1965. Insectes Sociaux 12: 291-308 (caste differentiation). —Eickwort, 1966. Kansas Ent. Soc., Jour. 39: 410-429 (phoretic mite). —Ordway, 1966. Kansas Ent. Soc., Jour. 39: 270-313 (bionomics).

pomoniella (Cockerell). Calif., Nev., Utah, Ariz. N. Mex. (Willow Creek); Mexico (Baja California, south along west coast to Chiapas and Yucatan), Guatemala and Costa Rica. Ecology: Nests in abandoned cells of *Sceliphron*. Pollen: Polylege, visits a great variety of flowers including *Acacia, Achillea, Agoseris, Arctostaphylos, Arenaria, Argemone, Asclepias, Aster, Astraglus, Baccharis, Baileya, Bebbia, Brassica, Brodiaea, Calandrinia, Calochortus, Carnegiea, Centaurea, Cercidium, Chaenactis, Chrysopsis, Chrysothamnus, Cirsium, Cissus, Clarkia, Cleome, Convolvulus, Coreopsis, Corethrogyne, Croton, Cryptantha, Dalea, Datura, Diplacus, Encelia, Enceliopsis, Eremocarpus, Eriastrum, Eriodictyon, Eriogonum, Eriophyllum, Erodium, Eryngium, Eschscholzia, Eucnide, Fendlerella, Gazania, Gilia, Gnaphalium, Gossypium, Grossularia, Gutierrezia, Haplopappus, Helianthus, Heliotropium, Hemizonia, Heterotheca, Hymenothrix, Isomeris, Kallstroemia, Lantana, Layia, Lessingia, Lomatium, Lotus, Malacothamnus, Marrubium, Melilotus, Mentha, Mirabilis, Monardella, Oenothera, Opuntia, Osmoronia, Penstemon, Perideridia, Petalonyx, Peucephyllum, Phacelia, Platystemon, Ranunculus, Raphanus, Rhus, Salix, Salvia, Sanicula, Scrophularia, Senecio, Sisymbrium, Sisyrinchium, Solanum, Solidago, Sphaeralcea, Stanleya, Stephanomeria, Tamarix, Trichostema, Wyethia Zauschneria.*

Augochlora pomoniella Cockerell, 1915. Pomona Jour. Ent. Zool. 7: 232. ♀.

Augochlora utahensis Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 314. ♀.

striata (Provancher). Southern Canada to south. Fla., west to Rocky Mountains. Parasite: *Myrmilloides grandiceps* (Blake), *Pseudomethoca frigida* (Sm.); *Sphecodes pimpinellae* Robt. Pollen: Polylege, visits a great variety of flowers including *Achillea, Aesculus, Agastache, Agoseris, Althaea, Amelanchier, Amorpha, Anemone, Anemonella, Antennaria, Apocynum, Aquilegia, Arabis, Aralia, Argemone, Aruncus, Asclepias, Aster, Astragalus, Barbarea, Berteroa, Bidens, Brassica, Caltirhoe, Calopogon, Camassia, Camelina, Campanula, Capsella, Cardamine, Carduus, Cassia, Caulophyllum, Ceanothus, Celastrus, Centaurea, Cephalanthus Cercis, Chaerophyllum, Chrysanthemum, Chrysopsis, Cichorium, Cicuta, Circaea, Cirsium, Citrullus, Claytonia, Clethra, Convolvulus, Coreopsis, Cornus, Crataegus, Cryptantha, Cryptotaenia, Cubelium, Cucumis, Cucurbita, Cunila, Daucus, Dentaria, Diervilla, Dodecatheon, Echinacea, Echium, Ellisia, Erigenia, Erigeron, Erysimum, Evonymus, Eupatorium, Euphorbia, Fragaria, Gaillardia, Geranium, Gerardia, Glechoma, Gnaphalium, Gossypium, Grindelia, Gutierrezia, Haplopappus, Hedeoma, Heiracium, Helenium, Helianthus, Heliopsis, Heracleum, Heterotheca, Heuchera, Houstonia, Hybanthus, Hydrangea, Hydrocotyle, Hydrolea, Hydrophyllum, Hypericum, Impatiens, Inula, Ipomoea, Iris, Isopyrum, Kolkwitzia, Krigia, Lactuca, Lathyrus, Lepidium, Lespedeza, Lesquerella, Linum, Lippia, Lobelia, Lomatium, Lonicera, Lotus, Lycopersicum, Lycopus, Lythrum, Malus, Malva, Medicago, Melilotus, Mentha, Mertensia, Mikania, Monarda, Myosoton, Nigella, Nothoscordum, Oenothera, Onopordum, Opuntia, Osmorrhiza, Oxalis, Paeonia, Parthenium, Parthenocissus, Paspalum, Pastinaca, Penstemon, Perideridia, Petalostemon, Phryma, Physalis, Polemonium, Polygonatum, Polygonum, Polymnia, Polytaenia, Pontederia, Potentilla, Prenanthes, Prunella, Prunus, Psoralea, Ptelea, Pteridium, Pycnanthemum, Pyrrhopappus, Pyrus, Ranunculus, Ratibida, Rhamnus, Rhus, Ribes, Rorippa, Rosa, Rubus, Rudbeckia, Sagittaria, Salix, Salvia, Sanicula, Sapindus, Satureja, Scrophularia, Scutellaria, Sedum, Senecio, Sericocarpus, Sida, Silphium, Sisymbrium, Sisyrinchium, Smilacina, Smilax, Solanum, Solidago, Sonchus, Specularia, Sphaeralcea, Spiraea, Stellaria, Stokesia, Strophostyles, Symphoricarpos, Syringa, Taenidia, Tanacetum, Taraxacum, Teucrium, Thaspium, Tradescantia, Tragopogon, Trifolium, Trillium, Triosteum, Vaccinium, Verbascum, Verbena, Vernonia, Viburnum,*

Vicia, Viola, Vitis, Waldsteinia, Xanthoxylum, Zizia. Predator: *Philanthus bilunatus* Cress., *P. gibbosus* (Fabr.), *P. lepidus* Cress., *P. politus politus* Say, *P. solivagus* Say.
Augochlora striata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 317. ♀, ♂.
Augochlora matilida Robertson, 1893. Amer. Ent. Soc., Trans. 20: 147. ♀.
Augochlora confusa Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 324. ♀, ♂.
Augochlora Coloradensis Titus, 1901. Canad. Ent. 33: 133. ♀, ♂.
Augochlora pseudopurella Strand, 1914. Arch. Naturgesch. 80 (Abt. A, Heft 1): 163.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 32 (as *confusus*). —Hicks, 1931. Canad. Ent. 63: 176 (as *coloradensis*). —Evans and Lin, 1959. Wasmann Jour. Biol. 17: 120, 123, 127, 131 (as *aurata* and *striata*). —Michener and Wille, 1961. Kansas Univ. Sci. Bul. 42: 1130. —Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 174. —Ordway, 1964. Kansas Ent. Soc., Jour. 37: 139-152. (parasite). —Evans, 1964. Psyche 71: 142, 147. —Michener, 1964. Amer. Zool. 4: 233. (nests). —Ordway, 1965. Ins. Sociaux 12: 291-308 (caste differentiation). —Ordway, 1966. Kansas Ent. Soc., Jour. 39: 270-313 (bionomics). —Eickwort, 1966. Kansas Ent. Soc., Jour. 39: 410-429 (phoretic mite).

Genus PSEUDAUGOCHLOROPSIS Schrottky

Augochloropsis subg. *Pseudaugochloropsis* Schrottky, 1906. Ztschr. System. Hym. Dipt. 6: 313.
Type-species: *Halictus nigromarginatus* Spinola. Desig. by Schrottky, 1909.
Caenaugochlora subg. *Pseudaugochlora* Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 77.
Type-species: *Halictus nigromarginatus* Spinola. Orig. desig.

Taxonomy: Eickwort, 1969. Kansas Univ. Sci. Bul. 48: 429-432 (generic classification).

Biology: Michener and Kerfoot, 1967. Kansas Ent. Soc., Jour. 40: 214-232 (nests, social behavior).

graminea (Fabricius). Tex. to Argentina; West Indies. Pollen: Possibly restricted to the pollen of *Solanum* (including *S. wendlandii*) and *Cassia*.
Megilla graminea Fabricius, 1804. Syst. Piez., p. 334.
Halictus nigromarginatus Spinola, 1841. Soc. Ent. France, Ann. 10: 137. ♀.
Augochlora camure Holmberg, 1884. Soc. Cient. Argentina, An. 18: 213. ♀.
?Augochlora chapadae Cockerell, 1900. Acad. Nat. Sci. Phila., Proc., p. 361, 375.

Taxonomy: Moure, 1960. Studia Ent. 3: 105-106 (synonymy, notes on type). —Eickwort, 1967. Kansas Ent. Soc., Jour. 40: 232-237 (tax. characters and status).

Biology: Michener and Kerfoot, 1967. Kansas Ent. Soc., Jour. 40: 214-232 (nests, sex ratio, social behavior).

Genus TEMNOSOMA Smith

Temnosoma Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 238.
Type-species: *Temnosoma metallicum* Smith. Monotypic.
Micraugochlora Schrottky, 1909. Rev. Mus. La Plata, 16: 138.
Type-species: *Micraugochlora sphaerocephala* Schrottky. Monotypic.
Temnosoma subg. *Temnosomula* Ogloblin, 1953. Soc. Ent. Argentina, Bol. 2: 2.
Type-species: *Temnosoma* (*Temnosomula*) *platensis* Ogloblin. Monotypic and orig. desig.

Taxonomy: Eickwort, 1969. Kansas Univ. Sci. Bul. 48: 446-448 (generic classification).

smaragdinum Smith. Ariz. (Tucson); Mexico, Centr. Amer.
Temnosoma smaragdinum Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 29. ♂.

Tribe HALICTINI

Taxonomy: Eickwort, 1969. Ent. Soc. Amer., Ann. 62: 654-656 (classification and nest architecture).

Genus AGAPOSTEMON Guerin-Meneville

Andrena subg. *Agapostemon* Guerin-Meneville, 1844. Iconogr. Regne Anim., Ins., v. 3, p. 448.

Type-species: *Apis femoralis* Guerin-Meneville. Monotypic. (=*Apis viridula* Fabricius).

The bees of this genus are known to visit a great variety of flowers for nectar and pollen. Since the data pertaining to the floral visitations of these bees are conveniently available (see discussion of the subfamily Halictinae), this information is not repeated here or presented in the species treated below.

Revision: Roberts, 1972. Kansas Univ. Sci. Bul. 49: 437-590, 228 figs. (included spp.).

Taxonomy: Roberts, 1973. Oreg. State Univ. Agr. Expt. Sta. Tech. Bul. 125: 1-23 (northwest. Amer. spp.).

Biology: Roberts, 1969. Kansas Univ. Sci. Bul. 48: 689-719, 21 figs. (natural history).

Species Group Splendens

angelicus Cockerell. N. Dak., Colo. and Iowa, south to Tex., N. Mex., Ariz. and south. Calif.; Mexico (Chihuahua, Durango and Sonora). Predator: *Philanthus albopilosus* Cress.
Agapostemon angelicus Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 537. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 159, fig. 5 (sleep). —Evans, 1975. Ent. Soc. Amer., Ann. 68: 891 (predator).

texanus Cresson. Transcont. south. Canada and U. S., south to centr. Costa Rica. Predator: *Philanthus crabroniformis* Smith.
Agapostemon texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 255. ♀.
Agapostemon texanus subtilior Cockerell, 1898. Ent. News 9: 27. ♀ ?
Agapostemon borealis Crawford, 1901. Nebr. Acad. Sci., Proc. 7: 160. ♀.
Agapostemon californicus Crawford, 1901. Nebr. Acad. Sci., Proc. 7: 164. ♀.
Halictus (Agapostemon) brachycerus Vachal, 1903. Misc. Ent. 11: 101. ♂.
Agapostemon texanus iowensis Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 363. ♀.
Agapostemon proscriptus Cockerell, 1912. Ann. and Mag. Nat. Hist. (8) 10: 24. ♀.
Agapostemon joseanus Friese, 1916. Stettin. Ent. Ztg. 77: 310. ♀.
Agapostemon sulfuripes Friese, 1916. Stettin. Ent. Ztg. 77: 310. ♂.
Agapostemon cyanozonus Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 539. ♂.
Agapostemon proscriptellus Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 538. ♀.
Agapostemon texanus vandykei Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 191. ♀.
Agapostemon californicus psammobius Cockerell, 1937. Pan-Pacific Ent. 13: 150. ♂, ♀.
Agapostemon angelicus idahoensis Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 314. ♀.
Agapostemon californicus clementinus Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 431. ♀, ♂.

splendens (Lepeletier). Ont. and Maine to Sask., south to Fla., Ala., Miss., La., Tex., N. Mex., Ariz.; Mexico (Gulf coast to Veracruz).
Halictus splendens Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 283. ♀.
Agapostemon aeruginosus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 86. ♀.

Biology: Stevens, 1921. Canad. Ent. 53: 68.

Species Group Sericeus

cockerelli Crawford. Wyo. Colo., Tex., N. Mex., Ariz.; Mexico.
Agapostemon Cockerelli Crawford, 1901. Nebr. Acad. Sci., Proc. 7: 161. ♀.

femoratus Crawford. B. C., Alta., N. Dak., south to N. Mex., Ariz., Nev., Calif., Mexico (Baja California).
Agapostemon femoratus Crawford, 1901. Nebr. Acad. Sci., Proc. 7: 162. ♂, ♀.

sericeus (Forster). Ont., Maine to Fla., west to N. Dak., south to Tex. Predator: *Philanthus sanbornii* Cress.
Apis sericea Forster, 1771. Novae Species Insectorum, Centuria vol. I, p. 91. ♂.
Halictus radiatus Say, 1837. Boston Jour. Nat. Hist. 1: 394. ♀.

Agapostemon pulchra Smith, 1853. Cat. Hym. Brit. Mus. v. 1, p. 87. ♀.
Agapostemon sulcatulus Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 25. ♂.

Taxonomy: van der Vecht, 1959. Ent. Ber. 19: 69 (tax. status). —Roberts, 1972. Kansas Univ. Sci. Bul. 49: 554 (tax. status). —Day and Fitton, 1977. Biol. Jour. Linn. Soc. 9: 39. ♂ (tax. status of type, synonymy).

Biology: Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 219.

Species Group Virescens

coloradinus Crawford. S. Dak., Nebr., Kans., Okla., Tex., N. Mex., Colo., Wyo., Utah.
Agapostemon coloradensis Crawford, 1901. Nebr. Acad. Sci., Proc. 7: 163. ♀. Preocc. through secondary homonymy prior to 1961.
Halictus Coloradinus Vachal, 1903. Misc. Ent. 11: 90. N. name.

tyleri Cockerell. Ariz., N. Mex., Tex.; Mexico.
Agapostemon tyleri Cockerell, 1917. Ann. and Mag. Nat. Hist. (8) 20: 241. ♀, ♂.
Agapostemon martini Cockerell, 1927. Pan-Pacific Ent. 3: 153. ♀ (♂ misdet.).

virescens (Fabricius). Ont. and Maine to Fla., west to B. C., Wash. and Oreg. Predator: *Philanthus gibbosus* (Fabr.), *P. solivagus* Say.
Andrena virescens Fabricius, 1775. Systema Ent., p. 378. ♀.
Andrena nigricornis Fabricius, 1793. Ent. System., v. 2, p. 313. ♂.
Halictus dimidiatus Lepeletier, 1841. Hist. Nat. Ins., Hym. v. 2, p. 283. ♀.
Halictus tricolor Lepeletier, 1841. Hist. Nat. Ins., Hym. v. 2, p. 389. ♂.
Agapostemon bicolor Robertson, 1893. Amer. Ent. Soc., Trans. 20: 148. ♀, ♂.

Taxonomy: Moure, 1960. Studia Ent. 3: 103-104 (synonymy, notes on type).

Species Group Melliventris

melliventris Cresson. Mont., Idaho, S. Dak., south to Tex., N. Mex., Ariz., and Calif.; Mexico. Ecology: Nests in abandoned burrows and holes including vacated *Sceliphron* nests. Predator: *Philanthus arizonicus* Bohart.
Agapostemon melliventris Cresson, 1874. Amer. Ent. Soc., Trans. 5: 101. ♀.
Agapostemon fasciatus Crawford, 1901. Nebr. Acad. Sci., Proc. 7: 163. ♀, ♂.
Halictus (Agapostemon) plurifasciatus Vachal, 1903. Misc. Ent. 11: 93, 101. ♀, ♂.
Agapostemon digueti Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 539. ♀, ♂.

mexicanus Roberts. Mexico (Baja California and Sonora). May occur in U. S. (vicinity of San Diego, Calif. or Yuma, Ariz.).
Agapostemon mexicanus Roberts, 1972. Kansas Univ. Sci. Bul. 49: 503. ♂, ♀.

peninsularis Roberts. Calif. (La Jolla and San Diego); Mexico (Baja California).
Agapostemon peninsularis Roberts, 1972. Kansas Univ. Sci. Bul. 49: 515. ♂, ♀.

Species Group Erebus

leunculus Vachal. Mexico to Colombia and Ecuador. May occur in U. S. since the species has been collected 10 miles southwest of Pharr, Texas in Mexico.
Agapostemon leunculus Vachal, 1903. Misc. Ent. 11: 92. ♀.
Agapostemon vulpicolor Crawford, 1906. Amer. Ent. Soc., Trans. 32: 162. ♀.
Agapostemon nasutus var. *ater* Friese, 1916. Stettin. Ent. Ztg. 77: 310. ♀.

Species Group Nasutus

nasutus Smith. Tex. (Brownsville), south to South America (Colombia, Ecuador, Peru and Venezuela) including Trinidad. Parasite: *Zodion americanum* Wied.
Agapostemon nasutus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 87. ♂.
Agapostemon peruvianus Cameron, 1903. Amer. Ent. Soc., Trans. 29: 237. ♂.
Agapostemon nasutus gualanicus Cockerell, 1912. Ann. and Mag. Nat. Hist. (8) 9: 556. ♂.
Agapostemon purpureopictus Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 538. ♀.
Agapostemon melanurus Cockerell, 1949. U. S. Natl. Mus., Proc. 98: 438. ♀.

Biology: Eickwort and Eickwort, 1969. Kansas Ent. Soc., Jour. 42: 421-452 (life history).

Genus HALICTUS Latreille

Revision: Sandhouse, 1941. Ent. Amer. (n. s.) 21: 23-37. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 332-338, figs. 82-83 (eastern U. S. spp.).

Biology: Wille and Michener, 1971. Biol. Trop., Rev. 18: 17-31 (Neotropical spp.).

Taxonomy: Roberts, 1973. Oreg. State Univ. Agr. Expt. Sta. Tech. Bul. 126: 1-23 (northwest. Amer. spp.).

Genus HALICTUS Subgenus HALICTUS Latreille

Halictus Latreille, 1804. Nouv. Dict. Hist. Nat., v. 24, p. 182.
Type-species: *Apis quadricincta* Fabricius. Desig. by Richards, 1935.
Odontalictus Robertson, 1918. Ent. News 29: 91.
Type-species: *Halictus ligatus* Say. Monotypic and orig. desig.
Monilapis Cockerell, 1931. Ann. and Mag. Nat. Hist. (10) 7: 529.
Type-species: *Hylaeus tomentosus* Eversmann. Monotypic and orig. desig.

farinosus Smith. Mont., Nebr., and N. Mex., west to B. C. and Calif. Parasite: *Sphecodes arvensiformis* Ckll. Predator: *Philanthus crabroniformis* Sm.
Halictus farinosus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 69. ♀.
Halictus montanus Crawford, 1902. Canad. Ent. 34: 234. ♀, ♂.
Paranomia venablesii Ashmead, 1903. Canad. Ent. 35: 243. ♀.
Halictus denticulus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 469. ♀, ♂.
Halictus procerus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 469. ♂.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 350. ♀.

ligatus Say. North America south of about 50 degrees latitude, southward to the West Indies and Colombia. Parasite: *Nomada* sp., *Thecophora modesta* (Will.). Predator: *Philanthus albopilosus* Cress., *P. bilunatus* Cress., *P. gibbosus* (Fabr.), *P. lepidus* Cress., *P. pacificus arizonae* Dunn., *P. solivagus* Say, *P. ventilabris* Fabr.
Halictus ligatus Say, 1837. Boston Jour. Nat. Hist. 1: 396. ♀, ♂.
Halictus poeyi Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 271. ♂.
Halictus capitosus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 67. ♀.
Halictus armaticeps Cresson, 1872. Amer. Ent. Soc., Trans. 4: 250. ♀.
Halictus texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 251. ♀, ♂.
Halictus ornatipes Cresson, 1872. Amer. Ent. Soc., Trans. 4: 252. ♂.
Halictus townsendi Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 293. ♀.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 31. —Hicks, 1926. Colo. Univ., Studies 15: 217. —Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 160.

parallelus Say. Ont. and N. J. to Fla., west to Mont., N. Mex., and Tex.
Halictus parallelus Say, 1837. Boston Jour. Nat. Hist. 1: 397. ♀.
Halictus occidentalis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 250. ♀, ♂.

Biology: Packard, 1868. Amer. Nat. 1: 364. —Hungerford and Williams, 1912. Ent. News 23: 241.

rubicundus (Christ). Holarctic, in North America ranging from Alaska, B. C., N. W. T., and N. S., south to Calif., Ariz., Tex., and Fla. Parasite: *Nomada imbricata* Sm., *Sphecodes dichrous* Sm., *Zodion cinerium* (Fabr.). Predator: *Philanthus albopilosus* Cress., *P. crabroniformis* Sm., *P. solivagus* Say.
Apis rubicunda Christ, 1791. Naturges. Klassif. Nomencl. Ins. Bienen, Wespen, Ameisengeschlect...Hym., p. 190. ♀.
Halictus lerouxi Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 272. ♀.
Halictus lerouxi var. *ruborum* Cockerell, 1898. Canad. Ent. 30: 52. ♀.
Halictus (*Halictus*) *lerouxii* Lovell, 1908. Psyche 15: 34. Emend.
Halictus lupinelli Cockerell, 1936. Pan-Pacific Ent. 12: 158. ♀.

Taxonomy: Cockerell, 1937. Canad. Ent. 69: 88.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 217. —Hicks, 1934. Colo. Univ., Studies 21: 265. —Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 162.

Genus HALICTUS Subgenus SELADONIA Robertson

Seladonia Robertson, 1918. Ent. News 29: 91.
Type-species: *Apis seladonius* Fabricius. Orig. desig.

confusus arapahonum Cockerell. N. Dak. to N. Mex., west to B. C., Oreg., Calif. and Utah.
Halictus arapahonum Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 316. ♀.
Halictus provancheri nearcticus Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 661. Preocc.
Halictus (*Chloralictus*) *olivarius* Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (2532): 10. ♀.

Taxonomy: Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1105 (synonymy).

confusus confusus Smith. Alaska, to N. S. south to Fla. west to N. Dak. and Tex. Predator: *Philanthus albopilosus* Cress., *P. bilunatus* Cress., *P. crabroniformis* Sm., *P. gibbosus* (Fabr.), *P. pacificus arizonae* Dunn., *P. politus politus* Say, *P. pulcher* Dalla Torre, *P. solivagus* Say.
Halictus confusus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 70. ♀, ♂.
Halictus constrictus Provancher, 1882. Nat. Canad. 13: 202. ♀. Preocc.
Halictus provancheri Dalla Torre, 1896. Cat. Hym., v. 10, p. 77. N. name.
Halictus nearcticus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 470. ♀, ♂.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 350. ♀. —Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 660. —Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1105 (synonymy).

Biology: Hicks, 1936. Canad. Ent. 68: 47. —Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 161.

harmonius Sandhouse. South. Calif.
Halictus (*Halictus*) *harmonius* Sandhouse, 1941. Ent. Amer. (n. s.) 21: 36. ♀.

tripartitus Cockerell. Idaho, Colo., and Tex. to Wash., Calif., Mexico (Baja California). Predator: *Philanthus crabroniformis* Sm., *P. gibbosus* (Fabr.), *P. pacificus arizonae* Dunn., *P. pulcher* Dalla Torre.
Halictus tripartitus Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 63. ♀.
Halictus meliloti Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 67. ♀.
Halictus catalinensis Cockerell, 1903. South. Calif. Acad. Sci., Bul. 2: 84. ♀.

Taxonomy: Michener, 1953. Kansas Univ. Sci. Bul. 35: 1027, figs. 60, 61 (larva).

virgatellus Cockerell. N. W. T., B. C., Alta., Oreg., Colo., N. Mex.
Halictus virgatellus Cockerell, 1901. Psyche 9: 284. ♀.
Halictus sansoni Crawford, 1911. U. S. Natl. Mus., Proc. 41: 267. ♀.
Halictus fraserae Cockerell, 1916. Entomologist 49: 100. ♀.
Halictus typographicus Cockerell, 1918. Entomologist 51: 261. ♂.
Halictus (*Seladonia*) *ororyctes* Cockerell, 1933. Ent. Soc. Amer., Ann. 26: 40. ♀.

Taxonomy: Cockerell, 1919. Ent. News 30: 288. ♂.

Nomina Nuda in Halictus Latreille

Halictus californica Bridwell, 1899. Kans. Acad. Sci., Trans. 16: 210.
Halictus emarginata Smith, 1910. N. J. State Mus., Ann. Rpt. 1909, p. 688.
Halictus fendleri Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 252.
Halictus medionitens Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 252.
Halictus missouriensis Bridwell, 1899. Kans. Acad. Sci., Trans. 16: 210.
Halictus pulzenus Clements and Long, 1923. Carnegie Inst. Wash., Pub. 336: 252.
Halictus rhoptoides Bray, 1917. Pomona Jour. Ent. Zool. 9: 99.

Genus LASIOGLOSSUM Curtis

Lasioglossum Curtis, 1833. Brit. Ent. v. 10, p. 448.
Type-species: *Melitta xanthopus* Kirby. Monotypic and orig. desig. (=*Lasioglossum tricingulum* Curtis).
Curtisapis Robertson, 1918. Ent. News 29: 91.

Type-species: *Halictus coriaceus* Smith. Orig. desig.
Pachyhalictus Cockerell, 1929. Ann. and Mag. Nat. Hist. (10) 4: 589.
Type-species: *Halictus merescens* Cockerell. Orig. desig.

Revision: Sandhouse, 1933. Ent. Soc. Wash., Proc. 35: 80-83 (eastern U. S. spp.). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 338-347, figs. 81, 84-87 (eastern U. S. spp.).

athabascense (Sandhouse). N. S. to B. C., south to Wis., Mich., Ohio and in the eastern U. S. to N. C.
Halictus athabascense Sandhouse, 1933. Ent. Soc. Wash., Proc. 35: 78. ♂, ♀.

bardum (Cresson). Tex. to Calif.
Halictus bardus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 251. ♀.

Taxonomy: Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 163.

citerior (Vachal). No locality recorded.
Halictus citerior Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 473. ♀.

coriaceum (Smith). N. S. to Ga., west to Alta. and N. Mex. ranging southward in Mississippi Valley to south. Ill. Predator: *Philanthus gibbosus* (Fabr.), *P. solivagus* Say.
Halictus coriaceus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 70. ♀.
Halictus subquadratus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 72. ♂.
Halictus 6-cinctus Provancher, 1882. Nat. Canad. 13: 200. ♂.
Halictus sexcinctus Dalla Torre, 1896. Cat. Hym., v. 10, p. 59. Emend.

cyaneiceps (Cockerell). N. Mex., Ariz.
Halictus cyaneiceps Cockerell, 1916. Canad. Ent. 48: 254. ♀, ♂.

forbesii (Robertson). N. B. west to Wash., south to Tex. and Ga. Predator: *Philanthus sanbornii* Cress.
Halictus Forbesii Robertson, 1890. Amer. Ent. Soc., Trans. 17: 315. ♀, ♂.
Halictus forbesi Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 163. Emend.

Taxonomy: Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 294.

Biology: Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 163.

fuscipenne (Smith). N. S. to Ontario, south to Tex. and Fla.
Halictus fuscipennis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 67. ♀, ♂.
Halictus capitulatus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 472. ♀.

heterorhinum (Cockerell). Colo., Ariz.
Halictus heterorhinus Cockerell, 1930. Amer. Mus. Novitates 397: 6. ♀.

leucozonium (Schrank). Holarctic, widespread in Europe and Canada; Maine, N. Y. Predator: *Philanthus albopilosus* Cress., *P. bilunatus* Cress., *P. solivagus* Say.
Apis leucozonia Schrank, 1781. Enum. Ins. Austr., p. 406.
Halictus similis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 69. ♀.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 352.

Biology: Atwood, 1933. Canad. Jour. Res. 9: 449. —Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 163.

manitouellum (Cockerell). Colo.
Halictus manitouellus Cockerell, 1908. Ent. Soc. Wash., Proc. 9: 119. ♀.

mellipes (Crawford). Calif.; Mexico (Baja California).
Halictus mellipes Crawford, 1907. Invertebrata Pacifica 19: 190. ♀.

olympiae (Cockerell). B. C., Wash., Oreg., Calif.,? Colo.
Halictus olympiae Cockerell, 1898. Canad. Ent. 30: 51. ♀.
Halictus olympiae var. *subangustus* Cockerell, 1898. Canad. Ent. 30: 51. ♀.
Halictus olympiae var. *subangustatus* Crawford, 1906. Canad. Ent. 38: 301. Error for *subangustus*.

Taxonomy: Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 476. ♂ ?

pacificum (Cockerell). B. C., Wash., Calif.
Halictus pacificus Cockerell, 1898. Acad. Nat. Sci. Phila., Proc. 50: 50. ♀, ♂.

pavonotum (Cockerell). Calif.
Halictus pavonotus Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 188. ♀, ♂.

riparíellum (Cockerell). Colo.
Halictus riparíellus Cockerell, 1918. Entomologist 51: 261. ♀.

sisymbrii (Cockerell). Wyo. to N. Mex., west to B. C. and Calif.; Mexico (Baja California). Predator: *Philanthus ventilabris* Fabr.
Halictus sisymbrii Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 63. ♀.

Taxonomy: Cockerell, 1897. Amer. Ent. Soc., Trans. 25: 165. ♀, ♂.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 159. —Alcock and Gamboa, 1975. Ariz. Acad. Sci. 10: 163 (predator).

titusi (Crawford). Oreg., Calif.
Halictus Titusi Crawford, 1902. Canad. Ent. 34: 235. ♀.

trizonatum (Cresson). Alta. to N. Mex., west to B. C. and Calif.
Halictus trizonatus Cresson, 1874. Amer. Ent. Soc., Trans. 5: 101. ♀.
Halictus egregius Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 476. ♀.
Halictus colatus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 476. ♂.

zonulum (Smith). Holarctic; N. S. to Minn., south to N. Y., Mich., Wis. Predator: *Philanthus gibbosus* (Fabr.).
Halictus zonulus Smith, 1848. Zoologist 6: 2171. ♀, ♂.
Halictus craterus Lovell, 1908. Psyche 15: 35. ♀, ♂.

Biology: Brittain, 1933. Canad. Dept. Agr., Bul. (n. s.) 162: 94. —Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 163.

Genus EVYLAEUS Robertson

Evylaeus Robertson, 1902. Canad. Ent. 34: 244.
Type-species: *Halictus arcuatus* Robertson. Orig. desig. (=*Halictus cinctipes* Provancher).

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 348-363, figs. 89-91 (eastern U. S. spp.).

Biology: Knerer and Plateaux, 1967. Acad. Sci. Paris, Compt. Rend. 265: 455-458 (nest architecture).

aberrans (Crawford). N. Dak., Nebr., Colo., N. Mex., Alta., Oreg., Calif., Utah. Parasite: *Sphecodes* sp. Pollen: Collects pollen principally from *Oenothera*, but also visits these and a wide variety of other plants for nectar or occasionally pollen. Predator: *Philanthus gibbosus* (Fabr.).
Halictus aberrans Crawford, 1903. Canad. Ent. 35: 336. ♀.
Halictus galpinsiae Cockerell, 1903. Canad. Ent. 35: 342. ♀.
Halictus gelidus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 481. ♂.

Biology: Bohart and Youssef, 1977 (1976). Wasmann Jour. Biol. 34: 185-234, 18 figs., 4 tables (nest architecture, life history, behavior, parasite, as *galpinsiae*).

absurdiceps (Timberlake). Calif. (Central Valley).
Halictus (*Evylaeus*) *absurdiceps* Timberlake, 1962. Ent. Soc. Wash., Proc. 62: 105. ♂.

allonotus (Cockerell). Calif.
Halictus allonotus Cockerell, 1936. Pan-Pacific Ent. 12: 156. ♀.

amicus (Cockerell). N. Mex., Ariz., Calif.
Halictus amicus Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 164. ♀.

angustior (Cockerell). N. Mex., Ariz.
Halictus angustior Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 165, 167. ♀, ♂.

argemonis (Cockerell). Calif.; Mexico.
Halictus arcuatus var. *argemonis* Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 146. ♀.
Halictus latifrons Crawford, 1907. Invertebrata Pacifica 1: 192. ♀.

Taxonomy: Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1107 (synonymy).

arizonensis (Crawford). Ariz., Calif.; Mexico (Baja California).
Halictus arizonensis Crawford, 1907. N. Y. Ent. Soc., Jour. 15: 189. ♀.

aspilurus (Cockerell). Calif.
Halictus aspilurus Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 190. ♀.

avalonensis (Cockerell). Calif.
Halictus avalonensis Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 150. ♀.

Taxonomy: Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 435. ♂.

birkmanni (Crawford). Tex.
Halictus Birkmanni Crawford, 1906. Canad. Ent. 38: 5. ♀.

bradleyi Mitchell. N. J. (Pitman). This may be the male of *Evylaeus pectinatus* (Robertson).
Evylaeus bradleyi Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 356, figs. 88, 91. ♂.

cinctipes (Provancher). N. S. to Fla., west to N. Dak. and Colo.
Halictus cinctipes Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 316. ♂.
Halictus arcuatus Robertson, 1893. Amer. Ent. Soc., Trans. 20: 145. ♀.
Halictus crassus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 477. ♀.
Halictus adelipus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 479. ♂.
Halictus arcuatus var. *parisus* Lovell, 1908. Psyche 15: 36. ♀.
Halictus arcuatus gulosus Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 661. ♀.
Halictus gulosus punctiferus Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 286. ♀.

Taxonomy: Knerer and Atwood, 1964. Canad. Ent. 96: 960-962, fig. 1.

Biology: Brittain, 1933. Canad. Dept. Agr., Bul. (n. s.) 162: 94. —Atwood, 1933. Canad. Jour. Res. 9: 448. —Knerer and Atwood, 1964. Canad. Ent. 96: 960-962, fig. 1. —Knerer and Plateaux-Quenu, 1966. Acad. Sci. Paris, Compt. Rend. 263: 1622-1625 (nests).

comagensis Knerer and Atwood. Ont., Alaska.
Evylaeus comagensis Knerer and Atwood, 1964. Canad. Ent. 96: 959, fig. 1. ♀, ♂.

cooleyi (Crawford). Alta., B. C., Mont., Colo., N. Mex., Tex., Oreg., Calif. Predator: *Philanthus crabroniformis* Sm.
Halictus cooleyi Crawford, 1906. *In* Viereck, Canad. Ent. 38: 301. ♀, ♂.

cordleyi (Crawford). B. C., Oreg., Calif.
Halictus Cordleyi Crawford, 1906. *In* Viereck, Canad. Ent. 38: 302. ♀, ♂.

dasiphorae (Cockerell). N. Mex., Calif.
Halictus dasiphorae Cockerell, 1901. Psyche 9: 285. ♀.

diatretus (Vachal). B. C., Wash., Nev., Colo.,? Oreg.
Halictus diatretus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 481. ♀, ♂.

divergenoides Mitchell. Mich., Ind. Predator: *Philanthus lepidus* Cress.
Evylaeus divergenoides Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 351, fig. 91. ♂.

divergens (Lovell). N. S. to Minn., south to Ga.
Halictus divergens Lovell, 1905. Canad. Ent. 37: 299. ♀.

Taxonomy: Knerer and Atwood, 1964. Canad. Ent. 96: 958, fig. 1. ♂.

fartus (Vachal). Wash.
Halictus fartus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 483. ♀.

fedorensis (Crawford). Tex.
Halictus Fedorensis Crawford, 1906. Canad. Ent. 38: 4. ♀.

foxii (Robertson). N. S. to Man. and Minn., south to Ga.
Halictus gracilis Robertson, 1890. Amer. Ent. Soc., Trans. 17: 316. ♀, ♂. Preocc.
Halictus foxii Robertson, 1895. Amer. Ent. Soc., Trans. 22: 117. N. name.
Halictus gracillimus Dalla Torre, 1896. Cat. Hym., v. 10, p. 63. N. name.

Biology: Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 164.

giffardi (Michener). Calif.
Halictus giffardi Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 315. ♀.

glabriventris (Crawford). Oreg., Calif., Colo.
Halictus Vachali Crawford, 1906. *In* Viereck, Canad. Ent. 38: 300. ♀. Preocc.
Halictus glabriventris Crawford, 1907. Canad. Ent. 39: 21. N. name.

Biology: Hicks, 1936. Canad. Ent. 68: 47.

granosus (Vachal). Colo.
Halictus granosus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 477. ♀, ♂.

gularis (Vachal). Calif.
Halictus gularis Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 481. ♂.

hammondi (Cockerell). Calif.
Halictus hammondi Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 149. ♀.

humboldtensis (Michener). Calif.
Halictus (*Evylaeus*) *humboldtensis* Michener, 1936. Pan-Pacific Ent. 12: 166. ♀.

inconditus (Cockerell). Alaska, Wash., Colo.
Halictus inconditus Cockerell, 1916. Entomologist 49: 101. ♀.

kincaidii (Cockerell). Wash., Oreg., Calif.
Halictus kincaidii Cockerell, 1898. Canad. Ent. 30: 51. ♀.

Taxonomy: Cockerell, 1903. Entomologist 36: 208. —Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 318. ♂, ♀. —Michener, 1953. Kansas Univ. Sci. Bul. 35: 1025, figs. 48-53 (larva).

lusorius (Cresson). Tex., N. Mex.
Halictus lusorius Cresson, 1872. Amer. Ent. Soc., Trans. 4: 252. ♀.

Taxonomy: Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 166. —Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 45.

macoupinensis (Robertson). Minn. to N. B., south to Ga. and Ala.
Halictus 4-maculatus Robertson, 1890. Amer. Ent. Soc., Trans. 17: 316. ♀, ♂. Preocc.
Halictus quadrimaculatus Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 65. Emend.
Halictus macoupinensis Robertson, 1895. Amer. Ent. Soc., Trans. 22: 117. N. name.

mendocinensis (Michener). Calif.; Mexico (Baja California).
Halictus (*Evylaeus*) *mendocinensis* Michener, 1936. Pan-Pacific Ent. 12: 167. ♀.

miguelensis (Cockerell). Calif.; Mexico (Baja California).
Halictus miguelensis Cockerell, 1937. Pan-Pacific Ent. 13: 156. ♂.
Halictus cooleyi obscurior Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 435. ♀, ♂. Preocc.

nelumbonis (Robertson). Maine to Minn., south to Fla. and Tex.
Halictus nelumbonis Robertson, 1890. Amer. Ent. Soc., Trans. 17: 316. ♀, ♂.

nigrescens (Crawford). Calif.; Mexico (Baja California).
Halictus nigrescens Crawford, 1907. Invertebrata Pacifica 1: 191. ♀.

Taxonomy: Cockerell, 1936. Pan-Pacific Ent. 12: 159. ♀.

nigricollis (Vachal). Colo.
Halictus nigricollis Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 480. ♂.

nigridens (Vachal). Calif.
Halictus nigridens Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 480. ♂.

niger (Viereck). Labrador, N. S., N. Y., Alta., B. C., south in mountains to N. Mex.; Eurasia.
Predator: *Philanthus crabroniformis* Sm., *P. pacificus arizonae* Dunn., *P. pulcher* Dalla Torre.
Halictus niger Viereck, 1903. Amer. Ent. Soc., Trans. 29: 56. ♀, ♂.
Halictus fratellus Perez, 1903. Soc. Linn. de Bordeaux, Actes 58: ccxiv. ♀.
Halictus frey-gessneri Alfken, 1905. Nat. Ver. Bremen, Abh. 18: 73. ♀, ♂.

Taxonomy: Eidman, 1935. Arb. ueber Morph. u. Taxonom. Ent. 2: 104.

occultus (Vachal). Wash.
Halictus occultus Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 478. ♀.

oenotherae (Stevens). N. S. south to Ga., west to N. Dak. and Kans. Pollen: Oligolege of *Oenothera*. *Evylaeus pineolensis* Mitchell is possibly the male of this species.
Halictus (*Evylaeus*) *oenotherae* Stevens, 1920. Ent. News 31: 37. ♀.
Halictus ralenci Crawford, 1932. Ent. Soc. Wash., Proc. 34: 70. ♀.

Taxonomy: Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 45. —Knerer and Atwood, 1964. Canad. Ent. 96: 958-959 (geogr. and floral records).

Biology: Knerer and MacKay, 1969. Canad. Jour. Zool. 47: 289-294 (nest architecture, life history).

orthocarpi (Cockerell). Calif.
Halictus orthocarpi Cockerell, 1936. Pan-Pacific Ent. 12: 159. ♀

Taxonomy: Michener, 1936. Pan-Pacific Ent. 12: 171. ♂.

ovaliceps (Cockerell). Colo., N. Mex., B. C., Calif.
Halictus ovaliceps Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 45. ♀. Republished by Cockerell, 1898. N. Mex. Univ., Bul. 1: 45. female.

Taxonomy: Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 317. ♂.

Biology: Hicks, 1936. Canad. Ent. 68: 47.

pecosensis (Crawford). N. Mex.
Halictus Pecosensis Crawford, 1906. Canad. Ent. 38: 6. ♀.

pectinatus (Robertson). Conn., N. J., Md., Ill., Mo.
Halictus pectinatus Robertson, 1890. Amer. Ent. Soc., Trans. 17: 315. ♀.

pectoralis (Smith). N. S. to Fla., west to Wis., Nebr., Tex.
Halictus pectoralis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 68. ♀.

Taxonomy: Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 64. —Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 44. ♂. —Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 350. ♀.

pectoraloides (Cockerell). Man., B. C., Colo., N. Mex., Ariz., Calif.; north. Mexico.
Halictus pectoraloides Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 64. ♀.
Halictus pectoraloides var. *beatulus* Cockerell, 1918. Entomologist 51: 262. ♀.
Halictus (*Evylaeus*) *grindeliae* Cockerell, 1934. Ent. News 45: 29. ♀.

Taxonomy: Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 166. ♀, ♂.

peralpinus (Cockerell). Colo.
Halictus peralpinus Cockerell, 1919. Ent. News 30: 289. ♀.

peraltus (Cockerell). Wash., Wyo., Colo., N. Mex., Calif. Predator: *Philanthus crabroniformis* Sm.
Halictus peraltus Cockerell, 1901. Psyche 9: 164. ♂.

pineolensis Mitchell. N. C. (Pineola). Possibly male of *Evylaeus oenotherae* (Stevens).
Evylaeus pineolensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 358. ♂.

pullilabris (Vachal). Calif.
Halictus pullilabris Vachal, 1904. Soc. Sci. Hist. Arch. Correze, Bul. 26: 479. ♂.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ., Pubs. Ent. 70: 37-40 (flower relationships).

pulveris (Cockerell). Colo.
Halictus pulveris Cockerell, 1930. Amer. Mus. Novitates 397: 7. ♀, ♂.

quebecensis (Crawford). Minn. to Newfoundland, south to Ga.
Halictus quebecensis Crawford, 1907. N. Y. Ent. Soc., Jour. 15: 189. ♀.

regis (Cockerell). Colo.
Halictus regis Cockerell, 1916. Entomologist 49: 102. ♀.

robertsoni (Crawford). Tex.
Halictus Robertsoni Crawford, 1906. Canad. Ent. 38: 4. ♀.

robustus (Crawford). Calif.
Halictus robustus Crawford, 1907. Invertebrata Pacifica 1: 191. ♀.

ruficornis (Crawford). Nev., Calif., Ariz.
Halictus ruficornis Crawford, 1907. Invertebrata Pacifica 1: 192. ♂.

rufitarsis (Zetterstedt). Holarctic; Alaska, N. S., N. B., Ont., Mich.
Halictus rufitarsis Zetterstedt, 1838. Ins. Lappon., v. 1, p. 462. ♀, ♂.
Hylaeus minutissimus Eversmann, 1852. Soc. Nat. Moscou, Bul. 25: 42. ♂.
Halictus atricornis Smith, 1870. Ent. Ann., p. 26. ♀, ♂.

Taxonomy: Eidmann, 1935. Arb. ueber Morph. u. Taxonom. Ent. 2: 104.

sanfrancisconis (Strand). Ariz.
Halictus sanfrancisconis Strand, 1917. Arch. f. Naturgesch. 83 (Abt. A, Heft 11): 57. ♂.

sequoiae (Michener). Calif.
Halictus (*Evylaeus*) *sequoiae* Michener, 1936. Pan-Pacific Ent. 12: 165. ♀.

sopinci (Crawford). N. J., N. C., Ga.
Halictus sopinci Crawford, 1932. Ent. Soc. Wash., Proc. 34: 69. ♀.

subobscurus (Cockerell). N. Mex.
Halictus subobscurus Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 65. ♀.
Halictus Cockerelli Crawford, 1902. Canad. Ent. 34: 236. ♀.

supranitens (Cockerell). Colo.
Halictus supranitens Cockerell, 1919. Ent. News 30: 289. ♀.

swenki (Crawford). N. Dak., Nebr.
Halictus swenki Crawford, 1906. Ent. News 17: 275. ♀.

synthyridis (Cockerell). Alta., Colo. Predator: *Philanthus crabroniformis* Sm., *P. pacificus arizonae* Dunn.
Halictus synthyridis Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 427. ♀, ♂.

tracyi (Cockerell). Calif.
Halictus tracyi Cockerell, 1936. Pan-Pacific Ent. 12: 161. ♀.

Taxonomy: Michener, 1936. Pan-Pacific Ent. 12: 170. ♀, ♂.

truncatus (Robertson). Que. and Maine to Ga., west to Kans., Nebr., and Wash.
Halictus truncatus Robertson, 1901. Canad. Ent. 33: 230. ♀, ♂.
Halictus fulgidus Crawford, 1902. Canad. Ent. 34: 235. ♀.

Taxonomy: Knerer and Atwood, 1964. Canad. Ent. 96: 962, fig. 1.

vaporellus (Cockerell). Colo.
Halictus vaporellus Cockerell, 1910. Canad. Ent. 42: 366. ♀.

Genus HEMIHALICTUS Cockerell

Hemihalictus Cockerell, 1897. Canad. Ent. 29: 288.
Type-species: *Panurgus lustrans* Cockerell. Monotypic.

lustrans (Cockerell). Va. to Fla., Ind. and Mich. to Miss. and Tex. Pollen: Oligolege of *Pyrrhopappus carolinianus*, but occassionally visits other flowers including *Cichorium intybus* and *Cucurbita* presumably for nectar; males also obtain nearly their entire nectar supply from the flowers of *Pyrrhopappus carolinianus*.
Panurgus lustrans Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 147. ♀.

Taxonomy: Michener, 1947. N. Y. Ent. Soc., Jour. 55: 50. ♂. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul., 141: 363-364, fig. 81.

Biology: Michener, 1947. N. Y. Ent. Soc., Jour. 55: 50. —Daly, 1961. Kans. Ent. Soc., Jour. 34: 134-140, 13 figs. (biology and taxonomy).

Genus SPHECODOGASTRA Ashmead

Sphecodogastra Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 92.
Type-species: *Parasphecodes texana* Cresson. Monotypic and orig. desig.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 364-366. —Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 45.

Biology: Stevens, 1920. Ent. News 31: 39-44.

noctivaga (Linsley and MacSwain). Utah, N. Mex., west Tex. Pollen: Collects pollen from flowers of *Oenothera hartwegii*, but visits flowers of other plants for nectar.
Lasioglossum (*Sphecodogastra*) *noctivaga* Linsley and MacSwain, 1962. Pan-Pacific Ent. 38: 46. ♀.

texana (Cresson). N. Dak. and Mich., south to Tex., N. Mex. and Mexico, west to Colo., east to Ind. Pollen: Oligolege of *Oenothera* including *O. caespitosa*, *O. rhombipetala*, *O. runcinata*, but visits the flowers of other plants for nectar.
Parasphecodes texanus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 249. ♀.

Biology: Graenicher, 1911. Pub. Mus. Milwaukee, Bul. 1: 222-225. —Stevens, 1920. Ent. News 31: 39. —Hicks, 1936. Canad. Ent. 68: 51. —Chandler, 1962. Ind. Acad. Sci., Proc. for 1961, 71: 124-129, 2 figs., 2 tables. —Kerfoot, 1967. Kansas Ent. Soc., Jour. 40: 84-93, 9 figs., 2 tables (nest architecture, behavior). —Kerfoot, 1967. Anim. Behavior 15: 479-486 (lunar periodicity).

Genus DIALICTUS Robertson

Dialictus Robertson, 1902. Canad. Ent. 34: 48.
Type-species: *Halictus anomalus* Robertson. Monotypic and orig. desig.
Chloralictus Robertson, 1902. Canad. Ent. 34: 248.
Type-species: *Halictus cressoni* Robertson. Orig. desig.
Halictus subg. *Gastrohalictus* Ducke, 1902. Ztschr. System. Hym. Dipt. 2: 102.
Type-species: *Halictus osmioides* Ducke. Monotypic.
Halictomorpha Schrottky, 1911. Rev. Mus. Paulista 8: 81.
Type-species: *Halictomorpha phaedra* Schrottky. Monotypic and orig. desig.

Revision: Sandhouse, 1923. Canad. Ent. 55: 193. —Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 1-10. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 368-445, figs. 95-102, tables 11-12 (eastern U. S. spp.).

abanci (Crawford). Minn. to N. B., south to Ga.
Halictus abanci Crawford, 1932. Ent. Soc. Wash., Proc. 34: 71. ♀.

abietus (Michener). Colo.
Halictus (*Chloralictus*) *abietum* Michener, 1938. Ann. and Mag. Nat. Hist. (10) 18: 281. ♀, ♂.

absimilis (Sandhouse). Colo.
Halictus absimilis Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 21. ♀.

abundus (Sandhouse). N. Mex.
Halictus abundus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 32. ♂.

academicus (Sandhouse). Iowa, Colo.
Halictus academicus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 12. ♀.
Halictus vintonensis Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 22. ♀.

Taxonomy: Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1111 (synonymy).

accentus (Sandhouse). Colo.
Halictus accentus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 38. ♂.

achilleae Mitchell. Mass. to N. C., Mich.
Dialictus achilleae Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 377. ♀.

actinosus (Sandhouse). Calif.
Halictus actinosus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 13. ♀.

actuarius (Sandhouse). Colo.
Halictus actuarius Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 25. ♂.

admirandus (Sandhouse). Minn. to N. S., south to La. and Fla.
Halictus admirandus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 14. ♀.

advertus Mitchell. Mass. (Reading).
Dialictus advertus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 433, fig. 102. ♂.

alachuensis Mitchell. Ga., Fla.
Dialictus alachuensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 378. ♀.

albipennis (Robertson). N. S. to Oreg., south to N. C., Ill., and Colo. Predator: *Philanthus politus politus* Say.
Halictus albipennis Robertson, 1890. Amer. Ent. Soc., Trans. 17: 317. ♀, ♂.
Halictus nubilis Lovell, 1905. Canad. Ent. 37: 40. ♀.

albitarsis (Cresson). Tex.,? Ont.
Halictus albitarsis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 254. ♂.

Taxonomy: Warncke, 1973. Soc. Royale Sci. Liege 42 (7-8): 294 (proposed replacement name).

albohirtus (Crawford). Nev.
Halictus albohirtus Crawford, 1907. Invertebrata Pacifica 1: 193. ♀.

albuquerquensis (Michener). N. Mex.
Halictus (*Chloralictus*) *albuquerquensis* Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 316. ♀.

alius (Sandhouse). N. Mex., Ariz.
Halictus alius Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 16. ♀.

alternatus Mitchell. Ont. and Mass. to Va., Ohio, Mich.
Dialictus alternatus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 433. ♂.

anomalus (Robertson). Alta. and Colo. east to N. S. south to Ala. and Ga.
Halictus anomalus Robertson, 1892. Amer. Nat. 26: 272. ♀.

apertus (Sandhouse). Minn. to Maine, south to La. and Ga. Predator: *Philanthus lepidus* Cress.
Halictus apertus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 35. ♂.

apocyni Mitchell. W. Va., Ohio, Ind., Tenn.
Dialictus apocyni Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 381. ♀.

apopkensis (Robertson). N. C. to Fla., Miss.
Halictus apopkensis Robertson, 1892. Amer. Nat. 26: 272. ♀.

aquilae (Cockerell). N. Mex.; north. Mexico.
Halictus aquilae Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 450. ♀.

Taxonomy: Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 415. ♂.

arcanus (Sandhouse). N. Mex.
Halictus arcanus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 19. ♀.

astutus (Sandhouse). N. Mex.
Halictus astutus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 31. ♂.

atlanticus Mitchell. Ont., Mass., N. Y., W. Va., N. C.
Dialictus atlanticus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 383. fig. 99. ♀.

Taxonomy: Knerer and Atwood, 1966. Canad. Ent. 98: 881. ♂.

atriventris (Crawford). Alta., B. C.
Halictus atriventris Crawford, 1906. *In* Viereck, Canad. Ent. 38: 303. ♀, ♂.

basilicus (Sandhouse). Minn. to Conn., N. H., Ont.
Halictus basilicus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 36. ♂.

Taxonomy: Knerer and Atwood, 1966. Canad. Ent. 98: 881. ♀.

bernardinensis (Michener). Calif.
Halictus (*Chloralictus*) *bernardinensis* Michener, 1936. Ann. and Mag. Nat. Hist. (10) 18: 286. ♀.

brassicae Mitchell. N. C., Fla.
Dialictus brassicae Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 384. ♀.

brevibasis (Cockerell). Sask.
Halictus (*Chloralictus*) *brevibasis* Cockerell, 1938. Amer. Mus. Novitates 983: 3. ♂.

bruneri (Crawford). Ont. and N. Y. to Fla., west to Nebr.
Halictus Bruneri Crawford, 1902. Canad. Ent. 34: 237. ♀.
Halictus brimleyi Crawford, 1932. Ent. Soc. Wash., Proc. 34: 71. ♀.

brunneiventris (Crawford). Nev., Calif.
Halictus brunneiventris Crawford, 1907. Invertebrata Pacifica 1: 194. ♀.

cabrilli (Cockerell). Calif. (San Miguel Island).
Halictus (*Chloralictus*) *cabrilli* Cockerell, 1937. Pan-Pacific Ent. 13: 155. ♂.

caducus (Sandhouse). N. Mex.
Halictus caducus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 17. ♀.

californiae (Ellis). Calif.
Halictus perpunctatus var. *californiae* Ellis, 1924. U. S. Natl. Mus., Proc. 65 (19): 6. ♀.
Lasioglossum (*Chloralictus*) *calforniae*(!) Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1112. *Lapsus calami.*

Taxonomy: Timberlake, 1940. South. Calif. Acad. Sci., Bul. 39: 190. ♀, ♂.

callidus (Sandhouse). Ill. and Mich. to New England, south to N. C.
Halictus callidus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 34. ♂.

cattellae (Ellis). Ohio, Que., New England, south to Ga.
Halictus cattellae Ellis, 1913. Ent. News 24: 209. ♀, ♂.

ceanothi Mitchell. N. C., Mich., Mo.
Dialictus ceanothi Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 386, fig. 99. ♀.

clarissimus (Ellis). N. Mex., Ariz.
Halictus clarissimus Ellis, 1914. N. Y. Ent. Soc., Jour. 22: 222. ♀.

clematisellus (Cockerell). N. Mex., Ariz., Calif., Utah. Predator: *Philanthus multimaculatus* Cam.
Halictus clematisellus Cockerell, 1904. Canad. Ent. 36: 13. ♀.

Taxonomy: Cockerell, 1904. Entomologist 39: 6. ♂, ♀.

coactus (Cresson). Tex.
Halictus coactus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 254. ♀.

coeruleus (Robertson). Minn. to Mass., south to Ga. Ecology: Nests in decomposed wood, but has been induced to nest in the soil.
Halictus coeruleus Robertson, 1893. Amer. Ent. Soc., Trans. 20: 146. ♀, ♂.

Biology: Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 167. —Stockhammer, 1967. Kansas Ent. Soc., Jour. 40: 177-189 (life history). —Barrows, 1973. Kansas Ent. Soc., Jour. 46: 496-499 (induced soil nesting experimentation).

comulus (Michener). N. Mex.
Halictus comis Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 18. ♀. Preocc. by Vachal, 1911.
Lasioglossum (*Chloralictus*) *comulum* Michener, 1951. *In* Muesebeck, Krombein, Townes, U. S. Dept. Agr., Agr. Monog. 2: 1113. N. name.

connexus (Cresson). Wis., Tex.
Halictus connexus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 253. ♀.

coreopsis (Robertson). Ill. and Mich. to Mass., south to Fla.
Halictus longiceps Robertson, 1892. Amer. Nat. 26: 272. ♀. Preocc. by Saunders, 1879.
Chloralictus cereopsis(!) Robertson, 1902. Canad. Ent. 34: 249. ♀.
Chloralictus coreopsis Robertson, 1902. Canad. Ent. 34: 250. ♂.
Lasioglossum (*Chloralictus*) *robertsonellum* Michener, 1951. *In* Muesebeck, Krombein, Townes, U. S. Dept. Agr., Agr. Monog. 2: 1117. N. name.

Biology: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 388-389, fig. 102 (synonymy, redescription).

crassiceps (Ellis). N. Mex.
Halictus crassiceps Ellis, 1914. Ent. News 25: 103. ♀.

creberrimus (Smith). N. C. to Fla., La.
Halictus creberrimus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 72. ♀.
Halictus ashmeadii Robertson, 1892. Amer. Nat. 26: 271. ♀.
Halictus ashmeadi Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 294. Emend.

cressonii (Robertson). N. S. to N. C., west to Alta., Wash., and Colo. Ecology: Nests in rotten wood above ground. Predator: *Philanthus lepidus* Cress., *P. politus politus* Say.
Halictus Cressonii Robertson, 1890. Amer. Ent. Soc., Trans. 17: 317. ♀, ♂.
Halictus (*Chloralictus*) *cressoni* Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 707. Emend.

cyaneonotus (Crawford). Nev.
Halictus cyaneonotus Crawford, 1907. Invertebrata Pacifica 1: 193. ♀.

cyanurus (Cockerell). Calif.
Halictus cyanurus Cockerell, 1936. Pan-Pacific Ent. 12: 157. ♀.

daggetti (Cockerell). Mexico (Baja California), near the border.
Halictus daggetti Cockerell, 1916. Canad. Ent. 48: 57. ♂.

delectatus Mitchell. N. B. to N. C., W. Va., Ohio, Ont.
Dialictus delectatus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 435. ♂.

disbanci Knerer and Atwood. Ont. and Que.
Dialictus disbanci Knerer and Atwood, 1966. Canad. Ent. 98: 882. ♀, ♂.

disparilis (Cresson). Kans., Tex., ?N. J., ?Alta., ?Nev.
Halictus disparilis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 253. ♀.

diversopunctatus (Ellis). Idaho, Wash., Calif., Ariz.
Halictus diversopunctatus Ellis, 1914. Ent. News 25: 154. ♀.

dreisbachi Mitchell. N. Y., Md., Mich., Minn.
Dialictus dreisbachi Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 391, fig. 101. ♀, ♂.

dubitatus Mitchell. N. Y. (Cortland Co.).
Dialictus dubitalus(!) Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 436. ♂. Spelled *dubitatus* in key (p. 376) and in index (p. 533).

eophilius (Ellis). N. Mex., Ariz.
Halictus eophilius Ellis, 1914. Ent. News 25: 153. ♀.

evestigatus (Sandhouse). Colo.
Halictus evestigatus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 27. ♂.

fattigi Mitchell. N. C., Ga.
Dialictus fattigi Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 392. ♀.

flaveriae Mitchell. Fla.
Dialictus flaveriae Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 393, figs. 101, 102. ♀, ♂.

foveolatus (Robertson). Ill., Mich.
Chloralictus foveolatus Robertson, 1902. Canad. Ent. 34: 250. ♂.

genuinus (Sandhouse). Ont. to N. C.
Halictus genuinus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 36. ♂.

grinnelli (Cockerell). Calif.; Mexico (Baja California).
Halictus grinnelli Cockerell, 1916. Canad. Ent. 48: 56. ♀.

halophitus (Graenicher). N. C. to Fla., La.
Halictus halophitus Graenicher, 1927. Psyche 34: 206. ♀, ♂.
Halictus halophilus Graenicher, 1930. Ent. Soc. Amer., Ann. 23: 156. Emend.

hartii (Robertson). Nebr., Minn. and Ill. to La. and N. C.
Halictus hartii Robertson, 1892. Amer. Nat. 26: 268. ♀.
Halictus rugosus Crawford, 1902. Canad. Ent. 34: 237. ♀, ♂.

hemimelas (Cockerell). Colo., N. Mex.
Halictus hemimelas Cockerell, 1901. Psyche, 9: 285. ♀.

heterognathus Mitchell. N. B. to Minn., south to N. C. and Tenn.
Dialictus heterognathus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 397, figs. 95, 99. ♀.
Dialictus banksi Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 434, fig. 102. ♂.

Taxonomy: Knerer and Atwood, 1963. Ent. Soc. Wash., Proc. 65: 167. ♂. —Knerer and Atwood, 1966. Canad. Ent. 98: 882 (synonymy).

highlandicus Mitchell. N. C., Ont.
Dialictus highlandicus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 398. ♀.

hudsoniellus (Cockerell). Colo., Ariz.
Halictus hudsoniellus Cockerell, 1919. Ent. News 30: 290. ♀.

hunteri (Crawford). Tex. to Calif.
Halictus hunteri Crawford, 1932. Ent. Soc. Wash., Proc. 34: 72. ♀.

hyalinus (Crawford). Wash. to Utah, Ariz., Nev. and Calif.
Halictus hyalinus Crawford, 1907. Invertebrata Pacifica 1: 194. ♀.

illinoensis (Robertson). Nebr., and Minn. to N. S., south to Tex. and Ga.
Halictus illinoensis Robertson, 1892. Amer. Nat. 26: 271. ♀.
Halictus illinoisensis Smith, 1910. N. J. State Mus., Ann. Rpt. 1909, p. 688. Emend.
Halictus (Chloralictus) politissimus Cockerell, 1917. *In* W. P. Cockerell, N. Y. Ent. Soc., Jour. 25: 189. ♀.

imitatus (Smith). New England and Que. west to Minn., south to Fla. and west to Calif. (Riverside Co.). Parasite: *Paralictus cephalotes* (Dalla Torre), *Pseudomethoca frigida frigida* (Sm.). Predator: *Philanthus albopilosus* Cress., *P. bilunatus* Cress., *P. gibbosus* (Fabr.), *P. lepidus* Cress., *P. politus politus* Say, *P. ventilabris* Fabr.
Halictus imitatus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 71. ♂.
Halictus inconspicuus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 73. ♀.
Halictus stultus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 254. ♀.
Chloralictus sparsus Robertson, 1902. Canad. Ent. 34: 249. ♀, ♂.
Halictus hortensis Lovell, 1905. Canad. Ent. 37: 39. ♀.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 350 (as *imitatus*). —Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 349 (as *inconspicuus*). —Michener, 1953. Kansas Univ. Sci. Bul. 35: 1027 (larva, as *sparsus*). —Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 168.

Biology: Michener and Wille, 1961. Kansas Univ. Sci. Bul. 42: 1123-1202, 44 figs., 11 tables (as *inconspicuus*).

Morphology: Knerer and Atwood, 1964. Ent. Soc. Wash., Proc. 66: 111-112 (metanotal anomaly).

impavidus (Sandhouse). Calif., Nev., Ariz.
Halictus impavidus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 18. ♀.

impurus (Cresson). Tex.
Halictus impurus Cresson, 1872. Amer. Ent. Soc., Trans. 4: 252. ♀.

incompletus (Crawford). N. Mex., Nev., Calif. Predator: *Philanthus crabroniformis* Sm., *P. gibbosus* (Fabr.), *P. pacificus arizonae* Dunn.
Halictus incompletus Crawford, 1907. Invertebrata Pacifica 1: 195. ♀.

Taxonomy: Michener, 1936. Ann. and Mag. Nat. Hist. (10) 19: 284. ♂.

insolitus (Sandhouse). Iowa.
Halictus insolitus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 41. ♂.

insulsus (Sandhouse). N. Mex.
Halictus insulsus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 29. ♂.

intrepidus Mitchell. Ga. (Stone Mt.).
Dialictus intrepidus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 437. ♂.

jameseae (Cockerell). Colo.
Halictus (*Chloralictus*) *jameseae* Cockerell, 1933. Ent. Soc. Amer., Ann. 26: 41. ♂.

junaluskensis Mitchell. N. C., N. Y., Mich., Minn.
Dialictus junaluskensis Mitchell, 1960 N. C. Agr. Expt. Sta. Tech. Bul. 141: 437. ♂.

kunzei (Cockerell). Ariz., Calif.
Halictus Kunzei Cockerell, 1898. Canad. Ent. 30: 238. ♀.

lactineus (Sandhouse). Colo.
Halictus lactineus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 34. ♂.

laevissimus (Smith). N. S. to Alta., south to Ga. and Calif. Predator: *Philanthus crabroniformis* (Sm.), *P. gibbosus* (Fabr.), *P. lepidus* Cress., *P. pacificus arizonae* Dunn., *P. pulcher* Dalla Torre.
Halictus laevissimus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 72. ♀.
Halictus levissimus Dalla Torre, 1896. Cat. Hym., v. 10, p. 68. Emend.
Halictus smilacinae Robertson, 1899. Acad. Sci. St. Louis, Trans. 7: 322. ♀.
Halictus euryceps Ellis, 1914. Ent. News 25: 98. ♀.

Taxonomy: Knerer and Atwood, 1962. Canad. Ent. 94: 1228. ♂.

Biology: Brittain, 1933. Canada Dept. Agr. Bul. (n. s.) 162: 94 (as *smilacinae*). —Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 168.

latus (Sandhouse). Colo.
Halictus latus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 20. ♀.

lazulis (Ellis). Colo.
Halictus lazulis Ellis, 1913. Ent. News 24: 207. ♀.

lectus Mitchell. Ga., D. C., N. J., Ind.
Dialictus lectus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 438. ♂.

leviensis Mitchell. N. C. to Fla.
Dialictus leviensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 403. ♀.

lineatulus (Crawford). Minn. to Newfoundland, south to Tex. and Ga. Predator: *Philanthus albopilosus* Cress., *P. gibbosus* (Fabr.)., *P. politus politus* Say, *P. solivagus* Say.
Halictus lineatulus Crawford, 1906. Canad. Ent. 38: 5. ♀.
Halictus subconnexus Ellis, 1915. Ent. News 26: 291. ♀.

Biology: Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 169.

Morphology: Knerer and Atwood, 1964. Ent. Soc. Wash., Proc. 66: 111-112 (metanotal anomaly).

lionotus Sandhouse. Colo.
Dialictus lionotus Sandhouse, 1923. Canad. Ent. 55: 194. ♂.

longicornis (Crawford). Calif.
Halictus longicornis Crawford, 1907. Invertebrata Pacifica 1: 195. ♂.

mactus (Sandhouse). Colo.
Halictus mactus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 37. ♂.

malinus (Sandhouse). Va.
Halictus malinus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 40. ♂.

marinensis (Michener). Calif.
Halictus (Chloralictus) marinensis Michener, 1936. Pan-Pacific Ent. 12: 167. ♀.

marinus (Crawford). Mass. to Fla.
Halictus marinus Crawford, 1904. Ent. News 15: 99. ♀.

Taxonomy: Graenicher, 1927. Psyche 34: 204. ♂. —Graenicher, 1930. Ent. Soc. Amer., Ann. 23: 156.

megastictus (Cockerell). Calif. (San Miguel Island).
Halictus (Chloralictus) megastictus Cockerell, 1937. Pan-Pacific Ent. 13: 152. ♀, ♂.

meritus (Sandhouse). Colo.
Halictus meritus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 19. ♀.

merosus (Sandhouse). N. Mex.
Halictus merosus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 40. ♂.

mesillensis (Cockerell). Tex. to Nev. and Calif.; Mexico (Hidalgo).
Halictus nymphalis race *mesillensis* Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 47. ♀. Republished by Cockerell, 1898. N. Mex. Univ., Bul. 1: 47. female.

microlepoides (Ellis). N. Mex., Ariz., Calif.; north. Mexico. Predator: *Philanthus gibbosus* (Fabr.), *P. multimaculatus* Cam., *P. ventilabris* Fabr.
Halictus microlepoides Ellis, 1914. Ent. News 25: 152. ♀.

Biology: Alcock and Gamboa, 1975. Ariz. Acad. Sci. 10: 163 (predator).

miniatulus Mitchell. Fla.
Dialictus miniatulus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 405. ♀.

mollis (Sandhouse). Colo.
Halictus mollis Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 39. ♂.

nevadensis (Crawford). Ariz., Nev., Calif.; Mexico (Baja California).
Halictus nevadensis Crawford, 1907. Invertebrata Pacifica 1: 195. ♀.
Halictus (Chloralictus) pasadenae Michener, 1936. Ann. and Mag. Nat. Hist. (10) 18: 285. ♀, ♂.

Taxonomy: Timberlake *In* Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1115 (synonymy).

nigroviridis (Graenicher). B. C. to N. B., south to Ga.
Halictus nigro-viridis Graenicher, 1910. Pub. Mus. City Milwaukee, Bul. 1: 233. ♀.

novascotiae Mitchell. N. S. to New England.
Dialictus novascotiae Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 407. ♀.

Taxonomy: Knerer and Atwood, 1964. Ent. News 75: 5, fig. 1. ♂.

nymphaearum (Robertson). Minn. and Kans. to N. S., south to Ga.
Halictus palustris Robertson, 1890. Amer. Ent. Soc., Trans. 17: 317. ♀, ♂. Preocc.
Halictus nymphaearum Robertson, 1895. Amer. Ent. Soc., Trans. 22: 117. N. name.
Halictus paludicola Dalla Torre, 1896. Cat. Hym., v. 10, p. 75. N. name.
Halictus oceanicus Cockerell, 1916. Brooklyn Ent. Soc., Bul. 11: 11. ♀.

nymphalis (Smith). Minn. and Mass. south to Tex. and Fla.
Halictus nymphalis Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 68. ♀.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 352.

oblongus (Lovell). Colo., Minn. and N. S., south to N. Mex., La. and Ga. Ecology: Nests in rotten wood above ground.
Halictus oblongus Lovell, 1905. Canad. Ent. 37: 40. ♀.
Halictus planatus Lovell, 1905. Canad. Ent. 37: 300. ♀.

Taxonomy: Lovell, 1908. Psyche 15: 39. ♂.

obnubilus (Sandhouse). Colo.
Halictus (Chloralictus) obnubilus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 28. ♂.

obscurus (Robertson). Minn. and Ill. to Conn. and Ont., south to Ga. Predator: *Philanthus gibbosus* (Fabr.).
Halictus obscurus Robertson, 1892. Amer. Nat. 26: 270. ♀.

occidentalis Crawford. Colo., N. Mex.
Dialictus occidentalis Crawford, 1902. Canad. Ent. 34: 318. ♀.
Halictus galei Cockerell, 1919. Canad. Ent. 51: 272. ♀.

oleosus (Cockerell). Colo., N. Mex.
Halictus oleosus Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 47. ♀. Republished by Cockerell, 1898. N. Mex. Univ., Bul. 1: 47, female.

orbitatus Mitchell. Minn. to Conn. and Ont., south to N. C. and W. Va.
Dialictus orbitatus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 440, fig. 101. ♂.

ornduffi Hurd. Calif. Pollen: Apparently a narrowly polylectic visitor to the flowers of *Jepsonia heterandra*, but also visits flowers of Compositae apparently for nectar.
Dialictus ornduffi Hurd, 1970. Pan-Pacific Ent. 46: 210. ♀, ♂.

Biology: Ornduff, 1971. Evolution 25: 300-311, 1 fig., 7 tables (role in pollination of *Jepsonia heterandra*).

otsegoensis Mitchell. Mich. (Otsego Co.).
Dialictus otsegoensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 440. ♂.

pacatus (Sandhouse). Colo.
Halictus pacatus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 16. ♀.

pallidellus (Ellis). N. Mex., Utah, Calif.
Halictus pallidellus Ellis, 1914. Ent. News 25: 151. ♀.

paradmirandus Knerer and Atwood. Ont.
Dialictus paradmirandus Knerer and Atwood, 1966. Canad. Ent. 98: 886. ♀, ♂.

paululus (Sandhouse). Colo.
Halictus paululus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 23. ♂.

pavoninus (Ellis). Colo.
Halictus pavoninus Ellis, 1913. Ent. News 24: 206. ♀.

pensitus (Sandhouse). Colo.
Halictus pensitus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 38. ♂.

perdifficilis (Cockerell). Colo., N. Mex.; north. Mexico.
Halictus perdifficilis Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 68. ♀.
Halictus perfficilis(!) Cockerell, 1897. N. Mex. Agr. Expt. Sta., Bul. 24: 19.

Taxonomy: Cockerell, 1901. Ann. and Mag. Nat. Hist. (7) 7: 126.

perexiguus (Sandhouse). N. Mex.
Halictus perexiguus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 26. ♂.

perichlarus (Cockerell). Calif.
Halictus (Chloralictus) perichlarus Cockerell, 1937. Pan-Pacific Ent. 13: 153. ♀, ♂.
Halictus perichlorus Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 428. Emend.

perparvus (Ellis). Ariz., Calif.; Mexico. Predator: *Philanthus multimaculatus* Cam.
Halictus perparvus Ellis, 1914. Ent. News 25: 102. ♀.

perpunctatulus Knerer and Atwood. Boreal Canada.
Dialictus perpunctatulus Knerer and Atwood, 1966. Canad. Ent. 98: 884. ♀, ♂.

perpunctatus (Ellis). N. B. to Ga., west to N. Mex., Colo. and Calif.
Halictus perpunctatus Ellis, 1913. Ent. News 24: 210. ♀.
Halictus brycinci Crawford, 1932. Ent. Soc. Wash., Proc. 34: 70. ♀.

perspicuus Knerer and Atwood. Ont., south to N. Y., west to Minn.
Dialictus perspicuus Knerer and Atwood, 1966. Canad. Ent. 98: 883. ♀, ♂.

petrellus (Cockerell). Calif.; Mexico (Baja California).
Halictus petrellus Cockerell, 1903. South. Calif. Acad. Sci., Bul. 2: 84. ♀.
Halictus coronadensis Cockerell, 1916. Canad. Ent. 48: 56. ♂.

phaceliarum (Cockerell). Colo.
Halictus phaceliarum Cockerell, 1919. N. Y. Ent. Soc., Jour. 27: 299. ♀.

philanthanus Mitchell. N. C., N. Y., Mich., Ont. Predator: *Philanthus* sp.
Dialictus philanthanus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 441. ♂.

pictus (Crawford). Nebr., Minn., Wis., Mich., Ill., Ont.
Halictus pictus Crawford, 1902. Canad. Ent. 34: 236. ♀.
Halictus graenicheri Ellis, 1914. N. Y. Ent. Soc., Jour. 22: 221. ♀.
Dialictus muskegonensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 439. ♂.

Biology: Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 170.

pikei (Sandhouse). Colo.
Halictus pikei Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 28. ♂.

pilosellus (Cockerell). Calif.
Halictus pilosellus Cockerell, 1936. Pan-Pacific Ent. 12: 160. ♀.

pilosicaudus (Cockerell). Calif. (San Miguel Isl.).
Halictus (*Chloralictus*) *pilosicaudus* Cockerell, 1937. Pan-Pacific Ent. 13: 155. ♀.

pilosus floridanus (Robertson). N. C. to Fla.
Halictus floridanus Robertson, 1892. Amer. Nat. 26: 269. ♀.

pilosus pilosus (Smith). Colo. and Minn. to N. S., south. to Ga. Parasite: *Sphecodes atlantis* Mitchell. Predator: *Philanthus albopilosus*, *P. gibbosus* (Fabr.), *P. politus politus* Say.
Halictus pilosus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 71. ♀.
Halictus pilosus var. *leucocomus* Lovell, 1908. Psyche 15: 37. ♀.
Halictus floridanus caesareus Cockerell, 1916. Brooklyn Ent. Soc., Bul. 11: 11. ♀.

Taxonomy: Robertson, 1895. Amer. Ent. Soc., Trans. 22: 117. ♂. —Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 351. —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 152: 547.

Biology: Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 170.

placidensis Mitchell. Fla.
Dialictus placidensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 441. ♂.

praepes (Sandhouse). Colo.
Halictus praepes Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 30. ♂.

pruinosiformis (Crawford). Alta., S. D., Iowa, Nebr., N. Mex., Tex., Ariz., Nev., Calif. Predator: *Philanthus multimaculatus* Cam.
Halictus pruinosiformis Crawford, 1906. Canad. Ent. 38: 284. ♀, ♂.
Halictus glaucovirens Cockerell, 1919. Ent. News 30: 290. ♀.
Halictus exalbidus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 24. ♂.

pruinosus (Robertson). New England states, south to N. J., west to Alta. and Ariz. Parasite: *Rhipiphorus fasciatus* Say. Predator: *Philanthus ventilabris* Fabr.
Halictus pruinosus Robertson, 1892. Amer. Nat. 26: 269. ♀, ♂.

Biology: Melander and Brues, 1903. Biol. Bul. 5: 1.

pseudotegularis (Cockerell). N. Mex.; Mexico
Halictus pseudotegularis Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 294. ♀.

pudicus (Sandhouse). Colo.
Halictus pudicus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 33. ♂.

punctatoventris (Crawford). Calif.; Mexico (Baja California).
Halictus punctatoventris Crawford, 1907. Invertebrata Pacifica 1: 196. ♀, ♂.

punctiferellus (Cockerell). Calif. (San Miguel Island).
Halictus (Chloralictus) punctiferellus Cockerell, 1937. Pan-Pacific Ent. 13: 154. ♀.

raleighensis (Crawford). N. C. to Fla.
Halictus raleighensis Crawford, 1932. Ent. Soc. Wash., Proc. 34: 73. ♀.

reticulatus (Robertson). Ill. and Mich. to Maine, south to Fla.
Halictus fulvipes Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 67. ♀. Preocc.
Halictus reticulatus Robertson, 1892. Amer. Nat. 26: 268. ♀.
Halictus rhododactylus Dalla Torre, 1896. Cat. Hym., v. 10, p. 80. ♀. N. name.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 351. —Mitchell, 1958. *In* Krombein, U. S. Dept. Agr., Agr. Monog. 2, sup. 1: 230. (synonymy).

rhodognathus (Cockerell). Tex.
Halictus (Chloralictus) rhodognathus Cockerell, 1917. *In* W. P. Cockerell, N. Y. Ent. Soc., Jour. 25: 190. ♀.

richardsoni (Cockerell). Alta.
Halictus (Chloralictus) richardsoni Cockerell, 1937. Canad. Ent. 69: 113. ♀.

rohweri (Ellis). Minn. to Maine and Ont., south to Ga. Parasite: *Pseudomethoca frigida frigida* (Sm.). Predator: *Philanthus gibbosus* (F.).
Halictus subconnexus rohweri Ellis, 1915. Ent. News 26: 292. ♀.

Taxonomy: Knerer and Atwood, 1962. Canad. Ent. 94: 1230. ♂.

Biology: Knerer and Atwood, 1962. Ent. Soc. Ontario, Proc. 92: 171. —Breed, 1975. Kansas Ent. Soc., Jour. 48: 64-80, 3 figs., 7 tables (life cycle, behavior).

rufulipes (Cockerell). Sask.
Halictus (Chloralictus) rufulipes Cockerell, 1938. Amer. Mus. Novitates 983: 3. ♀.

ruidosensis (Cockerell). Colo., N. Mex., Ariz. Predator: *Philanthus pacificus arizonae* Dunn., *P. pulcher* Dalla Torre.
Halictus ruidosensis Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 142. ♀, ♂.

sagax (Sandhouse). Colo.
Halictus sagax Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 25. ♂.

sandhouseae (Michener). Colo., Minn., Ont.
Halictus occultus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 27. ♂. Preocc. by Vachal, 1904.
Lasioglossum (Chloralictus) sandhouseae Michener, 1951. *In* Muesebeck, Krombein, Townes, U. S. Dept. Agr., Agr. Monog. 2: 1117. N. name.

Taxonomy: Knerer and Atwood, 1964. Ent. News 75: 7. (female).

scrophulariae (Cockerell). Colo.
Halictus (Chloralictus) scrophulariae Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 428. ♀.

sedi (Sandhouse). Calif., Oreg., Colo.
Halictus sedi Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 12. ♀.

Taxonomy: Timberlake *In* Michener, 1958. *In* Krombein, U. S. Dept. Agr., Agr. Monog. 2, Sup. 1: 230 (tax. status).

semibrunneus (Cockerell). N. Mex.
Halictus semibrunneus Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 67. ♀.

semicaeruleus (Cockerell). N. Mex.
Halictus semicaeruleus Cockerell, 1895. Ann. and Mag. Nat. Hist. (6) 16: 66. ♀.

solidaginis Mitchell. Mich. to Maine, south to Ind., W. Va., and N. Y.
Dialictus solidaginis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 443, fig. 102. ♂.

stictaspis Sandhouse. N. Mex.
Dialictus stictaspis Sandhouse, 1923. Canad. Ent. 55: 195. ♂.

stuartensis Mitchell. Fla. (Stuart).
Dialictus stuartensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 419. ♀.

subversans Mitchell. Mich., N. Y.
Dialictus subversans Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 419. ♀.

subviridatus (Cockerell). Sask.
Halictus (Chloralictus) subviridatus Cockerell, 1938. Amer. Mus. Novitates 983: 2. ♀, ♂.

succinipennis (Ellis). Colo.
Halictus succinipennis Ellis, 1913. Ent. News 24: 205. ♀.

supraclypeatus Mitchell. Va., Mich., Tenn., Mo.
Dialictus supraclypeatus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 420, fig. 99. ♀.

surianae Mitchell. Fla.
Dialictus surianae Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 420. ♀.

tahitensis Mitchell. Fla. (Tahiti Beach).
Dialictus tahitensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 421. ♀.

tamiamensis Mitchell. Fla.
Dialictus tamiamensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 421, figs. 98, 101, 102. ♀, ♂.

tarponensis Mitchell. Fla., Ga.
Dialictus tarponensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 423. ♀.

tegulariformis (Crawford). Idaho, Utah, Nev., N. Mex., Ariz., Calif.; Mexico (Baja California). Predator: *Philanthus pacificus arizonae* Dunn.
Halictus tegulariformis Crawford, 1907. Invertebrata Pacifica 1: 194. ♀, ♂.
Halictus helianthi Cockerell, 1916. Canad. Ent. 48: 77. ♀.
Halictus gaudialis Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 23. ♂.

Taxonomy: Michener, 1936. Ann. and Mag. Nat. Hist. (10) 18: 283. ♂.

Biology: Timberlake *In* Michener, 1951. *In* Muesebeck, Krombein, Townes, U. S. Dept. Agr., Agr. Monog. 2: 1118 (synonymy).

tegularis (Robertson). Minn. to N. H., south to Tex. and Fla.; recorded probably erroneously from Mont., Colo., Calif., and Mexico. Predator: *Philanthus lepidus* Cress.
Halictus tegularis Robertson, 1890. Amer. Ent. Soc., Trans. 17: 318. ♀, ♂.
Halictus ellisiae Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 11. ♀.
Halictus lepidii Graenicher, 1927. Psyche 34: 204. ♀, ♂.

tenax (Sandhouse). Colo.
Halictus tenax Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 15. ♀.

tenuis (Ellis). Colo.
Halictus tenuis Ellis, 1913. Ent. News 24: 208. ♀.

testaceus (Robertson). N. C., Wis., Ill., N. Dak.
Halictus testaceus Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 323. ♀.

theodori Crawford. N. Mex.
Dialictus Theodori Crawford, 1902. Canad. Ent. 34: 318. ♀.

tranquillus (Sandhouse). N. Mex.
Halictus tranquillus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 32. ♂.

unicus (Sandhouse). Minn., Mich., N. H., Ont., Va., N. C.
Halictus unicus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 21. ♀.

vanduzeei (Sandhouse and Cockerell). South. Calif. (Inyo County); Mexico (Baja California).
Halictus vanduzeei Sandhouse and Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 13: 334. ♀.

veganus (Cockerell). N. Mex., Calif.
Halictus veganus Cockerell, 1901. Psyche 9: 286. ♀.

versans (Lovell). Minn. to Newfoundland, south to Ga.; reportedly introduced in vicinity of San Francisco. Predator: *Philanthus lepidus* Cress., *P. solivagus* Say.
Halictus versans Lovell, 1905. Canad. Ent. 37: 39. ♀ (♂ misdet.).
Halictus consonus Sandhouse, 1924. U. S. Natl. Mus., Proc. 65 (19): 30. ♂.

versatus (Robertson). Minn. to Ont., south to Ga. and La. Parasite: *Pseudomethoca frigida frigida* (Sm.)? Predator: *Philanthus ventilabris* Fabr.
Chloralictus versatus Robertson, 1902. Canad. Ent. 34: 249. ♀, ♂.

Biology: Michener, 1966. Kansas Ent. Soc., Jour. 39: 193-217 (bionomics).

vierecki (Crawford). Minn. to New England, south to La. and Ga.
Halictus vierecki Crawford, 1904. Ent. News 15: 97. ♀.

Taxonomy: Graenicher, 1910. Canad. Ent. 42: 158. ♂.

viridatulus (Cockerell). Colo., Calif.
Halictus viridatulus Cockerell, 1919. Ent. News 30: 290. ♀.

viridatus (Lovell). Minn. to N. S., south to La. and Ga.
Halictus viridatus Lovell, 1905. Canad. Ent. 37: 300. ♀.
Dialictus lepidus Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 438. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 547.

Biology: Atwood, 1933. Canad. Jour. Res. 9: 453.

weemsi Mitchell. N. C., Ga.
Dialictus weemsi Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 431, fig. 99. ♀.

wheeleri Mitchell. Mass. (Forest Hills).
Dialictus wheeleri Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 445. ♂.

zephyrus (Smith). Maine to Ga., west to Minn., Colo. and Tex., Utah, Oreg. Parasite: *Paralictus cephalotes* (Dalla Torre), *Pseudomethoca frigida* (Sm.). Predator: *Philanthus gibbosus* (F.).
Halictus zephyrus Smith, 1853. Cat. Hym. Brit. Mus., v. 2, p. 68. ♂.

Taxonomy: Robertson, 1895. Amer. Ent. Soc., Trans. 22: 117. ♀. —Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 352. ♂.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 1. —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 157. —LaBerge and Isakson, 1963. Ent. News 74: 113-116. —Lin, 1964. Ins. Sociaux 11: 187-192 (reaction to mutillid parasitism). —Batra, 1964. Ins. Sociaux 11: 159-186, 20 figs. (behavior). —Batra, 1965. Kansas Ent. Soc., Jour. 38: 367-389 (associated organisms). —Batra, 1966. Kansas Univ. Sci. Bul 46: 359-423 (life cycle, behavior). —Michener and Brothers, 1971. Kansas Ent. Soc., Jour. 44: 236-239. —Michener, Brothers and Kamm, 1971. Kansas Ent. Soc., Jour. 44: 276-279 (queen-worker relationships). —Michener, Brothers and Kamm, 1971. Natl. Acad. Sci. U. S. A., Proc. 68: 1241-1245 (interactions within colonies). —Bell, 1973. Ins. Sociaux 20: 189-196. —Bell, 1973. Ins. Sociaux 20: 253-260 (factors controlling initiation of vitellogenesis). —Barrows and Snyder, 1973. Ent. News 84: 314-316. —Kamm, 1974. Kansas Ent. Soc., Jour. 47: 8-18 (effects of temperature, day length and number of adults on size of cells and offspring). —Brothers and Michener, 1974. Jour. Compar. Physiol. 90: 129-168 (ethometry of division of labor). —Brothers, 1974. Acad. Natl. Sci. U. S. A., Proc. 71: 671-674 (origin of altruism). —Bell, Breed, Richards and Michener, 1974. Jour. Compar. Physiol. 93: 173-181 (nest defense). —Bell and Hawkins, 1974. Jour. Compar. Physiol. 13: 183-193 (nest defense). —Bell, 1974. Jour. Compar. Physiol. 13: 195-202 (intraspecific defense of nests). —Barrows, 1975. Behavioral Biol. 15: 57-64 (female odor production, male response). —Kumar, 1975. Kansas Ent. Soc., Jour. 48: 374-380, 3 tables (cell size). —Barrows, Bell, and Michener, 1975. Natl. Acad. Sci. U. S. A., Proc. 72: 2824-2828 (individual odor differences and their social functions). —Breed and Gamboa, 1977. Science 195: 694-696, 2 figs. (behavioral control of workers by queens).

zophops (Ellis). Colo.
Halictus zophops Ellis, 1914. Ent. News 25: 97. ♀.

Genus PARALICTUS Robertson

Paralictus Robertson, 1901. Canad. Ent. 33: 299.
Type-species: *Halictus cephalotes* Dalla Torre. Orig. desig. (=*Halictus cephalicus* Robertson).

Members of this genus are believed to be inquilines in the nests of the genus *Dialictus*.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 445-450, figs. 103, 104, table 13 (included species).

asteris Mitchell. N. Y. to N. C., west to Mich., Ind. and Tenn. Ecology: Visits flowers of *Aster* and *Robinia*.
Paralictus asteris Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 446. ♀, ♂.

cephalotes (Dalla Torre). Minn. to Conn., south to N. C. Ecology: Visits flowers of *Gonolobus laevis, Leucanthemum, Salix nigra*. Host: *Dialictus imitatus* (Sm.).
Halictus cephalicus Robertson, 1892. Amer. Nat. 26: 270. ♀, ♂. Preocc.
Halictus cephalotes Dalla Torre, 1896. Cat. Hym., v. 10, p. 57. N. name.

michiganensis Mitchell. Mich. (Wayne Co.).
Paralictus michiganensis Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 148. ♀.

platyparius (Robertson). Minn., Mich., and Md., south to N. C. Ecology: Visits flowers of *Aster, Cucurbita, Erigeron, Gnaphalium, Gonolobus, Koellia, Rhus, Salix, Solidago, Taraxacum, Zanthoxylum, Zizia*.
Halictus platyparius Robertson, 1895. Amer. Ent. Soc., Trans. 22: 117. ♀.

simplex Robertson. Mich. to Mass., south to N. C. Ecology: Visits flowers of *Achillea, Ranunculus, Rubus, Solidago, Zizia*.
Paralictus simplex Robertson, 1901. Canad. Ent. 33: 230. ♀.

Genus SPHECODES Latreille

Sphecodes Latreille, 1804. Nouv. Dict. Hist. Nat., v. 24, p. 182.
Type-species: *Sphex gibba* Linnaeus. Monotypic.
Dichroa Illiger, [1806]. Mag. Insektenk. 5: 39.
Type-species: *Sphex gibba* Linnaeus. Desig. by Sandhouse, 1943.
Sabulicola Verhoeff, 1890. Ent. Nachr. 16: 328.
Type-species: *Sabulicola cirsii* Verhoeff. Monotypic.
Drepanium Robertson, 1903. Ent. News 14: 103.
Type-species: *Sphecodes falcifer* Patton. Monotypic.
Proteraner Robertson, 1903. Ent. News 14: 103.
Type-species: *Sphecodes ranunculi* Robertson. Monotypic.
Sphecodium Robertson, 1903. Ent. News 14: 104.
Type-species: *Sphecodes mandibularis* Cresson. Orig. desig. (=*Sphecodium cressonii* Robertson).
Machaeris Robertson, 1903. Ent. News 14: 104.
Type-species: *Sphecodes stygius* Robertson. Orig. desig.
Dialonia Robertson, 1903. Ent. News 14: 104.
Type-species: *Sphecodes antennariae* Robertson. Monotypic and orig. desig.
Sphecodes subg. *Microsphecodes* Eickwort and Stage, 1972. Kans. Ent. Soc., Jour. 45: 501.
Type-species: *Sphecodes kathleenae* Eickwort. Orig. desig.

This is a large and nearly worldwide genus of parasitic bees. While most of the species are cleptoparasites in the nests of other Halictinae, some are parasitic in the nests of certain species of Andrenidae and Colletidae. The adults visit a wide variety of flowers often in the company of their pollen collecting hosts.

There are obviously several subgenera of the genus *Sphecodes* represented in the Nearctic Region and some of the names cited above are available. However, until further studies are made, it is not possible to establish the limits of the subgenera present in our area.

Taxonomy: Robertson, 1903. Ent. News 14: 103 (Illinois species). —Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 450-451 (key to large species). —Lovell and Cockerell, 1907. Psyche 14: 101 (Maine species). —Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 469-506 (eastern U. S. spp.). —Torchio, 1975. Kans. Ent. Soc., Jour. 48: 264-265, 269-275, 278-279, figs. 15-18, 27 (life history, larvae, pupae).

antennariae Robertson. Wis. and Mich. to N. C.
Sphecodes antennariae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 63. ♀.

aroniae Mitchell. Va., N. C.
Sphecodes aroniae Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 474. ♀, ♂.

arroyanus Cockerell. Alta., N. D., Colo., N. Mex., Calif.
Sphecodes arroyanus Cockerell, 1904. Entomologist 37: 231. ♀.

arvensiformis Cockerell. Colo., Utah, Oreg., Calif. Host: *Halictus farinosus* Sm.
Sphecodes arvensiformis Cockerell, 1904. *In* Viereck, Canad. Ent. 36: 232. ♀.
Sphecodes levequeae Cockerell, 1929. Ann. and Mag. Nat. Hist. (10) 4: 296. ♀.

Taxonomy: Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 191. ♂.

asclepiadis Cockerell. N. Mex.
Sphecodes asclepiadis Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 45. ♀.
Republished by Cockerell, 1898. N. Mex. Univ., Bul. 1: 45. female.

atlantis Mitchell. Vt. and Mass., south to Fla., west to Tex., Ark., Tenn., Mich., Minn. Host: *Dialictus pilosus pilosus* (Sm.).
Sphecodes atlantis Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 221. ♀, ♂.

autumnalis Mitchell. Mich., Ont. and N. Y., south to N. C.
Sphecodes autumnalis Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 209. ♀, ♂.

banksii Lovell. Minn. to N. Y., south to Fla.
Sphecodes banksii Lovell, 1909. Ent. News 20: 416. ♀.

borealis Cockerell. Sask.
Sphecodes borealis Cockerell, 1937. Amer. Mus. Novitates 909: 2. ♂.

brachycephalus Mitchell. N. C. to Fla. Host: *Calliopsis andreniformis* Sm?
Sphecodes brachycephalus Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 207. ♀, ♂.

californicus Meyer. Calif.; Mexico.
Sphecodes californicus Meyer, 1922. Arch. Naturgesch. 88 (Abt. A, Heft. 8): 173. ♀.

carolinus Mitchell. Minn. to Maine, south to Tenn. and N. C.
Sphecodes carolinus Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 219. ♀.

castaneae Mitchell. Va. (Falls Church).
Sphecodes castaneae Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 480. ♀.

clematidis Robertson. Man. and Kans. to N. S., south to N. C.
Sphecodes clematidis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 320. ♀, ♂.
Sphecodes obscurans Lovell and Cockerell, 1907. Psyche 14: 103. ♀.
Sphecodes australis Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 213. ♂.

columbiae Cockerell. Wash.
Sphecodes columbiae Cockerell, 1906. Canad. Ent. 38: 280. ♀.

confertus Say. Minn. and Colo to N. S., Tex. and Ga.
Sphecodes confertus Say, 1837. Boston Jour. Nat. Hist. 1: 392.
Sphecodes falcifer Patton, 1880. Amer. Ent. 1: 230. ♀, ♂.
Drepanum falciferum Robertson, 1903. Ent. News 14: 105. ♀, ♂.
Sphecodes pithanus Lovell, 1909. Ent. News 20: 122. ♀.

Taxonomy: Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 317. ♂, ♀.

coronus Mitchell. Minn. to Que. and New England, south to N. C.
Sphecodes coronus Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 215. ♂.
Sphecodes canadensis Mitchell. 1956. Elisha Mitchell. Sci. Soc., Jour. 72: 218. ♂.

crawfordi Mitchell. N. C. (Bryson City).
Sphecodes crawfordi Mitchell, 1956. Elisha Mitchell, Sci. Soc., Jour. 72: 217. ♀.

cressonii (Robertson). Minn. and Ont. to New England, south to Mo. and N. C.
Sphecodium cressonii Robertson, 1903. Ent. News 14: 106. ♀, ♂.
Sphecodes nephelotus Lovell and Cockerell, 1907. Psyche 14: 106. ♂.
Sphecodes nubilus Lovell, 1909. Ent. News 20: 124, 417. Error for *nephelotus*.
Sphecodes heterurus Lovell, 1911. Ent. News 22: 212. ♀.

davisii Robertson. Minn. and Ont. to N. Y. and New England. Predator: *Philanthus solivagus* Say.
Sphecodes davisii Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 319. ♂.

Taxonomy: Graenicher, 1910. Canad. Ent. 42: 159. ♂, ♀.

dichrous Smith. Minn. to N. S., south to Mo. and Ga. Host: *Halictus rubicundus* (Chr.). Predator: *Philanthus gibbosus* (Fabr.).
Sphecodes dichroa Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 38. ♀ (not male).
Sphecodes arvensis Patton, 1880. Amer. Ent. 1: 230. ♀, ♂.

?Halictus scabrosus Provancher, 1882. Nat. Canad. 13: 200. ♂.
Sphecodes lautus Lovell and Cockerell, 1907. Psyche 14: 103. ♀.
Sphecodes (*Sphecodes*) *macfarlandi* Viereck, 1909. Ent. News 20: 292. ♀.

eustictus Cockerell. Wash., Colo.
Sphecodes eustictus Cockerell, 1906. Canad. Ent. 38: 162. ♀.

exaltus Mitchell. N. C. (Southern Pines).
Sphecodes exaltus Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 217. ♀.

fattigi Mitchell. Fla. (Gainesville).
Sphecodes fattigi Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 220. ♂.

fortior Cockerell. N. Mex., Ariz., Calif.
Sphecodes fortior Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 44. ♀. Republished by Cockerell, 1898. N. Mex. Univ., Bul. 1: 44. female.

Biology: Newberry, 1899. Psyche 9: 94.

fragariae Cockerell. Colo., N. Mex. Host: *Perdita nuda* Ckll.?
Sphecodes fragariae Cockerell, 1903. *In* Viereck, Amer. Ent. Soc., Trans. 29: 99.

galerus Lovell and Cockerell. N. H. and Vt. to Va.
Sphecodes galerus Lovell and Cockerell, 1907. Psyche 14: 106. ♀.

heraclei heraclei Robertson. Ill. to New England south to Ala. and Fla.
Sphecodes heraclei Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 318. ♀.

heraclei ignitus Cockerell. Ala., Fla.
Sphecodes ignitus Cockerell, 1922. U. S. Natl. Mus., Proc. 60 (18): 13. ♂.

hesperellus Cockerell. Wash., Oreg., Calif.
Sphecodes (*Sphecodes*) *hesperellus* Cockerell, 1904. *In* Viereck, Canad. Ent. 36: 232. ♀.

hudsoni Cockerell. Hudson's Bay, Canada.
Sphecodes hudsoni Cockerell, 1913. Canad. Ent. 45: 12. ♀.

hydrangeae Mitchell. Conn. to N. C.
Sphecodes hydrangeae Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 214. ♂.

illinoensis (Robertson). Minn. and Ont. to New England, south to N. C.
Machaeris illinoensis Robertson, 1903. Ent. News 14: 107. ♀.

johnsonii Lovell. Que. and N. B., south to N. C.
Sphecodes johnsonii Lovell, 1909. Ent. News 20: 122. ♀.

kincaidii Cockerell. Wash.
Sphecodes kincaidii Cockerell, 1898. Acad. Nat. Sci. Phila., Proc. 50: 56. ♀.

knetschi Cockerell. Ill. to New England, south to N. C.
Sphecodes knetschi Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 186. ♀, ♂.

lautipennis Cockerell. Sask., N. D., Mont., Wash., Colo., Calif.
Sphecodes lautipennis Cockerell, 1908. Entomologist 41: 60. ♂.

levis Lovell and Cockerell. Minn. and Ont. to Maine, south to Tenn. and N. C.
Sphecodes levis Lovell and Cockerell, 1907. Psyche 14: 105. ♀, ♂.

mandibularis Cresson. Colo., Kans., N. Mex., Calif.
Sphecodes mandibularis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 250. ♀.

manni Cockerell. Wash.
Sphecodes manni Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 63. ♀.

millsi Cockerell. Colo.
Sphecodes millsi Cockerell, 1919. Ent. News 30: 288. ♂.

minor Robertson. Alta. to Maine, south to N. C. and Miss.
Sphecodes minor Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 45. ♀.

nigricans miguelensis Timberlake. Calif. (San Miguel Island).
Sphecodes nigricans miguelensis Timberlake, 1940. South. Calif. Acad. Sci., Bul. 39: 193. ♂.

nigricans nigricans Timberlake. Calif.
Sphecodes nigricans Timberlake, 1940. South. Calif. Acad. Sci., Bul. 39: 192. ♂.

nigricorpus Mitchell. Conn. (Colebrook).
Sphecodes nigricorpus Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 220. ♂.

nitidissimus Cockerell. Colo.
Sphecodes (*Sphecodium*) *nitidissimus* Cockerell, 1910. Canad. Ent. 42: 367. ♂.

olympicus Cockerell. Wash.
Sphecodes (*Drepanium*) *Olympicus* Cockerell, 1904. *In* Viereck, Canad. Ent. 36: 230. ♀.

paraplesius Lovell. R. I.
Sphecodes paraplesius Lovell, 1911. Ent. News 22: 212. ♀.

patruelis Cockerell. Wash. Predator: *Philanthus crabroniformis* Sm.
Sphecodes patruelis Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 61. ♀, ♂.

pecosensis pecosensis Cockerell. Colo., N. Mex.
Sphecodes pecosensis Cockerell, 1904. Entomologist 37: 5. ♀.
Proteraner leptanthi Cockerell, 1904. Entomologist 37: 232. ♂.

Taxonomy: Cockerell, 1906. Canad. Ent. 38: 165. —Cockerell, 1909. Canad. Ent. 41: 219. ♀, ♂. —Timberlake, 1951. In Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1122 (synonymy).

pecosensis salicis Cockerell. Calif.
Sphecodes pecosensis salicis Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 547. ♀.

perlustrans Cockerell. N. Mex.
Sphecodes perlustrans Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 45. ♀.
Republished by Cockerell, 1898. N. Mex. Univ., Bul. 1: 45. female.

persimilis Lovell and Cockerell. Mich. to N. Y., R. I., Maine.
Sphecodes persimilis Lovell and Cockerell, 1907. Psyche 14: 103. ♀.

pimpinellae Robertson. Ill. to Kans. south to Va. and N. C. Host: *Augochlora persimilis* (Vier.), *A. striata* (Prov.).
Sphecodes pimpinellae Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 51. ♀.
Sphecodes distolus Lovell, 1909. Ent. News 20: 416. ♀.

Biology: Ordway, 1964. Kans. Ent. Soc., Jour. 37: 139-152, 5 figs. (parasitic relationships; probable male).

politulus Cockerell. Sask.
Sphecodes politulus Cockerell, 1937. Amer. Mus. Novitates 909: 3. ♂.

prosphorus Lovell and Cockerell. Minn. to N. S., south to N. C.
Sphecodes prosphorus Lovell and Cockerell, 1907. Psyche 14: 404. ♀, ♂.

prostygius Mitchell. N. H., Fla.
Sphecodes prostygius Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 499. ♀.

pulsatillae Cockerell. Colo.
Sphecodes hesperellus pulsatillae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 18: 75. ♀.

pusillus Cockerell. Sask.
Sphecodes pusillus Cockerell, 1937. Amer. Mus. Novitates 909: 3. ♂.

pycnanthemi Robertson. Ill., Colo.
Sphecodes pycnanthemi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 320. ♀.

ranunculi Robertson. Minn. to Maine, south to N. C., Kans., ?Ariz.
Sphecodes ranunculi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 318. ♀, ♂.

rhois (Cockerell). Colo., N. Mex., Ariz.; Mexico.
Proteraner rhois Cockerell, 1904. Entomologist 37: 233. ♂.

rohweri Cockerell. Colo., N. Mex.
Sphecodes (*Machaeris*) *Rohweri* Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 450. ♀.

semicoloratus (Cockerell). N. Mex.
Halictus semicoloratus Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 168. ♀.

shawi Lovell. N. H.
Sphecodes shawi Lovell, 1911. Ent. News 22: 212. ♀.

smilacinae Robertson. Minn., Ill.
Sphecodes smilacinae Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 321. ♀.

solidaginis Cockerell. Sask.
Sphecodes solidaginis Cockerell, 1937. Amer. Mus. Novitates 909: 2. ♂.

solonis Graenicher. Minn., Ont., and New England.
Sphecodes solonis Graenicher, 1910. Pub. Mus. City Milwaukee, Bul. 1: 229. ♂, ♀.
Sphecodes morsei Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 213. ♀.
Sphecodes packardi Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 216. ♂.

sophiae Cockerell. Colo., N. Mex., Ariz., Calif.
Sphecodes sophiae Cockerell, 1898 Denison Univ. Sci. Labs., Bul. 11: 44. ♀. Republished by Cockerell, 1898. N. Mex. Univ., Bul. 1: 44. female.

stygius Robertson. Minn. to Que. and New England, south to Fla.
Sphecodes stygius Robertson, 1893. Amer. Ent. Soc., Trans. 20: 145. ♀, ♂.

Taxonomy: Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 317. ♂, ♀.

sulcatulus Cockerell. Colo. Predator: *Philanthus crabroniformis* Sm.
Sphecodes sulcatulus Cockerell. 1906. Amer. Mus. Nat. Hist., Bul. 22: 426. ♀.

texana Cresson. Tex.
Sphecodes texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 249. ♀, ♂.

townesi Mitchell. Mich. and N. Y. to N. C.
Sphecodes townesi Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 212. ♀.

trentonensis Cockerell. N. Y.
Sphecodes trentonensis Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 62. ♀.

veganus Cockerell. N. Mex.
Sphecodes veganus Cockerell, 1904. Entomologist 37: 5. ♀.

washingtoni Cockerell. Wash.
Sphecodes (*Machaeris*) *Washingtoni* Cockerell, 1904. *In* Viereck, Canad. Ent. 36: 231. ♀.

wheeleri Mitchell. N. Y. and Conn., south to N. C., ?Kans. Probable male of *pimpinellae* Robt.
Sphecodes wheeleri Mitchell, 1956. Elisha Mitchell Sci. Soc., Jour. 72: 210. ♀, ♂.

Unplaced Taxa of Tribe Halictini

The following species cannot be placed as to genus from existing descriptions.

Halictus arctous Vachal, 1904. Soc. Hist. Arch. Correze, Bul. 26: 480. ♂. B. C.
Parasphecodes Californica Provancher, 1896. Nat. Canad. 23: 8. ♀. Calif.
Halictus crassicornis Kirby, 1837. *In* Richardson, Fauna Bor.-Amer., v. 4, p. 267. ♀. Canada.
Halictus distinguendus Dalla Torre, 1896. Cat. Hym., v. 10, p. 60. N. name for *Halictus distinctus* Provancher, 1882. Nat. Canad. 13: 200. male. ?Que. Preocc.

Family MELITTIDAE

With the exception of the subfamily Ctenoplectrinae which is restricted to the Ethiopian, Oriental and Australian regions, this family is represented in North America by three subfamilies also present in the Old World. None of these is known to occur in the Neotropical Region and only a few species of the Dasypodinae (Genus *Hesperapis*) are known to be present in northern Mexico. The generic relationships within this latter subfamily are in need of clarification especially those centering about the genus *Hesperapis*. On the basis of accumulated intrafloral information it appears that many, if not most, members of this family have evolved as oligoleges of both annual and perennial plants.

Taxonomy: Rozen and McGinley, 1974. Amer. Mus. Novitates 2545: 1-31, figs. 1-82, tables 1, 2 (larvae).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 32-33, fig. 13 (*Larrea* visiting spp.).

Subfamily MELITTINAE

Genus MELITTA Kirby

Genus MELITTA Subgenus MELITTA Kirby

Melitta Kirby, 1802. Monographia Apum Angliae, v. 1, p. 117.
Type-species: *Melitta tricincta* Kirby. Desig. by Richards, 1935.
Cilissa Leach, 1812. *In* Brewster's Edinburgh Encycl., v. 9, p. 154.

Type-species: *Andrena haemorrhoidalis* Fabricius. Desig. by Westwood, 1840.
Kirbya Lepeletier, 1841. Hist. Nat. Ins. Hym., v. 2, p. 145. Preocc.
Type-species: *Melitta tricincta* Kirby. Desig. by Sandhouse, 1943.
Melitta subg. *Brachycephalapis* Viereck, 1909. Ent. Soc. Wash., Proc. 11: 47.
Type-species: *Melitta californica* Viereck. Monotypic and orig. desig.

americana (Smith). Maine to Ga., Miss. Pollen: Unknown, but visits flowers of *Polycodium* and *Rubus*.
Cilissa americana Smith, 1853 Cat. Hym. Brit. Mus., v. 1, p. 123. ♀.

Taxonomy: Cockerell, 1906. Psyche 13: 5. ♀.

americaniformis Viereck. N. J.
Melitta americaniformis Viereck, 1909. Ent. Soc. Wash., Proc. 11: 50. ♀.

wilmattae Cockerell. Ariz., Calif. Pollen: Unknown, but visits flowers of *Coreopsis* and *Larrea*.

Melitta wilmattae Cockerell, 1937. Amer. Mus. Novitates 948: 3. ♀.

Genus MELITTA Subgenus DOLICHOCHILE Viereck

Dolichochile Viereck, 1909. Ent. Soc. Wash., Proc. 11: 49.
Type-species: *Dolichochile melittoides* Viereck. Monotypic and orig. desig.

melittoides (Viereck). Conn. to Ga., Tenn. Pollen: Unknown, but visits flowers of *Polycodium*, *Xolisma* and *Zenobia*.
Dolichochile melittoides Viereck, 1909. Ent. Soc. Wash., Proc. 11: 49. ♀.

Taxonomy: Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 692.

Subfamily DASYPODINAE

Genus HESPERAPIS Cockerell

Revision: Cockerell, 1916. Psyche 23: 176-177.

Genus HESPERAPIS Subgenus HESPERAPIS Cockerell

Hesperapis Cockerell, 1898. Canad. Ent. 30: 147.
Type-species: *Hesperapis elegantula* Cockerell. Monotypic.
Zacesta Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 73.
Type-species: *Zacesta rufipes* Ashmead. Monotypic and orig. desig.

arida Michener. Ariz., south. Calif., desert. Pollen: Oligolectic on flowers of *Larrea tridentata*.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 32-33 (floral relationships).
Hesperapis arida Michener, 1936. Ent. News 47: 183. ♂, ♀.

elegantula Cockerell. N. Mex.
Hesperapis elegantula Cockerell, 1898. Canad. Ent. 30: 148. ♀.

rufipes (Ashmead). South. Calif. Pollen: Oligolectic on flowers of *Hugelia*.
Zacesta rufipes Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 73. ♂.

Taxonomy: Michener, 1936. Ent. News 47: 182. ♂, ♀. —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1040, figs. 281-287 (larva).

Genus HESPERAPIS Subgenus AMBLYAPIS Cockerell

Amblyapis Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 362.
Type-species: *Halictoides ilicifoliae* Cockerell. Monotypic and orig. desig.

ilicifoliae (Cockerell). Calif. Pollen: Oligolectic on flowers of *Adenostoma*.
Halictoides ilicifoliae Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 361. ♂.

Genus HESPERAPIS Subgenus PANURGOMIA Viereck

Panurgomia Viereck, 1909. Ent. Soc. Wash., Proc. 11: 48.
Type-species: *Panurgomia fuchsi* Viereck. Monotypic.

arenicola Crawford. Ariz., Nev., Calif. deserts; Mexico. Pollen: Oligolectic on spring flowering Compositae including but apparently not limited to *Dyssodia*, *Encelia*, *Geraea*, *Helianthus*, and *Rafinesquia*.
Hesperapis arenicola Crawford, 1917. Ent. Soc. Wash., Proc. 19: 167. ♂.

carinata carinata Stevens. N. Dak., Idaho.
Hesperapis carinata Stevens, 1919. Canad. Ent. 51: 209. ♂.

Taxonomy: Stevens, 1921. Canad. Ent. 53: 65. ♀.

carinata rodecki Cockerell. Colo.
Hesperapis carinata rodecki Cockerell, 1934. Canad. Ent. 66: 153. ♀.

eumarpha (Cockerell). Calif.
Parandrena eumarpha Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 187. ♂.
Hesperapis eumorpha Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 70. Emend.

fuchsi (Viereck). Ariz.
Panurgomia fuchsi Viereck, 1909. Ent. Soc. Wash., Proc. 11: 49. ♀.

Taxonomy: Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 671.

fulvipes Crawford. Calif., deserts. Pollen: Oligolectic on flowers of *Geraea canescens*.
Hesperapis fulvipes Crawford, 1917. Ent. Soc. Wash., Proc. 19: 166. ♂.

Biology: Hurd, 1957. Kans. Ent. Soc., Jour. 30: 10 (seasonal synchronization with pollen source).

larreae Cockerell. Tex. to Utah and South. Calif. deserts; Mex. Pollen: Oligolectic on flowers of *Larrea tridentata*.
Hesperapis larreae Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 535. ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 33, fig. 13 (floral relationships).

laticeps Crawford. Calif. deserts and adjacent Nev. and Ariz. Pollen: Oligolectic on flowers of *Mentzelia*.
Hesperapis laticeps Crawford, 1917. Ent. Soc. Wash., Proc. 19: 166. ♂.

leucura Cockerell. Calif.; Mexico (Baja California). Pollen: Possibly oligolectic on flowers of *Dalea*, but is known to visit flowers of *Cryptantha*.
Hesperapis leucurus Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 44. ♂.

nitidula Cockerell. Calif.; Mexico (Baja California). Pollen: Oligolectic on flowers of *Oenothera*.
Hesperapis nitidulus Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 45. ♂.

Taxonomy: Cockerell, 1941. San Diego Soc. Nat. Hist., Trans. 9: 348. ♀.

oliviae (Cockerell). N. Mex.
Panurgus oliviae Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 149. ♂.

parva Michener. Calif. deserts; Mexico. Pollen: Unknown, but visits flowers of *Acacia*, *Cryptantha*, *Eriogonum*, *Eschscholzia*, *Oenothera*, and *Phacelia*.
Hesperapis parva Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 327. ♂, ♀.

pellucida Cockerell. Calif. Pollen: Oligolectic on flowers of *Eschscholzia californica*.
Hesperapis pellucidus Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 198. ♂.

regularis (Cresson). Calif. Pollen: Oligolectic on flowers of *Clarkia*.
Panurgus regularis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 62. ♂.

Biology: Burdick and Torchio, 1959. Kans. Ent. Soc., Jour. 32: 83-87, 7 figs. —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 16-20 (floral relationships).

rhodocerata (Cockerell). N. Mex., Calif.
Panurgus rhodoceratus Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 148. ♀, ♂.

semirudis Cockerell. Calif. Pollen: Appears to be oligolectic on vernal flowering Compositae including *Chaenactis*, *Coreopsis*, *Layia*, and *Malacothrix*.
Hesperapis semirudis Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 24. ♀.

wilmattae Cockerell. Calif., Ariz., Nev. deserts. Pollen: *Chaenactis*, *Encelia*, *Malacothrix*, *Oenothera*, *Rafinesquia*, *Sphaeralcea* and *Tetradymia*, but also visits a wide variety of

other flowers including *Abronia, Astragalus, Baileya, Calycoseris, Cryptantha, Eriophyllum, Eschscholzia, Geraea, Malva, Nama,* and *Phacelia* for nectar.
Hesperapis wilmattae Cockerell, 1933. Pan-Pacific Ent. 9: 26. ♀.

Taxonomy: Michener, 1936. Ent. News 47: 184. ♂.

Subfamily MACROPIDINAE

Genus MACROPIS Panzer

Revision: Michener, 1938. Psyche 45: 133-135.

Genus MACROPIS Subgenus MACROPIS Panzer

Megilla Fabricius, 1804. Systema Piezatorum, p. 328.
Type-species: *Megilla labiata* Fabricius. Desig. by Westwood, 1840.
Macropis Panzer, 1809. Faunae Ins. German., h. 107, No. 16.
Type-species: *Megilla labiata* Fabricius. Monotypic.

This is the only subgenus present in North America, and all of the species are believed to be oligolectic on flowers of *Steironema*.

ciliata Patton. Wis. to Que. and Maine south to Ga. Pollen: Unknown, but visits flowers of *Apocynum, Houstonia,* and *Hydrangea*.
Macropis ciliata Patton, 1880. Ent. Monthly Mag. 17: 31. ♀.

clypeata Swenk. Nebr.
Macropis clypeata Swenk, 1907. Ent. News 18: 293. ♂.

longilingua Provancher. Que.
Macropis longilingua Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 424. ♀.

nuda (Provancher). Colo., Mont., and south. Canada to N. Y., New England States and N. S. Pollen: Unknown, but has been taken at flowers of *Apocynum, Geranium, Rubus,* and *Vaccinium*.
Eucera nuda Provancher, 1882. Nat. Canad. 13: 174. ♀.
Macropis (*Macropis*) *morsei* Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 338. ♂, ♀.

Taxonomy: Mitchell, 1960. N. C. Agr. Expt. Sta. Tech. Bul. 141: 527 (tax. status, synonymy).

patellata Patton. Vt. to N. C., west to Nebr., and Mo. Pollen: Oligolectic on flowers of *Steironema*.
Macropis patellata Patton, 1880. Ent. Monthly Mag. 17: 33. ♂.

steironematis opaca Michener. Wash.
Macropis steironematis opaca Michener, 1938. Psyche 45: 134. ♂.

steironematis steironematis Robertson. Iowa and Mo. to Va., N. C., and Ga. Pollen: Presumably oligolectic on flowers of *Steironema*, but has been taken at flowers of *Apocynum, Ceanothus, Melilotus,* and *Seriocarpus*.
Macropis steironematis Robertson, 1891. Amer. Ent. Soc., Trans. 18: 63. ♀, ♂.

Family MEGACHILIDAE

This is one of the largest families of bees and is represented by about an equal number of species in each of the six zoogeographic regions. It is morphologically the most uniform and discrete familial assemblage within the Apoidea. While many of the characteristics of this family are shared with other families of bees and to a lesser extent with the Sphecoidea, the Megachilidae also possess many characteristics in common with the Scolioidea.

The family is composed of three subfamilies, the Fideliinae and Lithurginae which are all pollen-collecting bees, and the Megachilinae which are predominantly pollen-collecting species, but which contain several genera that are cleptoparasitic mainly in the nests of other megachilids. The Fideliinae are found only in Chile and South Africa, but both of the other subfamilies are nearly cosmopolitan and are well represented in America north of Mexico. Most of the pollen-collecting species do not make their own burrows, but appropriate a wide variety of pre-existing burrows, holes, shells and other cavities or construct their nests either in the open

attaching them to branches and so forth, or place them under stones, cow chips and so on. As a consequence of these habits, many species readily accept artificial nesting devices, and this has not only permitted detailed studies of their biology, but has also made possible the manipulation and management of several species for use in the pollination of agricultural crops. However, some species in certain genera (e.g., *Megachile*) and even some groups of species (e.g., *Heteranthidium* and *Trachusa*) do construct their own burrows. All of the pollen-collecting Megachilidae use foreign materials in the construction of the cell walls. These materials include leaves, plant down, leaf pulp, petals, resin, pebbles, mud, clay, and the like. The larvae spin tough cocoons before pupation.

Apart from the cleptoparasitic species, many of the megachilids are highly restricted in their intrafloral relationships and thus oligolecty is a relatively common phenomenon in this family.

Revision: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 5-232, 1 frontis., figs. 1-66, tables 1-7 (eastern U. S. spp.).

Taxonomy: Rozen, 1973. Amer. Mus. Novitates 2527: 1-14, 22 figs. (immature stages).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 264-344, figs. (life histories, nests, associates). —Eickwort, 1975. Evolution 29: 142-150, 1 fig., 2 tables (gregarious nesting, and evolution of parasitism and sociality among megachilid bees).

Morphology: Pasteels and Pasteels, 1972. Acad. Roy. Belgique, Mem. Classe Sci. 18: 1-28, 3 pls. (cuticular hairs). —Pasteels and Pasteels, 1973. Tissue and Cell 5: 63-82 (morphogenetic fields of hairs on legs). —Pasteels and Pasteels 1974. Tissue and Cell 6: 65-83 (Stereoscan studies of abdominal scopae).

Subfamily LITHURGINAE

Taxonomy: Rozen, 1973. Amer. Mus. Novitates 2527: 1-14, 22 figs. (immature stages).

Genus LITHURGE Latreille

Genus LITHURGE Subgenus LITHURGE Latreille

Lithurge Latreille, 1825. Fam. Nat. Regne Anim., p. 463.
Type-species: *Andrena cornuta* Fabricius. Monotypic.
Lithurgus Berthold, 1827. *In* Latreille, Nat. Fam. Thierr., p. 467. Emend.

Found in the Old World.

Genus LITHURGE Subgenus LITHURGOPSIS Fox

Lithurgopsis Fox, 1902. Ent. News 13: 138.
Type-species: *Lithurgus apicalis* Cresson. Orig. desig.

Revision: Mitchell, 1938. Psyche 45: 146-155. (Nearctic spp.).

apicalis apicalis (Cresson). S. Dak., Nebr., Kans., Tex., Wyo., Utah, Colo., N. Mex., Ariz., Nev., east. Calif. principally from Transit. Zone. Ecology: Nests have been found in holes of an old, barkless, cottonwood log in Utah; it also is reported to construct its nests in the doorways of homes in Arizona. Parasite: *Anthrax cintalapa* Cole. Pollen: Oligolectic, stores pollen of *Opuntia*, but visits other flowers presumably for nectar including *Echinocactus, Encelia californica, Eriogonum, Sphaeralcea.*
Lithurgus apicalis Cresson, 1875. *In* Wheeler, Rpt. Geog. Geol. Expl. and Surv. west of 100th Meridian, v. 5, p. 724. ♀.

Taxonomy: Rozen, 1973. Amer. Mus. Novitates 2527: 6-8, figs. 13-18 (larva).

Biology: Parker and Potter, 1973. Pan-Pacific Ent. 49: 294-299, 19 figs. (nest, larval habits, parasite).

apicalis littoralis (Cockerell). South Tex. (Point Isabel; near Brownsville).
Lithurgus apicalis littoralis Cockerell, 1917. *In* W. P. Cockerell, N. Y. Ent. Soc. Jour. 25: 191. ♂.

apicalis opuntiae (Cockerell). Colo., N. Mex., Tex., Ariz., Calif.; north. Mexico, principally from Sonoran Zone. Pollen: Oligolectic, presumably collects pollen from flowers of *Opuntia* including *O. echinocarpa, O. megacarpa, O. vaseyi*, but visits other flowers for nectar.
Lithurgus apicalis var. *opuntiae* Cockerell, 1902. Ent. News 13: 182.

arizonensis (Cockerell). Ariz.
Lithurgus arizonensis Cockerell, 1937. South. Calif. Acad. Sci., Bul. 36: 108. ♀.

bruesi (Mitchell). Ill. to Tex.; Mexico.
Lithurgus bruesi Mitchell, 1927. Psyche 34: 104. ♂.

echinocacti (Cockerell). N. Mex., Ariz.; Mexico (Baja California and Sonora). Ecology: Nests in rotten wood. Pollen: Presumably oligolectic, visits flowers of *Echinocactus*.
Lithurgus echinocacti Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 453. ♀.

gibbosus (Smith). N. C., to Fla., Tex. Pollen: Oligolectic, collects pollen from flowers of *Opuntia*, but visits other flowers, presumably for nectar including *Cirsium, Helianthus, Ilex, Pontederia, Rudbeckia*.
Lithurgus gibbosus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 147. ♀.
Lithurgus compressus Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 147. ♂.

Subfamily MEGACHILINAE

This is a large group of mostly pollen-collecting species which are present on all the continents and many of the islands. The subfamily is composed of two tribes, the Anthidiini and the Megachilini, both of which are well represented by numerous species in America north of Mexico.

Tribe ANTHIDIINI

Although this tribe is present throughout much of the world, it contains fewer species than the Megachilini and, unlike that tribe, is represented by only a single species in Australia. Like the Megachilini the pollen-collecting species use a wide variety of foreign materials in constructing their nest cells, but are not known to use mud. While the majority of the Anthidiini are solitary, some of the pollen-collecting species in certain genera (e. g., *Heteranthidium* and *Trachusa*) live in colonies.

Revision: Michener, 1948. Amer. Mus. Novitates 1381: 1-29 (generic classification).

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 1-113, 229 figs., 41 maps (Calif. spp.). —Pasteels, 1969. Soc. Roy. Ent. Belgique, Mem. 31: 1-148, 199 figs. (classification). —Pasteels, 1972. Soc. Roy. Ent. Belgique, Bul. Ann. 108: 72-128, 107 figs. (classification).

Biology: Custer and Hicks, 1927. Biol. Bul. 52: 258-277 (nesting habits).

Genus TRACHUSA Panzer

Trachusa Panzer, 1804. Faunae Ins. German., pt. 86, nos. 14-15.
Type-species: *Apis byssina* Panzer. Desig. by Sandhouse, 1943. (=*Trachusa serratulae* Panzer).
Diphysis Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 307.
Type-species: *Apis byssina* Panzer. Monotypic. (=*Diphysis pyrenaica* Lepeletier).
Trachusomimus Popov, 1964. Rev. Ent. URSS 43: 406.
Type-species: *Trachusa perdita* Cockerell. Orig. desig.

The genus also occurs in the Palaearctic Region.

Revision: Michener, 1941. Pan-Pacific Ent. 17: 119-125. (Nearctic spp.).

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 5: 1041 (larva). —Thorp, 1963. Pan-Pacific Ent. 39: 56-58 (Key to spp. of *Trachusa*). —Thorp, 1966. Kans. Ent. Soc., Jour. 39: 132 (generic status of *Trachusomimus* Popov). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 4-6, figs. 1, 129-134, map 1 (Calif. spp.).

gummifera Thorp. Calif. (Marin and San Francisco Counties).
Trachusa gummifera Thorp, 1963. Pan-Pacific Ent. 39: 56. ♀, ♂.

manni Crawford. South Ariz., north. Mexico. Parasite: *Heterostelis manni* Cwfd.? *Trachusa manni* Crawford, 1917. Ent. Soc. Wash., Proc. 19: 167. ♂.

perdita Cockerell. Calif. Parasite: *Heterostelis hurdi* Thorp, *Nemognatha scutellaris* LeC. Pollen: Presumably polylectic, visits flowers of *Brodiaea lutea, Clarkia cylindrica, C. purpurea quadrivulnera, C. speciosa speciosa, Collinsia heterophylla, Convolvulus, Eriodictyon californicum, Eriophyllum confertiflorum, Layia platyglossa campestris, Lotus scoparius, Lupinus nanus, Penstemon antirrhinoides, P. heterophyllus, Salvia columbariae.*
Trachusa perdita Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 159. ♂.

Biology: Michener, 1941. Pan-Pacific Ent. 17: 123 (nest). —Thorp, 1966. Kans. Ent. Soc., Jour. 39: 132 (parasite). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 49 (floral relationships).

Genus HETERANTHIDIUM Cockerell

Heteranthidium Cockerell, 1904, Ent. News 15: 292.
Type-species: *Anthidium dorsale* Lepeletier. Monotypic and orig. desig.

Taxonomy: Schwarz, 1926. Amer. Mus. Novitates 218: 1-15 (U. S. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 23-31, figs. 8-10, table 1 (eastern U. S. spp.). —Snelling, 1966, Los Angeles County Mus. Contrib. Sci. 97: 1-8, 1 fig. (Key to U. S. spp.). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 6-10, figs. 111-128, maps 2-5 (Calif. spp.).

autumnale Snelling. Calif. (Desert Hot Springs); Mexico (Baja California). Pollen: Unknown, but presumably visits flowers of *Chrysothamnus* or *Haplopappus.*
Heteranthidium autumnale Snelling, 1966. Los Angeles County Mus. Contrib. Sci. 97: 1, fig. 1. ♂, ♀.

Taxonomy: Snelling, 1975. Ent. Soc. Wash., Proc. 77: 90 (color variation in Baja Calif. specimen).

bequaerti Schwarz. South. Calif. (Colorado Desert). Pollen: Oligolege of *Dalea spinosa.*
Heteranthidium bequaerti Schwarz, 1926. Amer. Mus. Novitates 218: 6. ♀.

cordaticeps Michener. Tex., N. Mex. Ariz. Pollen: Unknown, but visits flowers of *Helianthus annuus,* also possibly *Heterotheca subaxillaris.*
Heteranthidium cordaticeps Michener, 1949. Kans. Ent. Soc., Jour. 22: 41. ♀.

Taxonomy: Snelling, 1975. Ent. Soc. Wash., Proc. 77: 87-88, fig. 1 (male, geogr. and floral records).

crassipes (Cresson). N. C. to Fla.
Anthidium crassipes Cresson, 1878. Amer. Ent. Soc., Trans. 7: 112. ♀.

dorsale (Lepeletier). N. J., N. C., Ga., Ala. Pollen: Unknown, but visits flowers of *Strophostyles.*
Anthidium dorsale Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 384. ♂.
Anthidium harbecki Crawford, 1910. Ent. News 21: 456. ♀.

Taxonomy: Cresson, 1864. Ent. Soc. Phila., Proc. 2: 381. ♂.

fontemvitae Schwarz. N. C. to Fla. Pollen: Unknown, but visits flowers of *Chrysopsis, Kuhnistera.*
Heteranthidium fontemvitae Schwarz, 1926. Amer. Mus. Novitates 218: 8. ♂, ♀.

larreae (Cockerell). West. Tex. to south. Utah, Nev. and south. Calif. (Sonoran and Mojave deserts); Mexico. Pollen: Oligolege of *Larrea tridentata,* but visits other flowers for nectar including *Baileya, Machaeranthera tortifolia, Salvia dorri, Senecio douglasii.*
Anthidium larreae Cockerell, 1897. Canad. Ent. 29: 220. ♀, ♂.

Biology: MacSwain, 1946. Pan-Pacific Ent. 22: 159. (nesting habits). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 34, fig. 14 (intrafloral relationships).

occidentale (Cresson). Colo., N. Mex.; Mexico (Puebla).
Anthidium occidentale Cresson, 1868. Amer. Ent. Soc., Trans. 1: 386. ♀, ♂.

ridingsii (Cresson). N. C. to Fla. and Tex. Pollen: Unknown, but visits flowers of *Crotalaria, Galactia, Hypericum, Melilotus, Rhus.*
Anthidium ridingsii Cresson, 1878. Amer. Ent. Soc., Trans. 7: Proc. iii. ♀.

timberlakei Schwarz. South. Oreg., Calif., west. Nev. Pollen: Polylectic, visits flowers of *Chaenactis douglasii, C. glabriuscula, Cirsium, Clarkia biloba, C. concinna, C. cylindrica, C. gracilis, Coreopsis lanceolata, Encelia farinosa, Helianthus gracilentus, Salvia mellifera.*
Heteranthidium timberlakei Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 409. ♂, ♀.
Heteranthidium subtimberlakei Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 414. ♀.

Taxonomy: Stephen and Torchio, 1961. Pan-Pacific Ent. 37: 41-43 (as *zebratum*). —Snelling, 1966. Los Angeles County Mus. Contrib. Sci. 97: 5 (synonomy).

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 49 (floral relationships).

zebratum (Cresson). Mich. south to Miss., west to S. Dak., Nebr., Colo. and N. Mex. Pollen: Unknown, but visits flowers of *Gaillardia, Helianthus.*
Anthidium zebratum Cresson, 1872. Amer. Ent. Soc., Trans. 4: 270. ♂.
Protanthidium cockerelli Titus, 1902. Ent. News 13: 170. ♂.
Anthidium (*Protanthidium*) *Chippewaense* Graenicher, 1910. Canad. Ent. 42: 157. ♂, ♀.
Heteranthidium zebratum mississippi Michener, 1937. Amer. Midland Nat. 38: 449. ♂, ♀.

Taxonomy: Snelling, 1966. Los Angeles County Mus. Contrib. Sci. 97: 4-5 (synonymy).

Genus PARANTHIDIUM Cockerell and Cockerell

Genus PARANTHIDIUM Subgenus PARANTHIDIUM Cockerell and Cockerell

Anthidium subg. *Paranthidium* Cockerell and Cockerell, 1901. Ann. and Mag. Nat. Hist. (7) 7: 50.
Type-species: *Paranthidium jugatorium perpictum* (Cockerell). Orig. desig. (=*Anthidium perpictum* Cockerell).

Taxonomy: Schwarz, 1926. Amer. Mus. Novitates 226: 19-25 (N. Amer. spp.). —Moure, 1965. Ent. Soc. Wash., Proc. 67: 29-31 (generic limits).

jugatorium butleri Snelling. Ariz. Pollen: Unknown, but visits flowers of *Erigeron, Helianthus.*
Paranthidium jugatorium butleri Snelling, 1962. Pan-Pacific Ent. 38: 225. ♀, ♂.

jugatorium jugatorium (Say). N. Y., N. J., Ind., Minn., Wis., Mo., Nebr. Parasite: *Dasymutilla asopus bexar* (Blake). Pollen: Unknown, but visits flowers of *Helianthus strumosus.*
Megachile jugatoria Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 352. ♀.
Stelis obesa Say, 1837. Boston Jour. Nat. Hist. 1: 398. ♂.

Biology: Michener, 1975. Kansas Ent. Soc., Jour. 48: 194-200 (nest, parasite).

jugatorium lepidum (Cresson). Ky. and Va., south to Ga. Pollen: Unknown, but visits flowers of *Helenium, Helianthus, Rudbeckia, Silphium.*
Anthidium lepidum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 115. ♂.

jugatorium perpictum (Cockerell). Colo., N. Mex., Ariz.
Anthidium perpictum Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 63. ♀.
Anthidium (*Dianthidium*) *perpictum coloradense* Swenk, 1914. Nebr. Univ., Studies 14: 32. ♀.

Taxonomy: Cockerell, 1898. N. Mex. Univ., Bul. 1: 63. ♀. —Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 413. ♂, ♀.

Biology: Banks, 1902. N. Y. Ent. Soc., Jour. 10: 213 (nesting habits).

Genus PARANTHIDIUM Subgenus MECANTHIDIUM Michener

Paranthidium subg. *Mecanthidium* Michener, 1942. N. Y. Ent. Soc., Jour. 50: 278.
Type-species: *Paranthidium* (*Mecanthidium*) *sonorum* Michener. Orig. desig.

Taxonomy: Moure, 1965. Ent. Soc. Wash., Proc. 67: 30 (systematic position).

sonorum Michener. Ariz., northern Mexico.
Paranthidium (*Mecanthidium*) *sonorum* Michener, 1942. N. Y. Ent. Soc., Jour. 50: 278. ♂, ♀.

Genus ADANTHIDIUM Moure

Adanthidium Moure, 1965. Ent. Soc. Wash., Proc. 67: 29.
Type-species: *Anthidium texanum* Cresson. Orig. desig.

arizonicum (Rohwer). Ariz.
Dianthidium arizonicum Rohwer, 1916. Ent. Soc. Wash., Proc. 18: 192. ♂.

Biology: Middleton, 1916. Ent. Soc. Wash., Proc. 18: 193 (nest).

texanum (Cresson). Kans., Ariz., Tex.
Anthidium texanum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 113. ♂.

Biology: Melander, 1902. Biol. Bul. 3: 27 (nest).

Genus ANTHIDIUM Fabricius

Genus ANTHIDIUM Subgenus ANTHIDIUM Fabricius

Anthidium Fabricius, 1804. Systema piezatorum, p. 364.
Type-species: *Apis manicata* Linnaeus. Desig. by Latreille, 1810.

Taxonomy: Swenk, 1913. Nebr. Univ., Studies 14: 9-18 (Nebr. spp.). —Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 345-361 (western U. S. spp.). —Schwarz, 1927. Amer. Mus. Novitates 252: 1-22; 253: 1-17 (N. Amer. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 9-13, figs. 1, 3, table 1 (eastern U. S. spp.). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 10-35, figs. 3, 7-100, 214, 217-220, maps 6-24 (Calif. spp.).

Biology: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 11 (summary of literature).

atripes Cresson. Tex., Colo., Nev., and Calif. Pollen: Apparently narrowly polylectic, visits flowers of *Astragalus* including *A. douglasii* var. *parishii*, *Lotus* including *L. strigosus* var. *hirtellus*.
Anthidium emarginatum var. *atripes* Cresson, 1879. Amer. Ent. Soc., Trans. 7: 205. ♂.
Anthidium polingae Schwarz, 1931. N. Y. Ent. Soc., Jour. 39: 315. ♀, ♂.

Taxonomy: Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 388. ♀. —Schwarz, 1937. N. Y. Ent. Soc., Jour. 45: 377.

banningense Cockerell. Wash., Utah, Oreg., Calif. Ecology: Nests in ground and uses down-like nesting materials from *Artemisia* and *Cirsium*. Parasite: *Chrysis florissanticola* Roh. Pollen: Apparently oligolectic on *Phacelia* including *P. heterophylla*, *P. imbricata*, *P. leucophylla*, *P. ramosissima*, but also visits other flowers presumably for nectar including *Chaenactis glabriuscula*, *Clarkia amoena*, *Cryptantha*, *Lotus davidsonii*, *Medicago*, *Melilotus*, *Oenothera*, *Physocarpus*, *Trifolium wormskioldii*.
Anthidium banningense Cockerell, 1904. South. Calif. Acad. Sci. Proc. 3: 58. ♂.
Anthidium plumarium Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 356. ♂.
Anthidium longispinum Schwarz, 1927. Amer. Mus. Novitates 253: 6. ♀.

Biology: Jaycox, 1967. Kans. Ent. Soc., Jour. 40: 565-570 (territoriality, pollen source).

clypeodentatum Swenk. Man. to B. C., Nebr., Colo., Calif. Pollen: Apparently narrowly polylectic, presumably obtains pollen from Leguminosae including *Astragalus douglasii* var. *parishii*, *Lotus davidsonii*, *L. oblongiflorus*, *Lupinus*, but also visits other flowers for nectar including *Ceanothus*, *Cryptantha intermedia*, *Phacelia frigida*.
Anthidium clypeodentatum Swenk, 1914. Nebr. Univ., Studies 14: 12. ♀.
Anthidium incurvatum Swenk, 1914. Nebr. Univ., Studies 14: 22. ♂.
Anthidium emarginatum bilineatum Schwarz, 1927. Amer. Mus. Novitates 252: 4. ♂.
Anthidium clypeodentatum var. *lutzi* Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 380. ♀, ♂.

Taxonomy: Schwarz, 1928. Canad. Ent. 60: 215. —Schwarz, 1937. N. Y. Ent. Soc., Jour. 45: 380 (*lutzi*). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 15-16, figs. 16-18, 68, 70, 91, map 8 (synonymy).

cockerelli Schwarz. West. Tex. to south. Nev. and south. Calif.; Mexico (Baja California). Pollen: Polylectic, visits flowers of *Abronia villosa*, *Cercidium floridum*, *Chaenactis carphoclinia*, *Dalea californica*, *D. emoryi*, *Encelia*, *Eschscholzia darwinensis*, *Geraea*

canescens, Larrea tridentata, Lupinus, Malacothrix, Palafoxia linearis, Phacelia crenulata, P. distans, Trifolium, Oenothera clavaeformis var. *auriantiaca.*
Anthidium cockerelli Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 386. ♂.

Taxonomy: Cockerell, 1937. Amer. Mus. Novitates 948: 6. ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 35 (floral relationship with *Larrea*).

collectum Huard. Calif. (including Channel Islands); Mexico (Baja California). Ecology: Nests in abandoned burrows in the ground, and uses down from the leaves and along the stem of *Artemisia tridentata.* Parasite: *Chrysis cognata* Bohart, *C. coloradica* Bohart, *C. tripartita* Aaron, *Dioxys pomonae* Ckll., *D. productus cismontanicus* Hurd, *Monodontomerus montivagus* Ashm., *Sphaeropthalma blakei* (Fox), *S. orestes* (Fox), *S. unicolor* (Cress.). Pollen: Polylectic, especially on *Lotus, Phacelia, Cryptantha,* but visits a wide variety of flowers presumably for nectar and or pollen including *Amsinckia intermedia, Astragalus tener, Chaenactis glabriuscula, Cryptantha intermedia, Dudleya, Encelia farinosa, Eriastrum pluriflorum, Erodium botrys, Gilia, Lotus argyrophyllus, L. corniculatus, L. davidsonii, L. glaber, L. hamatus, L. scoparius, L. strigosus* var. *hirtellus, L. subpinnatus, Lupinus bicolor, L. densiflorus, L. nanus, Melilotus, Mimulus fremontii, Mirabilis laevis, Nemophila, Oenothera, Phacelia cicutaria, P. distans, P. hispida, P. imbricata, P. ramosissima, P. tanacetifolia, Pholisma racemosa, Platystemon californicus, Salix, Salvia columbariae, Sambucus, Trichostema lanatum, T. parishii, Viguiera laciniata, V. multiflora.*
Anthidium compactum Provancher, 1896. Nat. Canad. 23: 9. ♂. Preocc.
Anthidium collectum Huard, 1896. Nat. Canad. 23: 124. N. name.
Anthidium angelarum Titus, 1906. Ent. Soc. Wash., Proc. 7: 164. ♀.
Anthidium transversum Swenk, 1914. Nebr. Univ., Studies 14: 19. ♀.
Anthidium puncticaudum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 360. ♂.
Anthidium collectum bilderbacki Cockerell, 1938. San Diego Soc. Nat. Hist., Trans. 9: 38. ♀.
Anthidium catalinense Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 433. ♂, ♀.
Anthidium clementinum Cockerell, 1939. South. Calif. Acad. Sci., Bul. 38: 138. ♀.

Taxonomy: Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 57, 73. —Titus, 1906. Ent. Soc. Wash., Proc. 7: 163. —Cockerell, 1941. Sixth Pacific Sci. Cong., Proc., v. 4, p. 289 (*clementinum*). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 16-19, figs. 19-21, 83, map 10 (synonymy).

Biology: Hicks, 1929. Canad. Ent. 61: 84 (nesting habits, copulation, nest construction, sleeping sites). —Hurd, 1958. Calif. Univ. Pubs. Ent. 14: 285, 292-293 (parasites). —Ferguson, 1962. Calif. Univ. Pubs. Ent. 27: 6-22 (parasites, nest).

dammersi Cockerell. Calif. (Colorado and Mojave deserts), Nev. Pollen: Unknown, but visits flowers of *Astragalus lentiginosus* var. *fremontii, Dalea fremontii, D. f.* var. *saundersii, Phacelia distans.*
Anthidium dammersi Cockerell, 1937. Amer. Mus. Novitates 948: 6. ♂, ♀.

edwardsii Cresson. Wash., Oreg., Calif., Idaho, Utah. Ecology: Nests in dead bamboo. Parasite: *Tricrania stansburyi* Hald. Pollen: Polylectic, visits a wide variety of flowers including *Achillea millaefolium, Adenostegia pilosa, Astragalus, Bigelovia, Calochortus luteus, Cirsium, Clarkia speciosa, Cleomella obtusifolia, Cordylanthus pilosa, C. tenuis, Cressa cretica, Eriogonum gracile, Eriophyllum, Frankenia grandiflora, Heliotropium curassavicum, Hemizonia, Lathyrus splendens, Lotus americanus, L. purshianus, L. scoparius, Marrubium vulgare, Medicago sativa, Melilotus, Monardella lanceolata, Navarretia heterodoxa, Penstemon heterophyllus, Phacelia distans, P. ramosissima, Solidago californica, Stephanomeria exigua, Trichostema lanceolatum, T. laxum, Trifolium obtusifolium, T. repens, T. variegatum, Verbena californica, V. lasiostachys, Wislizenia refracta.*
Anthidium edwardsii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 112. ♂.
Anthidium 3-cuspidum Provancher, 1896. Nat. Canad., 23: 10. ♂.
Anthidium tricuspidum Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 57. Emend.
Anthidium hesperium Swenk, 1914. Nebr. Univ., Studies 14: 18. ♀.

Anthidium depressum Schwarz, 1927. Amer. Mus. Novitates 253: 4. ♂.

Taxonomy: Titus 1906. Ent. Soc. Wash. Proc. 7: 163. —Grigarick and Stange. 1968. Calif. Ins. Survey, Bul. 9: 19-21, figs. 3, 49-51, 79, map. 12 (synonymy).

emarginatum (Say). B. C. to Calif., east to Kans., Nebr. and N. Mex. Ecology: Uses down from stems of *Cirsium undatum* for nest construction in Colo. Parasite: *Leucospis affinis* Say, *Monodontomerus montivagus* Ashm., *Nemognatha dubia* LeC., *N. lutea* LeC., *Physocephala texana* (Will.). Pollen: Apparently polylectic, visits flowers of *Arenaria, Astragalus bolanderi, Clarkia pulchella, Cryptantha intermedia, Dalea fremontii, Erigeron foliosus* var. *stenophyllus, Eriodictyon, Hackelia jessicae, Lotus argyraeus multicaulis, L. scoparius, Lupinus lyallii, L. superbus, Penstemon, Phacelia californica, P. superbus, P. frigida, P. heterophylla, P. ramosissima, Symphoricarpos.*

Megachile emarginata Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 352. ♀.
Anthidium atrifrons Cresson, 1868. Amer. Ent. Soc., Trans. 1: 387. ♀.
Anthidium atriventre Cresson, 1878. Amer. Ent. Soc., Trans. 7: Proc. iii. ♀.
Anthidium saxorum Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 57. ♂.
Anthidium collectum var. *ultrapictum* Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 73. ♂.
Anthidium titusi Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 58. ♂.
Anthidium bernardinum var. *aridum* Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 58. ♂.
Anthidium astragali Swenk, 1914. Nebr. Univ., Studies 14: 16. ♂, ♀.
Anthidium fresnoense Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 347. ♀.
Anthidium angulatum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 357. ♂.
Anthidium hamatum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 358. ♂.
Anthidium spinosum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 359. ♂.
Anthidium lucidum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 361. ♂.
Anthidium rhodophorum Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 623. ♀.
Anthidium sculleni Schwarz, 1930. N. Y. Ent. Soc., Jour. 38: 10. ♂.

Taxonomy: Cresson, 1864. Ent. Soc. Phila., Proc. 2: 374. ♀, ♂. —Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 72. ♂ (*saxorum*). —Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 73. ♂ (*titusi*). —Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 76. —Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 372 (*bernardinum* var. *aridum*). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 21-22, figs. 34-36, 87, 95, map 13 (synonymy).

Biology: Hicks, 1926. Colo. Univ., Studies 15: 47 (collection of nest material).

jocosum Cresson. Mont., Colo., Calif.; Mexico (Baja California and Sonora). Pollen: Apparently polylectic, visits flowers of *Ceanothus, Chorizanthe staticoides, Cryptantha intermedia, Eriastrum plurifolium, Ericameria monactis, Eriodictyon, Eriogonum fasciculatum, E. f. polifolium, E. inflatum, Gutierrezia californica, Haplopappus cooperi, Hemizonia, Larrea tridentata, Lasthenia, Lotus scoparius, Marrubium vulgare, Oenothera, Penstemon, Phacelia ramosissima, Salvia carduacea, S. pachyphylla, Trifolium repens.*

Anthidium jocosum Cresson, 1878 Amer. Ent. Soc., Trans. 7: 111. ♂.
Anthidium xanthognathum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 347. ♀.
Anthidium fontis Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 348. ♂, ♀.

Taxonomy: Schwarz, 1927. Amer. Mus. Novitates 277: 5. ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 35 (floral relationships).

maculifrons Smith. Ill., Tenn. and Va., south to Fla., west to Ariz.; Mexico. Pollen: Unknown, but visits flowers of *Afzelia, Asclepias, Bidens, Coreopsis, Cracca, Crotalaria, Galactia, Galax, Phaseolus, Psoralea.*

Anthidium maculifrons Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 214. ♀.
Anthidium cognatum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 109. ♀, ♂.

Biology: Hungerford and Williams, 1912. Ent. News 23: 256.

maculosum Cresson. S. Dak., Colo., and Tex., west to Oreg. and Calif.; Mexico. Ecology: Nests in elderberry stems. Parasite: *Chrysis tripartita* Aaron, *Dioxys aurifuscus* (Titus), *Leucospis affinis* Say. Pollen: Apparently polylectic, visits flowers of *Antirrhinum,*

Arctostaphylos, Aster, Astragalus douglasii var. *parishii, Chrysopsis villosa, Cirsium vulgare, Cordylanthus nevinii, Corethrogyne filaginifolia, Eriodictyon trichocalyx, Grindelia camporum, Haplopappus linearifolius, Helianthus, Hulsea callicarpha, Lotus argophyllus, L. corniculatus, L. davidsonii, L. humistratus, L. nevadensis, L. scoparius, L. strigosus* var. *hirtellus, Phacelia ramosissima, Senecio ionophyllus, Solidago californica, Stachys albens, S. bullata, S. pycnantha, Trichostema laxum, Verbena hastata, V. lasiostachys.*

Anthidium maculatum Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 216. ♂. Preocc.
Anthidium maculosum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 110. ♀.
Anthidium lupinellum Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 58. ♂.
Anthidium americanum Friese, 1911. Das Tierreich, v. 28, p. 395. N. name.

Taxonomy: Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 412. ♂. —Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 336. —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 23-25, figs. 7, 9, 71, map 15.

Biology: Parker and Bohart, 1966. Pan-Pacific Ent. 42: 95 (nest, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 269-272, pl. 17, figs. 79, 80 (nest, supersedure, nest architecture, life history). —Horning, 1971. Ent. Soc. Wash., Proc. 73: 43 (nest, parasite).

manicatum Linnaeus. N. Y. (Ludlowville); Argentina, Brazil, Uruguay and Canary Is.; Europe. Ecology: Nests readily in a wide variety of movable objects including trap-nests. Adventive from Europe. Pollen: Polylectic, visits a wide variety of flowers for nectar and pollen in Europe and South America, but so far has only been taken at the flowers of *Caryopteris clandonensis* in N. Y.

Apis manicata Linnaeus, 1758. Syst. Nat., Ed. 10, p. 577.
Apis uncata Schrank 1802. Fauna Boica 2(2): 379.

Taxonomy: Moure and Urban, 1964. II Congr. Latino-Amer. Zool., An. 1: 96-102, figs. 1-5 (S. Amer. distr.). —Jaycox, 1967. Kans. Ent. Soc., Jour. 40: 124-126 (N. Amer. distr.).

Biology: Green, 1921. Ent. Soc. London, Proc., p. lxxii-lxxiii (territoriality). —Ward, 1928. Entomologist 61: 267-272 (territoriality). —Haas, 1960. Ztschr. Tierpsychol. 17: 402-416 (territoriality). —Pechuman, 1967. N. Y. Ent. Soc. 75: 68-73 (behavior).

montivagum Cresson. Colo.

Anthidium montivagum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 110. ♀, ♂.

mormonum Cresson. B. C., Idaho, Mont. and Nebr., south to Calif., Ariz. and N. Mex.; Mexico (Baja California). Ecology: Nests in deserted beetle burrows in old yucca floral scapes and oak stumps, uses down gathered from hairy leaves and stems of *Lepidospartum squamatum* for nest construction. Parasite: *Chelynia leucotricha* Ckll.? Pollen: Apparently polylectic, visits flowers of *Astragalus, Ceanothus parviflorus, Chrysothamnus viscidiflorus, Cryptantha intermedia, Eriodictyon, Eriogonum fasciculatum, Grindelia, Lotus andersoni, L. argophyllus, L. davidsonii, L. nevadensis, L. oblongifolius, L. scoparius, L. strigosus* var. *hirtellus, Lupinus lobbii, Penstemon spectabilis, Phacelia ciliata, P. heterophylla, P. imbricata, P. pringeli, P. ramosissima, Rubus leucodermis, Stenotopsis linearifolius, Trifolium repens.*

Anthidium mormonum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 110. ♂.
Anthidium blanditum Cresson, 1879. Amer. Ent. Soc., Trans. 7: 206. ♀.
Anthidium pondreum Titus, 1902. Ent. News 13: 169. ♂.
Anthidium pecosense Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 58. ♂.
Anthidium bernardinum var. *wilsoni* Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 58. ♂.
Anthidium bernardinum var. *fragariellum* Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 58. ♂.
Anthidium blanditum praedentatum Cockerell, 1907. Entomologist 40: 99. ♀.
Anthidium poudreum(!) Cockerell, 1911. U. S. Natl. Mus., Proc. 40: 248. ♂ (♀ misdet.).
Anthidium wallisi Cockerell, 1913. Canad. Ent. 45: 13. ♀.
Anthidium nebrascense Swenk, 1914. Nebr. Univ., Studies 14: 14. ♂, ♀.
Anthidium praedentatum triangulifer um Swenk, 1914. Nebr. Univ., Studies 14: 18. ♀.
Anthidium flavicaudum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 359. ♂.
Anthidium wyomingense Schwarz, 1927. Amer. Mus. Novitates 252: 20. ♀.

Anthidium mormonum hicksi Schwarz, 1934. Amer. Mus. Novitates 743: 4. ♀.
Anthidium wallisi var. *wallowana* Schwarz, 1940. Amer. Mus. Novitates 1058: 5. ♀.

Taxonomy: Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 74. ♂ (*pecosense*). —Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 75, 76. ♂, ♀ ? —Cockerell, 1911. U. S. Natl. Mus., Proc. 40: 248. ♂, ♀ (*pecosense*). —Schwarz, 1927. Amer. Mus. Novitates 252: 7 (*nebrascense*). —Schwarz, 1928. Canad. Ent. 60: 213 (*nebrascense*). —Schwarz, 1930. N. Y. Ent. Soc., Jour. 38: 9 (*nebrascense*). —Schwarz, 1940. Amer. Mus. Novitates 1058: 6 (*nebrascense*). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 25-27, figs 43-45, 80, 92, map 16 (synonymy).

Biology: Hicks, 1929. Ent. News 40: 105 (nesting habits).

pallidiclypeum Jaycox. Calif. Pollen: Unknown, but visits flowers of *Ceanothus, Collinsia bicolor, Delphinium parryi* var. *seditiossum, Lotus scoparius, Trifolium variegatum.*
Anthidium pallidiclypeum Jaycox, 1963. Pan-Pacific Ent. 39: 267, 5 figs. ♂, ♀.

palliventre Cresson. Utah, B. C., Oreg., Calif. Ecology: Excavates nest in sand. Pollen: Unknown, but visits flowers of *Abronia maritima, Cakile edentula, Dudleya, Horkelia, Lathyrus littoralis, Lotus eriophorus, L. heermannii, Phacelia distans, P. ramosissima.*
Anthidium palliventre Cresson, 1878. Amer. Ent. Soc., Trans. 7: 114. ♀.
Anthidium pallidiventre Dalla Torre, 1896. Cat. Hym., v. 10, p. 468. Emend.
Anthidium californicum Cresson, 1879. Amer. Ent. Soc., Trans. 7: 206. ♂.
Anthidium palliventre vanduzeei Cockerell 1937. Pan-Pacific Ent. 13: 150. ♀, ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 28-29, figs. 28-30, 85, map 18 (synonymy).

Biology: Hicks, 1928. Pan-Pacific Ent. 5: 51 (nest excavation).

palmarum Cockerell. West. Tex to south. Calif. and Nev.; Mexico (Baja California). Ecology: Found in burrow of dead floral scape of *Yucca whipplei*. Pollen: Possibly oligolectic on *Phacelia* including *P. affinis, P. cicutaria, P. ciliata, P. crenulata, P. distans, P. hispida, P. ramosissima*, but visits other flowers including *Acamptopappus sphaerocephalus, Amsinckia, Aster tortifolius, Astragalus, Bebbia juncea, Dalea schottii, Encelia virginiensis actoni, Lotus argophyllus, Lotus scoparius, Oenothera, Senecio douglasii, Sphaeralcea, Stenotopsis linearifolius.*
Anthidium palmarum Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 59. ♂.
Anthidium palmarum micheneri Schwarz, 1957. Kans. Ent. Soc., Jour. 30: 132. ♂, ♀.

Taxonomy: Snelling, 1962. Pan-Pacific Ent. 38: 226-227 (distribution and floral records, *palmarum micheneri*). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 29-30, figs. 64-66, 69, 74, map 19 (synonymy).

paroselae Cockerell. Tex. to south. Calif.; Mexico (Sonora). Ecology: Nests in hard sand; two flight periods occur, one in the spring and one in the autumn. Parasite: *Dioxys productus subruber* (Ckll.)? Pollen: Polylectic, visits flowers of *Baileya multiradiata, Bebbia juncea, Croton californicus, Cryptantha barbigera, Dalea scoparia, Helianthus petiolaris* var. *canescens, Larrea tridentata, Malacothrix, Melilotus, Palafoxia linearis, Pulchea sericea, Prosopis.*
Anthidium paroselae Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 62. ♀.
Anthidium parosetae(!) Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 302.

Taxonomy: Cockerell, 1898. N. Mex. Univ., Bul. 1: 62. ♀. —Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 412. ♀, ♂. —Schwarz, 1929 (1928). N. Y. Ent. Soc., Jour. 36: 384. ♀, ♂. —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 30, figs. 10-12, 73, 100, map. 20.

Biology: Newberry, 1900. Psyche 9: 94 (nest, parasite). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 35 (floral relationships).

placitum Cresson. Idaho and Wyo., south to Calif., Ariz. and N. Mex. Pollen: Apparently polylectic, although current data suggests a predilection for the flowers of *Cordylanthus* including *C. filifolius, C. nevinii, C. rigidus brevibracteatus*, but also visits flowers of *Chrysopsis villosa, Cryptantha intermedia, Eriodictyon trichocalyx, Eriogonum subscaposum, Gutierrezia californica, Monardella, Solidago confinis.*
Anthidium placitum Cresson, 1879. Amer. Ent. Soc., Trans. 7: 206. ♀.
Anthidium bernardinum Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 58. ♂.

Anthidium hesperium dentipygum Swenk, 1914. Nebr. Univ., Studies 14: 19. ♀.
Anthidium permaculatum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 349. ♀.
Anthidium bernardinum mesaverdense Schwarz, 1927. Amer. Mus. Novitates 252: 15. ♂, ♀.
Anthidium niveumtarsum Schwarz, 1927. Amer. Mus. Novitates 252: 18. ♂, ♀.

Taxonomy: Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 74. ♂. —Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 378. ♀, ♂ (*permaculatum*). —Schwarz, 1937. N. Y. Ent. Soc., Jour. 45: 382. —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 30-32, figs. 46-48, 78, 93, map 21 (synonymy).

porterae Cockerell. B. C., Mont., Wyo., Nebr., Colo., Ariz., N. Mex., Tex. Parasite: *Chrysis lauta* Cress. Pollen: Unknown, but visits flowers of *Asclepias, Erigeron, Penstemon coloradensis, P. occidentata, Petalostemon, Phacelia distans, Psilostrophe.*
Anthidium porterae Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 411. ♂, ♀.
Anthidium porterae var. *amabile* Cockerell, 1904. Entomologist 37: 7. ♂.
Anthidium porterae personulatum Cockerell, 1907. Canad. Ent. 39: 135. ♀, ♂.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 247. —Custer and Hicks, 1927. Biol. Bul. 52: 258-267 (nesting habits). —Custer, 1928. Ent. News 39: 123 (nesting habits).

psoraleae Robertson. Colo. and N. Dak., east to Ill. and Mich.; although it has been questionably listed from B. C., Calif. and Ariz., there are no recent records west of Colo. Pollen: Unknown, but visits flowers of *Astragalus, Lobelia, Psoralea, Trifolium, Verbena.*
Anthidium psoraleae Robertson, 1902. Canad. Ent. 34: 322. ♀, ♂.

Taxonomy: Schwarz, 1928. Canad. Ent. 60: 214. —Mitchell, 1962. N. C. Agr. Exp. Sta. Tech. Bul. 152: 11-13, fig. 3 (redescription).

rodecki Schwarz. Colo., Nev. (Washoe Co.).
Anthidium rodecki Schwarz, 1934. Amer. Mus. Novitates 743: 1. ♂, ♀.

sonorense Cockerell. Ariz., south. Nev. and south. Calif.; Mexico (Baja California and Sonora). Pollen: Possibly an oligolege of *Larrea tridentata*, but a female has been collected at the flowers of *Prosopis.*
Anthidium sonorense Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 91. ♂.
Anthidium sonorense productum Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 92. ♀.
Anthidium rohweri Schwarz, 1927. Amer. Mus. Novitates 253: 7. ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 32, figs. 13-15, 72, 90, 99, map 22 (synonymy).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 35 (floral relationships).

tenuiflorae Cockerell. N. W. T., Alta., Sask., Mont., Wyo., S. Dak., south to Calif., Ariz., N. Mex., and Nebr. Ecology: A nest was constructed between two rocks. Pollen: Unknown, but visits flowers of *Arenaria kingii, Aster foliaceus, Astragalus, Epilobium adenocaulum* var. *parishii, E. californicum, Gormania obtusata, Horkelia fusca, Lotus argophyllus, L. davidsonii, Lupinus confertus, L. lyallii lobbii, Penstemon secundiflorus, Phacelia frigida, P. heterophylla, Potentilla glandulosa, P. gracilis, Solidago confinis, Streptanthus tortuosus, Trifolium oliganthum.*
Anthidium tenuiflorae Cockerell, 1907. Canad. Ent. 39: 135. ♀, ♂.
Anthidium tenuiflorae yukoneuse Cockerell, 1926. Ann. and Mag. Nat. Hist. (9) 18: 622. ♂, ♀.

Taxonomy: Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 379 (as *tenuiflorae yukonense*). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 32-33, figs. 31-33, 88, 96, map 23 (synonymy).

Biology: Hicks, 1926. Colo. Univ., Studies 15: 217, 248 (nest).

utahense Swenk. B. C., Mont. and Utah, south to Calif., Nev. and Ariz. Ecology: Nests in ground in holes and crevices frequently using cavities made by other insects and animals as well as artificial nest cavities which offer vertical holes at ground level. Parasite: *Dioxys productus* (Cress.)? Pollen: Polylectic, stores pollen of *Phacelia* and

Melilotus, but visits a wide variety of flowers, some of which may also serve as pollen sources including *Antirrhinum coulterianum, Artemisia, Aster, Astragalus bolanderi, Brodiaea laxa, Calycadenia multiglandulosa, Calyptridium umbellatum, Ceanothus, Chaenactis glabriuscula, Chamaebatia foliolosa, Cirsium vulgare, Clarkia amoena, C. cylindrica, C. speciosa speciosa, C. unguiculata, Croton californicus, Cryptantha intermedia, C. muricata, eriastrum plurifolium, Eriodictyon californicum, Eriogonum fasciculatum, E. f. polifolium, Grindelia, Hemizonia lobbii, Horkelia bolanderi, H. b.* var. *clevelandii, H. b.* var. *parryi, Lotus argophyllus, L. davidsonii, L. hamatus, L. humistratus, L. nevadensis, L. nuttallianus, L. purshianus, L. scoparius, L. strigosus* var. *hirtellus, Lupinus bicolor, L. nanus, Melilotus alba, Oenothera, Penstemon, Phacelia ramosissima.*

Anthidium utahense Swenk, 1914. Nebr. Univ., Studies 14: 23. ♂, ♀.
Anthidium sagittipictum Swenk, 1914. Nebr. Univ., Studies 14: 20. ♀.
Anthidium divisum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 350. ♀.
Anthidium divisum nanulum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 350. ♀.
Anthidium divisum ornatifrons Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 350. ♀.
Anthidium brachyurum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 357. ♂.

Taxonomy: Schwarz, 1930. N. Y. Ent. Soc., Jour. 38: 10 (*divisum*). —Grigarick and Stange, 1968. Calif. Ins. Surv., Bul. 9: 33-35, figs. 31-33, 88, 96, map 23 (synonymy).

Biology: Jaycox, 1966. Pan-Pacific Ent. 42: 18-20 (nest, parasite). —Jaycox, 1967. Kans. Ent. Soc., Jour. 40: 569 (interspecific relationships).

Genus CALLANTHIDIUM Cockerell

Callanthidium Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 365.
Type-species: *Anthidium illustre* Cresson. Orig. desig.

formosum (Cresson). Mont., Colo., Nev., Oreg., Calif., Ariz. (Oak Creek Canyon). Pollen: Unknown, but visits flowers of *Astragalus, Castilleia, Clarkia cylindrica, Lotus argophyllus, Monardella linoides, Medicago sativa, Phacelia.*
Anthidium formosum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 112. ♂.
Anthidium conspicuum Cresson, 1879. Amer. Ent. Soc., Trans. 7: 207. ♀.
Anthidium illustre var. *consonum* Cresson, 1879. Amer. Ent. Soc., Trans. 7: 207. ♀.
Dianthidium balli Titus, 1902. Ent. News 13: 170. ♀.
Callanthidium formosum pratense Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 366. ♂.

Taxonomy: Cockerell, 1909. Ent. News 20: 262. —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 36, figs. 101-105, map 25 (geogr. and floral records).

illustre (Cresson). Utah, Oreg., Calif., Nev., Ariz., N. Mex.; Mexico (Baja California). Ecology: Nests in dead, floral scape of *Yucca whipplei* and in stump of oak. Parasite: *Dioxys aurifuscus* (Titus)?, *Nemognatha scutellaris* LeC., *Sphaeropthalma unicolor* (Cress.). Pollen: Polylectic, stores pollen of *Lotus scoparius* in southern Calif., visits a wide variety of flowers including *Artemisia californica, Astragalus douglasii, Calochortus, Cirsium, Castilleia plagiotoma, Clarkia, Collinsia, Cordylanthus nevinii, Cryptantha intermedia, Eriodictyon crassifolium, E. trichocalyx, E. t.* var. *lanatum, Helianthus, Lathyrus odoratus, Lotus argophyllus, L. oblongifolius, L. scoparius, Lupinus albifrons, Malacothamnus arcuatus, Medicago sativa, Penstemon, Phacelia distans, P. grandiflora, P. heterophylla, P. imbricata, P. ramosissima, Turricula parryi.*
Anthidium illustre Cresson, 1879. Amer. Ent. Soc., Trans. 7: 206. ♀.
Anthidium serranum Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 24. ♂.

Taxonomy: Cockerell, 1909. Ent. News 20: 262. ♂. —Schwarz, 1940. Amer. Mus. Novitates 1058: 3. —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 36-38, figs. 4, 106-110, map 26 (geogr. and floral records).

Biology: Johnson, 1904. Ent. News 15: 284 (nest). —Hicks, 1929. Canad. Ent. 61: 1-8 (nest, parasite). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 96 (nest).

Genus DIANTHIDIUM Cockerell

Anthidium subg. *Dianthidium* Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 412.

Type-species: *Dianthidium sayi* Cockerell. Orig. desig. (=*Anthidium curvatum* Cockerell).

Taxonomy: Schwarz, 1926. Amer. Mus. Novitates 226: 1-15 (N. Amer. spp.). —Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 71-109 (racial differentiation of Nearctic spp.). —Timberlake, 1948 N. Y. Ent. Soc., Jour. 56: 149-153 (additions and corrections). —Timberlake, 1949. Pan-Pacific Ent. 25: 129-132 (Baja Calif. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 15-18, figs. 1, 5, table 1 (eastern U. S. spp.). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 38-58, figs. 5, 138-203, 221-224, maps 27-39 (Calif. spp.).

Biology: Hurd and Linsley, 1950. N. Y. Ent. Soc., Jour. 58: 247-250 (parasites and inquilines). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 39 (summary of literature). —Clement, 1976. Wasmann Jour. Biol. 34: 9-10 (summary of literature).

concinnum (Cresson). Kans., Colo., Tex., Ariz. Ecology: Nests have been reported from underside of stone and in dead branch of Chinese elm.
Anthidium concinnum Cresson, 1872. Amer. Ent. Soc., Trans. 4: 270. ♀, ♂.

Biology: Hungerford and Williams, 1912. Ent. News 23: 256 (nest). —Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 408-409 (nest). —Fischer, 1951. Kans. Ent. Soc. Jour. 24: 46, figs. 1, 2 (nest).

cressonii (Dalla Torre). Utah, Colo., Nev., Ariz., N. Mex.
Anthidium venustum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 113. ♀. Preocc.
Anthidium cressonii Dalla Torre, 1896. Cat. Hym., v. 10, p. 458. N. name.

curvatum curvatum (Smith). N. C. to Fla., west to Mo. and Ark. Pollen: Unknown, but visits flowers of *Aster*, *Chrysopsis*, *Helenium*, *Koellia*, *Psoralea*.
Anthidium curvatum Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 215. ♀.

curvatum sayi Cockerell. Alta., Idaho, Utah, Colo. and Kans., south to east. Calif., Ariz. and Tex. Ecology: Nests in aggregations in the soil, uses resin from stems and leaves of *Helianthus petiolaris* for nest construction. Parasite: *Dasymutilla asopus bexar* (Blake), *Eusapyga rubripes* Cress., *Monodontomerus montivagus* Ashm., *Rhydinofoenus pattersonae* Melander and Brues, *Sphaeropthalma uro* (Blake), *Villa* (*Anthrax*) sp. *Megachile interrupta* Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 350. ♂, ♀. Preocc.
Dianthidium Sayi Cockerell, 1907. Canad. Ent. 39: 136. N. name.

Taxonomy: Michener, 1953. Kans. Univ. Sci., Bul. 35: 1045, figs. 130-133 (larva). —Grigarick and Stange, 1968. Calif. Ins. Surv., Bul. 9: 41-42, figs. 171-173, 178, 197, map 27 (tax. characters, geogr. records).

Biology: Hungerford and Williams, 1912. Ent. News 23: 256 (nest, as *curvatum*). —Hicks, 1926. Amer. Nat. 9: 199 (nest). —Hicks, 1926. Colo. Univ., Studies 15: 249 (nest, parasite). —Custer and Hicks, 1927. Biol. Bul. 52: 268 (nest) —Custer, 1928. Ent. News 39: 123 (nest). —Mickel, 1928. U. S. Natl. Mus., Bul. 143: 61 (parasite). —Fischer, 1951. Kans. Ent. Soc., Jour. 24: 47-49 (nest).

curvatum xerophilum Cockerell. N. Mex., Ariz. (Apache Pass).
Dianthidium Sayi xerophilum Cockerell, 1907. Canad. Ent. 39: 136. ♀.

desertorum Timberlake. South. Calif. (Colorado Desert). Pollen: Unknown, but visits flowers of *Hyptis emoryi*.
Dianthidium desertorum Timberlake. 1943. N. Y. Ent. Soc., Jour. 51: 84. ♂, ♀.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 42, figs. 168-170, 184, 196, map 28 (tax. characters, geogr. and floral records).

discors Timberlake. West Tex., Ariz.
Dianthidium discors Timberlake, 1948. N. Y. Ent. Soc., Jour. 56: 149. ♀.

dubium dilectum Timberlake. Calif. (Central Coast and Peninsular ranges). Ecology: Nests made of gravel and resin have been found attached to a leaf and on exposed clay shales. Parasite: *Amobia floridensis* (Twn.), *Chrysis coerulans* Fabr., *Sapyga nevadica* Cress., *Toxophora pellucida* Coq. Pollen: Apparently polylectic, visits flowers of *Achillea*

millefolium, Calochortus weedii, Chenopodium, Cirsium vulgare, Convolvulus, Cordylanthus pilosus, Corethrogyne, Dicentra, Encelia californica, Erigeron, Eriodictyon trichocalyx, E. t. var. *lanatum, E. parryi, Eriogonum elegans, E. fasciculatum, Helianthus gracilentus, Hesperochiron californicum, Lepidium virginicum, Lotus americanus, L. humistratus, L. scoparius, Monardella villosa, Penstemon, Phacelia ramosissima, Stachys pycnantha, Stephanomeria cichoriacea, Trichostema parishii, Turricula parryi, Verbena lasiostachys, Viguiera multiflora.*
Dianthidium dubium dilectum Timberlake, 1948. N. Y. Ent. Soc., Jour. 56: 152. ♀, ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 42-43, map 2 (tax. characters, geogr. and floral records).

Biology: Hurd and Linsley, 1950. N. Y. Ent. Soc., Jour. 58: 247, 248 (nest, parasite).

dubium dubium Schwarz. South. Oreg. and north. Calif. (Coast Range, north of San Francisco; Cascade Range; and west. slope of Sierra Nevada Mts.). Ecology: Nests are made of resin and gravel attached to vegetation or rocks. Pollen: Apparently polylectic, visits flowers of *Bigelovia, Chamaebatia foliolosa, Clarkia biloba, C. cylindrica, C. dudleyana, C. unguiculata, Collinsia tinctoria, Eriodictyon, Eriogonum latifolium nudum, Gayophytum nuttallii, Lessingia leptoclada, Lotus americanus, L. nevadensis, L. purshianus, Monardella lanceolata, Marrubium vulgare, Penstemon spectabilis, Stachys ajugoides, Stephanomeria virgata, Trichostema lanceolatum, T. laxum, Trifolium, Vicia.*
Dianthidium dubium Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 405. ♂, ♀.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 42, 43-44, figs. 5, 138-140, 185, 195, map 29 (tax. characters, geogr. and floral records).

dubium mccrackenae Timberlake. Calif. (east slope, Sierra Nevada Mts.). Pollen: Unknown, but visits flowers of *Eriastrum densifolium.*
Dianthidium consimile mccrackenae Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 104. ♀, ♂.
Dianthidium plenum convictorum Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 108. ♀.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 44-45, map 29 (tax. characters, geogr. and floral records).

floridiense Schwarz. Fla. Ecology: Nests in borings. Pollen: Unknown but visits flowers of *Bidens, Sabal.*
Dianthidium floridiense Schwarz, 1926. Amer. Mus. Novitates 226: 5. ♂, ♀.
Dianthidium floridense(!) Michener, 1951. *In* Muesebeck, Krombein and Townes, U. S. Dept. Agr., Agr. Monog. 2: 1143.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 16-17 (redescription).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 272-273 (nest architecture, life history).

heterulkei fraternum Timberlake. Tex., N. Mex., Ariz., Nev. Parasite: *Anthrax irroratus* Say.
Dianthidium fraternum fraternum Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 92. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 273-274 (nest architecture, life history, parasite).

heterulkei heterulkei Schwarz. Calif. (Sierra Nevada Mts.), Oreg., Nev., Utah, Wyo. Ecology: Constructs nests in natural depressions within volcanic outcroppings and possibly uses lodgepole pine as source of resin. Parasite: *Monodontomerus clementi* Grissell. Pollen: Polylectic, is known to collect pollen from flowers of *Eriophyllum integrifolium, Trifolium longipes,* but also visits flowers of *Aster, Chaenactis glabriuscula lanosa, Chrysothamnus, Haplopappus suffruticosa, Solidago.*
Dianthidium heterulkei Schwarz, 1940. Amer. Mus. Novitates 1058: 6. ♂, ♀.
Dianthidium heterulkei var. *cornucopiana* Schwarz, 1940. Amer. Mus. Novitates 1058: 8. ♂.
Dianthidium fraternum hirtulum Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 94. ♂, ♀.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 45-46, figs. 159-161, 181, 194, map 30 (geogr. and floral records). —Clement, 1976. Wasmann Jour. Biol. 34: 16-18, fig. 2 (larva).

Biology: Clement, 1976. Wasmann Jour. Biol. 34: 9-22, 2 figs. (nest site, nest architecture, life history, mating, floral relationships, parasite).

implicatum Timberlake. Tex. to south. Calif. and Nev.; Mexico (Chihuahua). Ecology: A pebble and resin nest attached to a twig of *Dalea*. Pollen: Unknown, but visits flowers of *Cevallia*, *Gutierrezia microcephala*.
Dianthidium implicatum Timberlake, 1948. N. Y. Ent. Soc., Jour. 56: 150. ♀.

Taxonomy: Grigarick and Stange, 1964. Pan-Pacific Ent. 40: 152. (male). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 46, figs. 150-152, 174, 190, map 31 (geogr. and floral record).

marshi Grigarick and Stange. Calif., Ariz. (Santa Catalina Mts.). Pollen: Unknown, but visits flowers of *Bebbia*, *Eriastrum densifolium*.
Dianthidium marshi Grigarick and Stange, 1964. Pan-Pacific Ent. 40: 149, figs. 1, 2, 3, 10, 11. ♂, ♀.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 46-47, figs. 147-149, 186-187, 201, map 32 (geogr. and floral records).

parkeri Grigarick and Stange. Ariz., Tex.; Mexico (Sonora, Sinaloa, Durango). Pollen: Unknown, but visits flowers of *Verbesina encelioides*.
Dianthidium parkeri Grigarick and Stange, 1964. Pan-Pacific Ent. 40: 150, figs. 4, 5, 6, 12. ♂, ♀.

parvum parvum (Cresson). N. Mex., west to Colo., Utah, Nev. and Calif.; Mexico. Pollen: Unknown, but visits flowers of *Chrysothamnus*, *Grindelia serrulata*, *Hyptis emoryi*, *Palafoxia linearis*, *Senecio douglasii*.
Anthidium parvum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 114. ♀, ♂.
Dianthidium profugum Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 90. ♀.
Dianthidium parvum heteropoda Schwarz, 1934. Amer. Mus. Novitates 743: 4. ♀.
Dianthidium parvum basingeri Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 97. ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 47-48, figs. 153-155, 183, 188, 190, map 33 (synonymy, geogr. and floral records).

parvum schwarzi Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Asclepias erosa*, *Chrysothamnus nauseosus mohavensis*, *Corethrogyne bernardina*, *Croton californicus*, *Encelia californica*, *Erigeron foliosus* var. *stenophyllus*, *Eriogonum fasciculatum polifolium*, *E. gracile*, *Grindelia*, *Gutierrezia californica*, *G. microcephala*, *G. sarothrae*, *Heterotheca grandiflora*, *Lepidospartum squamatum*, *Lotus scoparius*, *Senecio douglasii*, *Stephanomeria exigua*.
Dianthidium parvum schwarzi Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 96. ♀, ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 48, map 33 (geogr. and floral records).

platyurum mohavense Timberlake. Calif. Pollen: Unknown, but visits flowers of *Erigeron*, *Eriogonum fasciculatum*.
Dianthidium platyurum mohavense Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 87. ♀.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 49, map 34 (geogr. and floral records).

platyurum platyurum Cockerell. Tex., Ariz., west. Nev., Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Bebbia juncea*, *Encelia californica*, *Erigeron foliosus* var. *stenophyllus*, *Eriastrum densifolium*, *E. plurifolium*, *E. virgatum*, *Eriogonum*, *Gutierrezia californica*, *G. sarothrae*, *Heterotheca grandiflora*, *Lotus scoparius*, *Malacothrix*, *Phacelia ramosissima*, *Senecio douglasii*, *Stephanomeria exigua*, *S. virgata*.
Dianthidium platyurum Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 90. ♂, ♀.
Dianthidium parvum baculifrons Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 365. ♀.
Dianthidium ulkei riparii Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 400. ♂, ♀.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 49-50, figs. 165-167, 180, 200, map 34 (geogr. and floral records).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 274-275 (nest architecture, life history).

plenum Timberlake. Oreg., Calif. and west. Nev. Ecology: A resin and gravel nest attached in crotch of apple tree. Pollen: Unknown, but visits flowers of *Chaenactis glabriuscula lanosa, Monardella lanceolata, Phacelia.*

Dianthidium plenum plenum Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 106. ♂, ♀.
Dianthidium plenum williamsi Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 107. ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 50-51, figs. 144-146, 175, 193, 225, map 35 (synonymy, geogr. and floral records).

pudicum consimile (Ashmead). Ariz., Calif.; Mexico (Baja California). Ecology: Constructs nest of resin and large grains of sand or gravel, either in the crotches of terminal branches of shrubs or in depressions or angles of stones or boulders lying on the ground. Parasite: *Eusapyga verticalis* Cress., *Leucospis affinis* Say, *Microdontomerus anthidii* (Ashm.), *Monodontomerus montivagus* Ashm., *Sapyga minor* Roberts. Pollen: Unknown, but visits flowers of *Cirsium vulgare, Corethrogyne, Cryptantha intermedia, Encelia californica, Eriastrum densifolium, E. plurifolium, Eriodictyon crassifolium, E. trichocalyx* var. *lanatum, Eriogonum fasciculatum, E. inflatum, E. latifolium nudum, Grindelia camporum, G. robusta, G. stricta procumbens, Gutierrezia californica, G. microcephala, G. sarothrae, Haplopappus, Krameria grayi, Lonicera hispidula* var. *vacillans, Lotus glaber, L. scoparius, Melilotus indica, Monardella villosa, Phacelia distans, P. ramosissima, Salvia, Stachys pycnantha, Stephanomeria cichoriacea, S. exigua, Trichostema lanceolatum.* Predator: *Trichodes ornatus ornatus* Say, *T. o. tenellus* LeC.

Anthidium consimile Ashmead, 1896. Ent. News 7: 25 "♀" = ♂.
Dianthidium provancheri Titus, 1906. Ent. Soc. Wash., Proc. 7: 164. ♂.
Dianthidium plenum australe Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 108. ♀.
Dianthidium macswaini Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 109. ♀.
Dianthidium pudicum peninsulare Timberlake, 1949. Pan-Pacific Ent. 25: 130. ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 51-52, map 36 (synonymy, geogr. and floral records).

Biology: Davidson, 1896. Ent. News 7: 22 (nest, parasites). —Hicks, 1934. Colo. Univ. Studies 21: 265 (nest, parasites). —Linsley and MacSwain, 1942. Ent. Soc. Amer., Ann. 36: 589 (parasite). —Hurd and Linsley, 1950. N. Y. Ent. Soc. 58: 248, 249 (parasites). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 52 (summary of literature).

pudicum pudicum (Cresson). B. C. and Alta., south to Ariz. and Calif. Ecology: Constructs nest of resin and gravel either in crotches of small trees or shrubs or on underside of rocks. Parasite: *Eusapyga proxima* (Cress.), *E. rubripes* (Cress.), *Monodontomerus montivagus* Ashm., *Sapyga* sp., *Zonitis* sp. Pollen: Unknown, but visits flowers of *Aster, Chaenactis glabriuscula lanosa, Chrysothamnus, Cirsium vulgare, Cleome lutea, Eriastrum densifolium, Gormania obtusata, Medicago sativa, Oenothera clavaeformis cruciformis, Streptanthus tortuosus, Symphoricarpos.*

Anthidium pudicum Cresson, 1879. Amer. Ent. Soc., Trans. 7: 208. ♂.
Anthidium pudens Cresson, 1879. Amer. Ent. Soc., Trans. 7: 208. ♀.
Dianthidium pudicum decorum Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 100. ♀, ♂.
Dianthidium pudicum inyoense Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 101. ♀, ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Surv., Bul. 9: 53-54, figs. 141-143, 176, 191, map 36 (synonymy, geogr. and floral records).

Biology: Hicks, 1927. Psyche 34: 193. (nest, parasites). —Hicks, 1931. Canad. Ent. 63: 173 (nest). —Hicks, 1934. Colo. Univ. Studies 21: 268 (nest, parasites). —Roberts, 1933. Kans. Ent. Soc., Jour. 61: 91 (parasite). —Hurd and Linsley, 1950. N. Y. Ent. Soc., Jour. 58: 248 (parasites, as *pudicum decorum*). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 53 (summary of literature). —Clement and Rust, 1974. Pan-Pacific Ent. 50: 87-89, 1 fig. (nest).

simile (Cresson). Minn. to Ont. and Maine, south to Ga. Ecology: Reared from partly rotted log. Pollen: Unknown, but visits flowers of *Aster, Clethra.*

Anthidium simile Cresson, 1864. Ent. Soc. Phila., Proc. 2: 378. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 17-18, fig. 5 (redescript.).

Biology: Fischer, 1951. Kans. Ent. Soc., Jour. 24: 46-47 (nest).

singulare (Cresson). Calif., Nev. Ecology: Constructs nest of resin and pebbles on side or face of rocks. Pollen: Unknown, but visits flowers of *Chaenactis glabriuscula lanosa, Chrysanthemum, Chrysothamnus, Cirsium californicum, Erysimum asperum, Lupinus parishii, Perideridia, Solidago californica, Viguiera multiradiata.*

Anthidium singulare Cresson, 1879. Amer. Ent. Soc., Trans. 7: 207. ♀.

Dianthidium singulare var. *perluteum* Cockerell and Cockerell, 1904. *In* Cockerell, South. Calif. Acad. Sci., Bul. 3: 23. ♀.

Dianthidium singulare melanognathum Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 363. ♀.

Taxonomy: Cockerell, 1925. Calif. Acad. Sci. Proc. (4) 14: 363. ♂, ♀ (*singulare perluteum*). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 54, figs. 135-137, 177, 202-203, map 37 (synonymy, geogr. and floral records).

Biology: Michener, 1935. Pan-Pacific Ent. 11: 23-24 (nest). —Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 75 (nest). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 54 (summary of literature).

subparvum Swenk. B. C., Idaho and Mont., south to Calif., Nev., Utah and Wyo. Pollen: Possibly oligolege of Compositae, visits flowers of *Aster alpigenus, A. andersonii, A. canescens, A. foliaceus, Chaenactis glabriuscula, Chaetopappa aurea, Chenopodium, Chrysothamnus viscidiflorus, Clematis pauciflora, Corethrogyne bernardina, Erigeron divergens, Erigeron foliosus, E. f.* var. *stenophyllus, Eriogonum fasciculatum, Grindelia, Gutierrezia californica, G. sarothrae, Haplopappus suffruticosus, Linum, Lotus strigosus* var. *hirtellus, Machaeranthera tephrodes, Phacelia, Ranunculus, Senecio douglasii, Solidago.*

Dianthidium subparvum Swenk, 1914. Nebr. Univ., Studies 14: 30. ♀, ♂.

Dianthidium semiparvum Schwarz, 1926. Amer. Mus. Novitates 226: 12. ♂.

Dianthidium semiparvum gallatinae Schwarz, 1927. Amer. Mus. Novitates 277: 6. ♂, ♀.

Dianthidium parvum var. *swenki* Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 402. ♂ (♀ misdet.).

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 54-56, figs. 156-158, 182, 189, 192, map 38 (synonymy, geogr. and floral records).

subrufulum Timberlake. Mo., Ark., Tex.

Dianthidium subrufulum Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 78. ♂, ♀.

ulkei cooleyi Schwarz. Mont.

Dianthidium ulkei cooleyi Schwarz, 1927. Amer. Mus. Novitates 277: 7. ♀.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 58 (taxonomic status).

ulkei perterritum Cockerell. Nebr., N. Mex., Ariz. Ecology: Nests in borings, constructs nest using resin and pebbles. Parasite: *Nemognatha nigripennis* LeC.

Dianthidium ulkei perterritum Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 191. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 275-276, pl. 17, fig. 81 (nest architecture, supersedure, life history, parasite).

ulkei ulkei (Cresson). B. C., Idaho, Mont. and S. Dak. south to Calif., Nev., Utah, N. Mex. and Nebr. Ecology: Nests in abandoned nests of other aculeates, cavities or short tunnels in the ground, and trap nests. Parasite: *Eusapyga verticalis* (Cress.). Pollen: Possibly an oligolege of Compositae, but visits a wide variety of flowers including *Achillea millefolium, Aster adscendens, A. canescens, Calycadenia multiglandulosa, Centaurea, Chaetopappa aurea, Chrysopsis fastigiata, C. villosa, Chrysothamnus nauseosus, C. viscidiflorus, C. v. typicus, Cleomella serrulata, Cordylanthus filifolius, Encelia californica, Eriastrum densifolium, Erigeron divergens, E. foliosus* var. *stenophyllus, Eriodictyon, Eriogonum fasciculatum, E. subscaposum, E. vimineum, Gilia capitata, Grindelia camporum, G. serrulata, Haplopappus arborescens, H. bloomeri, Helenium bigelovii, Helianthus petiolaris, Heterotheca grandiflora, Lessingia leptoclada, Lotus davidsonii, L. scoparius, Machaeranthera tephrodes, Medicago sativa, Melilotus alba,*

Monardella laceolata, Ranunculus, Senecio douglasii, S. ionophyllus, Solidago californica, Stephanomeria californica, S. cichoracea, S. virgata, Vicia cracca, Viguiera multiflora.

Anthidium ulkei Cresson, 1878. Amer. Ent. Soc., Trans. 7: 115. ♀.
Anthidium davidsoni Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 5. ♂.
Dianthidium ulkei reductum Timberlake, 1943. N. Y. Ent. Soc., Jour. 51: 82. ♀, ♂.

Taxonomy: Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 56-58, figs., 162-164, 179, 198, map 39 (synonymy, geogr. and floral records).

Biology: Hicks, 1926. Colo. Univ., Studies 15: 250 (nest). —Hicks, 1933. Ent. News 44: 75 (nest). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 96. —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 58 (summary of literature).

Genus ANTHIDIELLUM Cockerell

Anthidium subg. *Anthidiellum* Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 3.
Type-species: *Anthidium strigatum* Panzer. Orig. desig.
Anthidium subg. *Ceri-anthidium* Friese, 1923. Die Europ. Bienen, p. 304.
Type-species: *Anthidium strigatum* Panzer. Desig. by Cockerell, 1925.
Cerianthidium Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 361. Emend.

Revision: Schwarz, 1926. Amer. Mus. Novitates 226: 15-19 (N. Amer. spp.)

Taxonomy: Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 369-418, 23 figs. (status of spp. and subspp.). —Schwarz, 1957. Kans. Ent. Soc., Jour. 30: 137 (key to spp. of *notatum* complex). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 18-23, figs. 1, 6-7, table 1 (eastern U. S. spp.). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 58-62, figs. 204-211, maps 40-41 (Calif. spp.).

ehrhorni (Cockerell). Ariz., Nev., Calif.; Mexico (Baja California). Ecology: Constructs a single celled nest of resin attached to twigs or flat pieces of wood. Pollen: Apparently polylectic, visits flowers of *Asclepias, Baileya, Chaenactis fremontii, Dalea schottii, Encelia, Eriogonum inflatum, Geraea canescens, Larrea tridentata, Lotus scoparius, Phacelia distans, P. ramosissima, Pluchea sericea, Prosopis, Stephanomeria virgata, Trixis californica.*
Anthidium (*Dianthidium*) *ehrhorni* Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 414. ♂.

Taxonomy: Schwarz, 1929 (1928). N. Y. Ent. Soc., Jour. 36: 392. ♀. —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1045, figs. 119, 123, 124, 127 (larva). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 59-60, figs. 208-211, map 40 (geogr. and floral records).

Biology: Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 397 (nest). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 60, fig. 227 (nest). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 35-36 (floral relationships).

notatum boreale (Robertson). Ill., Nebr. Pollen: Unknown, but visits flowers of *Verbena stricta.*
Dianthidium boreale Robertson, 1902. Canad. Ent. 34: 323. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 20-21 (redescription).

notatum gilense (Cockerell). Colo., Ariz., N. Mex., Tex.
Anthidium gilense Cockerell, 1897. Canad. Ent. 29: 222. ♀.

Taxonomy: Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 413. ♂.

notatum notatum (Latreille). Mass. to Ill., south to Fla. and Miss. Pollen: Apparently polylectic, visits flowers of *Afzelia, Baptisia, Chrysopsis, Desmodium, Erigeron, Eupatorium, Galactia, Helianthus, Melilotus, Monarda, Phaseolus, Psoralea, Solidago, Trifolium.*
Anthidium notatum Latreille, 1809. Mus. Nat. Hist., Ann. 13: 48, 231. ♂.

Taxonomy: Cresson, 1864. Ent. Soc. Phila., Proc. 2: 376. ♀, ♂. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 19-20, fig. 6 (redescript., floral records).

notatum robertsoni (Cockerell). B. C., Idaho, Colo., Utah, Oreg., Calif., Nev., Ariz.; Mexico (Baja California). Pollen: Polylectic, visits a wide variety of flowers including *Agastache, Amorpha californica, Aster adscendens, Astragalus, Chrysothamnus, Clarkia biloba, C. elegans, C. rhomboidea, Cordylanthus pilosus, C. rigidus, Clematis pauciflora, Cryptantha intermedia, Dalea, Eriodictyon, Eriogonum fasciculatum, E. latifolium nudum, Grindelia, Gutierrezia californica, Heliotropium curassavicum, Hemizonia fasciculata, Lippia, Lonicera hispidula* var. *vacillans, Lotus americanus, L. argophyllus, L. nevadensis, L. oblongifolius, L. purshianus, L. scoparius, Marrubium vulgare, Melilotus alba, Monardella lanceolata, Penstemon, Phacelia distans, P. ramosissima, Salvia, Solidago californica, Stellaria longipes, Stephanomeria exigua, Trichostema lanceolatum, Wislizenia refracta.*
Dianthidium robertsoni Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 4. ♀, ♂.
Anthidiellum robertsoni race *citrinellum* Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 362. ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1046, figs. 121, 122, 128 (larva). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 60-62, figs. 204-207, 228, map. 41 (geogr. and floral records).

Biology: Leech, 1947. Ent. Soc. Brit. Col., Proc. 44: 39, 2 figs. (nest). —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 159-160, figs. 6-7 (sleep). —Grigarick and Stange, 1968. Calif. Ins. Survey, Bul. 9: 62, fig. 228 (nest, summary of literature).

notatum rufimaculatum Schwarz. Fla. Pollen: Unknown, but visits flowers of *Rhus.*
Anthidiellum notatum var. *rufimaculatum* Schwarz, 1926. Amer. Mus. Novitates 226: 15. ♂, ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 21 (redescription).

Biology: Schwarz, 1928. N. Y. Ent. Soc., Jour. 36: 395, pl. 12, figs. 1A, 1B (nest).

perplexum (Smith). N. C. to Fla. Pollen: Unknown, but visits flowers of *Afzelia, Amorpha, Bidens, Chrysopsis, Desmodium, Erigeron, Hypericum, Ilex, Kuhnistera, Linaria, Monarda, Ocimum, Polygonum, Psoralea, Ptilimnium, Rhus, Solidago.*
Anthidium perplexum Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 214. ♀, ♂.

Taxonomy: Cresson, 1864. Ent. Soc. Phila., Proc. 2: 377. ♀, ♂.

Genus HETEROSTELIS Timberlake

Stelis subg. *Heterostelis* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 125.
Type-species: *Stelis anthidioides* Timberlake. Orig. desig.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 33-35, fig. 11, table 2 (eastern U. S. spp.). —Thorp, 1966. Kans. Ent. Soc., Jour. 39: 131-146, 16 figs. (N. Amer. spp.). —Pasteels, 1968. Nat. Canad. 95: 1057 (tax. status).

anthidioides (Timberlake). Calif.
Stelis (*Heterostelis*) *anthidioides* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 123. ♀.

Taxonomy: Thorp, 1966. Kans. Ent. Soc., Jour. 39: 134, 141-142, fig. 8 (tax. characters, geogr. records).

australis australis (Cresson). N. J. to Fla.
Stelis australis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 92. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 33. ♀ (redescription). —Thorp, 1966 Kans. Ent. Soc., Jour. 39: 136, figs. (tax. characters of male and female, geogr. and floral records).

australis floridensis Mitchell. Fla.
Heterostelis australis floridensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 33, fig. 11. ♀, ♂.

Taxonomy: Thorp, 1966. Kans. Ent. Soc., Jour. 39: 136-137 (tax. characters).

grossa Mitchell. Fla. (Gainesville), Ala. (Ft. Morgan).
Heterostelis grossa Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 35. ♀.

Taxonomy: Thorp, 1966. Kans. Ent. Soc., Jour. 39: 134, 137-138, fig. 5 (tax. characters, geogr. record).

hurdi Thorp. Calif. Host: *Trachusa perdita* Ckll.
Heterostelis hurdi Thorp, 1966. Kans. Ent. Soc., Jour. 39: 142, figs. 3, 9, 11, 13-16. ♀, ♂.

Taxonomy: Thorp, 1966. Kans. Ent. Soc., Jour. 39: 143-144, figs. 14-16 (cocoon, larva, pupa).

Biology: Thorp, 1966. Kans. Ent. Soc., Jour. 39: 132, 145 (nest, parasite).

manni (Crawford). Ariz. Host: *Trachusa manni* Cwfd.?
Stelis manni Crawford, 1917. Ent. Soc. Wash., Proc. 19: 168. ♀.

Taxonomy: Thorp, 1966. Kans. Ent. Soc., Jour. 39: 134, 140-141, fig. 7 (tax. characters).

texana Thorp. Tex. (Austin).
Heterostelis texana Thorp, 1966. Kans. Ent. Soc., Jour. 39: 135, figs 2, 6, 12. ♂.

Genus STELIS Panzer

Insofar as known the species of this genus are cleptoparasites, chiefly in the nests of pollen-collecting bees of the tribe Megachilini (*Ashmeadiella*, *Chalicodoma*, *Heriades*, *Hoplitis*, *Osmia*, *Proteriades* and *Robertsonella*). However, one of our species has been reared from a nest of the genus *Anthidium* and some extralimital species of *Stelis* have been shown to be cleptoparasites in the nests of *Ceratina* and *Euglossa*.

Taxonomy: Cockerell, 1898. Entomologist 31: 166-167 (U. S. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 35-47 figs. 12-14, table 2 (eastern U. S. spp.). —Rozen, 1966. N. Y. Ent. Soc., Jour. 74: 84-91, 18 figs. (immature stages). —Pasteels, 1968. Nat. Canad. 95: 1055-1063 (tax. status, affinities and origin).

Genus STELIS Subgenus STELIS Panzer

Stelis Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 246.
Type-species: *Apis punctulatissima* Kirby. Monotypic. (=*Apis aterrima* Panzer).
Gyrodroma Klug, 1807. Mag. Insektenk. 6: 198.
Type-species: *Apis punctulatissima* Kirby. Monotypic. (=*Apis aterrima* Panzer).
Gymnus Spinola, 1808. Insectorum Liguriae, v. 2, p. 9.
Type-species: *Apis punctulatissima* Kirby. Monotypic. (=*Apis aterrima* Panzer).
Ceraplastes Gistel, 1848. Naturgesch. Thierr. f. hoh. Schul., p. x. Proposed unnecessarily to replace *Stelis*.

This subgenus does not occur in North America.

Genus STELIS Subgenus PROTOSTELIS Friese

Stelis subg. *Protostelis* Friese, 1895. Die Bienen Europas v. 1, p. 25.
Type-species: *Stelis freygessneri* Friese. Desig. by Popov, 1938.

arizonensis Swenk. Ariz.
Stelis (*Microstelis*) *arizonensis* Swenk, 1915. Nebr. Univ., Studies 15: 189. ♀, ♂.

costalis costalis Cresson. Va. and Ky., south to Fla. and Tex.
Stelis costalis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 274. ♀, ♂.
Stelis louisae Cockerell, 1911. U. S. Natl. Mus., Proc. 40: 247. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 37-38, figs 12-13 (redescription).

costalis floridana Graenicher. Fla. Host: A resin-using anthidiine bee or a species of *Chalicodoma* subg. *Chelostomoides*.
Stelis floridana Graenicher, 1928. Ent. News 39: 282. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 38-39 (redescription).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 481-482 (cocoon, host).

laticincta Cresson. Calif.
Stelis laticincta Cresson, 1878. Amer. Ent. Soc., Trans. 7: 92. ♀.

Taxonomy: Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 3. ♂.

perpulchra Crawford. Ariz., Calif., Mexico (Baja California).
Stelis perpulchra Crawford, 1916. Insecutor Inscitiae Menstruus 4: 107. ♂.

Taxonomy: Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 89. ♀, ♂.

rudbeckiarum Cockerell. N. Mex., Ariz.
Stelis rudbeckiarum Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 3. ♂.
Stelis rudbeckiana(!) Snow, 1906. Kans. Acad. Sci., Trans. 20: 138.

Genus STELIS Subgenus MICROSTELIS Robertson

Microstelis Robertson, 1903. Amer. Ent. Soc., Trans. 29: 170.
Type-species: *Stelis lateralis* Cresson. Orig. desig.

coarctatus Crawford. Kans., Nev. (Elko County). Host: *Proteriades shoshone* Parker.
Stelis coarctatus Crawford, 1916. Insecutor Inscitiae Menstruus 4: 105. ♀.

Biology: Parker, 1976. Pan-Pacific Ent. 52: 78 (host).

crassiceps Cockerell. Colo. Host: *Hoplitis producta* (Cress.).
Stelis crassiceps Cockerell, 1926. Ann. and Mag. Nat. Hist. (9) 18: 625. ♂.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 246 (host).

lateralis Cresson. Maine and Ont. to N. Dak., south to Ga. and Tex. Host: *Hoplitis cylindrica* (Cress.), *H. pilosifrons* (Cress.), *H. producta* (Cress.). Predator: *Philanthus pulcher* Dalla Torre.
Stelis lateralis Cresson, 1864. Ent. Soc. Phila., Proc. 2: 410. ♀.

Taxonomy: Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 48. ♂, ♀. —Michener, 1953, Kans. Univ. Sci. Bul. 35: 1048, figs. 114-116, 118 (larva). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 42-43, fig. 14 (redescription). —Rozen, 1966. N. Y. Ent. Soc., Jour. 74: 86-89, figs. 9-10 (larva).

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 153 (as *sexmaculatus*). —Swenk, 1914. Nebr. Univ., Studies, 14: 5 (host). —Hicks, 1926. Colo. Univ., Studies 15: 217 (life history, host). —Rau, 1928. Psyche 35: 100 (life history, host). —Michener, 1955. Kans. Ent. Soc., Jour. 28: 83-86 (life history, host).

maculata (Provancher). B. C.
Heriades maculatum Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 323. ♀.

Taxonomy: Titus, 1906. Ent. Soc. Wash., Proc. 7: 162 (tax. characters).

plena (Provancher). Ont. (Ottawa).
Heriades plenum Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 425. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 43 (status).

sexmaculata Ashmead. Calif., Nev., ?Mo., ?Colo. Host: *Hoplitis brachyodonta* (Ckll.), *H. colei* (Cwfd.), *H. grinnelli* Ckll., *H. hypocrita* (Ckll.), *H. producta gracilis* (Mich.), *H. producta producta* (Cress.), *Osmia glauca* (Fowler). Parasite: *Epistenia* sp., *Leucospis affinis* Say, *Microdontomerus anthidii* (Ashm.).
Stelis 6-maculata Ashmead, 1896. Ent. News 7: 218. ♀.
Stelis sexmaculata Cockerell, 1898. Entomologist 31: 167. Emend.

Taxonomy: Cockerell, 1934. Amer. Mus. Novitates 732: 6. ♂. —Rust and Clement, 1972. Kans. Ent. Soc., Jour. 45: 526 (cocoon, host).

Biology: Davidson, 1896. Ent. News 7: 218 (host). —Davidson, 1897 South. Calif. Acad. Sci., Proc. 1: 4 (life history, hosts). —Hicks, 1926. Colo. Univ., Studies 15: 217 (life history, hosts). —Rau, 1928. Psyche 35: 100 (Colo. and Mo. records may refer to *lateralis*). —Parker and Bohart, 1966. Pan-Pacific Ent. 42: 98 (parasites).

vernalis Mitchell. Pa., N. C., Mich., Minn. Host: *Heriades carinata* Cress.
Stelis (*Microstelis*) *vernalis* Mitchell, 1962. N C. Agr. Expt. Sta. Tech. Bul. 152: 43. ♀, ♂.

Biology: Matthews, 1965. Amer. Ent. Inst., Contrib. 1: 24-25 (behavior, host).

Genus STELIS Subgenus PAVOSTELIS Sladen

Stelis subg. *Pavostelis* Sladen. 1916. Canad. Ent. 48: 313.

Type-species: *Stelis montana* Cresson. Monotypic.

anthracina Timberlake. Calif.
Stelis (Pavostelis) anthracina Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 125. ♂.

ater Mitchell. Fla.
Stelis (Pavostelis) ater Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 39. ♀.

callura Cockerell. Colo., Utah.
Stelis callura Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 212. ♂.

carnifex Cockerell. Nev., Calif.
Stelis carnifex Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 769. ♀.

diversicolor Crawford. Tex. to Tenn. and N. C.
Stelis diversicolor Crawford, 1916. Insecutor Inscitiae Menstruus 4: 106. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 39-40, fig. 14 (redescription).

fremonti Cockerell. Oreg.
Stelis fremonti Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 213. ♀.

montana Cresson. Alta., B. C., Wyo., Oreg., Colo., Utah, Ariz., Calif. Host: *Osmia montana* Cress., *O. texana* Cress.
Stelis montana Cresson, 1864. Ent. Soc. Phila., Proc. 3: 39. ♀.

Biology: Rust, 1974. Wasmann Jour. Biol. 32: 80 (host).

seneciophila Cockerell. Colo.
Stelis seneciophila Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 2: 329. ♀.

Genus STELIS Subgenus CHELYNIA Provancher

Chelynia Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 322.
Type-species: *Chelynia labiata* Provancher. Monotypic.

Taxonomy: Cockerell, 1898. Entomologist 31: 166-167. —Cockerell, 1936. Canad. Ent. 68: 275 (Key to U. S. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 36 (tax. status).

calliphorina (Cockerell). Calif.
Chelynia calliphorina Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 769. ♀.

chlorocyanea (Cockerell). Calif. Host: *Osmia nigrifrons* Ckll. Parasite: *Dibrachys* sp.
Chelynia chlorocyanea Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 208. ♀.

Taxonomy: Rust and Thorp, 1973. Kans. Ent. Soc., Jour. 46: 548-562, 26 figs. 2 tables (immature stages).

Biology: Rust and Thorp, 1973. Kans. Ent. Soc., Jour. 46: 548-562 (life history, hosts). —Rust, Thorp and Torchio, 1974. Nat. Hist., Jour. 8: 44 (host).

cusackae (Cockerell). Colo.
Chelynia cusackae Cockerell, 1910. Ent. News 21: 270. ♀.

depressa Timberlake. Calif.
Stelis (Chelynia) depressa Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 127. ♀, ♂.

elegans Cresson. B. C., Colo., Ariz.
Stelis elegans Cresson, 1864. Ent. Soc. Phila., Proc. 2: 411. ♂ (♀ misdet.).

foederalis Smith. N. B. to Minn., south Ga. and Colo. Host: *Hoplitis cylindrica* (Cress.), *Osmia atriventris* Cress.
Stelis foederalis Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 275. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 45, figs. 12-13 (redescription).

fragariella (Cockerell). Calif.
Chelynia fragariella Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 209. ♂.

franciscana (Cockerell). Calif.
Chelynia franciscana Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 207. ♀.

holocyanea (Cockerell). Calif.
Chelynia holocyanea Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 209. ♀.

idahoensis Swenk. Idaho.
Stelis (Chelynia) idahoensis Swenk, 1914. Nebr. Univ., Studies 14: 6. ♀.

Taxonomy: Cockerell, 1936. Canad. Ent. 68: 275 (tax. characters).

interrupta Cresson. Nev.
Stelis interrupta Cresson, 1897. Amer. Ent. Soc., Trans. 7: 205. ♀.

labiata (Provancher). Que. to Wis., south to N. C. and Tex.? Host: *Hoplitis anthocopoides* (Schenck), *H. cylindrica* (Cress.), *H. pilosifrons* (Cress.), *H. producta* (Cress.), *H. simplex* (Cress.).
Chelynia labiata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 322. ♀, ♂.
?Stelis (*Microstelis*) *birkmanni* Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 29. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 40-42, fig. 13 (redescription, synonymy).

Biology: Eickwort, 1973. Search, Cornell Univ. Agr. Expt. Sta. 3: 27 (host relationships).

leucotricha (Cockerell). Calif. Host: *Anthidium mormonum* Cress.
Chelynia leucotricha Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 208. ♀, ♂.

Biology: Hicks, 1929. Ent. News 40: 108. (host).

linsleyi Timberlake. Calif.
Stelis (*Chelynia*) *linsleyi* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 129. ♀.

melanotricha (Cockerell). Colo.
Chelynia melanotricha Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 626. ♀.

michiganensis Mitchell. Mich. (Luce Co.).
Stelis michiganensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 45. ♀.

monticola Cresson. B. C., Idaho, Wyo., Colo. Host: *Hoplitis fulgida* Cress.
Stelis? monticola Cresson, 1878. Amer. Ent. Soc., Trans. 7: 94. ♀.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 243 (host).

nitida Cresson. Canada, N. Y., Wis., N. C.
Stelis? nitida Cresson, 1878. Amer. Ent. Soc., Trans. 7: 92. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 46-47 (redescription).

nitidula (Cockerell). Calif.
Chelynia nitidula Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 210. ♂.

Taxonomy: Cockerell, 1936. Canad. Ent. 68: 274 (tax. characters).

pavonina (Cockerell). Wyo., Colo.
Chelynia pavonina Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 339. ♂.

Taxonomy: Cockerell, 1922. Amer. Mus. Novitates 40: 7. ♂, ♀.

pulchra Crawford. Nebr., Colo.
Stelis pulchra Crawford, 1902. Canad. Ent. 34: 239. ♀.

semirubra reducta Snelling. Calif. (Tuolumne and Mariposa counties).
Stelis (*Chelynia*) *semirubra reducta* Snelling, 1962. Pan-Pacific Ent. 38: 227. ♀, ♂.

semirubra semirubra Timberlake. Calif.
Stelis (*Chelynia*) *semirubra* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 127. ♀.

subcaerulea Cresson. Wyo., Nev., Calif.
Stelis? subcaerulea Cresson, 1878. Amer. Ent. Soc., Trans. 7: 93. ♂.

Taxonomy: Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 768. ♂, ♀.

subemarginata Cresson. N. B., Ont., Man., Wis., N. Dak., Wyo., Idaho, Colo. Host: *Hoplitis albifrons* (Kirby), *H. cylindrica* (Cress.), *Osmia proxima* Cress., *O. simillima* Sm.
Stelis? subemarginata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 93. ♀.

Taxonomy: Swenk, 1915. Nebr. Univ., Studies 15: 191. ♂. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 47 (redescription).

Biology: Graenicher, 1935. Ent. Soc. Amer., Ann. 28: 300 (host). —Fye, 1965. Canad. Ent. 97: 865 (hosts).

subglauca (Cockerell). Wash.
Chelynia subglauca Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 210. ♂.

Genus STELIS Subgenus MELANOSTELIS Ashmead

Melanostelis Ashmead, 1898. Psyche 8: 283.
Type-species: *Chelynia rubi* Cockerell. Monotypic and orig. desig. (=*Melanostelis betheli* Ashmead).

ricardonis (Cockerell). B. C.
Chelynia ricardonis Cockerell, 1912. Canad. Ent. 44: 293. ♀.

rubi Cockerell. B. C., Alta., Wash., Calif., Colo.
Stelis rubi Cockerell, 1898. Entomologist 31: 167. ♀.
Melanostelis betheli Ashmead, 1898. Psyche 8: 283. ♀.

Taxonomy: Swenk, 1914. Nebr. Univ. Studies 14: 8. ♀, ♂.

Genus STELIS Subgenus STELIDIUM Robertson

Stelidium Robertson, 1902. Canad. Ent. 24: 323.
Type-species: *Stelidium trypetinum* Robertson. Monotypic and orig. desig.

ashmeadiellae Timberlake. Calif. Host: *Ashmeadiella californica* (Ashm.).
Stelis (*Stelidium*) *ashmeadiellae* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 133. ♀, ♂.

Biology: Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 134 (host).

nyssonoides (Brues). Tex.
Melanostelis nyssonoides Brues, 1903. Ent. News 14: 84. ♀.

palmarum Timberlake. Calif.
Stelis (*Stelidium*) *palmarum* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 134. ♀.

permaculata Cockerell. Colo., N. Mex. Host: *Heriades carinata* Cress.?
Stelis lateralis var. *permaculata* Cockerell, 1898. Entomologist 31: 167. ♂.

Biology: Hicks, 1927. Ent. News 38: 297 (host).

robertsoni Timberlake. Calif.
Stelis (*Stelidium*) *robertsoni* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 136. ♀, ♂.

trypetina (Robertson). Ill., Ont., Va.
Stelidium trypetinum Robertson, 1902. Canad. Ent. 34: 323. ♀.
Stelis (*Stelidium*) *ontariana* Sladen, 1916. Canad. Ent. 48: 312. ♀, ♂.

Taxonomy: Cockerell, 1922. Canad. Ent. 54: 143 (tax. characters). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 44-45 (redescription).

Genus STELIS Subgenus STELIDINA Timberlake

Stelis subg. *Stelidina* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 125.
Type-species: *Stelis hemirhoda* Linsley. Orig. desig.
Stelidella(!) Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 133.

Revision: Linsley, 1939. Ent. News 50: 255.

acutiventris Linsley. Calif.
Stelis (*Stelidium*) *acutiventris* Linsley, 1939. Ent. News 50: 252. ♀.

cockerelli (Hicks). Calif.
Herbstiella cockerelli Hicks, 1933. Amer. Mus. Novitates 616: 1. ♀.

hemirhoda Linsley. Calif.
Stelis (*Stelidium*) *hemirhoda* Linsley, 1939. Ent. News 50: 250. ♀, ♂.

micheneri Linsley. Calif.
Stelis (*Stelidium*) *micheneri* Linsley, 1939. Ent. News 50: 253. ♀, ♂.

nigriventris Timberlake. Calif.
Stelis (*Stelidina*) *nigriventris* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 132. ♀.

trichopyga Timberlake. Calif.
Stelis (*Stelidina*) *trichopyga* Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 130. ♀.

Unplaced Taxon of Stelis

The following species can neither be recognized as to subgenus nor associated with any of the described species of *Stelis* in North America, but is a member of the genus *Stelis*.

Andrena nigrita Fabricius, 1775. Systema Ent., p. 377. "Habitat in America."

Nomen Nudum in Stelis Panzer

Stelis foxi Smith, 1910 (1909). N. J. State Mus., Ann. Rpt., p. 695.

Genus DIOXYS Lepeletier and Serville

Dioxys Lepeletier and Serville, 1825. Encycl. Meth., Dict. Ins., v. 10, p. 109.
Type-species: *Trachusa cincta* Jurine. Monotypic.
Paradioxys Mocsary, 1894. Termes. Fuzetek, v. 17, p. 35.
Type-species: *Dioxys pannonica* Mocsary. Monotypic.
Hoplopasites Ashmead, 1898. Psyche 8: 284.
Type-species: *Phileremus? productus* Cresson. Monotypic and orig. desig.
Chrysopheon Titus, 1901. Canad. Ent. 33: 256.
Type-species: *Chrysopheon aurifuscus* Titus. Monotypic.

Revision: Hurd, 1958. Calif. Univ. Pubs. Ent. 14: 275-302, 28 figs., 4 maps. (Nearctic spp.).

Taxonomy: Cockerell, 1928. Colo. Univ., Studies 16: 111 (synopsis). —Rozen, 1967. N. Y. Ent. Soc., Jour. 75: 236-248, 31 figs. (immature stages).

Biology: Hurd, 1958. Calif. Univ. Pubs. Ent. 14: 276 (floral and host relationships).

aurifuscus (Titus). Colo., Idaho, Calif., Oreg. Host: *Anthidium maculosum* Cress.?, *Callanthidium illustre* Cress.
Chrysopheon aurifuscus Titus, 1901. Canad. Ent. 33: 256. ♀.
Dioxys fulvohirta Ducke, 1909. Rev. de Ent. 27: 44. ♀.

Taxonomy: Horning, 1966. Ent. Soc. Wash., Proc. 68: 157 (geogr. records).

Biology: Cockerell, 1909. Canad. Ent. 41: 334 (host). —Hicks, 1929. Canad. Ent. 61: 8 (host). —Horning, 1971. Ent. Soc. Wash., Proc. 73: 43 (host).

pacificus melanogaster Hurd. South. Calif. (San Bernardino, San Gabriel and San Jacinto Mts.).
Dioxys pacificus melanogaster Hurd, 1958. Calif. Univ. Pubs. Ent. 14: 296. ♀, ♂.

pacificus pacificus Cockerell. Calif. (except mts. of southern Calif.), Oreg., Nev., Utah, Wyo.
Dioxys pacificus Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 286. ♀.

pomonae pomonae Cockerell. Idaho, Utah, Colo., N. Mex., Ariz., Oreg. and Calif. (except Sonoran Desert). Host: *Anthidium collectum* Huard, *Chalicodoma subexilis* (Ckll.), *Osmia nifoata* Ckll., *O. nigrobarbata* Ckll.
Dioxys pomonae Cockerell, 1910. Canad. Ent. 42: 169. ♂.
Dioxys phaceliae Cockerell, 1911. Amer. Ent. Soc., Trans. 37: 235. ♀.
Dioxys catalinensis Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 148. ♂.

Taxonomy: Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 285. ♀. —Gittins, 1959. Brooklyn Ent. Soc., Bul. 54: 135 (geogr. records). —Horning, 1966. Ent. Soc. Wash., Proc. 68: 157 (floral and geogr. records). —Rozen, 1967. N. Y. Ent. Soc., Jour. 75: 236-248, 31 figs. (immature stages).

Biology: Rozen and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 197-203, 7 figs. (life history, host).

pomonae timberlakei Hurd. Southern Calif., deserts.
Dioxys pomonae timberlakei Hurd, 1958. Calif. Univ. Pubs. Ent. 14: 285. ♀, ♂.

productus cismontanicus Hurd. Pacific slope of Calif.; Mexico (Baja California). Host: *Anthidium collectum* Huard.
Dioxys productus cismontanicus Hurd, 1958. Calif. Univ. Pubs. Ent. 14: 290. ♀, ♂.

productus productus (Cresson). Great Basin of Calif., Nev., Wash., Oreg., Utah. Host: *Anthidium utahense* Swenk.
Phileremus? productus Cresson, 1879. Amer. Ent. Soc., Trans. 7: 203. ♀.

Taxonomy: Ducke, 1909. Rev. de Ent. 27: 44 (tax. characters). —Horning, 1966. Ent. Soc. Wash., Proc. 68: 157 (geogr. record). —Rozen, 1967. N. Y. Ent. Soc., Jour. 75: 2, 36, 238-239, 240, 242, figs. 9-15 (larva, as *productus productus*?).

Biology: Jaycox, 1966. Pan-Pacific Ent. 42: 18-20 (habits, host).

productus subruber (Cockerell). Calif. deserts, Ariz., N. Mex., western Tex. Host: *Anthidium paroselae* Ckll.?

Phileremus productus var. *subruber* Cockerell, 1898. N. Mex. Univ., Bul. 1: 60. ♀.

Dioxys martii Cockerell, 1902. Ann. and Mag. Nat. Hist. (7) 9: 233. ♀ (= male).

Biology: Newberry, 1900. Psyche 9: 94 (host).

rohweri Cockerell. Colo. (Troublesome).

Dioxys rohweri Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 2: 329. ♂.

Tribe MEGACHILINI

The tribe Megachilini, which contains the well known leaf-cutter and mason bees, is represented by numerous species throughout much of the world. Although some of these bees are cleptoparasites, mainly in the nests of other Megachilini, most members of this tribe are pollen-collecting bees, and like the Anthidiini make use of a wide variety of foreign materials for the construction of the cells in their nests. However, unlike the Anthidiini some of these bees utilize mud for cell construction, but none is known to use plant down for this purpose. Some of the species live in colonies (e.g., certain *Chalicodoma* and *Osmia*) which are communal and even possibly quasisocial, but the majority of the species are solitary. Most of the species appropriate a wide variety of pre-existing holes and cavities of all sorts in which to make their nests, but some of them do excavate their own tunnels in the ground. In some classifications the tribe Megachilini is divided into two subtribes, the Osmiini (arolium present) and the Megachilini (arolium absent).

Taxonomy: Michener, 1941. Amer. Midland Nat. 26: 147-167 (partial generic revision). —Michener, 1944. Amer. Nat. 78: 257-266, 1 fig. (distribution of osmiine bees of the N. Amer. deserts). —Hurd and Michener, 1955. Calif. Ins. Survey Bul. 3: 1-248, 141 figs., 112 maps (Calif. spp. except of *Osmia*, *Megachile*, and *Coelioxys*). —Michener and Sokal, 1957. Evolution 11: 130-162, 15 figs., 4 tables (genera of *Hoplitis* complex). —Sokal and Michener, 1958. Kans. Univ. Sci. Bul. 38: 1409-1438 (statistical evaluation of systematic relationships in the *Hoplitis* complex). —Michener, 1962. N. Y. Ent. Soc., Jour. 70: 17-29 (classification of bees commonly placed in the genus *Megachile*). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 48-232, figs. 1, 15-66, tables 3-7 (eastern U. S. spp.). —Rubin, 1966. Syst. Zool. 15: 169-182, 3 tables (homogeneous groups in the *Hoplitis* complex). —Michener and Sokal, 1966. Ent. Soc. Amer., Ann. 59: 1211-1217, 5 figs. (phenetic similarities in the *Hoplitis* complex). —Sokal and Michener, 1967. Linn. Soc. London, Proc. 178: 59-74 (effects of different numerical techniques on the phenetic classification of the *Hoplitis* complex).

Biology: Eickwort, 1975. Evolution 29: 142-150, 1 fig., 2 tables (evolution of parasitism and sociality in *Hoplitis*).

Genus HERIADES Spinola

The bees of this genus nest in small holes, such as those made by emerging beetles in old logs, dead branches, and pine cones. Insofar as known, the species are polylectic and have rather long seasons of flight.

Revision: Michener, 1938. Ent. Soc. Amer., Ann. 31: 514-531 (Amer. spp.). —Hurd and Michener, 1955. Calif. Ins. Survey, Bul. 3: 11-24, pls. 3, 12, figs. 7-16, maps 2-7 (Calif. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 48-52, figs. 1, 15, table 3 (eastern U. S. spp.).

Genus HERIADES Subgenus HERIADES Spinola

Heriades Spinola, 1808. Insectorum Liguriae, v. 2, p. 7.
Type-species: *Apis truncorum* Linnaeus. Desig. by Latreille, 1810.

Trypetes Schenck, 1859. Nassau. Ver. f. Naturk. Jahrb. 14: 32. Preocc.

Type-species: *Apis truncorum* Linnaeus. Monotypic.

This subgenus is not found in America.

Genus HERIADES Subgenus NEOTRYPETES Robertson

Neotrypetes Robertson, 1918. Ent. News 29: 92.
Type-species: *Megachile variolosa* Cresson. Monotypic and orig. desig. (=*Trypetes productus* Robertson).

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 27: 68-69 (rev. key to spp.).

crucifera Cockerell. N. Mex., Ariz.
Heriades crucifera Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 137. ♂.

leavitti Crawford. N. B. and Maine, south to Fla., west to Tex. and Wyo. Pollen: Polylectic, visits a wide variety of flowers including *Anthemis cotulla, Bidens, Chrysopsis, Erigeron, Galax, Helenium, Ilex, Jussiaea, Melilotus officinalis, Oenothera, Polygonum, Senecio, Solidago, Stokesia.*
Heriades leavitti Crawford, 1913. Canad. Ent. 45: 270. ♂.
Heriades crawfordi Graenicher, 1928. Ent. News 39: 281. ♀, ♂.
?Neotrypetes truncatus Robertson, 1929. Flowers and Insects, p. 131. ♀, ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 278-279 (nest architecture, life history).

micheneri Timberlake. Ariz.
Heriades (*Neotrypetes*) *micheneri* Timberlake, 1947. Pan-Pacific Ent. 23: 26. ♂, ♀.

micropthalma Michener. Deserts of west. Tex., N. Mex., Ariz., Utah. Pollen: Apparently polylectic, visits flowers of *Melilotus officinalis, Monarda, Petalostemon, Tetradymia canescens.*
Heriades micropthalma Michener, 1954. Kans. Ent. Soc., Jour. 27: 66, 2 figs. ♀, ♂.

texana Michener. Tex., Ariz.
Heriades texana Michener, 1938. Ent. Soc. Amer., Ann. 31: 517. ♀.

variolosa purpurascens Cockerell. South. Tex. to Yucatan.
Heriades carinata purpurascens Cockerell, 1931. Ann. and Mag. Nat. Hist. (10) 8: 543. ♀.

Taxonomy: Michener, 1949. Kans. Ent. Soc., Jour. 22: 43.

variolosa variolosa (Cresson). Ont. and Maine, south to Fla., west to B. C., Wash., Oreg., Utah, Colo., N. Mex. and Tex; Mexico (northern). Ecology: Nests in twigs of sumac. Pollen: Polylectic, principally Compositae, but visits a wide variety of flowers including *Amorpha, Apocynum, Asclepias, Aster, Berteroa, Bidens, Blephilia, Brassica, Ceanothus, Cirsium, Coreopsis, Erigeron philadelphicus, Grindelia, Gutierrezia sarothrae, Helianthus, Heliopsis helianthoides, Houstonia, Malva silvestris, Melilotus alba, Mentha canadensis, Monarda, Parthenium, Prunus, Ratibida, Senecio, Solidago rigida, Thelesperma gracile, Toxicodendron, Trifolium, Vernonia.*
Megachile variolosa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 270. ♀.
Heriades odontophora Schletterer, 1889. Zool. Jahrb., Abt. f. System., Geog. u. Biol. Tiere 4: 679. ♀.
Heriades asteris Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 135. ♂.
Trypetes barbatus Robertson, 1903. Amer. Ent. Soc., Trans. 29: 171. ♂ (♀ misdet.).
Trypetes productus Robertson, 1905. Canad. Ent. 37: 236. ♂.

Biology: Fischer, 1955. Canad. Ent. 87: 33-36 (nest).

Genus HERIADES Subgenus PHYSOSTETHA Michener

Heriades subg. *Physostetha* Michener, 1938. Ent. Soc. Amer., Ann. 31: 523.
Type-species: *Heriades carinata* Cresson. Orig. desig.

carinata Cresson. N. B. and Que. to Fla., west to B. C., Oreg., Utah, N. Mex., and Tex. Parasite: *Leucospis affinis* Say, *Melittobia chalybii* Ashm., *Sapyga louisi* Krombein, *Stelis permaculata* Ckll., *S. vernalis* Mitchell. Pollen: Polylectic, visits a wide variety of flowers including *Apocynum, Aronia, Asclepias syriaca, Cichorium intybus, Cleome*

serrulata, Erigeron, Fayopyrum, Helianthus, Ilex, Medicago sativa, Melilotus alba, M. officinalis, Mentha canadensis, Monarda fistulosa, Parthenocissus quinquefolia, Penstemon, Petalostemon candidus, Polygonum scandens, Potentilla, Rhus glabra, R. typhina, Rubus, Senecio, Solidago, Trifolium, Vicia.

Heriades carinatum Cresson, 1864. Ent. Soc. Phila., Proc. 2: 383. ♀, ♂.

Heriades glomerans Schletterer, 1889. Zool. Jahrb., Abt. f. System., Geog. u. Biol. Tiere 4: 681. ♀.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 39-40 (nest). —Matthews, 1965. Amer. Ent. Inst. Contrib. 1: 1-33, 23 figs., 7 tables (nest, life history, immature stages, parasites). —Krombein, 1967. Trap-nesting wasps and bees, pp. 279-282 (nest architecture, life history, supersedure).

cressoni Michener. Nebr. to N. Mex., west to B. C. and Calif. Pollen: Polylectic, visits a wide variety of flowers including *Achillea lanulosa, Aster adscendens delectabilis, A. canescens, A. parishii, Calycadenia multiglandulosa, Chrysopsis, Chrysothamnus pumilus, C. viridulus, Chamaenerion angustifolium, Cirsium californicum, Erigeron foliosus* var. *stenophyllus, Eriogonum elongatum, E. latifolium* var. *nudum, Eriophyllum confertiflorum, Gayophytum ramosissimum, Geranium richardsoni, Gutierrezia californica, Haplopappus gracilis, Helenium bigelovii, Heteromeles arbutifolia, Potentilla gracilis, P. glandulosa, Senecio ionophyllus, Solidago californica, S. confinis, S. petradoria.*

Heriades (*Physostetha*) *cressoni* Michener, 1938. Ent. Soc. Amer., Ann. 31: 529. ♀, ♂.

gracilior Cockerell. Colo., N. Mex., Ariz., Nev. and south. Calif. Pollen: Unknown, but visits flowers of *Convolvulus arvensis, Opuntia.*

Heriades gracilior Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 138. ♂, ♀.

occidentalis Michener. Oreg., Calif. Ecology: Nests in abandoned beetle burrows in cones of *Pinus attenuata.* Pollen: Polylectic, visits a wide variety of flowers including *Adenostoma fasciculatum, Angelica tomentosa, Asclepias fascicularis, Baccharis douglasii, Cirsium vulgaris, Cordylanthus, Cryptantha intermedia, Eriogonum fasciculatum, Eriogonum latifolium* var. *nudum, Eriodictyon trichocalyx, Eriophyllum lanatum, Eryngium aristatulum, Gnaphalium thermale, Haplopappus squarrosus, Helianthum scoparius, Helianthus gracilentus, Hemizonia paniculata, Heteromeles arbutifolia, Lonicera interrupta, Lotus, Nolina parryi, Opuntia occidentalis, Phacelia imbricata, Rhus integrifolia, Sidalcea malvaeflora, Solidago californica, S. occidentalis, Stephanomeria, Swertia parryi, Tetradymia canescens, Verbena lasiostachys.*

Heriades (*Physostetha*) *occidentalis* Michener, 1938. Ent. Soc. Amer., Ann. 31: 525. ♀, ♂.

timberlakei Michener. Ariz., Nev., N. Mex., Colo. Pollen: Unknown, but visits flowers of *Euphorbia albomarginata.*

Heriades (*Physostetha*) *timberlakei* Michener, 1938. Ent. Soc. Amer., Ann. 31: 527. ♂, ♀.

Genus PROCHELOSTOMA Robertson

Prochelostoma Robertson, 1903. Amer. Ent. Soc., Trans. 29: 167.
Type-species: *Heriades philadelphi* Robertson. Monotypic and orig. desig.

Revision: Michener, 1938. Ent. News 69: 131.

philadelphi (Robertson). N. Y. to Ga., west to Mich., Ill., Kans. and Miss. Ecology: Nests in deserted anobiid borings and trap-nests. Parasite: *Melittobia chalybii* Ashm., *Pyemotes ventricosus* (Newport). Pollen: Unknown, but visits flowers of *Capsella, Crataegus, Ellisia, Geranium, Hydrophyllum, Ilex, Philadelphicus, Rubus.* Predator: *Trogoderma ornatum* Say.

Heriades philadelphi Robertson, 1891. Amer. Ent. Soc., Trans. 18: 64. ♀, ♂.

Biology: Krombein, 1959. Ent. News 70: 135-136 (nest, mating). —Krombein, 1967. Trap-nesting wasps and bees, pp. 276-278, pl. 17, fig. 86 (nest architecture, life history, supersedure, parasites).

Genus CHELOSTOMA Latreille

Chelostoma Latreille, 1809. Gen. Crust. Ins., v. 4, p. 16.

Type-species: *Apis florisomnis* Linnaeus. Monotypic. (=*Apis maxillosa* Linnaeus).

Gyrodroma Thomson, 1872. Hym. Scand., v. 2, p. 259. Preocc.
Type-species: *Heriades nigricornis* Nylander. Desig. by Cockerell, 1925.

Nearctic species of this genus visit flowers of Hydrophyllaceae, especially the genera *Phacelia* and *Eriodictyon*, and possibly collect pollen exclusively from these flowers.

Revision: Michener, 1938. Pan-Pacific Ent. 14: 36-45.

bernardinum Michener. South. Calif. Pollen: Unknown, but visits flowers of *Nemophila integrifolia, N. menziesii, N. spatulata, Phacelia davidsonii.*
Chelostoma bernardinum Michener, 1938. Pan-Pacific Ent. 14: 40. ♀, ♂.

californicum Cresson. Calif.; Mexico (Baja California). Pollen: Apparently oligolectic on flowers of *Phacelia* including *P. ciliata, P. davidsonii, P. distans, P. hispida, P. imbricata, P. platyloba, P. ramosissima*, but visits other flowers presumably for nectar including *Cryptantha intermedia, C. flaccida, Eriodictyon californicum, E. trichocalyx, Hesperochiron californicum, Layia platyglossa, Nemophila menziesii, N. integrifolia, Plagiobothrys nothofulvus, Salvia carnosa.*
Chelostoma californicum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 108. ♂.
Heriades albicinctum Provancher, 1895. Nat. Canad. 22: 190. ♀, ♂.
Heriades odontura Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 139. ♂.
Robertsonella dolichosoma Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 456. ♀.

cockerelli Michener. South. Calif. Pollen: Apparently oligolectic on flowers of *Eriodictyon* including *E. californicum, E. crassifolium, E. trichocalyx*, but visits other flowers including *Clarkia, Cryptantha intermedia, Gilia exilis, Lotus scoparius, Mimulus fremontii, Nama parryi, Navarretia heterodoxa, Penstemon, Phacelia distans, P. tanacetifolia, Trichostema lanatum, T. parishii, Verbena lasiostachys, Viguiera deltoides.*
Chelostoma minutum cockerelli Michener, 1938. Pan-Pacific Ent. 14: 43. ♂, ♀.

incisulum Michener. Calif. Pollen: Apparently oligolectic on flowers of *Phacelia* including *P. distans, P. platyloba*, but also visits flowers of *Ceanothus, Cryptantha, Gilia tricolor, Hesperochiron californicus, Lasthenia chrysostoma, Linanthus aureus.*
Chelostoma minutum incisulum Michener, 1938. Pan-Pacific Ent. 14: 44. ♂.

marginatum incisuloides Michener. Cent. Calif. Pollen: Apparently oligolectic on flowers of *Phacelia* including *P. platyloba*, but also visits other flowers including *Amsinckia, Cryptantha, Eriodictyon californicum, Nemophila pulchella, Penstemon laetus.*
Chelostoma marginatum incisuloides Michener, 1954. Kans. Ent. Soc., Jour. 27: 69. ♂, ♀.

marginatum marginatum Michener. South Calif. Pollen: Apparently oligolectic on flowers of *Phacelia* including *Phacelia davidsonii, P. distans, P. hispida, P. minor*, but also visits other flowers including *Allium parvum, Cryptantha intermedia, Eriodictyon crassifolium, Lomatium dasycarpum, Nemophila pulchella, Rhamnus crocea, Rhus trilobata, Salvia columbariae, S. mellifera.*
Chelostoma minutum marginatum Michener, 1938. Pan-Pacific Ent. 14: 44. ♂, ♀.

minutum Crawford. Wash., Oreg., Utah, Nev., Calif. (Sierra Nevada and San Bernardino Mts.), Idaho. Pollen: Presumably oligolectic on *Phacelia* including *P. californica, P. davidsonii, P. distans, P. heterophylla, P. imbricata, P. linearis, P. ramosissima*, but also visits other flowers including *Allium parvum, Calochortus, Cryptantha, Draperia systyla, Erigeron divergens, Eriodictyon crassifolium, E. trichocalyx, Eriophyllum lanatum, Erysimum asperum, Heuchera micrantha, Lepidium virginicum, Lotus argophyllus, Mimulus fremontii, Nemophila menziesii, Penstemon spectabilis, Polemonium, Potentilla glandulosa, Sidalcea malvaeflora.*
Chelostoma minuta Crawford, 1916. Insecutor Inscitiae Menstruus 4: 102. ♀.

phaceliae Michener. Wash., Oreg., Calif., Nev. Pollen: Apparently oligolectic on *Phacelia* including *P. californica, P. distans, P. heterophylla, P. hispida P. imbricata, P. linearis, P. ramosissima, P. tanacetifolia*, but also visits other flowers including *Allium dichlamydium, Brodiaea laxa, Calochortus, Clarkia dudleyana, C. pulchella, C. rhomboidea, Cryptantha intermedia, Erigeron foliosus* var. *stenophyllus, Eriodictyon californicum, E. crassifolium, Gilia exilis, Horkelia bolanderi, Lepechinia calycina,*

Lotus scoparius, Mimulus fremontii, Monardella lanceolata, Nama parryi, Nasturtium officinale, Polemonium, Potentilla glandulosa, Sidalcea malvaeflora.
Chelostoma phaceliae Michener, 1938. Pan-Pacific Ent. 14: 38. ♂, ♀.

tetramerum Michener. North. Calif. Pollen: Unknown, but visits flowers of a yellow *Mimulus*.
Chelostoma tetramerum Michener, 1942. Ent. News 53: 47. ♂.

Genus CHELOSTOMOPSIS Cockerell

Chelostomopsis Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 205.
Type-species: *Chelynia rubifloris* Cockerell. Orig. desig.
Raphidostoma Cockerell, 1936. Pan-Pacific Ent. 12: 133.
Type-species: *Chelynia rubifloris* Cockerell. Monotypic and orig. desig. (=*Raphidostoma ceanothi* Cockerell).

Revision: Michener, 1938. Ent. News 49: 127.

Taxonomy: Popov, 1961. Zool. Zhur. Akad. Nauk 40: 359-370, 3 figs. (tax. status, tax, relationships).

rubifloris (Cockerell). Wash., Oreg., Calif., Ariz. Ecology: Has been reared from cones of *Pinus attenuata*. Pollen: Polylectic, visits a wide variety of flowers including *Allium parvum, Agoseris, Arbutus menziesii, Arctostaphylos drupacea, A. mariposa, A. nevadensis, A. patula, Arenaria douglasii, Calochortus luteus, C. nudus, Castilleia, Ceanothus cuneatus, C. integerrimus, C. parviflorus, Cercocarpus ledifolius, Chamaebatia foliolosa, Chorizanthe staticoides, Clarkia unguiculata, Collinsia bicolor, Convolvulus occidentalis, Cryptantha denticulata, C. intermedia, C. lepida, Delphinium, Eriastrum, Eriodictyon californicum, Frasera californica, Fragaria californica, Gilia exilis, G. tricolor, Grindelia, Haplopappus linearifolius, Helianthus, Hesperochiron, Horkelia, Lepechinia, calycina, Limnanthes douglasii, Lotus argophyllus, L. corniculatus, L. davidsonii, L. glaber, L. scoparius, Lupinus bicolor, L. micranthus, L. nanus, Melilotus, Mimulus fremontii, M. primuloides, M. suksdorfii, Montia perfoliata, Nama parryi, Navarretia heterodoxa, Nemophila exilis, N. heterophylla, N. integrifolia, N. maculata, N. menziesii, Penstemon breviflorus, P. heterophyllus, Phacelia brachyloba, P. californica, P. davidsonii, P. heterophylla, Plagiobothrys nothofulvous, Plectritis ciliosa, Potentilla glandulosa, Prunus ilicifolia, P. subcordata, Radicula nasturtium-aquaticum, Ranunculus, Rhamnus californica, R. crocea, Rhus trilobata, Ribes roezlii, Salvia carnosa, S. columbariae, S. mellifera, Satureja douglasii, Sedum stenopetalum, Senecio, Stenotopsis linearifolius, Streptanthus tortuosus, Thysanocarpus curvipes, Trifolium gracilentum, T. melananthum, T. microcephalum, T. tridentatum, Verbena lasiostachys, V. prostrata, Viola pedunculata, V. purpurea, Wyethia.*
Chelynia rubifloris Cockerell, 1898. Canad. Ent. 30: 50. ♀.
Chelostoma rubifloris edwardsii Cockerell, 1916. Entomologist 49: 157. ♀.
Raphidostoma ceanothi Cockerell, 1936. Pan-Pacific Ent. 12: 134. ♂.

Genus PROTERIADES Titus

The bees of this genus appear to collect pollen almost exclusively from flowers of the boraginaceous genus *Cryptantha*. Some of the species make their nests in the ground while others construct them in preexisting holes in wood above ground.

Revision: Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 387-440, 16 figs.

Taxonomy: Hurd and Michener, 1955. Calif. Ins. Survey, Bul. 3: 129-153, pls. 9, 21-22, figs. 92-111, maps 63-76 (Calif. spp.). —Michener and Sokal, 1957. Evolution 11: 158 (subgeneric assignments). —Rubin, 1966. Syst. Zool. 15: 176-182, tables 1-3 (phenetic classification). —Michener and Sokal, 1966. Ent. Soc. Amer., Ann. 59: 1211-1217, 5 figs. (phenetic similarities among the species of the *Hoplitis* complex).

Genus PROTERIADES Subgenus CEPHALAPIS Cockerell

Chelostoma subg. *Cephalapis* Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 23.
Type-species: *Chelostoma* (*Cephalapis*) *jacintanum* Cockerell. Monotypic and orig. desig.

jacintana (Cockerell). Calif., Oreg. Pollen: Oligolege of *Cryptantha* including *C. intermedia*, *C. micrantha*, *C. m.* var. *lepida*, *C. muricata* var. *denticulata*, but also visits flowers of *Ceanothus* and *Eriogonum* for nectar.
Chelostoma jacintanum Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 23. ♂.

Genus PROTERIADES Subgenus PROTERIADES Titus

Proteriades Titus, 1904. N. Y. Ent. Soc., Jour. 12: 25.
Type-species: *Heriades semirubra* Cockerell. Monotypic.

basingeri Timberlake and Michener. Calif. (Riverside). Pollen: *Cryptantha intermedia*.
Proteriades basingeri Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 413. ♂, ♀.

bidenticauda Timberlake and Michener. Calif. (Inyo and Kern Cos.). Pollen: *Cryptantha* sp., but also visits flowers of *Mentzelia* presumably for nectar.
Proteriades bidenticauda Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 420., figs. 4, 11. ♂, ♀.

boharti Timberlake and Michener. Calif. (Carrville, Trinity Co.).
Proteriades boharti Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 429, figs. 2, 14. ♂.

caudex Timberlake and Michener. Calif. (San Jacinto Mts.). Pollen: Oligolege of *Cryptantha intermedia*, *C. lepida*, *C. micrantha*.
Proteriades caudex Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 418, figs. 3, 15. ♂, ♀.

cryptanthae Timberlake and Michener. South. Calif. Pollen: *Cryptantha intermedia*.
Proteriades cryptanthae Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 416. ♂, ♀.

deserticola Timberlake and Michener. South. Calif. Ecology: Nests in burrows in ground. Pollen: *Cryptantha angustifolia*, *C. barbigera*.
Proteriades deserticola Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 430. ♂, ♀.

evansi Michener. Calif. (Sierra Nevada Mts.). Pollen: *Cryptantha flaccida*.
Proteriades evansi Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 92. ♀.

hamulicornis Timberlake and Michener. Calif. (Inyo Co.). Pollen: *Cryptantha* spp.
Proteriades hamulicornis Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 425, figs. 5, 13. ♂, ♀.

nanula nanula Timberlake and Michener. South. Calif. lowlands. Pollen: *Cryptantha intermedia*.
Proteriades nanula nanula Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 409. ♂, ♀.

nanula sparsa Timberlake and Michener. Centr. Calif., south. Calif. mts. Pollen: *Cryptantha angustifolia*, *C. flaccida*, *C. micrantha* var. *lepida*.
Proteriades nanula sparsa Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 410. ♂, ♀.

nigrella attonita Michener. Calif. (Inyo Co.). Pollen: *Cryptantha racemosa*.
Proteriades nigrella attonita Michener, 1954. Kans. Ent. Soc., Jour. 27: 73. ♀, ♂.

nigrella nigrella Michener. South. Calif. Pollen: *Cryptantha angustifolia*.
Proteriades nigrella nigrella Michener, 1954. Kans. Ent. Soc., Jour. 27: 73. ♀.

palmarum (Cockerell). South. Calif. Pollen: *Cryptantha angustifolia*, *C. barbigera*.
Osmia palmarum Cockerell, 1935. Pan-Pacific Ent. 11: 48. ♀.
Proteriades nigra Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 405. ♀.

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 27: 71. ♂. —Hurd and Michener, 1955. Calif. Ins. Survey, Bul. 3: 139 (synonymy).

pygmaea Timberlake and Michener. South. Calif. Pollen: Oligolege of *Cryptantha* including *C. angustifolia*, *C. barbigera*, but also visits flowers of *Eriogonum* and *Nama demissum*.
Proteriades pygmaea Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 411, figs. 6, 16. ♂, ♀.

reducta Timberlake and Michener. Calif. (Riverside Co.). Pollen: *Cryptantha intermedia*.
Proteriades reducta Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 414. ♂, ♀.

seminigra seminigra Timberlake and Michener. South. Calif. Pollen: *Cryptantha intermedia*.
Proteriades seminigra seminigra Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 403. ♂, ♀.

seminigra yosemitensis Timberlake and Michener. Cent. Calif. Pollen: *Cryptantha* sp.
Proteriades seminigra yosemitensis Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 404. ♂, ♀.

semirubra (Cockerell). Coastal south. and cent. Calif. Pollen: *Cryptantha intermedia*, but also visits *Eriophyllum multicaule* for nectar.
Heriades semirubra Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 198. ♂.

shoshone Parker. Nev. (Elko County). Ecology: Nests in elderberry trap-stems. Parasite: *Stelis coarctatus* Cwfd. Pollen: Stores pollen of *Cryptantha*.
Proteriades shoshone Parker, 1976. Pan-Pacific Ent. 52: 73, figs. 1-8. ♂, ♀.

Biology: Parker, 1976. Pan-Pacific Ent. 52: 75-79, figs. 9-14 (nest, sex ratio, cocoon, supersedure, parasite).

similis Timberlake and Michener. South. Calif. Pollen: *Cryptantha intermedia*.
Proteriades similis Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 406. ♀.

tristis Michener. South. Calif. Pollen: *Cryptantha intermedia*, *C. micrantha*, *C. muricata*.
Proteriades tristis Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 92. ♀.

truicauda Timberlake and Michener. Calif. (San Jacinto Mts.). Pollen: *Cryptantha micrantha*.
Proteriades truicauda Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 423. ♂, ♀.

Genus PROTERIADES Subgenus XEROSMIA Michener

Anthocopa subg. *Xerosmia* Michener, 1943 Ent. Soc. Amer., Ann. 36: 81.
Type-species: *Osmia xerophila* Cockerell. Orig. desig.

xerophila (Cockerell). South. Calif. Ecology: Reared from old nests of *Anthophora linsleyi* Timberlake dug from ground. Parasite: *Nemognatha scutellaris* Say. Pollen: Oligolege of *Cryptantha* including *C. barbigera*, but also visits flowers of *Larrea tridentata* and *Malva parviflora* for nectar. Predator: *Cymatodera*.
Osmia xerophila Cockerell, 1935. Pan-Pacific Ent. 11: 45. ♀, ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1055, figs. 146-148, 150 (larva).

Biology: Linsley and MacSwain, 1942. Amer. Midland Nat. 27: 408 (nest).

Genus PROTERIADES Subgenus PENTERIADES Michener and Sokal

Proteriades subg. *Penteriades* Michener and Sokal, 1957. Evolution 11: 158.
Type-species: *Osmia remotula* Cockerell. Orig. desig.

incanescens incanescens (Cockerell). Ariz.
Hoplitina incanescens Cockerell, 1922. Amer. Mus. Novitates 40: 7. ♀.

incanescens nevadensis Timberlake and Michener. S. Dak., Wyo., Nev., Calif. Pollen: *Cryptantha bradburiana*.
Proteriades incanescens nevadensis Timberlake and Michener, 1950. Kans. Univ. Sci. Bul. 33: 399. ♀.

Taxonomy: Michener, 1954. Kans. Ent. Soc. Jour. 27: 71. ♂. —LaBerge, 1973. Ent. News 84: 160. (geog. and floral recs.). —Tepedino, 1974. Ent. News 85: 146 (geogr. record).

incanescens tota Michener. Calif. (Tuolumne Co.).
Proteriades incanescens tota Michener, 1954. Kans. Ent. Soc., Jour. 27: 72. ♀.

remotula (Cockerell). Calif. Ecology: Observed entering hole in the ground. Pollen: Oligolege of *Cryptantha* including *C. intermedia*, *C. micrantha*, but also visits flowers of *Asclepias* and *Eriophyllum confertiflorum* for nectar.
Osmia remotula Cockerell, 1910. Canad. Ent. 42: 170. ♀.

Taxonomy: Snelling, 1962. Pan-Pacific Ent. 38: 228-229 (geogr. and floral records).

Genus PROTERIADES Subgenus HOPLITINA Cockerell

Hoplitella Cockerell, 1910. Canad. Ent. 42: 169. Preocc.

Type-species: *Ashmeadiella howardi* Cockerell. Monotypic. (=*Hoplitella pentamera* Cockerell).

Hoplitina Cockerell, 1913. Canad. Ent. 45: 34. Proposed to replace *Hoplitella* Cockerell.

bullifacies (Michener). East. Calif., desert. Parasite: *Anthrax irroratus* Say, *Leucospis affinis* Say, *Sphaeropthalma* sp., *Stelis* sp. Pollen: Presumably *Cryptantha*, but is known to visit flowers of *Phacelia* including *P. aff. fremontii*. Predator: *Trichodes ornatus* Say.

Hoplitis (*Hoplitina*) *bullifacies* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 274. ♀ (♂ misdet.).

Taxonomy: Michener, 1954. Pan-Pacific Ent. 30: 37-38. ♂, ♀.

bunocephala (Michener). Cent. Calif. Parasite: *Chrysura pacifica* (Say). Pollen: Unknown, but visits flowers of *Lotus* including *L. subpinnatus*.

Hoplitis (*Hoplitina*) *bunocephala* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 276. ♀, ♂.

howardi (Cockerell). South. and cent. Calif. Parasite: *Stelis* sp. Pollen: Unknown, but appears to visit principally the flowers of *Lotus* including *L. glaber*, *L. scoparius*, *L. strigosus*, but has also been taken at flowers of *Cryptantha intermedia*, *Eriophyllum confertiflorum*, and *Salvia*.

Ashmeadiella howardi Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 22. ♀ (♂ misdet.).

Hoplitella pentamera Cockerell, 1910. Canad. Ent. 42: 169. ♂.

Hoplitina hesperia Crawford, 1916. Insecutor Inscitiae Menstruus 4: 103. ♀.

linsdalei (Michener). Cent. Calif.

Hoplitis (*Hoplitina*) *linsdalei* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 277. ♂.

mazourka (Michener). Calif. (Inyo Co.). Pollen: Unknown, but visits flowers of *Cryptantha*, *Gilia*, *Tetradymia*.

Hoplitis mazourka Michener, 1954. Pan-Pacific Ent. 30: 38. ♂.

mojavensis (Michener). South. Calif. Pollen: Unknown, but visits flowers of *Cryptantha barbigera*, *Lasthenia chrysostoma*, *Nama demissum*, *Phacelia fremontii*.

Hoplitis (*Hoplitina*) *mojavensis* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 275. ♀.

Genus PROTERIADES Subgenus ACROSMIA Michener

Hoplitis subg. *Acrosmia* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 298. Type-species: *Hoplitis plagiostoma* Michener. Orig. desig.

laevibullata (Michener). Calif., Utah. Pollen: Unknown, but visits flowers of *Calyptridium umbellatum*, *Nemophila*, *Phacelia*.

Anthocopa (*Eremosmia*) *laevibullata* Michener, 1943. Ent. Soc. Amer., Ann. 36: 68. ♀.

Hoplitis (*Acrosmia*) *perissocera* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 299. ♂.

Taxonomy: Michener, 1954. Pan-Pacific Ent. 30: 40 (synonymy).

plagiostoma (Michener). Calif. (Sierra Nevada Mts.), Oreg.

Hoplitis (*Acrosmia*) *plagiostoma* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 298. ♂.

rufina (Michener). Calif., Oreg., Utah. Pollen: Unknown, but visits flowers of *Nemophila*, *Viola purpurea*.

Hoplitis rufina Michener, 1954. Pan-Pacific Ent. 30: 40. ♀, ♂.

Genus HOPLITIS Klug

Revision: Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 261-317 (N. Amer. spp. with references to biological works).

Taxonomy: Hurd and Michener, 1955. Calif. Ins. Survey, Bul. 3: 44-94, pls. 7, 14-18, figs. 5, 51-70, maps 17-39 (Calif. spp.). —Michener and Sokal, 1957. Evolution 11: 130-162 (phenetic classification of the *Hoplitis* complex). —Sokal and Michener, 1958. Kans. Univ. Sci. Bul. 38: 1409-1438 (systematic relationships within the *Hoplitis* complex). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 56-68, figs. 19-25, table 3 (eastern U. S. spp.). —Michener, 1966. Entomologist 99: 146 (status of *Anthocopa* and *Hoplitis*). —Rubin, 1966. Syst. Zool. 15: 176-182, tables 1-3 (phenetic classification of the *Hoplitis* complex). —Michener and Sokal, 1966. Ent. Soc. Amer., Ann. 59: 1211-1217, 5 figs. (phenetic

similarities among the species of the *Hoplitis* complex). —Michener, 1968. Ent. South. Africa, Jour. 31: 337 (status of *Anthocopa* and *Hoplitis*).

Genus HOPLITIS Subgenus HOPLITIS Klug

Hoplitis Klug, 1807. Mag. Insektenk. 6: 225.
Type-species: *Apis adunca* Panzer. Monotypic.
Osmia subg. *Ctenosmia* Thomson, 1872. Hym. Scand., v. 2, p. 233.
Type-species: *Apis adunca* Panzer. Desig. by Michener, 1941.

anthocopoides (Schenck). N. Y. (Albany and adjacent counties); Europe. Ecology: Builds mortar and pebble nests on exposed rock surfaces. Adventive from Europe. Parasite: *Acroricnus stylator* (Thunb.), *Anthrax irroratus* Say, *Chrysis coerulans* Fabr., *Melittobia chalybii* Ashm., *Monodontomerus montivagus* Ashm., *Stelis labiata* (Prov.). Pollen: Oligolectic on *Echium vulgare*, but in Europe also collects pollen from *Anchusa officinalis*.
Osmia spinolae Schenck, 1851. Nassau. Ver. f. Naturk. Jahrb. 7: 68. ♀. Preocc.
Osmia anthocopoides Schenck, 1853. Nassau. Ver. f. Naturk. Jahrb. 9: 181. N. name.
Osmia caementaria Gerstaecker, 1869. Stettin. Ent. Ztg. 30: 339. ♀, ♂.

Taxonomy: Eickwort, 1970. Psyche 77: 190-201, 11figs. (synonymy, redescription, systematic position, distribution).

Biology: Eickwort, 1970. Psyche 77: 196-199 (floral relationships, summary of life history). —Eickwort, 1973. Search, Cornell Univ. Agr. Expt. Sta. 3: 1-31, 55 figs., 3 tables (life history, nest architecture, immature stages, parasites). —Eickwort, 1975. Evolution 29: 142-150, 1 fig., 2 tables (gregarious nesting and evolution of parasitism and sociality among megachilid bees). —Eickwort, 1975. Ztschr. Tierpsychol. 3: 237-254, 8 figs, 1 table (nest-building behavior).

Morphology: Schmidt and Stockton, 1971. Ent. News 82: 275-277 (analysis of DNA in sperm).

Genus HOPLITIS Subgenus ANDRONICUS Cresson

Andronicus Cresson, 1864. Ent. Soc. Phila., Proc. 2: 384.
Type-species: *Andronicus cylindricus* Cresson. Montypic.

cylindrica (Cresson). Que. and N. S. to Fla., west to N. W. T., B. C., Colo., Tex. Ecology: Nests in dry pithy stems including trap-nests. Parasite: *Melittobia chalybii* Ashm., *Stelis foederalis* Smith, *S. labiata* Prov., *S. lateralis* Cress., *Tricrania stansburyi* Hald. Pollen: Polylectic, visits flowers of many families, principally Leguminosae, Compositae, and Labiatae, including *Amorpha, Blephilia, Celastrus, Dianthera, Hydrophyllum, Lobelia, Petalostemon, Rubus, Senecio, Specularia, Trifolium, Verbena, Veronica*.
Andronicus cylindricus Cresson, 1864. Ent. Soc. Phila., Proc. 2: 384. ♂.
Osmia spoliata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 327. ♀.
Hopilitis monardae Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 363. ♀.
Hoplitis hicksi Cockerell, 1932. Brooklyn Ent. Soc., Bul. 27: 203. ♀.

Biology: Hicks, 1926 Colo. Univ. Studies 15: 217 (nest). —Fye, 1965. Canadian Ent. 97: 871-872, fig. 2 (life history, parasite). —Medler, 1967. Kans. Ent. Soc., Jour. 40: 137-140, fig. 1 (nest architecture, life history, parasites).

Genus HOPLITIS Subgenus MONUMETHA Cresson

Monumetha Cresson, 1864. Ent. Soc. Phila., Proc. 2: 387.
Type-species: *Chelostoma albifrons* Kirby. Desig. by Titus, 1904. (=*Monumetha argentifrons* Cresson).
Chlorosmia Sladen, 1916. Canad. Ent. 48: 270.
Type-species: *Osmia fulgida* Cresson. Monotypic.

Taxonomy: Michener, 1936. Amer. Mus. Novitates 875: 29 (key).

albifrons albifrons (Kirby). N. S., to N. Y., west to B. C., north to N. W. T. and Alaska. Parasite: *Melittobia chalybii* Ashm., *Stelis subemarginata* Cress. Pollen: Unknown, but visits flowers of *Phacelia*.
Chelostoma albifrons Kirby, 1837. *In* Richardson, Fauna Bor.-Amer., v. 4, p. 270. ♂.
Monumetha borealis Cresson, 1864. Ent. Soc. Phila., Proc. 2: 388. ♀.
Monumetha obsoleta Cresson, 1864. Ent. Soc. Phila., Proc. 2: 388. ♂.
Megachile oblonga Provancher, 1882. Nat. Canad. 13: 230. ♀.

Taxonomy: Michener, 1947. Evolution, 1: 172.

Biology: Fye, 1965. Canad. Ent. 97: 867-871, tables 2-4 (nest, nest architecture, parasite).

albifrons argentifrons (Cresson). Alta. south to N. Mex. and Ariz., east to Nebr. (Sioux Co.), west to B. C., Wash. and Oreg., thence south along Sierra Nev. in Calif. Pollen: Apparently polylectic, visits a wide variety of flowers including *Allium, Apocynum, Arctostaphylos nevadensis, Astragalus, Cirsium, Clarkia pulchella, C. unguiculata, C. williamsoni, C. xantiana, Cleome serrulata, Erigeron, Eriodictyon californicum, Geranium fremontii, Gilia, Gormania obtusata, Lotus, Mertensia franciscana, Mirabilis laevis, Nama rothrockii, Opulaster, Opuntia, Pedicularis groenlandica, Penstemon newberryi, Phacelia frigida, P. glandulosa, P. leucophylla, Phyllodoce breweri, Potentilla glandulosa, Rosa, Senecio, Spiraea sorbifolia, Streptanthus tortuosus.*
Monumetha argentifrons Cresson, 1864. Ent. Soc. Phila., Proc. 2: 387. ♂.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 51 (floral relationships).

albifrons maura (Cresson). Southwest. Oreg., Calif. (west of Sierra Nevada Mts.). Ecology: A female has been collected carrying a pulpy, green mass, apparently consisting of macerated leaf tissue. Parasite: *Stelis* sp., *Tricrania stansburyi* Hald. Pollen: Apparently polylectic, visits a wide variety of flowers including *Apocynum androsaemifolium, Brodiaea lutea, Chamaebatia foliolosa, Clarkia biloba, C. breweri, C. concinna, C. cylindrica, C. dudleyana, C. elegans, C. gracilis albicaulis, C. rhomboidea, C. rubicunda, C. speciosa nitens, C. unguiculata, Cirsium, Convolulus, Cordylanthus pilosus, Cryptantha intermedia, Eriodictyon trichocalyx, Eriogonum, Gilia capitata, Gormania obtusata, Iris missouriensis, Helianthella californica, Lotus davidsonii, L. scoparius, Lonicera interrupta, Mimulus, Mirabilis laevis, Nemophila integrifolia, N. menziesii, Penstemon, Phacelia californica, P. distans, P. heterophylla, P. ramosissima, Phyllodoce breweri, Ranunculus, Stanleya pinnata.*
Osmia maura Cresson, 1878. Amer. Ent. Soc., Trans. 7: 104. ♀.
Andronicus hesperius Cockerell, 1903. South. Calif. Acad. Sci., Bul. 2: 35. ♂.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 51 (floral relationships).

fulgida fulgida (Cresson). Alaska and Yukon, south to Oreg., Ariz. and N. Mex. Ecology: Nests in abandoned beetle burrows in wood of various sorts. Parasite: *Aritranis imitator ruficauda* Townes, *Melittobia* sp., *Sapyga aculeata* Cress., *Sphaeropthalma* sp., *Stelis monticola* Cress., *Stelis* sp., *Tricrania stansburyi* Hald. Pollen: Apparently polylectic, visits flowers of *Allium diehlii, Clarkia pulchella, Convolvulus, Fragaria vesca, Gentiana parryi, Geranium caespitosum, Phacelia leucophylla, P. linearis, Potentilla, Prunus melanocarpa, Ranunculus, Rosa, Rubus deliciosus.* Predator: *Trichodes ornatus* Say.
Osmia fulgida Cresson, 1864. Ent. Soc. Phila., Proc. 3: 34. ♀.
Osmia viridis Cresson, 1864. Ent. Soc. Phila., Proc. 3: 35. ♀.

Biology: Clement and Rust, 1976. Pan-Pacific Ent. 52: 114-116, figs. 3, 4, tables 1, 2 (nest architecture, cell provisions, development, parasites).

fulgida platyura (Cockerell). South. Oreg., Calif. Parasite: *Anthrax irroratus* Say, *Leucospis affinis* Say, *Sapyga aculeata* Cress. Pollen: Apparently polylectic, visits flowers of *Allium parvum, Astragalus douglasii, Calochortus nudus, Centromadia, Chamaebatia foliolosa, Clarkia cylindrica, C. dudleyana, C. purpurea quadrivulnera, C. rhomboidea, C. unguiculata, Chaenactis glabriuscula, Collinsia heterophylla, C. tinctoria, C. torreyi wrightii, Cryptantha intermedia, Eriodictyon californicum, E. crassifolium, Fragaria*

californica, Gilia capitata, Haplopappus linearifolius, Hemizonia, Hesperochiron californicus, Lappula, Lotus subpinnatus, Lupinus bicolor, L. formosus, L. nanus, Marrubium vulgare, Mentzelia albicaulis, Mimulus, Nemophila integrifolia, N. maculata, N. menziesii, Phacelia alba, P. ciliata, P. davidsonii, P. distans, P. frigida, P. heterophylla, P. ramosissima, P. tanacetifolia, Potentilla glandulosa, Rhus trilobata, Salix, Sidalcea malvaeflora, Sphaeralcea fasciculatum, Stachys californica, Taraxacum, Thysanocarpus curvipes, Trichostema parishii, Trifolium.

Osmia platyura Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 765. ♂, ♀.
Osmia lawae Michener, 1936. Amer. Mus. Novitates 875: 29. ♂, ♀.

Biology: Clement and Rust, 1976. Pan-Pacific Ent. 52: 114-116, figs 3, 4, tables 1, 2 (nest architecture, cell provisions, development)

louisae (Cockerell). B. C., Wash., Oreg., Idaho, north. Calif. and Utah.
Osmia louisae Cockerell, 1934. Amer. Mus. Novitates 679: 14. ♀.

viridimicans (Cockerell). Wash., west Oreg., Calif. (Sierra Nevada Mts.).
Osmia viridimicans Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 334. ♀.

Genus HOPLITIS Subgenus DASYOSMIA Michener

Hoplitis subg. *Dasyosmia* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 294.
Type-species: *Alcidamea biscutellae* Cockerell. Orig. desig.

biscutellae (Cockerell). Tex., N. Mex., Ariz., Utah, Nev., south. Calif.; deserts. Ecology: Nest has been observed in a bank. Parasite: *Anthrax irroratus* Say, *Nemognatha macswaini* Enns, *N. nigripennis* LeC., *Stelis* sp. Pollen: Oligolege of *Larrea tridentata*, but also visits other flowers for nectar including *Aster abatus, Encelia farinosa, Geraea canescens, Helianthus niveus, Hyptis emoryi, Prosopis, Salvia, Sphaeralcea, ambigua, Stenotopsis linearifolius.* Predator: *Cymatodera* sp., *Trichodes ornatus* Say.
Alcidamea biscutellae Cockerell, 1897. Ann. and Mag., Nat. Hist. (6) 19: 400. ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 36, tables 2, 5, 7, 9, 11-15 (floral relationship with *Larrea*).

paroselae Michener. East. Calif., desert. Pollen: Unknown, but visits flowers of *Dalea fremontii, D. polyadenia.*
Hoplitis (*Dasyosmia*) *paroselae* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 296. ♂, ♀.

Genus HOPLITIS Subgenus CYRTOSMIA Michener

Hoplitis subg. *Cyrtosmia* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 292.
Type-species: *Osmia hypocrita* Cockerell. Orig. desig. and monotypic.

hypocrita (Cockerell). B. C. to Calif., Nev., Utah., Colo. and Ariz. Ecology: Nests in dead dry stems and also trap-nests of various sorts. Parasite: *Aritranis imitator ruficauda* Townes, *Eurytoma* sp., *Nemognatha scutellaris* LeC., *Sapyga aculeata* Cress., *Stelis sexmaculata* Ashm., *Stelis* sp., *Tricrania stansburyi* Hald. Pollen: Polylectic, visits a wide variety of flowers including *Amsinckia douglasiana, Astragalus antisellii, A. goniatus, A. pomonensis, A. parishii, A. tener, Brodiaea capitata, Brassica campestris, Eriodictyon californicum, Grindelia, Lathyrus, Lotus crassifolius, L. glaber, L. scoparius, Lupinus paynei, Medicago sativa, Penstemon leonardi, Salix, Salvia carnosa, Sambucus, Stanleya pinnata, Trifolium, Vicia.*
Osmia hypocrita Cockerell, 1906. Canad. Ent. 38: 160. ♀.

Biology: Hicks, 1926. Colo. Univ. Studies 15: 217 (nest). —Clement and Rust, 1976. Pan-Pacific Ent. 52: 111-114, figs. 1, 2, tables 1, 2 (nest architecture, cell provisions, development, parasite)

Genus HOPLITIS Subgenus ALCIDAMEA Cresson

Alcidamea Cresson, 1864. Ent. Soc. Phila., Proc. 2: 385.
Type-species: *Alcidamea producta* Cresson. Desig. by Michener, 1941.
Autochelostoma Sladen, 1916. Canad. Ent. 48: 270.
Type-species: *Alcidamea producta* Cresson. Monotypic. (=*Autochelostoma canadensis* Sladen).

The species of this subgenus, whose habits are known, nest in the pithy cores of dead stems or canes of various plants.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1051, figs. 142-145, 149 (larva).

brachyodonta (Cockerell). South. Calif. Ecology: Uses plant material sometimes supplemented with pebbles in nest construction. Parasite: *Stelis sexmaculata* Ashm. Pollen: Unknown, but visits flowers of *Chaenactis glabriuscula, Heliotropium curassavicum.*

Alicidamea brachyodonta Çockerell, 1933. Ent. News 44: 205. ♂.

colei (Crawford). South. Nev., south. Calif. Parasite: *Nemognatha scutellaris* LeC., *Stelis sexmaculata* Ashm. Pollen: Possibly an oligolege of *Eriodictyon* including *E. californicum, E. crassifolium, E. trichocalyx,* but also visits other flowers including *Collinsia tinctoria, Eriastrum virgatum, Lotus, Nama demissum.*

Alcidamea colei Crawford, 1916. Ent. Soc. Wash., Proc. 18: 127. ♂.

elongaticeps Michener. Calif. (Mojave and east. deserts). Pollen: Unknown, but visits flowers of *Dalea fremontii, Mimulus.*

Hoplitis (*Alcidamea*) *elongaticeps* Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 290. ♀, ♂.

grinnelli grinnelli (Cockerell). Ariz., Calif., north. Mexico (Baja California and Sonora). Parasite: *Nemognatha scutellaris* LeC., *Stelis sexmaculata* Ashm. Pollen: Polylectic, visits a wide variety of flowers including *Amsinckia intermedia, Astragalus fremontii, Ceanothus, Chaenactis, Chorizanthe staticoides, Collinsia torreyi, Cryptantha intermedia, C. racemosa, Dalea fremontii, Eriastrum virgatum, Erigeron stenophyllus, Eriogonum fasciculatum, Eucnide urens, Larrea tridentata, Lotus glaber, L. scoparius, L. strigosus, L. subpinnatus, Lupinus concinnus, Marrubium vulgare, Melilotus indica, Mentzelia, Mesembryanthemum edule, Mimulus, Phacelia distans, P. platyloba, P. ramosissima, Prosopis pubescens, Rhamnus crocea, Salvia mellifera, Sphaeralcea ambigua, Trifolium.*

Hoplitis grinnelli Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 22. ♀.

grinnelli septentrionalis Michener. B. C., Wash., Oreg., Idaho, Utah. Pollen: Unknown, but visits flowers of *Linum, Penstemon cyananthus, Phacelia linearis.*

Hoplitis grinnelli septentrionalis Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 291. ♂, ♀.

pilosifrons (Cresson). Que. and Mass. to Fla., west to Alta., Colo., and Tex. Ecology: Excavates pith in dead stem of *Helianthus tuberosus* for nest. Parasite: *Stelis labiata* Cress., *S. lateralis* (Prov.). Pollen: Stores pollen of *Amorpha fruticosa* and *Melilotus officinalis,* but also visits other flowers for nectar and or pollen including *Barbarea, Blephilia, Cardamine, Chrysanthemum, Coreopsis, Desmodium, Dianthera, Erigeron, Geranium, Gillenia, Heracleum, Houstonia, Hydrophyllum, Krigia, Lepachys, Linaria, Lobelia, Lythrum, Malva, Nepeta, Oenothera, Oxalis, Pedicularis, Penstemon, Petalostemon, Polymonium, Potentilla, Psoralea, Pycnanthemum, Radicula, Rubus, Scutellaria, Senecio, Specularia, Stachys, Taenidia, Tephrosia, Teucrium, Trifolium, Verbena, Veronica, Vicia, Zizia.*

Alcidamea pilosifrons Cresson, 1864. Ent. Soc. Phila., Proc. 2: 386. ♂.
Hoplitis graceae Cockerell, 1923. Ann. and Mag. Nat. Hist. (9) 11: 263. ♀.
Alcidamea mucronata Cockerell, 1934. Brooklyn Ent. Soc., Bul. 29: 18. ♂.

Biology: Michener, 1955. Kans. Ent. Soc., Jour. 28: 81-83 (nest, life history, parasite).

producta bernardina Michener. South. Calif. Mts. (overlapping range of *producta gracilis*). Pollen: Apparently polylectic, visits a wide variety of flowers including *Astragalus parishii, Collinsia, Convolvulus, Dicentra chrysantha, Gilia exilis, Helianthus, Hesperochiron, Lotus scoparius, Mesembryanthemum crystallinum, Mimulus fremontii, Penstemon cordifolius, P. grinnelli, P. heterophyllus, P. spectabilis, Phacelia.*

Hoplitis producta bernardina Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 287. ♂, ♀.

producta gracilis (Michener). Oreg., Calif. Nev. Ecology: Nests in dead, pithy stems and trap-nests of various sorts. Parasite: *Aprostocetus* sp., *Chrysura sonorensis* (Cam.), *Eurytoma stigmi* Ashm., *Sapyga aculeata* Cress., *Stelis sexmaculata* Ashm. Pollen: Apparently polylectic, visits a wide variety of flowers including *Allium parvum, Aster*

foliaceus, Astragalus bolanderi, Brodiaea capitata, Calyptridium umbellatum, Carduus tenuiflorus, Castilleia, Chamaebatia foliolosa, Cirsium vulgare, Clarkia amoena, C. biloba, C. dudleyana, C. elegans, C. gracilis albicaulis, C. purpurea, C. rhomboidea, C. unguiculata, C. williamsonii, Collinsia parviflora, C. tinctoria, C. torreyi, Convolvulus, Cryptantha, Dudleya, Hugelia brauntonii, Eriodictyon californicum, E. trichocalyx, Gayophytum diffusum, Gilia exilis, Glycyrrhiza lepidota, Gormania obtusata, Hesperochiron, Heterogaura heterandra, Kelloggia galioides, Lepechinia calycina, Lessingia germanorum, Lotus argophyllus, L. corniculatus, L. davidsonii, L. nevadensis, L. scoparius, Lupinus breweri, Mimulus, Monardella villosa, Navarretia heterodoxa, Nemophila, Penstemon heterodoxus, P. newberryi, P. spectabilis, Phacelia davidsonii, P. distans, P. linearis, Potentilla glandulosa, Ranunculus californicus, Rosa, Rubus leucodermis, Salix, Satureja douglasii, Sidalcea calycosa, Trifolium gracilentum, T. variegatum, Verbena lasiostachys, Vicia americana.

Osmia gracilis Michener, 1935. Pan-Pacific Ent. 11: 183. ♀.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ., Pubs. Ent. 70: 51 (floral relationships).

producta interior Michener. Alta., Wyo., Colo., Utah, N. Mex., Ariz. (west of plains). Pollen: Apparently polylectic, visits flowers of *Achillea millefolium, Astragalus, Helianthus peliolaris, Monarda pectinata, Penstemon angustifolium, Phacelia linearis.*

Hoplitis producta interior Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 286. ♂, ♀.

producta panamintana Michener. Calif. (Panamint and nearby mts.). Pollen: Unknown, but visits flowers of *Phacelia.*

Hoplitis producta panamintana Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 287. ♂.

producta producta (Cresson). Que. to Ga., west to Alta., Colo., and Tex. Ecology: Nests in sumac borings. Parasite: *Anthrax irroratus* Say, *Leucospis affinis* Say, *Nemognatha nigripennis* LeC., *N. scutellaris* LeC., *Sapyga aculeata* Cress., *Stelis crassiceps* Ckll., *S. labiata* (Prov.), *S. lateralis* Cress., *S. sexmaculata* Ashm., *Tricrania stansburyi* Hald. Pollen: Polylectic, visits a wide variety of flowers including *Amorpha fruticosa, Apocynum, Astragalus, Azalea, Baptisia, Barbarea, Chrysanthemum, Crataegus, Erigeron philadelphicus, Geranium maculatum, Gilia, Lesquerella, Medicago sativa, Melilotus officinalis, Mentha canadensis, Penstemon hirsutus, Phacelia dubia, Potentilla, Rubus argutus, Salix, Solidago, Tephrosia virginiana, Trifolium.* Predator: *Philanthus pulcher* Dalla Torre.

Alcidamea producta Cresson, 1864. Ent. Soc. Phila., Proc. 2: 386. ♂.

Autochelostoma canadensis Sladen, 1916. Canad. Ent. 48: 270. "♂" = intersex.

Alcidamea helenae Cockerell, 1934. Amer. Mus. Novitates 732: 6. ♂.

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 153 (nest). —Comstock, 1924. Introduction to entomology, p. 824 (nest). —Hicks, 1926. Colo. Univ. Studies 15: 217 (nest). —Rau, 1928. Psyche 35: 100-107, 1 fig. (nest, life history). —Medler, 1961. Canad. Ent. 93: 571-573 (nest, life history).

producta subgracilis Michener. B. C., Wash., Oreg., Idaho.

Hoplitis producta subgracilis Michener, 1947. Amer. Mus. Nat. Hist., Bul. 89: 286. ♂, ♀.

sambuci Titus. B. C. to Calif., Nev. and Utah. Ecology: Nests in dry, pithy stems and trap-nests of various sorts. Parasite: *Gasteruption kirbii russeum* Townes, *Nemognatha nigripennis* LeC., *N. scutellaris* LeC., *Sapyga aculeata* Cress., *Sphaeropthalma* sp., *Stelis* sp. Pollen: Apparently polylectic, visits a wide variety of flowers including *Amorpha fruticosa, Asclepias eriocarpa, Astragalus antisellii, Cirsium, Clarkia unguiculata, Cryptantha, Dicentra chrysantha, Eriodictyon californicum, E. crassifolium, Eriogonum, Helianthus, Hesperochiron, Layia glandulosa, Lonicera interrupta, Lotus glaber, L. scoparius, Lupinus formosus, L. hallii, L. paynei, Medicago sativa, Mimulus guttatus, Nama parryi, Penstemon spectabilis, Phacelia, Potentilla glandulosa, Rhamnus californica, Rubus leucodermis, Salvia mellifera, Sambucus glauca, Stanleya pinnata, Trichostema ovatum, Vicia americana.*

Hoplitis sambuci Titus, 1904. Ent. Soc. Wash., Proc. 6: 101. ♀, ♂.

Biology: Clement and Rust, 1976. Pan-Pacific Ent. 52: 116-117, fig. 5, tables 1, 2 (nest architecture, cell provisions, development, parasite).

truncata mescalerium Cockerell. Colo., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Gilia*.
Hoplitis mescalerium Cockerell, 1910. Entomologist 43: 90. ♀.

truncata truncata (Cresson). Que. and Maine to Fla., west to N. Dak., Wyo., Colo. and Miss. Parasite: *Sapyga centrata* Say. Pollen: Apparently polylectic, visits a wide variety of flowers including *Baptisia, Berlandiera, Ceanothus, Cleome, Convolvulus, Erigeron, Gillenia, Ilex, Melilotus, Oenothera, Penstemon, Pogonia graminifolia, Rubus, Tephrosia virginiana, Trifolium, Vaccinium, Vicia*.
Alcidamea truncata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 108. ♂.

uvulalis (Cockerell). Calif., Oreg., Idaho, Utah. Parasite: *Nemognatha scutellaris* LeC. Pollen: Unknown, but visits flowers of *Castilleia, Senecio*.
Alcidamea uvulalis Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 139. ♂.

Genus HOPLITIS Subgenus FORMICAPIS Sladen

Formicapis Sladen, 1916. Canad. Ent. 48: 271.
Type-species: *Formicapis clypeata* Sladen. Monotypic.

Revision: Michener, 1938. Ent. News 49: 129 (as *clypeata*).

robusta (Nylander). Holarctic, Alaska, N. W. T., Que., B. C., Alta., Sask., Mont. Wyo., Colo., Oreg., Calif.; Europe and Asia. Pollen: Apparently polylectic, evidently stores pollen of *Astragalus, Silene ruprestris, Taraxacum, Trifolium*. Predator: *Philanthus pulcher* Dalla Torre.
Heriades robusta Nylander, 1848. Notis. Saellsk. Faun. Flor. Fenn. Forh. 1: 270. ♀, ♂.
Osmia rhinoceros Giraud, 1861. Zool.-Bot. Gesell. Wien, Verh. 11: 464. ♀.
Formicapis clypeata Sladen, 1916. Canad. Ent. 48: 271. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 57-58, figs. 19-20 (redescription). —Peters, 1970. Senckenb. Biol. 51: 193-197 (synonymy, distribution, floral relationships).

Biology: Clement and Rust, 1975. Ent. News 86: 115-120, 2 figs. (nest, cocoon, supersedure, floral relationships).

Genus HOPLITIS Subgenus ROBERTSONELLA Titus

Robertsonella Titus, 1904. N. Y. Ent. Soc., Jour. 12: 22.
Type-species: *Robertsonella gleasoni* Titus Monotypic and orig. desig.

Revision: Michener, 1938. Ent. News 49: 130.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 64-68, fig. 25, table 3 (eastern U. S. spp.).

gleasoni (Titus). Tex. to Ill. and N. J. Pollen: Unknown, but visits flowers of *Geranium, Phacelia, Rubus*.
Robertsonella gleasoni Titus, 1904. N. Y. Ent. Soc., Jour. 12: 23. ♀, ♂.
Robertsonella crataegina Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 28. ♂.

micheneri Mitchell. Kans., Ga. Pollen: Unknown, but visits flowers of *Amorpha fruticosa*.
Hoplitis (*Robertsonella*) *micheneri* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 64, fig. 25. ♀, ♂.

simplex (Cresson). Tex. to Conn. Parasite: *Stelis labiata* (Prov.). Pollen: Unknown, but visits flowers of *Phacelia, Salix*.
Heriades simplex Cresson, 1864. Ent. Soc. Phila., Proc. 2: 384. ♀.

Genus HOPLITIS Subgenus Unassigned

alboscopata (Provancher). Que.
Heriades alboscopatum Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 425. ♀.

Taxonomy: Titus, 1906. Ent. Soc. Wash., Proc. 7: 160.

imperfecta (Provancher). Calif.
Monumetha imperfecta Provancher, 1896. Nat. Canad. 23: 9. ♀. Perhaps a *Megachile*.

Genus ANTHOCOPA Lepeletier

This rather large genus of chiefly Holarctic bees occurs in Eurasia, Africa and in western North America, west of the Great Plains. Although there is some evidence which indicates that *Anthocopa* should be merged with *Hoplitis*, these taxa are maintained as distinct in this catalog.

Revision: Michener, 1943. Ent. Soc. Amer., Ann. 36: 49-86 (Nearctic spp.).

Taxonomy: Hurd and Michener, 1955. Calif. Ins. Survey, Bul. 3: 94-126, pls. 8, 19-20, figs. 71-91, maps 40-61 (Calif. spp.). —Michener and Sokal, 1957. Evolution 11: 130-162 (phenetic classification of the *Hoplitis* complex). —Sokal and Michener, 1958. Kans. Univ. Sci. Bul. 38: 1409-1438 (systematic relationships within the *Hoplitis* complex). —Michener, 1966. Entomologist 99: 146 (status of *Anthocopa* and *Hoplitis*). —Rubin, 1966. Syst. Zool. 15: 176-182, tables 1-3 (phenetic classification of the *Hoplitis* complex). —Michener and Sokal, 1966. Ent. Soc. Amer., Ann. 59: 1211-1217, 5 figs. (phenetic similarities among the species of the *Hoplitis* complex). —Michener, 1968. Ent. South Africa, Jour. 31: 337 (status of *Anthocopa* and *Hoplitis*).

Genus ANTHOCOPA Subgenus ANTHOCOPA Lepeletier

Anthocopa Lepeletier, 1825. Encycl. Meth., Dict. Ins., v. 10, p. 314.
Type-species: *Apis papaveris* Latreille. Monotypic.
Phyllotoma Dumeril, 1860. Acad. Sci. Inst. Imp. France, Mem. 31: 842. Preocc.
Type-species: *Apis papaveris* Latreille. Desig. by Michener, 1941.
Pseudosmia Radoszkowski, 1872. Soc. Ent. Rossica, Horae 8: xviii. Republished by Radoszkowski, 1874. Soc. Imp. Nat. Moscou, Bul. 48 (1): 152.
Type-species: *Megachile cristata* Fonscolombe. Desig. by Cockerell, 1922.
Pseudo-osmia Radoszkowski, 1873. Soc. Imp. Nat. Moscou, Bul. 46 (2): 137. Emend.
Peudocosmia Radoszkowski, 1886. Soc. Ent. Rossica, Horae 20: 14. Emend.

This subgenus does not occur in the New World.

Genus ANTHOCOPA Subgenus ATOPOSMIA Cockerell

Osmia subg. *Atoposmia* Cockerell, 1935. Pan-Pacific Ent. 11: 50.
Type-species: *Osmia triodonta* Cockerell. Orig. desig.

All species visit chiefly flowers of *Penstemon* in the mountains.

abjecta abjecta (Cresson). Calif. (White Mts.), Oreg., Utah, Wyo., Colo. Ecology: Nests under stones. Pollen: Oligolege of *Penstemon*, including *P. alpinus*, *P. heterodoxus*, *P. moffatti*, *P. newberryi*.
Osmia abjecta Cresson, 1878. Amer. Ent. Soc., Trans. 7: 103. ♀.
Hoplitis mesae Cockerell, 1930. Amer. Mus. Novitates 397: 2. ♂.
Anthocopa (*Atoposmia*) *nigrior* Michener, 1943. Ent. Soc. Amer., Ann. 36: 54. ♀ (♂ misdet.).

Taxonomy: Michener, 1954. Pan-Pacific Ent. 30: 43 (synonymy).

Biology: Parker, 1975. Pan-Pacific Ent. 51: 119-121, table 1 (nest, cocoon, sex ratio).

abjecta alta (Michener). Calif. (Sierra Nevada Mts.).
Osmia alta Michener, 1936. Canad. Ent. 68: 41. ♀.

anthodyta anthodyta Michener. Calif., Nev., Oreg., Idaho; Mexico (Baja California). Pollen: Oligolege of *Penstemon* including *P. cinereus*, *P. grinnellii*, *P. newberryi*, *P. palmeri*, but also visits flowers of *Collinsia parviflora*.
Anthocopa (*Atoposmia*) *anthodyta* Michener, 1943. Ent. Soc. Amer., Ann. 36: 60. ♀, ♂.

anthodyta bequaerti Michener. Ariz. (Santa Rita Mts.). Pollen: *Penstemon*.
Anthocopa anthodyta bequaerti Michener, 1954. Pan-Pacific Ent. 30: 42. ♂, ♀.

arizonensis Michener. Ariz.
Anthocopa arizonensis Michener, 1954. Pan-Pacific Ent. 30: 43. ♀.

elongata (Michener). Calif., Oreg., Wash., Mont., Colo. Pollen: Oligolege of *Penstemon* including *P. heterodoxus*, *P. newberryi*, but also visits flowers of *Phacelia*, *Potentilla* presumably for nectar.
Osmia elongata Michener, 1936. Canad. Ent. 68: 41. ♀.

hebitis Michener. Calif. (Sierra Nevada Mts.). Pollen: Presumably an oligolege of *Penstemon*, but also visits flowers of *Mimulus*.
Anthocopa hebitis Michener, 1954. Pan-Pacific Ent. 30: 44. ♀, ♂.

Taxonomy: Snelling, 1962. Pan-Pacific Ent. 38: 228 (geogr. and floral records).

oregona Michener. Calif. (Sierra Nevada Mts.), Oreg.
Anthocopa (*Atoposmia*) *oregona* Michener, 1943. Ent. Soc. Amer., Ann. 36: 53. ♀, ♂.

panamintensis Michener. Calif. (Panamint Mts.).
Anthocopa (*Atoposmia*) *panamintensis* Michener, 1943. Ent. Soc. Amer., Ann. 36: 65. ♀, ♂.

pycnognatha pycnognatha Michener. East. Calif. Pollen: Oligolege of *Penstemon* including *P. breviflorus*.
Anthocopa (*Atoposmia*) *pycnognatha* Michener, 1943. Ent. Soc. Amer., Ann. 36: 64. ♀, ♂.

pycnognatha solata Michener. Calif. Pollen: Oligolege of *Penstemon* including *P. antirrhinoides*, *P. spectabilis*, but also visits flowers of *Euphorbia albomarginata*, *Salvia columbariae* presumably for nectar.
Anthocopa (*Atoposmia*) *pycnognatha solatus* Michener, 1949. Kans. Ent. Soc., Jour. 22: 48. ♀, ♂.

Taxonomy: Snelling, 1962. Pan-Pacific Ent. 38: 228 (geogr. and floral records).

triodonta shastensis (Cockerell). Calif. (Sierra Nevada Mts.), Nev., Oreg. Pollen: Oligolege of *Penstemon* including *P. cinereus*.
Osmia shastensis Cockerell, 1935. Pan-Pacific Ent. 11: 46. ♀.

triodonta triodonta (Cockerell). Calif. (Mt. Diablo, Sierra Nevada and White Mts.). Pollen: Oligolege of *Penstemon* including *P. heterophyllus*.
Osmia (*Atoposmia*) *triodonta* Cockerell, 1935. Pan-Pacific Ent. 11: 50. ♂, ♀.

triodonta usingeri Michener. South. Calif. Pollen: Oligolege of *Penstemon* including *P. grinnellii*, *P. labrosus*, *P. spectabilis*, but also visits other flowers presumably for nectar including *Nama parryi*.
Anthocopa triodonta usingeri Michener, 1943. Ent. Soc. Amer., Ann. 36: 63. ♂, ♀.

Genus ANTHOCOPA Subgenus HEXOSMIA Michener

Anthocopa subg. *Hexosmia* Michener, 1943. Ent. Soc. Amer., Ann. 36: 74.
Type-species: *Osmia copelandica* Cockerell. Orig. desig.

copelandica albomarginata (Cockerell). Calif. west. Oreg. Parasite: *Chrysura sonorensis* Cam., *Epistenia* sp., *Nemognatha scutellaris* LeC., *Sapyga pumila* Cress. Pollen: Apparently an oligolege of *Phacelia* including *P. ciliata*, *P. davidsonii*, *P. distans*, *P. heterophylla*, *P. hydrophylloides*, *P. ramosissima*, but also visits other flowers including *Collinsia wrightii*, *Mimulus rubellus*, *Nemophila integrifolia*, *N. menziesii*.
Osmia albomarginata Cockerell, 1935. Pan-Pacific Ent. 11: 49. ♀, ♂.

Biology: Parker, 1975. Pan-Pacific Ent. 51: 116-119, figs. 7-8, table 1 (nest, cocoon, parasites).

copelandica arefacta (Cockerell). South. Calif., deserts. Parasite: *Leucospis affinis* Say. Pollen: Apparently an oligolege of *Phacelia* including *P. distans*, but also visits other flowers presumably for nectar including *Cryptantha intermedia*, *Malacothrix glabrata*.
Predator: *Cymatodera* sp.
Osmia arefacta Cockerell, 1935. Pan-Pacific Ent. 11: 42. ♀, ♂.

Biology: Parker, 1975. Pan-Pacific Ent. 51: 116, 117, 119, fig. 9, table 1 (nest, cocoon, nest associates).

copelandica copelandica (Cockerell). Colo., Utah, Wyo., Mont., Idaho, east. Oreg., Wash., B. C. Pollen: Apparently an oligolege of *Phacelia*.
Osmia copelandica Cockerell, 1908. Entomologist 41: 59. ♀.
Osmia besseyae Cockerell, 1910. Entomologist 43: 92. ♀, ♂.

Biology: Parker, 1975. Pan-Pacific Ent. 51: 116 (Idaho nests only).

phaceliarum (Cockerell). South. Calif. Pollen: Apparently an oligolege of *Phacelia* including *P. distans*.
Osmia phaceliarum Cockerell, 1935. Pan-Pacific Ent. 11: 45. ♀.

Genus ANTHOCOPA Subgenus EREMOSMIA Michener

Anthocopa subg. *Eremosmia* Michener, 1943. Ent. Soc. Amer., Ann. 36: 66.
Type-species: *Osmia robustula* Cockerell. Orig. desig.
Anthocopa subg. *Phaeosmia* Michener, 1943. Ent. Soc. Amer., Ann. 36: 77.
Type-species: *Osmia enceliae* Cockerell. Orig. desig.

Revision: Michener, 1949. Kans. Ent. Soc., Jour 22: 53 (spp. formerly placed in *Phaeosmia*).

beameri Michener. Tex. (Big Bend Natl. Park, Marathon). Pollen: Unknown, but visits flowers of *Nama*, *Phacelia*.
Anthocopa (*Eremosmia*) *beameri* Michener, 1951. Pan-Pacific Ent. 27: 64. ♀, ♂.

daleae Michener. Tex. (Big Bend Natl. Park, Sanderson). Pollen: Unknown, but visits flowers of *Dalea*, *Phacelia*.
Anthocopa (*Phaeosmia*) *daleae* Michener, 1951. Pan-Pacific Ent. 27: 62. ♀, ♂.

enceliae enceliae (Cockerell). South. Calif., desert border. Pollen: Unknown, but visits flowers of *Baileya*, *Encelia farinosa*.
Osmia enceliae Cockerell, 1935. Pan-Pacific Ent. 11: 43. ♀.

enceliae mortua (Cockerell). Ariz., Calif., Nev. Pollen: Unknown, but visits flowers of *Encelia actoni*, *E. farinosa*.
Osmia viguierae var. *mortua* Cockerell, 1935. Pan-Pacific Ent. 11: 44. ♀, ♂.
Anthocopa (*Eremosmia?*) *mallognatha* Michener, 1943. Ent. Soc. Amer., Ann. 36: 67. ♀.

hemizoniae (Cockerell). South. Calif. Pollen: Unknown, but visits flowers of *Helianthus gracilentus*, *Hemizonia paniculata*.
Osmia hemizoniae Cockerell, 1935. Pan-Pacific Ent. 11: 47. ♀.

Taxonomy: Michener, 1954. Pan-Pacific Ent. 30: 50. ♂.

hypostomalis Michener. Calif. Ecology: Nests in preexisting burrows in wood including prebored elderberry trap stems. Parasite: *Leucospis affinis* Say, *Sphaeropthalma amphion* (Fox), *Stelis* sp. Pollen: Apparently an oligolege of *Dalea* including *D. fremontii*, *D. schottii*, but also visits other flowers including *Cryptantha barbigera*, *Palafoxia linearis*. Predator: *Cymatodera* sp.
Anthocopa (*Phaeosmia*) *hypostomalis* Michener, 1949. Kans. Ent. Soc., Jour. 22: 50. ♀.

Taxonomy: Michener, 1954. Pan-Pacific Ent. 30: 49. ♂.

Biology: Parker, 1975. Pan-Pacific Ent. 51: 113-116, figs. 1-6, table 1 (nest, cocoon, sex ratio, nest associates).

maryae Michener. Tex. Pollen: Unknown, but visits flowers of *Dalea*.
Anthocopa (*Phaeosmia*) *maryae* Michener, 1949. Kans. Ent. Soc., Jour. 22: 50. ♀.

mirifica Michener. Calif. (Inyo and Riverside Cos.). Pollen: Unknown, but visits flowers *Chaenactis brachypappa*, *C. carphoclinia*, *Cryptantha*, *Encelia farinosa*.
Anthocopa mirifica Michener, 1954. Pan-Pacific Ent. 30: 51. ♀, ♂.

namatophila Michener. Calif. (Twentynine Palms). Pollen: Unknown, but visits flowers *Nama demissum*.
Anthocopa namatophila Michener, 1954. Pan-Pacific Ent. 30: 47. ♀.

nitidivitta Michener. South. and east. Calif., desert. Pollen: Unknown, but visits flowers of *Astragalus fremontii*, *Dalea fremontii*, *Mentzelia albicaulis*, *Nama demissum*, *Phacelia*.
Anthocopa (*Eremosmia*) *nitidivitta* Michener, 1943. Ent. Soc. Amer., Ann. 36: 70. ♀, ♂.

robustula (Cockerell). South. and east. Calif., Nev. Pollen: Unknown, but visits flowers of *Astragalus coulteri*, *Cercidium floridum*, *Cryptantha barbigera*, *Dalea californica*, *D. fremontii*, *D. polyadenia*, *D. saundersii*, *D. schottii*, *Geraea canescens*, *Lotus scoparius*, *Lupinus odoratus*, *Palafoxia linearis*, *Senecio*.
Osmia robustula Cockerell, 1935. Pan-Pacific Ent. 11: 44. ♀.

rupestris (Cockerell). South. and east. Calif., desert. Pollen: Unknown, but visits flowers of *Chaenactis stevioides, Eriodictyon trichocalyx, Larrea tridentata, Nama demissum, Phacelia distans.*
Osmia rupestris Cockerell, 1935. Pan-Pacific Ent. 11: 47. ♀.

segregata Michener. Calif. (Inyo Co.). Pollen: Unknown, but visits flowers of *Dalea fremontii.*
Anthocopa segregata Michener, 1954. Pan-Pacific Ent. 30: 48. ♀.

timberlakei (Cockerell). South. Calif., desert. Pollen: Unknown, but visits flowers of *Astragalus fremontii, Palafoxia linearis.*
Osmia timberlakei Cockerell, 1935. Pan-Pacific Ent. 11: 41. ♀.

viguierae (Cockerell). South. Calif., desert border. Pollen: Apparently an oligolege of vernal flowering Compositae including *Encelia farinosa, Enceliopsis argophylla* var. *grandiflora, Viguiera parishii*, but also visits flowers of *Hyptis emoryi.*
Osmia viguierae Cockerell, 1935. Pan-Pacific Ent. 11: 44. ♀ (♂ misdet.).

Genus ANTHOCOPA Subgenus ISOSMIA Michener and Sokal

Anthocopa subg. *Isosmia* Michener and Sokal, 1957. Evolution 11: 159.
Type-species: *Anthocopa* (*Phaeosmia*) *rubrella* Michener. Orig. desig.

hurdiana Michener. Calif. (Panamint Mts.). Pollen: Unknown, but visits flowers of *Dalea fremontii.*
Anthocopa hurdiana Michener, 1954. Pan-Pacific Ent. 30: 47. ♀, ♂.

rubrella macswaini Michener. Calif., Nev. Pollen: Unknown, but visits flowers of *Dalea mollis.*
Anthocopa rubrella macswaini Michener, 1954. Pan-Pacific Ent. 30: 45. ♀, ♂.

rubrella rubrella Michener. Tex.; Mexico (Sonora). Pollen: Unknown, but visits flowers of *Dalea.*
Anthocopa (*Phaeosmia*) *rubrella* Michener, 1949. Kans. Ent. Soc., Jour. 22: 51. ♀, ♂.

rubrella rubrior Michener. South. Calif. Pollen: Unknown, but visits flowers of *Dalea mollis.*
Anthocopa rubrella rubrior Michener, 1954. Pan-Pacific Ent. 30: 46. ♀, ♂.

Genus ASHMEADIELLA Cockerell

Revision: Michener, 1936. Amer. Mus. Novitates 875: 1-16. —Michener, 1939. Amer. Midland Nat. 22: 1-84 (Nearctic spp.).

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1051, figs. 134, 138, 139, 141 (larva). —Hurd and Michener, 1955. Calif. Ins. Survey, Bul. 3: 153-215, pls. 10, 23-24, figs. 2, 112-141, maps 77-111 (Calif. spp.). —Michener and Sokal, 1957. Evolution 11: 130-162 (phenetic classification of the *Hoplitis* complex). —Sokal and Michener, 1958. Kans. Univ. Sci. Bul. 38: 1409-1438 (systematic relationships within the *Hoplitis* complex). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 53-56, figs. 1, 17-18, table 3 (eastern U. S. spp.). —Rubin, 1966. Syst. Zool. 15: 176-182, tables 1-3 (phenetic classification of the *Hoplitis* complex). —Michener and Sokal, 1966. Ent. Soc. Amer., Ann. 59: 1211-1217, 5 figs. (phenetic similarities among species of the *Hoplitis* complex).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 36 (*Larrea* visiting spp.).

Morphology: Michener, 1943. Pan-Pacific Ent. 19: 96-100 (sex anomalies).

Genus ASHMEADIELLA Subgenus CHILOSIMA Michener

Ashmeadiella subg. *Chilosima* Michener, 1939. Amer. Midland Nat. 22: 78.
Type-species: *Ashmeadiella rhodognatha* Cockerell. Orig. desig.

holtii Cockerell. N. Mex., Ariz., deserts.
Ashmeadiella holtii Cockerell, 1898. Canad. Ent. 30: 51. ♂.

rhodognatha Cockerell. Tex., Nev. South. and east. Calif.; north. Mexico (Baja California and Sonora). Pollen: Unknown, but visits flowers of *Cercidium torreyanum, Cryptantha angustifolia, Dalea californica, D. emoryi, D. fremontii, D. neomexicana, D. polyadenia,*

D. schottii, Heliotropium curassavicum, Larrea tridentata, Melilotus, Nama hispidum, Olneya tesota, Pluchea sericea, Prosopis glandulosa var. *torreyanum.*
Ashmeadiella rhodognatha Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 557. ♀.

Taxonomy: Michener, 1942. Ent. News 53: 51. —Michener, 1943. Pan-Pacific Ent. 19: 96.

Genus ASHMEADIELLA Subgenus ASHMEADIELLA Cockerell

Ashmeadiella Cockerell, 1897. Ent. News 8: 197.
Type-species: *Heriades opuntiae* Cockerell. Orig. desig.
Titusella Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 445.
Type-species: *Titusella pronitens* Cockerell. Monotypic.

Taxonomy: Michener and Sokal, 1957. Evolution 11: 159 (synonymy).

altadenae Michener. South. and cent. Calif. Pollen: Unknown, but visits flowers of *Adenostoma fasciculatum, Lotus scoparius.*
Ashmeadiella altadenae Michener, 1936. Pan-Pacific Ent. 12: 63. ♂.

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 27: 75. ♀.

aridula aridula Cockerell. Wash., Oreg., Calif., Nev., Utah, Idaho, Wyo., Colo. Parasite: *Anthrax irroratus* Say, *Chrysura sonorensis* (Cam.), *Epistenia* sp., *Leucospis affinis* Say, *Sapyga pumila* Cress. Pollen: Presumably polylectic, visits a wide variety of flowers including *Chaetopappa aurea, Cleomella obtusifolia, Cryptantha intermedia, C. Micrantha, Eriogonum gracile, Eriodictyon, Gutierrezia lucida, G. sarothrae, Heliotropium curassavicum* var. *oculatum, Lotus americanus, L. argyrophyllus, L. canadensis, L. davidsonii, L. glaber, L. hamatus, L. nevadensis, Nama parryi, Phacelia imbricata, P. ramosissima, Prosopis, Sidalcea malvaeflora, Solidago californica, Sphaeralcea ambigua, Viguiera nevadensis.*
Ashmeadiella aridula Cockerell 1910. Entomologist 43: 91. ♂.

aridula astragali Michener. Wash., Wyo., Oreg., Calif., Nev. Pollen: Presumably polylectic, visits a wide variety of flowers including *Astragalus bolanderi, Calycadenia multiglandulosa, Centromadia pungens, Cressa cretica, Dalea polyadenia, Euphorbia, Grindelia camporum, Heliotropium curassavicum* var. *obovatum, H. c.* var. *oculatum, Hemizonia pungens, Lotus americanus, L. glaber, Marrubium vulgare, Melilotus alba, Phacelia distans, Solidago californica, Trichostema laxum, Trifolium.*
Ashmeadiella (*Ashmeadiella*) *cactorum astragali* Michener, 1939. Amer. Midland Nat. 22: 44. ♀, ♂.

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 27: 74 (geogr. records and variation).

Morphology: Snelling, 1962. Pan-Pacific Ent. 38: 229-230, fig. 1 (intersex).

bigeloviae (Cockerell). Tex., to south. Calif., Nev.; north. Mexico. Ecology: Nests readily in trap nests. Parasite: *Anthrax irroratus* Say, *Chrysura sonorensis* (Cam.), *Leucospis affinis* Say, *Monodontomerus anthidii* (Ashm.), *Nemognatha nigripennis* LeC., *Pyemotes ventricosus* (Newport). Pollen: Polylectic, visits a wide variety of flowers including *Acacia greggii, Asclepias galioides, Baileya pleniradiata, Bebbia juncea, Cercidium floridum, C. torreyanum, Cleomella obtusifolia, Coldenia palmeri, Cryptantha barbigera, C. intermedia, Dalea fremontii, D. mollis, D. spinosa, Echinocereus engelmannii, Eriastrum virgatum, Eriogonum deflexans, E. deserticola, E. fasciculatum, E. f.* var. *polifolium, E. inflatum, E. trichopes, Encnide urens, Geraea canescens, Gutierrezia californica, G. lucida, G. sarothrae, Haplopappus acradenius, H. palmeri, Helenium laciniatum, Heliotropium curassavicum, Hymenopappus flavescens, Isomeris arborea, Larrea tridentata, Lepidium alyssoides, Lotus davidsonii, Medicago sativa, Melilotus alba, Monardella exilis, Pectis papposa, Petalonyx thurberi, Phacelia crenulata, Pyrrhopappus multicaulis, Prosopis, Rhus trilobata, Salvia pilosa, Senecio douglasii, Sesuvium sessile, Sphaeralcea ambigua, S. orcutti, Stephanomeria pauciflora, Tamarix gallica, Thelypodium cooperi, Tidestromia oblongiflora, Verbesina auriculata, Wislizenia refracta.* Predator: *Trichodes ornatus* Say.
Heriades bigeloviae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 136. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 282-284 (nest architecture, supersedure, parasite).

biscopula Michener. Ariz., N. Mex. Pollen: Unknown, but visits flowers of *Prosopis*.
Ashmeadiella (*Titusella*) *biscopula* Michener, 1935. Amer. Midland Nat. 22: 54. ♀.

bucconis bucconis (Say). N. Dak., south to N. Mex. and Tex., east to Wis., Ill., Ind., Mo., Ark., La. and Ga. Pollen: Appears to collect pollen principally from the Compositae, visits flowers of *Ambrosia psilostachya, Anthemis cotula, Brauneria pallida, Callirrhoe involucrata, Coreopsis, Gaillardia pulchella, Grindelia squarrosa, Helenium laciniatum, Helianthus petiolaris, Heliopsis helianthoides, Lactuca pulchella, Monarda, Petalostemon, Sideranthus, Solidago, Tetragonotheca ludoviciana, Verbena, Verbesina.*
Osmia bucconis Say, 1837. Boston Jour. Nat. Hist. 1: 400. ♀, ♂.
Megachile osmioides Cresson, 1872. Amer. Ent. Soc., Trans. 4: 269. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 54-55, fig. 17 (redescription).

bucconis denticulata (Cresson). B. C. to Calif., east to Mont., Wyo., Colo., N. Mex. and Tex.; Mexico. Ecology: Nests readily in trap-nests. Parasite: *Anthrax irroratus* Say, *Chrysura sonorensis* (Cam.), *Leucospis affinis* Say, *Nemognatha nigripennis* LeC., *Pyemotes ventricosus* (Newport). Pollen: Appears to collect pollen principally from the Compositae, visits flowers of *Acamptopappus sphaerocephalus, Adenostoma sparsifolium, Aster tephrodes, Baileya multiradiata, B. pleniradiata, Chaenactis glabriuscula, Chrysothamnus nauseosus, Coreopsis grandiflora, C. lanceolata, Cryptantha intermedia, Encelia californica, E. farinosa, Eremocarpus setigerus, Erigeron divergens, E. foliosus* var. *stenophyllus, Eriogonum gracile, Eriophyllum confertiflorum, Gnaphalium californicum, Grindelia camporum, G. hallii, G. nana, Gutierrezia californica, G. lucida, G. sarothrae, Haplopappus acradenius, H. squarrosus, H. teretifolius, H. venetus, H. vernonioides, Helianthus, Heterotheca grandiflora, Navarretia viscidula, Pectis papposa, Penstemon, Senecio douglasii, Solidago californica, Stephanomeria exigua.*
Heriades? denticulatum Cresson, 1878. Amer. Ent. Soc., Trans. 7: 108. ♂.
Heriades? rotundiceps Cresson, 1879. Amer. Ent. Soc., Trans. 7: 205. ♀.
Ashmeadiella wislizeni Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 545. ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 285-286 (nest architecture, life history, parasites).

cactorum basalis Michener. South. and cent. Calif., west of deserts, also isolated localities in east Calif. Pollen: Apparently polylectic, visits flowers of *Baileya multiradiata, Castilleia, Chilopsis linearis, Chrysopsis villosa, Chrysothamnus, Cordylanthus nevinii, C. pilosus, Cryptantha inaequata, C. intermedia, C. micrantha* var. *lepida, Dalea fremontii, Encelia farinosa, Erigeron divergens, Eriastrum virgatum, Eriogonum fasciculatum, E. wrightii subscaposum, Eryngium aristatulum, Grindelia camporum, Gutierrezia californica, G. sarothrae, Lotus argophyllus, L. davidsonii, L. glaber, L. nevadensis, L. rosea, L. scoparius, Mimulus, Monardella linoides* var. *stricta, Penstemon bridgesii, P. grinnellii, P. ternatus, Phacelia heterophylla, P. imbricata, P. ramosissima, Salvia pachyphylla, Trichostema lanatum, T. parishii, Verbena lasiostachys.*
Ashmeadiella basalis basalis Michener, 1936. Amer. Mus. Novitates 875: 6. ♂, ♀.

cactorum cactorum (Cockerell). B. C., Wash., Oreg., north. and east. Calif., Mont., Wyo., Utah, Colo., Ariz., N. Mex., Tex.; north. Mexico. Pollen: Stores pollen of *Prosopis* and small amounts of *Anisacanthus*, but is most probably quite polylectic; visits a wide variety of flowers including *Allium parvum, Asclepias tuberosa, Chilopsis linearis, Clarkia pulchella, C. rhomboidea, Cordylanthus nevinii, Cryptantha, Dalea argyraea, D. pogonothera, Echinocereus, Encelia farinosa, Eriastrum virgatum, Erigeron divergens, E. stenophyllus, Eriogonum fasciculatum, Lasthenia chrysostoma, Lotus argyrophyllus, L. scoparius, Monardella stricta, Nama rothrockii, Opuntia, Penstemon ternatus, Phacelia ramosissima, Trichostema lanatum.*
Heriades cactorum Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 140. ♀.
Ashmeadiella curriei Titus, 1904. Ent. Soc. Wash., Proc. 6: 100. ♀.
Ashmeadiella echinocerei Cockerell, 1911. Canad. Ent. 43: 132. ♀.
Ashmeadiella echinocacti(!) Cockerell, 1931. Ann. and Mag. Nat. Hist. (8) 10: 543.
Ashmeadiella basalis nigra Michener, 1936. Amer. Mus. Novitates 875: 7. ♀, ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 286-288 (nest architecture, larval food, life history, cocoon).

californica californica (Ashmead). B. C. to Calif. (except deserts and Sierra Nevada Mts.), Idaho, Nev., Utah; Mexico (Baja California). Parasite: *Anthrax irroratus* Say, *Chrysura* sp., *Leucospis affinis* Say, *Sphaeropthalma unicolor* (Cress.), *Stelis ashmeadiellae* Timberlake. Pollen: Apparently polylectic, visits a wide variety of flowers including *Asclepias, Aster adscendens* var. *yosemitanus, Calycadenia multiglandulosa, Camissonia campestris, Centaurea melitensis, Chaenactis glabriuscula, Chorizanthe staticoides, Chrysothamnus, Corethrogyne, Cressa cretica, Cryptantha intermedia, Encelia californica, E. farinosa, Eriastrum virgatum, Erigeron divergens, E. foliosus* var. *stenophyllus, Eriogonum fasciculatum, E. subscaposum, Eriophyllum confertiflorum, Eupatorium occidentale, Frankenia grandiflora, Gilia multicaulis, Grindelia camporum, G. elata, Gutierrezia californica, G. sarothrae, Haplopappus linearifolius, H. parishii, H. squarrosus, H. vernonioides, Helianthus gracilentus, Hemizonia fasciculata, H. luzulaefolia, H. paniculata, H. wrightii, Heterotheca grandiflora, Lessingia germanorum, L. grandiflora, L. leptoclada, L. tenuis, Lotus americanus, L. glaber, L. hamatus, L. scoparius, Medicago sativa, Melilotus, Monardella douglasii, M. stricta, Navarretia heterodoxa, N. viscidula, Pentachaeta aurea, Phacelia ciliata, P. davidsonii, Potentilla glandulosa, Senecio douglasii, Sesuvium sessile, Solidago lasiostachys, Stephanomeria exigua, Verbena prostrata, Viguiera.*

Chalicodoma californica Ashmead, 1897. South. Calif. Acad. Sci., Proc. 1 (3): 1. ♂, ♀.
Ashmeadiella coquilletti Titus, 1904. Ent. Soc. Wash., Proc. 6: 99. ♀, ♂.

Biology: Timberlake, 1941. N. Y. Ent. Soc., Jour. 49: 134 (parasite).

californica florissantensis Michener. Idaho. Wyo., Colo., N. Mex. Pollen: Unknown, but visits flowers of *Aster, Chrysolepis.*

Ashmeadiella florissantensis Michener, 1936. Pan-Pacific Ent. 12: 62. ♂, ♀.

californica sierraensis Michener. Calif. (Sierra Nevada Mts.). Pollen: Apparently polylectic, principally flowers of Compositae, including *Aster adscendens, A. foliaceus, Erigeron, Helianthus, Senecio canus, Solidago multiradiata.*

Ashmeadiella (*Ashmeadiella*) *californica sierraensis* Michener, 1939. Amer. Midland Nat. 22: 51. ♀, ♂.

cockerelli Michener. South. Calif.

Ashmeadiella cockerelli Michener, 1936. Pan-Pacific Ent. 12: 62. ♂.

cubiceps clypeata (Michener). Calif., low and middle altitudes; Mexico (Baja California). Parasite: *Chrysura* sp., *Leucospis affinis* Say, *Monodontomerus anthidii* (Ashm.). Pollen: Apparently polylectic, principally Compositae, visits flowers of *Baileya, Chaenactis, Cryptantha, Encelia, Eriophyllum confertiflorum, Haplopappus linearifolius, Hemizonia, Lessingia germanorum, Melilotus, Sphaeralcea, Viguiera.*

Titusella clypeata Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 93. ♀.

cubiceps cubiceps (Cresson). Nev., Calif., Oreg., high mts.

Heriades? cubiceps Cresson, 1879. Amer. Ent. Soc., Trans. 7: 205. ♀.

difugita difugita Michener. South. Calif. Pollen: Unknown, but visits flowers of *Chrysopsis fastigiata, Eriodictyon trichocalyx, Eriogonum fasciculatum, E. inflatum, Gilia, Phacelia heterophylla, Verbena lasiostachys.*

Ashmeadiella (*Ashmeadiella*) *difugita* Michener, 1939. Amer. Midland Nat. 22: 41. ♀, ♂.

difugita emarginatula Michener. Calif. (Sierra Nevada Mts.), Oreg., Idaho, Nev. Pollen: Unknown, but visits flowers of *Camissonia clavaeformis citrina, C. tanacetifolia, Chrysothamnus nauseosus, Cirsium tioganum, Clarkia, Eriogonum, Grindelia, Haplopappus apargoides.*

Ashmeadiella difugita emarginatula Michener, 1951. Kans. Ent. Soc., Jour. 24: 53. ♀.

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 27: 74 (geogr. and floral records).

dimalla Michener. Ariz.

Ashmeadiella (*Ashmeadiella*) *dimalla* Michener, 1939. Amer. Midland Nat. 22: 45. ♀, ♂.

femorata (Michener). South. and east. Calif., Nev., Ariz., deserts. Pollen: Unknown, but visits flowers of *Baileya, Cercidium floridum, C. torreyanum, Croton californicus, Dalea fremontii, Haplopappus interior, Hyptis emoryi, Larrea tridentata, Prosopis pubescens.* Predator: *Cymatodera* sp.

Osmia femorata Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 91. ♀.

floridana (Robertson). N. C. to Fla. Pollen: Unknown, but visits flowers of *Lupinus.*

Heriades floridanus Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 348. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Exp. Sta. Tech. Bul. 152: 55-56, fig. 18, table 3 (redescription).

foveata Michener. Cent. and east. Calif., Ariz., Nev., Utah. Ecology: Nests under stones. Pollen: Unknown, but visits flowers of *Collinsia torreyi, Cryptantha intermedia, Dalea, Diplacus auriantiacus, Encelia, Erigeron miser, Haplopappus interior, Helianthus gracilentus, Heliotropium curassavicum* var. *oculatum, Lotus scoparius, Monardella lanceolata, Phacelia platyloba, Prosopis, Salvia pilosa.*

Ashmeadiella (*Ashmeadiella*) *foveata* Michener, 1939. Amer. Midland Nat. 22: 39. ♀.

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 27: 74. ♂.

gillettei cismontanica Michener. Calif. (Riverside, Fresno, Contra Costa Cos.). Pollen: Unknown, but visits flowers of *Cryptantha intermedia, Eriastrum virgatum, Eriogonum, Heliotropium curassavicum* var. *oculatum, Melilotus.*

Ashmeadiella (*Ashmeadiella*) *gillettei cismontanica* Michener, 1951. Pan-Pacific Ent. 27: 67. ♀.

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 24: 52. ♂.

gillettei gillettei Titus. Colo., N. Dak., S. Dak., Nebr. Pollen: Unknown, but visits flowers of *Sedum stenopetalum.*

Ashmeadiella gillettei Titus, 1904. Ent. Soc. Wash., Proc. 6: 100. ♀.

Ashmeadiella coloradensis Cockerell, 1934. Amer. Mus. Novitates 732: 4. ♂.

gillettei rubra Michener. Tex., N. Mex. Pollen: Unknown, but visits flowers of *Dalea formosa.*

Ashmeadiella (*Ashmeadiella*) *gillettei rubra* Michener, 1951. Pan-Pacific Ent. 27: 67. ♀, ♂.

gillettei rufiventris Michener. South. and east. Calif.; Mexico (Baja California). Parasite: *Anthrax irroratus* Say, *Chrysura* sp., *Leucospis affinis* Say, *Stelis* sp. Pollen: Unknown, but visits flowers of *Aster abatus, Astragalus fremontii, Baileya pleniradiata, Cercidium floridum, C. torreyanum, Chaenactis carphoclinia, Cryptantha, Dalea mollis, Geraea canescens, Heliotropium curassavicum, Lupinus, Malacothrix, Palafoxia linearis, Phacelia distans, Prosopis glandulosa* var. *torreyanum, Stephanomeria.* Predator: *Cymatodera* sp.

Ashmeadiella (*Ashmeadiella*) *rufiventris* Michener, 1939. Amer. Midland Nat. 22: 32. ♀, ♂.

leucozona Cockerell. South. Calif., Ariz.; north. Mexico, deserts. Pollen: Unknown, but visits flowers of *Cercidium torreyanum, Heliotropium curassavicum* var. *oculatum, Nama hispidum, Teucrium depressum.*

Ashmeadiella leucozona Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 556. ♂, ♀.

maxima Michener. Tex.

Ashmeadiella maxima Michener, 1936. Pan-Pacific Ent. 12: 61. ♀, ♂.

meliloti meliloti (Cockerell). South. Calif., Ariz., N. Mex., Tex.; north. Mexico; deserts. Parasite: *Anthrax irroratus* Say, *Chrysura* sp., *Epistenia* sp., *Leucospis affinis* Say, *Nemognatha nigripennis* LeC., *Sapyga pumila* Cress., *Stelis* sp. Pollen: Apparently polylectic, analyzed pollen masses (2) ranged from 100 per cent *Prosopis* to a mixture of several pollens consisting of 74 per cent *Stemodia* and 26 per cent Chenopodiaceae with traces of pollen from *Acacia, Krameria,* entomophilous Compositae and *Pinus;* visits a wide variety of flowers including *Acacia greggii, Acamptopappus sphaerocephalus, Baileya multiradiata, Chilopsis linearis, cleome, Cryptantha, Crusea subulata, Dalea argyraea, D. formosa, D. pogonathera, Eriogonum gracile, E. inflatum, Eriastrum virgatum, Gutierrezia californica, G. lucida, Haplopappus interior, Heliotropium curassavicum* var. *oculatum, Lepidium alyssoides, L. montanum, Lotus davidsonii, Melilotus* alba, *Opuntia megacarpa, Penstemon, Phacelia cicutaria, P. ramosissima, Prosopis glandulosa* var. *torreyanum, Pyrrhopappus multicaulis, Rhus trilobata,*

Salvia pilosa, Solidago californica, Sphaeralcea ambigua, Viguiera nevadensis. Predator: *Cymatodera* sp., *Trichodes horni* Wolcott and Chapin. Another subspecies, *crassa* Ckll., occurs in Mexico (Baja California).

Heriades meliloti Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 141. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 288-290 (nest architecture, larval food, life history, supersedure, parasites and predators).

occipitalis Michener. South. Ariz., west. Tex.; Mexico (Sonora, Baja California). Ecology: Readily nests in trap-nests. Parasite: *Chrysura sonorensis* (Cam.), *Nemognatha nigripennis* LeC. Predator: *Pyemotes ventricosus* (Newport), *Trichodes horni* Wolcott and Chapin.

Ashmeadiella (*Ashmeadiella*) *occipitalis* Michener, 1939. Amer. Midland Nat. 22: 22. ♀, ♂.

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 27: 76 (geogr. records, tax. characters of female).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 290-294, pl. 17, fig. 78 (nest architecture, larval food, life history, male production, supersedure, parasites, predators).

opuntiae (Cockerell). Tex. to south. Calif., Utah and Colo.; north. Mexico (Sonora). Parasite: *Anthrax irroratus* Say, *Chrysura* sp., *Leucospis affinis* Say, *Melittobia chalybii* Ashm. Pollen: Oligolege of Cactaceae, analyzed pollen masses (4) contained 95.2 per cent *Opuntia* pollen of the subgenus *Cylindropuntia* and 4.8 per cent pollen of the subgenus *Platyopuntia;* obtains pollen and nectar from flowers of Cactaceae including *Echinocactus cylindraceus, Echinocereus engelmannii, Ferrocactus acanthodes, Opuntia echinocarpa, O. megacarpa, O. occidentalis, O. parryi, O. vaseyi,* but also visits other flowers for nectar including *Chrysothamnus, Penstemon, Viguiera nevadensis.* Predator: *Cymatodera* sp.

Heriades opuntiae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 139. ♀.
Ashmeadiella submaxima Michener, 1936. Amer. Mus. Novitates 875: 3. ♂.
Ashmeadiella arizonensis Michener, 1936. Amer. Mus. Novitates 875: 3. ♂.

Taxonomy: Michener, 1943. Pan-Pacific Ent. 19: 97. —Hurd and Michener, 1955. Calif. Ins. Survey, Bul. 3: 192 (synonymy).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 294-295 (nest architecture, larval food, life history, parasite).

pronitens (Cockerell). Colo., Wyo.

Titusella pronitens Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 446. ♀.

prosopidis (Cockerell). Tex. to south. Calif.; north. Mexico, deserts. Pollen: Apparently an oligolege of *Prosopsis* including *P. glandulosa* var. *torreyanum, P. pubescens,* but visits other flowers presumably for nectar including *Acacia greggii, Cryptantha barbigera, Heliotropium curassavicum, Larrea tridentata, Melilotus, Pluchea sericea, Salix nigra, Sphaeralcea ambigua.*

Heriades prosopidis Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 20: 140. ♀ (♂ misdet.).
Ashmeadiella schwarzi Titus, 1904. Ent. Soc. Wash., Proc. 6: 98. ♀, ♂.
Ashmeadiella subangusta Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 588. ♀.

Taxonomy: Hurd and Michener, 1955. Calif. Ins. Survey, Bul. 3: 161 (synonymy).

rufipes Titus. South. and east. Calif., north. Mexico, deserts. Parasite: *Monodontomerus anthidii* (Ashm.), *Stelis* sp. Pollen: Unknown, but visits flowers of *Abronia, Cryptantha barbigera, C. intermedia, Dalea emoryi, D. mollis, Heliotropium curassavicum, H. c.* var. *oculatum, Palafoxia linearis, Pectis papposa, Petalonyx thurberi, Tidestromia oblongiflora.*

Ashmeadiella rufipes Titus, 1904. Ent. Soc. Wash., Proc. 6: 99. ♀.
Ashmeadiella haematopoda Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 555. ♀.
Ashmeadiella rhodopus Michener, 1936. Pan-Pacific Ent. 12: 59. ♂, ♀.

Taxonomy: Michener, 1936. Pan-Pacific Ent. 12: 58. ♀, ♂. —Hurd and Michener, 1955. Calif. Ins. Survey Bul. 3: 175-177 (synonymy).

rufitarsis Michener. Calif. Pollen: Apparently an oligolege of *Eriogonum*, including *E. fasciculatum*, *E. gracile*, *E. vimineum*, but also visits other flowers presumably for nectar including *Euphorbia*.
Ashmeadiella (*Ashmeadiella*) *rufitarsis* Michener, 1939. Amer. Midland Nat. 22: 37. ♀, ♂.

sonora Michener. Calif., Ariz., Utah; north. Mexico (Baja California). Pollen: Unknown, but visits flowers of *Asclepias*, *Baileya multiradiata*, *Dalea*, *Eriastrum virgatum*, *Eriogonum trichopes*, *Euphorbia polycarpa* var. *hirtella*, *Fouquieria splendens*, *Gutierrezia sarothrae*, *Lepidium alyssoides*, *Olneya tesota*, *Pectis papposa*.
Ashmeadiella (*Ashmeadiella*) *sonora* Michener, 1939. Amer. Midland Nat. 22: 35. ♂, ♀.

stevensi Michener. N. Dak.
Ashmeadiella stevensi Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 405. ♀.

titusi Michener. Calif. Pollen: Possibly an oligolege of *Lotus* including *L. scoparius*, but visits other flowers presumably for nectar including *Helianthus gracilentus*, *Phacelia ramosissima*.
Ashmeadiella (*Ashmeadiella*) *titusi* Michener, 1939. Amer. Midland Nat. 22: 25. ♀, ♂.

Taxonomy: Snelling, 1962. Pan-Pacific Ent. 38: 230 (geogr. and floral records).

truncativentris Michener. Tex. (Sanderson). Pollen: Unknown, but visits flowers of *Dalea*.
Ashmeadiella (*Ashmeadiella*) *truncativentris* Michener, 1951. Pan-Pacific Ent. 27: 68. ♀, ♂.

vandykiella Michener. Tex.
Ashmeadiella (*Ashmeadiella*) *vandykiella* Michener, 1949. Kans. Ent. Soc., Jour. 22: 46. ♀, ♂.

Genus ASHMEADIELLA Subgenus AROGOCHILA Michener

Ashmeadiella subg. *Arogochila* Michener, 1939. Amer. Midland Nat. 22: 58.
Type-species: *Ashmeadiella timberlakei* Michener. Orig. desig.
Ashmeadiella subg. *Corythochila* Michener, 1939. Amer. Midland Nat. 22: 74.
Type-species: *Ashmeadiella inyoensis* Michener. Orig. desig.
Rhamphorhina Michener, 1939. Amer. Midland Nat. 22: 8. Republished by Michener and Sokal, 1957. Evolution 11: 135 and 159, lapsus for *Corythochila* Michener.

australis (Cockerell). Calif., Nev., Utah. Pollen: Apparently an oligolege of *Penstemon* including *P. breviflorus*, *P. grinnellii*, *P. palmeri*, but visits other flowers presumably for nectar including *Geranium*, *Monardella linoides* var. *stricta*, *Solidago californica*, *Streptanthus tortuosus*.
Chelostoma australis Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 139. ♀.
Chelostomopsis australis nanus Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 206. ♀.

Taxonomy: Snelling, 1962. Pan-Pacific Ent. 38: 234 (geogr. and floral records).

barberi Michener. Ariz.
Ashmeadiella (*Arogochila*) *barberi* Michener, 1939. Amer. Midland Nat. 22: 61. ♀.

breviceps Michener. South. Calif., Ariz., Nev.; Mexico (Baja Calif., Sonora). Parasite: *Chrysura* sp., *Stelis* sp. Pollen: Apparently polylectic, visits a wide variety of flowers including *Cercidium floridum*, *Dalea mollis*, *Dipetalia linifolia*, *Hyptis emoryi*, *Larrea tridentata*, *Prosopis glandulosa* var. *torreyanum*, *Stephanomeria*. Predator: *Cymatodera* sp.
Ashmeadiella (*Corythochila*) *breviceps* Michener, 1939. Amer. Midland Nat. 22: 77. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 36 (floral relationships).

cazieri Michener. South. and east. Calif., Ariz., deserts. Parasite: *Nemognatha nigripennis* LeC., *Stelis* sp. Pollen: Apparently polylectic, visits flowers of *Cercidium torreyanum*, *Dalea californica*, *D. fremontii*, *D. johnsonii*, *Larrea tridentata*.
Ashmeadiella (*Arogochila*) *cazieri* Michener, 1939. Amer. Midland Nat. 22: 72. ♀, ♂.

clypeodentata clypeodentata Michener. Ariz., south. Calif., north. Mexico, deserts. Pollen: Apparently polylectic, visits flowers of *Cercidium floridum*, *C. torreyanum*, *Dalea emoryi*, *Heliotropium curassavicum* var. *oculatum*, *Phacelia hispida*, *Prosopis glandulosa* var. *torreyanum*.
Ashmeadiella clypeodentata Michener, 1936. Pan-Pacific Ent. 12: 57. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, p. 295 (nest architecture, life history).

clypeodentata simplicior Michener. Tex., Ariz. Pollen: Unknown, but visits flowers of *Prosopis.*
Ashmeadiella (*Arogochila*) *clypeodentata simplicior* Michener, 1951. Pan-Pacific Ent. 27: 70. ♀.

erema Michener. Tex., Ariz., south Calif., deserts. Pollen: Unknown, but visits flowers of *Dalea* including *D. fremontii.*
Ashmeadiella (*Arogochila*) *erema* Michener, 1939. Amer. Midland Nat. 22: 65. ♀.

eurynorhyncha Michener. East. Calif., desert. Pollen: Unknown, but visits flowers of *Dalea fremontii.*
Ashmeadiella (*Arogochila*) *eurynorhyncha* Michener, 1939. Amer. Midland Nat. 22: 62. ♀, ♂.

foxiella Michener. Wash., Oreg., cent. Calif., Idaho. Pollen: Unknown, but visits flowers of *Penstemon, Phacelia.*
Ashmeadiella (*Arogochila*) *foxiella* Michener, 1939. Amer. Midland Nat. 22: 73. ♂.
Ashmeadiella (*Chilosima*) *Washingtonensis* Michener, 1939. Amer. Midland Nat. 22: 80. ♀.

inyoensis Michener. East. Calif., deserts. Pollen: Unknown, but visits flowers of *Dalea polyadenia, D. schottii.*
Ashmeadiella (*Corythochila*) *inyoensis* Michener, 1939. Amer. Midland Nat. 22: 75. ♀, ♂.

lateralis Michener. South. Calif.
Ashmeadiella lateralis Michener, 1936. Pan-Pacific Ent. 12: 60. ♂.

leachi Michener. Calif.
Ashmeadiella (*Arogochila*) *leachi* Michener, 1949. Kans. Ent. Soc., Jour. 22: 43. ♀.

lutzi (Cockerell). Utah, Colo. Pollen: Unknown, but visits flowers of *Phacelia leucophylla.*
Chelostomopsis lutzi Cockerell, 1930. Amer. Mus. Novitates 397: 2. ♀.

micheneri Snelling. Calif. (Stanislaus and Mariposa counties). Pollen: Unknown, but visits flowers of *Phacelia.*
Ashmeadiella (*Arogochila*) *micheneri* Snelling, 1962. Pan-Pacific Ent. 38: 231, fig. 2. ♂, ♀.

neomexicana (Cockerell). N. Mex.
Chelostoma Neomexicanum Cockerell, 1904. Canad. Ent. 36: 13. ♀.

salviae Michener. South. and cent. Calif. Pollen: Apparently polylectic, visits flowers of *Brassica, Calochortus luteus, Dalea, Lepechinia calycina, Rhamnus crocea, Salvia mellifera, Trichostema parishii.*
Ashmeadiella (*Arogochila*) *salviae* Michener, 1939. Amer. Midland Nat. 22: 69. ♀, ♂.

sculleni Michener. Oreg.
Ashmeadiella (*Arogochila*) *sculleni* Michener, 1939. Amer. Midland Nat. 22: 60. ♀.

stenognatha Michener. Calif. Pollen: Unknown, but visits flowers of *Phacelia platyloba.*
Ashmeadiella (*Arogochila*) *stenognatha* Michener, 1939. Amer. Midland Nat. 22: 63. ♀.

Taxonomy: Michener, 1954. Kans. Ent. Soc., Jour. 27: 77. ♂.

timberlakei solida Michener. Cent. and north. Calif., Oreg., Nev. Pollen: Apparently polylectic, visits flowers of *Astragalus bolanderi, Eriodictyon, Grindelia camporum, Kelloggia galioides, Lotus argophyllus, L. glaber, L. nevadensis, L. scoparius, Nama rothrockii, Nemophila, Phacelia distans, Solidago californica, Trifolium variegata.*
Ashmeadiella (*Arogochila*) *timberlakei solida* Michener, 1939. Amer. Midland Nat. 22: 68. ♂, ♀.

timberlakei timberlakei Michener. South. Calif. Parasite: *Anthrax irroratus* Say, *Leucospis affinis* Say, *Nemognatha nigripennis* LeC., *Rhydinofoenus* sp., *Stelis* sp. Pollen: Apparently polylectic, visits flowers of *Chaenactis, Chorizanthe staticoides, Cryptantha intermedia, C. lepida, Dalea californica, Eriodictyon crassifolium, E. trichocalyx, Lotus argophyllus, L. davidsonii, L. glaber, L. nevadensis, L. scoparius, Lupinus arizonicus, L. concinnus, Mimulus fremontii, Oenothera dentata, Penstemon spectabilis, Phacelia cicutaria, P. davidsonii, P. heterophylla, P. ramosissima, Trichostema lanata, T. parishii, Trifolium variegata.*
Ashmeadiella timberlakei Michener, 1936. Pan-Pacific Ent. 12: 56. ♀, ♂.

Genus ASHMEADIELLA Subgenus CUBITOGNATHA Michener

Ashmeadiella subg. *Cubitognatha* Michener, 1939. Amer. Midland Nat. 22: 81.
Type-species: *Ashmeadiella xenomastax* Michener. Orig. desig. and monotypic.

xenomastax Michener. South. and east. Calif., Nev.; Mexico (Sonora); deserts. Pollen: Apparently polylectic, visits flowers of *Aster abatus, Chaenactis xantiana, Dalea californica, D. mollis, D. polyadenia, D. saundersii, D. schottii, Eriogonum fasciculatum, Lotus, Lupinus odoratus, Phacelia distans, Pholisma arenarium, Salvia columbariae.*
Ashmeadiella (*Cubitognatha*) *xenomastax* Michener, 1939. Amer. Midland Nat. 22: 81. ♀.

Taxonomy: Michener, 1942. Ent. News 53: 51. ♂.

Genus OSMIA Panzer

Revision: Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 1-167 (Nearctic spp.). —Rust, 1974. Wasmann Jour. Biol. 32: 1-93, 45 figs., 9 tables (treats Nearctic spp. of the subgenera *Cephalosmia, Chalcosmia* and *Osmia* and includes information on their biologies).

Taxonomy: Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 357-364 (key to western spp.). —Sandhouse, 1925. Canad. Ent. 57: 35-41 (key to Canad. spp.). —Michener, 1941. Amer. Midland Nat. 26: 147-167 (classification). —Sinha, 1958 (1956). Xth Internatl. Congress Ent., Proc. 1: 243-251, 1 fig., 4 tables (phylogenetic relationships). —Sinha, 1958. Kans. Univ. Sci. Bul. 39: 211-261, 151 figs. (reclassification of New World subgenera). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 69-107, figs. 1, 25-35, table 4 (eastern U. S. spp.). —Snelling, 1967. South. Calif. Acad. Sci., Bul. 66: 103-108, 1 fig. (treats subgenera *Euthosmia* and *Mystacosmia*).

Biology: Rau, 1937. Ent. Soc. Amer., Ann. 30: 324-343, 6 figs., 2 tables (nesting habits). —Bohart, 1955. Ent. Soc. Wash., Proc. 57: 203-204 (gradual nest supersedure). —Crosswhite and Crosswhite, 1966. Amer. Midland Nat. 76: 450-467 (*Penstemon* visiting spp.). —Krombein, 1967. Trap-nesting wasps and bees, pp. 295-320, pl. 16, figs. 70-77, pl. 17, figs. 82-85, 87, pl. 18, figs. 88-91, pl. 23, figs. 111-114, pl. 27, figs. 128-130, tables 29-33 (life histories, nests, associates). —Medler, 1967. Ent. Soc. Amer., Ann. 60: 338-344, figs. 1-2, 2 tables (life histories, nests and associates of Wis. spp.). —Maeta, 1969. The life study, Fukui 13: 41-43 (supersedure). —Rust, 1974. Wasmann Jour. Biol. 32: 1-93, 45 figs., 9 tables (life histories, nests and associates of the subgenera *Cephalosmia, Chalcosmia* and *Osmia*).

Genus OSMIA Subgenus OSMIA Panzer

Osmia Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 230.
Type-species: *Apis rufa* Linnaeus. Desig. by Latreille, 1810. (=*Apis bicornis* Linnaeus).
Amblys Klug, 1807. Mag. Insektenk. 6: 198.
Type-species: *Apis rufa* Linnaeus. Desig. by Latreille, 1810.
Osmia subg. *Ceratosmia* Thomson, 1872. Hym. Scand., v. 2, p. 232.
Type-species: *Apis rufa* Linnaeus. Monotypic.
Osmia subg. *Aceratosmia* Schmiedeknecht, [1885]. Apidae Europaeae, v. 2, p. 19.
Type-species: *Osmia emarginata* Lepeletier. Desig. by Sandhouse, 1939.
Osmia subg. *Pachyosmia* Ducke, 1900. Ber. naturw.-med. Ver. Innsbruck 25: 18.
Type-species: *Osmia rufa* (Linnaeus). Desig. by Sandhouse, 1939.

Revision: Rust, 1974. Wasmann Jour. Biol. 32: 8-32, figs. 1-2, 7-15, tables 1-3 (Nearctic spp.).

Biology: Rust, 1974. Wasmann Jour. Biol. 32: 9-11 (summary of information on life histories).

cornifrons (Radoszkowski). Utah (Garden City and Providence Canyon); China, Korea, Japan.
Ecology: Nests in preexisting burrows, holes or cavities in wood, stems or culms including trap-nests. Purposely introduced into Utah from Morioka, Japan in 1965 and possibly is an established species. Parasite: *Tricrania stansburyi* (Hald.). Pollen: Apparently polylectic, visits flowers of *Malus, Prunus, Pyrus.*
Chalicodoma cornifrons Radoszkowski, 1887. Soc. Ent. Ross., Horae 21: 430. ♀.

Biology: Rust, 1974. Wasmann Jour. Biol. 32: 14-15 (nest architecture, cocoon, life history, parasite).

lignaria lignaria Say. N. S. to Ga., west to Mich., Iowa, Nebr., Kans., Okla., and Tex. Ecology: Nests in a wide variety of preexisting borings, burrows, cavities, crevices, and mud nests of wasps as well as attaching their cells in clusters on exposed surfaces; uses mud for nest construction. Parasite: *Chaetodactylus krombeini* Baker, *Chrysura kyrae* Krombein, *Leucospis affinis* Say, *Melittobia chalybii* Ashm., *Monodontomerus obscurus* Westw., *Sapyga angustata* Cress. Pollen: Polylectic, visits a wide variety of flowers including *Camassia, Cardamine, Cercis canadensis, Chaerophyllum, Claytonia, Collinsia, Dentaria laciniata, Dicentra, Diervilla japonica, Dirca, Erigenia, Erythronium albidum, E. americanum, Fragaria, Geranium, Glechoma hederacea, Hydrophyllum, Lupinus, Malus, Mertensia, Nepeta hederacea, Osmorrhiza, Oxalis, Polemonium, Prunus, Pyrus, Ranunculus, Ribes, Rosa, Rubus, Salix, Senecio, Stellaria, Taenidia, Taraxacum, Viburnum, Vicia, Viola, Zanthoxylum.*
Osmia lignaria Say, 1837. Boston Jour. Nat. Hist. 1: 399. ♀, ♂.
Osmia purpurascens Smith, 1849. Zoologist 7 (app.): lviii. ♂.

Biology: Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 203 (nest). —Rau, 1937. Ent. Soc. Amer., Ann. 30: 324-342, 1 pl. (nest architecture, life history, effect of cell size and placement on sex ratio, foraging behavior, parasite). —Bohart, 1955. Ent. Soc. Wash., Proc. 57: 203-204 (nest architecture, life history, supersedure). —Chandler, 1959 (1958). Ind. Acad. Sci., Proc. 68: 199-204 (nest). —Balduf, 1961. Brooklyn Ent. Soc., Bul. 56: 83-84 (nest, foraging behavior). —Krombein, 1962. Biol. Soc. Wash., Proc. 75: 239-242, pl. 1 (nest architecture, parasite). —Chandler, 1962. Ent. Soc. Amer., North Central Branch, Proc. 16: 18-19 (nest architecture, life history, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 296-306; pl. 16, figs. 70-77; pl. 17, figs. 82-85, 87; pl. 18, fig. 88; pl. 23, figs. 111-114; pl. 27, figs. 128-130 (nest architecture, life history, supersedure, effect of cell size and placement on sex ratio, foraging behavior, cocoon, parasites). —Medler, 1967. Ent. Soc. Amer., Ann. 60: 340-341, fig. 2, table 1 (nest architecture, life history). —Byers, 1972. Kans. Ent. Soc., Jour. 45: 235-238 (supersedure by *Monobia quadridens*). —Matthews and Kislow, 1973. Environ. Ent. 2: 157-158, 1 fig. (cocoon orientation). —Rust, 1974. Wasmann Jour. Biol. 32: 21-27, table 3 (nest architecture, life history, parasites). —Torchio, 1976. Kans. Ent. Soc., Jour. 49: 475-482, 4 figs., 4 tables (use as pollinator in apple and prune orchards).

lignaria propinqua Cresson. Sask., to west. Tex., west to B. C., Wash., Oreg. and Calif. Ecology: Nests in a wide variety of preexisting borings, burrows, cavities, crevices and mud nests of wasps as well as attaching their cells in clusters on exposed surfaces; uses mud for nest construction. Parasite: *Leucospis affinis* Say, *Sapyga emarginata* Cress., *Stelis* sp., *Tricrania stansburyi* Hald. Pollen: Polylectic, visits a wide variety of flowers including *Acer, Amsinckia intermedia, Arbutus menziesii, Arctostaphylos drupacea, A. glauca, A. patula, Astragalus, Berberis californica, Blennosperma nanum, Brassica, Ceanothus integerrimus, Cercis occidentalis, Cercocarpus betulifolius, Cirsium, Clarkia, Collinsia heterophylla, Cryptantha, Cytisus scoparius, Eriodictyon, Erythronium, Geraea canescens, Gilia tricolor, Hydrophyllum, Isomeris arborea, Limnanthes douglasii, Lonicera, Lupinus albifrons, L. bicolor, Lycium, Mimulus, Nemophila exilis, N. menziesii, Penstemon, Phacelia cicutaria, P. distans, P. tanacetifolia, Prunus subcordata, Ranunculus californicus, Raphanus sativus, Rhamnus californica, R. crocea, Ribes cereum, R. menziesii, R. roezlii, R. velutina, R. viscosissimum, Rubus ursinus, Salix laevigata, S. lasiolepis, Salvia carduacea, Senecio, Sisymbrium irio, Tamarix, Taraxacum vulgare, Trifolium repens, Vicia californicum, Viola, Wyethia.* Predator: *Ptinus californicus* Pic., *Trichodes ornatus* Say.
Osmia propinqua Cresson, 1864. Ent. Soc. Phila., Proc. 3: 23. ♀.
Osmia lignaria lignariella Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 227. ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1054, figs. 135-137, 140 (larva).

Biology: Hicks, 1934. Colo. Univ., Studies 21: 265 (nest). —Linsley and MacSwain, 1941. South. Calif. Acad. Sci., Bul. 40: 129 (nest, parasites). —Levin, 1957. Econ. Ent., Jour. 50: 506-507 (nest architecture, life history). —Levin and Haydak, 1957. Bee World 38: 221-226 (comparative nutritional values of different pollens). —Levin, 1966. Kans. Ent. Soc., Jour.

39: 524-535, figs 2-6 (nest architecture, life history, cocoon, effect of cell size and placement on sex ratio, mud collecting, foraging behavior, parasites, predators). —Rust, 1974. Wasmann Jour. Biol. 32: 21-27, table 3 (nest architecture, life history, mating behavior, parasites, predators).

ribifloris biedermannii Michener. Oreg., Calif., Nev., Utah, Ariz., west. N. Mex.; Mexico (Baja California). Ecology: Nests in borings, abandoned *Sceliphron* nests and between cracks in shingles. Pollen: Polylectic, visits flowers of *Arctostaphylos drupacea, A. glandulosa, A. glauca, A. patula, Asclepias, Astragalus, Berberis, Eriodictyon crassifolium, Fendlera, Phlox, Prunus, Rhus, Ribes, Salix, Salvia sonomensis, Wyethia.*
Osmia ribifloris biedermannii Michener, 1936. Amer. Mus. Novitates 875: 19. ♀, ♂.

Biology: Leech, 1959. Pan-Pacific Ent. 35: 53 (nest). —Krombein, 1967. Trap-nesting wasps and bees, p. 306 (nest architecture, life history, as *ribifloris*). —Rust, 1974. Wasmann Jour. Biol. 32: 32 (nest architecture, foraging behavior).

ribifloris ribifloris Cockerell. Tex., N. Mex., Colo., Utah, Nev. Pollen: Unknown, but visits flowers of *Berberis, Sophora.*
Osmia (*Melanosmia*) *ribifloris* Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 410. ♀.

Genus OSMIA Subgenus CHALCOSMIA Schmiedeknecht

Osmia Subg. *Chalcosmia* Schmiedeknecht, [1885]. Apidae Europaeae, v. 2, p. 886.
Type-species: *Osmia fulviventris* Latreille. Desig. by Sandhouse, 1939.
Gnathosmia Robertson, 1903. Amer. Ent. Soc., Trans. 29: 165.
Type-species: *Osmia georgica* Cresson. Orig. desig. and monotypic.

Revision: Rust, 1974. Wasmann Jour. Biol. 32: 32-56, figs. 3-4, 15-26, tables 4-6.

Biology: Rust, 1974. Wasmann Jour. Biol. 32: 34 (summary of information on life histories).

chalybea Smith. N. J., N. C., Ga., Fla., La., Tex. Pollen: Unknown, but visits flowers of *Ceanothus, Cirsium, Vaccinium.*
Osmia chalybea Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 143. ♀, ♂.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 33. ♂.

coerulescens (Linnaeus)* Holarctic. N. S. to Minn. south to N. C., Ind., Ill., Mo., and Neb.; Idaho (Twin Falls), where probably adventive. Ecology: Nests in preexisting burrows in wood or in open cavities as in old mud dauber nests. Parasite: *Melittobia chalybii* Ashm., *Monodontomerus* sp. Pollen: Collects pollen from *Leonurus cardiaca, Medicago sativa, Nepeta cataria,* but visits other flowers including *Agastache, Cercis, Cirsium, Lotus, Philadelphus, Salvia, Trifolium, Vicia.* Predator: *Attagenus piceus* Oliv., *Chaetodactylus* sp., *Trogoderma inclusum* LeC., *T. teukton* Beal.
Apis coerulescens Linnaeus, 1758. Syst. Nat., ed. 10, p. 576. ♀.
Apis aenea Linnaeus, 1761. Fauna Suecica, ed. 2, p. 421. ♂.
Osmia cyanea Giraud, 1866. Soc. Ent. France, Ann. 6: 451. ♀, ♂.
Osmia purpurea Cresson, 1864. Ent. Soc. Phila., Proc. 3: 27. ♀.
Osmia rustica Cresson, 1864. Ent. Soc. Phila., Proc. 3: 27. ♂.
Osmia caerulescens Dalla Torre, 1896. Cat. Hym., v. 10, p. 388. Emend.

Biology: Chandler, 1963. North Central Branch, Ent. Soc. Amer., Proc. 18: 30 (nest, predators, parasites). —Krombein, 1967. Trap-nesting wasps and bees, pp. 310-311 (nest architecture, life history, predator). —Medler, 1967. Ent. Soc. Amer., Ann. 60: 341, table 1 (nest architecture). —Tasei, 1972. Apidologie 3: 149-165 (nest architecture, life history, parasites). —Rust, 1974. Wasmann Jour. Biol. 32: 42 (life history, predators, parasites).

coloradensis Cresson. Nebr. to Tex., west to B. C., Wash., Oreg. and Calif.; Mex. (Baja California). Ecology: Nests in burrow in *Pinus jeffreyi* cone as well as trap-nests. Parasite: *Chrysura pacifica* (Say). Pollen: Apparently prefers pollen from the flowers of Compositae, but also visits other flowers possibly for nesting material; visitation records include *Amsinckia intermedia, Barbarea orthoceras, Calandrinia caulescens* var. *menziesii, Calendula, Carduus tenuiflorus, Centaurea, Chaenactis fremontii, C. glabriuscula, Chrysothamnus, Cirsium californicum, Coreopsis lanceolata, Cryptantha intermedia, Encelia farinosa, Erigeron, Eriodictyon, Eriogonum nudum, Eriophyllum*

confertiflorum, E. lanatum, Eucnide, Gilia multicaulis, Grindelia camporum, Gutierrezia, Helenium bigelovii, Helianthella californica, Helianthus gracilentus, Hyptis emoryi, Iris, Lasthenia chrysostoma, Layia platyglossa var. *breviseta, Malacothrix, Mimulus guttatus, Penstemon, Phacelia minor, Phalacoseris bolanderi, Ranunculus californicus, Rhus trilobata, Senecio integerrimus, S. lugens, Silybum marianum, Sisymbrium irio, Sonchus oleraceus, Sphaeralcea ambigua, Stenotopsis linearifolius, Taraxacum officinale, Verbena, Viguiera laciniata, Wyethia.*

Osmia coloradensis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 105. ♀.
Osmia hypochrysea Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 449. ♀.
Osmia hypochrysea Rohweri Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 366. ♀.
Osmia pasadenae Cockerell, 1910. Ent. News 21: 122. ♂.

Biology: Ruckes, 1956. Pan-Pacific Ent. 32: 122, 1 fig. —Rust, 1974. Wasmann Jour. Biol. 32: 47-48 (nest architecture, cocoon, parasite).

georgica Cresson. Mass. to Mich., south to Fla. and Tex. Ecology: Nests in borings and glass tubes. Parasite: *Chrysura pacifica* (Say). Pollen: Unknown, but visits flowers of *Aronia, Brassica, Cardamine, Chrysanthemum leucanthemum, Claytonia, Coreopsis, Erigeron, Erythronium, Fragaria, Geranium, Hydrangea, Krigia Linaria, Lupinus, Malus, Pyrus, Ranunculus, Rubus, Salix, Senecio, Taraxacum, Verbena, Vicia.* Predator: *Camponotus* sp., *Crematogaster* sp.

Osmia georgica Cresson, 1878. Amer. Ent. Soc., Trans. 7: 105. ♀.
Osmia (*Gnathosmia*) *louisianae* Cockerell, 1901. Canad. Ent. 42: 171. ♀.

Biology: Hartman, 1944. Psyche, 51: 162-165 (nest architecture, life history). —Krombein, 1967. Trap-nesting wasps and bees. p. 311 (nest architecture, life history). —Hawkins, 1975. Kans. Ent. Soc., Jour. 48: 493-499, 3 figs. (nest architecture, life history, parasite, predator).

texana Cresson. N. Y., Mich., Ohio, Nebr., Tex., and B. C., Alta. and N. Dak., south to N. Mex., Ariz. and Calif.; Mexico (Baja California and Tamaulipas). Ecology: Nests in abandoned cells of *Anthophora occidentalis* Cr. in clay bank and in elderberry trap-nests; uses masticated leaf material from *Malva neglecta* and *Sphaeralcea coccinea* for cell partitions and cell plug. Parasite: *Anthrax irroratus* Say, *Chrysis densa* Cress., *Hornia minutipennis* Riley, *Monodontomerus montivagus* Ashm., *Nemognatha* sp., *Stelis montana* Cress. Pollen: Apparently prefers pollen from Compositae, visits a wide variety of flowers including *Asclepias, Campanula, Carduus tenuiflorus, Calochortus splendens, Centaurea, Chaenactis glabriuscula, Cirsium californicum, C. vulgare, Coreopsis lanceolata, Cryptantha intermedia, Diplacus aurantiacus, Erigeron, Eriodictyon californicum, Eriophyllum lanatum, Grindelia camporum, Frasera parryi, Helianthus, Lotus, Marrubium vulgare, Monarda, Monardella villosa, Parkinsonia aculeata, Penstemon, Phalacoseris bolanderi, Rubus leucodermis, Senecio, Stenotopsis linearifolius, Sidalcea malvaeflora, Viguiera laciniata, V. multiflora, Wyethia helenioides.* Predator: *Trichodes simulator* (Horn).

Osmia texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 261. ♂.
Osmia mandibularis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 102. ♀.
Osmia faceta Cresson, 1878. Amer. Ent. Soc., Trans. 7: 103. ♂.
Osmia davidsoniella Cockerell, 1905. Canad. Ent. 37: 370. ♂.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 217 (nest). —Mickel, 1928. Ent. News 39: 69 (nest). —Hobbs, Nummi and Virostek, 1961. Canad. Ent. 93: 143 (nest, parasite). —Rust, 1974. Wasmann Jour. Biol. 32: 54-56 (nest architecture, life history, parasites).

Genus OSMIA Subgenus CEPHALOSMIA Sladen

Cephalosmia Sladen, 1916. Canad. Ent. 48: 270.
Type-species: *Osmia montana* Cresson. Monotypic. (=*Osmia armaticeps* Cresson).

Revision: Rust, 1974. Wasmann Jour. Biol. 32: 56-85, figs. 5-6, 27-45, tables 7-9.

Biology: Rust, 1974. Wasmann Jour. Biol. 32: 58 (summary of information on life histories).

californica Cresson. B. C. to Calif., east to Mont., Wyo. and Colo. Ecology: Nests in borings and preexisting burrows in various wood substrates. Parasite: *Anthrax* sp., *Chrysis* sp., *Leucospis affinis* Say, *Nemognatha* sp., *Stelis* sp., *Tricrania stansburyi* Hald. Pollen: Apparently mainly dependent upon the pollens of Compositae, especially *Cirsium*, but visits many flowers including *Amsinckia, Arnica, Balsamorrhiza, Brodiaea lutea, Calochortus, Carduus tenuiflorus, Ceanothus, Chaenactis glabriuscula, Cirsium californicum, C. proteanum, Clarkia, Cryptantha intermedia, Erigeron pygmaeus, Eriodictyon californicum, Eriogonum, Eriophyllum lanatum, Gilia capitata, Grindelia camporum, Helianthus nuttallii, Layia platyglossa, Lotus strigosus* var. *hirtellus, Lupinus, Mimulus guttatus, Penstemon, Phacelia heterophylla, P. humilis, Physocarpus, Ranunculus, Salix, Senecio integerrimus, Sidalcea, Stenotopsis linearifolius, Taraxacum officinale, Viguiera multiflora, Wyethia angustifolia, W. elata, W. glabra, W. helenioides, W. longicaulis, W. mollis, W. ovata, W. reticulata.* Predator: *Ptinis californicus* Pic, *Trichodes ornatus* Say.

Osmia californica Cresson, 1864. Ent. Soc. Phila., Proc. 3: 24. ♀.
Osmia pascoensis Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 342. ♀.
Osmia nassa Cockerell, 1910. Ent. News 21: 272. ♀.
Osmia occidentalis Michener, 1936. Canad. Ent. 68: 42. ♀.

Biology: Bohart, 1955. Ent. Soc. Wash., Proc. 57: 203-204 (nest, supersedure). —Levin, 1966. Kans. Ent. Soc., Jour. 39: 524-535, 6 figs., 3 tables (nest architecture, life history, supersedure, sex relationships, pollen collection, parasites). —Rust, 1974. Wasmann Jour. Biol. 32: 66-69 (nest architecture, life history, parasites).

grinnelli Cockerell. Calif., Nev., Utah, Idaho. Pollen: Unknown, but visits flowers of *Arctostaphylos drupacea, A. patula, Aster abatus, Astragalus pachypus, Chaenactis glabriuscula, Coreopsis lanceolata, Cryptantha intermedia, Descurainia sophia, Encelia actoni, E. frutescens, Erysimum, Helianthus gracilentus, Hesperochiron californicum, Hulsea callicarpha, Lupinus, Nepeta, Penstemon, Prunus subcordata, Sisymbrium, Stenotopsis linearifolius, Taraxacum, Wyethia.*

Osmia grinnelli Cockerell, 1910. Ent. News 21: 120. ♀.

marginipennis Cresson. Calif., Nev., Oreg., Idaho, Utah, Colo., Wyo.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Chaenactis.*

Osmia marginipennis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 106. ♂.
Osmia gaillardiae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 227. ♀.
Osmia viridior Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 261. ♂.
Osmia leonis Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 123. ♀.

montana montana Cresson. B. C. to Calif. (White Mts.), east to Idaho and Mont., south to Ariz. and N. Mex. Ecology: Nests in trap-nests. Parasite: *Stelis montana* Cress. Pollen: Analyzed pollen stores indicates reliance on Compositae including *Balsamorrhiza sagittata, Cosmos, Helianthus annuus, Wyethia amplexicaulis,* but also visits other flowers for nectar or pollen including *Arnica, Aster, Chaenactis, Gutierrezia, Senecio, Silybum, Taraxacum.*

Osmia montana Cresson, 1864. Ent. Soc. Phila., Proc. 3: 24. ♂.
Osmia armaticeps Cresson, 1878. Amer. Ent. Soc., Trans. 7: 104. ♀.
Osmia armaticeps var. *sapellonis* Cockerell, 1901. Ann. and Mag. Nat. Hist. (7) 7: 336. ♀.

Biology: Rust, 1974. Wasmann Jour. Biol. 32: 76-80 (nest architecture, life history, supersedure, parasite).

montana quadriceps Cresson. Wash. to Calif., Nev., Ariz. (Santa Catalina Mts.). Ecology: Nests in abandoned beetle burrows in *Pinus contorta.* Pollen: Apparently polylectic, although most floral records from noncomposite genera refer to visits for leaf or dried flower material; visitation records include *Agoseris heterophylla, Arctostaphylos patula, Aster, Astragalus, Balsamorhiza deltoides, Ceanothus integrirrimus, Chaenactis glabriuscula, Cirsium, Clarkia biloba, Coreopsis, Eriodictyon, Eriophyllum confertiflorum, E. lanatum, Gilia capitata, Gormania obtusata, Haplopappus linearifolius, Helianthella californica, Helianthus gracilentus, Hesperochiron californicus, Lasthenia chrysostoma, Layia platyglossa, Lotus scoparius, Lupinus, Mimulus suksdorfii, Nemophila integrifolia, Penstemon, Phacelia humilis, Potentilla,*

Raillardella scaposa, Ribes cereum, Salvia, Senecio, Sidalcea, Sisymbrium irio, Tamarix gallica, Taraxacum officinale, Wyethia angustifolia, W. helenioides, W. mollis.

Osmia quadriceps Cresson, 1878. Amer. Ent. Soc., Trans. 7: 104. ♀.

Biology: Rust, 1974. Wasmann Jour. Biol. 32: 81 (nest).

subaustralis Cockerell. N. W. T. east to Ont. and Mich., south to Calif., Nev., Ariz. and N. Mex. Ecology: Nests in abandoned beetle burrows in fir log, probably *Abies lasiocarpa*. Pollen: Analyzed pollen stores revealed 99 per cent from Compositae, probably *Senecio;* visits flowers of *Aster, Centaurea, Encelia farinosa, Erigeron, Gutierrezia, Lupinus, Penstemon, Phacelia humilis, Raillardella scaposa, Senecio, Solidago, Streptanthus, Taraxacum, Wyethia, Yucca.*

Osmia nigrifrons var. *subaustralis* Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 410. ♀.
Osmia wardiana Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 368. ♀.
Osmia seneciophila Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 446. ♂.
Osmia nelsoni Cockerell, 1930. Ann. and Mag. Nat. Hist. (10) 5: 411. ♀.
Osmia wardiana austromontana Michener, 1936. Canad. Ent. 68: 42. ♀.
Osmia lyncis Cockerell, 1937. South. Calif. Acad. Sci., Bul. 36: 110. ♀.
Osmia (*Cephalosmia*) *mendocinensis* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 27. ♀.

Biology: Rust, 1974. Wasmann Jour. Biol. 32: 85 (nest architecture, pollen).

Genus OSMIA Subgenus CENTROSMIA Robertson

Centrosmia Robertson, 1903. Amer. Ent. Soc., Trans. 29: 165.
Type-species: *Osmia bucephala* Cresson. Orig. desig. and monotypic.

Revision: Sinha and Michener, 1958. Kans. Univ. Sci. Bul. 39: 275-303 (Nearctic spp.).

austromaritima Michener. Calif., Colo., Utah.

Osmia austromaritima Michener, 1936. Canad. Ent. 68: 43. ♂.

bakeri Sandhouse. Oreg., Calif. Pollen: Unknown, but visits flowers of *Clarkia, Collinsia childii, C. heterophylla, C. wrightii, Cryptantha lepida, Gilia tricolor, Nemophila integrifolia.*

Osmia bakeri Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 345. ♂.

bucephala Cresson. Holarctic; Alaska, Yukon and N. W. T. to Que., south to Calif., Utah, N. Mex., Ill., Tenn., and N. C.; limited to mountains in southern part of range. Ecology: Nests in borings and in a tunnel in a maple tree. Parasite: *Chaetodactylus krombeini* Baker, *Melittobia chalybii* Ashm. Pollen: Unknown, but visits flowers of *Aesculus, Azalea, Baptisia, Cercis canadensis, Dentaria, Dicentra, Erythronium, Mertensia virginica, Nepeta hederacea, Penstemon, Taraxacum, Tephrosia virginiana, Viola.*

Osmia bucephala Cresson, 1864. Ent. Soc. Phila., Proc. 3: 17. ♀.
Osmia megacephala Cresson, 1864. Ent. Soc. Phila., Proc. 3: 18. ♀.
Osmia latitarsis Cresson, 1864. Ent. Soc. Phila., Proc. 3: 20. ♂.
Osmia lignivora Packard, 1867. Amer. Nat. 1: 375. ♀.
Osmia lignicola Provancher, 1882. Nat. Canad. 13: 208. ♀.
Osmia subornata Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 342. ♀.

Biology: Packard, 1867. Amer. nat. 1: 375 (nest, as *lignivora*). —Krombein, 1967. Trap-nesting wasps and bees, pp. 307-310, pl. 18, figs. 89-91 (nest architecture, life history, supersedure, parasites).

nigriventris (Zetterstedt). Holarctic; Alaska to Hudson Bay and Ont., south to Oreg., Colo. and Minn.; Eurasia.

Anthophora nigriventris Zetterstedt, 1838. Ins. Lapponica, v. 1, p. 465. ♀.
Osmia frigida Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 142. ♀, ♂.
Osmia hudsonica Cresson, 1864. Ent. Soc. Phila., Proc. 3: 21. ♂.
Osmia corticalis Gerstaecker, 1869. Stettin. Ent. Ztg. 30: 331. ♀, ♂.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 331. ♀, ♂. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 77-78, fig. 33, table 4 (redescription, synonymy).

pikei Cockerell. B. C., Wash., Oreg., Nev., Calif., Colo., Wyo. Parasite: *Nemognatha scutellaris* LeC., *Sapyga fulvicornis* Cress. Pollen: Unknown, but visits flowers of *Ribes cereum*.
Osmia pikei Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 367. ♀.
Osmia universitatis Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 538. ♂.
Osmia integrella Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 124. ♂.
Osmia vallicola Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 449. ♂.
Osmia amala Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 447. ♂.
Osmia metitia Cockerell, 1909. Canad. Ent. 41: 130. ♂.

raritatis Michener. Colo., Wash., Calif.
Osmia raritatis Michener, 1957. Kans. Ent. Soc., Jour. 30: 40, figs. 1, 3, 5. ♂.

tanneri Sandhouse. Utah. Ecology: Nests made entirely of mud on concave underside of stone. Parasite: *Chrysura pacifica* (Say). Pollen: Traces of pollen attached to cocoon and exines in feces in cell indicate an unknown species of Umbelliferae.
Osmia (*Nothosmia*) *tanneri* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 87. ♂.

Taxonomy: Parker, 1975. Pan-Pacific Ent. 51: 179-180, figs. 1-2. ♀.

Biology: Parker, 1975. Pan-Pacific Ent. 51: 180-182, figs. 3-4 (nest architecture, larval habits, life history, parasite).

tarsata Provancher. Que.
Osmia tarsata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 328. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 78-79 (redescription, tax. status).

thysanisca Michener. Calif., Oreg., Wyo. Pollen: Unknown, but visits flowers of *Hackelia jessicae*, *Trifolium*.
Osmia thysanisca Michener, 1957. Kans. Ent. Soc., Jour. 30: 39, fig. 2. ♂.

vandykei Sandhouse. Oreg.
Osmia vandykei Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 344. ♂.

Genus OSMIA Subgenus ACANTHOSMIOIDES Ashmead

Acanthosmioides Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 76.
Type-species: *Osmia odontogaster* Cockerell. Orig. desig. and monotypic.

Revision: White, 1952. Kans. Univ. Sci. Bul. 35: 219-307, pls. 39-44 (Nearctic spp.).

Taxonomy: Michener, 1936. Amer. Mus. Novitates 875: 27-28 (Key).

ashmeadii (Titus). Oreg. (Dalles).
Acanthosmioides ashmeadii Titus, 1904. Ent. Soc. Wash., Proc. 6: 101. ♂.

calcarata White. Calif. (Sierra Nevada Mts.). Pollen: Unknown, but visits flowers of *Astragalus*, *Lotus*.
Osmia calcarata White, 1952. Kans. Univ. Sci. Bul. 35: 245, pl. 39, fig. 15; pl. 40, fig. 11; pl. 41, fig. 9; pl. 42, fig. 9; pl. 43, fig. 11; pl. 44, fig. 15. ♂, ♀.

dakotensis Michener. N. Dak., Mont., east. Colo., Wyo.
Osmia dakotensis Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 407. ♀.
Osmia (*?Acanthosmioides*) *dacotensis* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 62. Emend.

franciscconis White. Calif. (San Francisco). Ecology: Collected in sand dunes.
Osmia franciscconis White, 1952. Kans. Univ. Sci. Bul. 35: 269, pl. 40, fig. 2. ♀.

giffardi Sandhouse. Calif. (Sierra Nevada Mts.).
Osmia (*Acanthosmioides*) *giffardi* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 50. ♂.

giliarum Cockerell. Idaho, Mont., Wyo., Colo. Pollen: Unknown, but visits flowers of *Gilia*, *Penstemon*.
Osmia giliarum Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 451. ♀.

hurdi White. Calif., B. C. Pollen: Unknown, but visits flowers of *Allium*.
Osmia hurdi White, 1952. Kans. Univ. Sci. Bul. 35: 273, pl. 39, fig. 7. ♀.

integra Cresson. Calif. to B. C., east to Man., south to Ariz., N. Mex., Tex., Mich. Pollen: Unknown, but visits flowers of *Astragalus pomonensis, Lotus scoparius, Phacelia distans.*

Osmia integra Cresson, 1878. Amer. Ent. Soc., Trans. 7: 106. ♂.
Osmia novomexicana Cockerell, 1903. Ent. News 14: 331. ♀.
Osmia florissanticola Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 450. ♀.
Osmia integra nigrigena Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 90. ♂, ♀.

Taxonomy: Cockerell, 1910. Ent. News 21: 270. ♂.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 246 (nesting habits, as *novomexicana*).

kenoyeri Cockerell. Yukon, Alta., Calif., Colo.

Osmia kenoyeri Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 16: 483. ♂, ♀.

lanei Sandhouse. Calif.

Osmia (*Acanthosmioides*) *lanei* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 51. ♂.

longula Cresson. B. C. to Calif., east to Mont., Wyo., Colo. and Utah. Ecology: Nests on side of stone beneath a slight overhang. Pollen: Stores pollen of an unidentified Leguminosae; visits flowers of *Astragalus, Erigeron compositus, Penstemon heterodoxus, Wyethia mollis.*

Osmia longula Cresson, 1864. Ent. Soc. Phila., Proc. 3: 19. ♀.
Osmia abnormis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 105. ♂.
Osmia grandior Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 343. ♀.
Osmia permorata Cockerell, 1910. Canad. Ent. 42: 310. ♀.

Biology: Parker, 1975. Pan-Pacific Ent. 51: 182-183, figs. 5-6 (nest architecture, larval habits, sex ratio, nest provisions).

nifoata Cockerell. Wash. to Calif., east to Idaho, Utah, Colo. and Wyo. Parasite: *Dioxys pomonae* Ckll. Pollen: Unknown, but visits flowers of *Amsinckia, Astragalus pomonensis, Chaenactis, Lotus argophyllus, L. crassifolius, L. davidsonii, L. glaber, L. scoparius, L. strigosus, Lupinus confertus, L. formosus, L. lobbii* var. *lyallii, L. odoratus, Potentilla glandulosa, Rhus trilobata, Streptanthus bernardinus, Trifolium involucratum, T. variegatum.*

Osmia (*Acanthosmioides*) *nifoata* Cockerell, 1909. Entomologist 42: 95. ♂.
Osmia pellax Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 356. ♀.
Osmia (*Acanthosmioides*) *wyomingensis* Michener, 1936. Amer. Mus. Novitates 875: 27. ♂.

Biology: Fulton and Bergen, 1935. Econ. Ent., Jour. 28: 729 (nest). —Hurd, 1958. Calif. Univ. Pubs. Ent. 14: 285 (parasite).

nigrifrons Cresson. N. Dak. and Alta., west to B. C., south to Calif., Utah, Colo. and Wyo. Ecology: Nest in borings, bamboo culms, and in corrugated steel drain pipes. Parasite: *Chrysura pacifica* (Say), *Dibrachys* sp., *Monodontomerus montivagus* Ashm., *Stelis chlorocyanea* Ckll. Pollen: Polylectic, apparently prefers flowers of Leguminosae for pollen and nectar; visits other flowers for pollen including *Astragalus, Lotus, Onobrychis, Trifolium, Vicia;* visitation records include *Amsinckia douglasiana, Astragalus douglasiana, A. parishii, A. utahensis, Brassica nigra, Lotus crassifolius, L. davidsonii, L. humistratus, L. scoparius, Medicago sativa, Melilotus alba, M. officinalis, Onobrychis sativa, Phacelia, Trifolium repens, Vicia americana.*

Osmia nigrifrons Cresson, 1878. Amer. Ent. Soc., Trans. 7: 103. ♀.
Osmia casta Cockerell, 1910. Ent. News 21: 272. ♀.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 246 (nest). —Rust and Thorp, 1973. Kans. Ent. Soc., Jour. 46: 548-562, 26 figs., 2 tables (parasite). —Rust, Thorp and Torchio, 1974. Nat. Hist., Jour. 8: 29-47, 14 figs., 2 tables (nest architecture, life history, parasites).

nigrobarbata Cockerell. Wash., Calif., Ariz., Oreg.?, Idaho?, Utah? and Sask.? Ecology: Nests in burrows in the ground. Parasite: *Dioxys pomonae* Ckll. Pollen: Stores pollen of *Astragalus* including *A. antisellii, A. parishii, A. pomonensis,* but visits other flowers including *Amsinckia, Brodiaea, Castilleia, Cryptantha, Lotus, Lupinus, Mimulus, Penstemon, Salvia, Vicia.*

Osmia nigrobarbata Cockerell, 1916. Pomona Col. Jour. Ent. Zool. 8: 52. ♀.
Osmia vandzeei Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 343. ♂.

Biology: Rozen and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 197-203, 31 figs. (nest architecture, life history, parasite).

obliqua White. Calif., Oreg. Pollen: Unknown, but visits flowers of *Astragalus*.
Osmia obliqua White, 1952. Kans. Univ. Sci. Bul. 35: 238, pl. 40, fig. 7; pl. 41, fig. 5; pl. 42, fig. 2; pl. 43, fig. 9; pl. 44, figs. 1, 5. ♂.

odontogaster Cockerell. B. C., Wash., Oreg., Calif.
Osmia odontogaster Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 338. ♂.

physariae Cockerell. B. C., Alta. and Sask., south to Calif., Nev., Utah, Colo. and Wyo. Pollen: Unknown, but visits flowers of *Allium, Iris missouriensis, Lappula, Lotus, Trifolium hybridum*.
Osmia physariae Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 446. ♂.
Osmia pinorum Cockerell, 1935. Amer. Mus. Novitates 766: 4. ♀.
Osmia (*Acanthosmioides*) *erecta* Michener, 1936. Canad. Ent. 68: 40. ♂.
Osmia crenulaticornis Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 84. ♂.

Taxonomy: Michener, 1949. Kans. Ent. Soc., Jour. 22: 56 (*crenulaticornis*).

sedula Sandhouse. B. C., Wash., Wyo., Calif. Pollen: Unknown, but visits flowers of *Layia platyglossa, Lotus, Phacelia distans*.
Osmia sedula Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 353. ♀.
Osmia lutzi Michener, 1936. Amer. Mus. Novitates 875: 25. ♀.

sladeni Sandhouse. B. C., Alta., Wyo., Utah.
Osmia sladeni Sandhouse, 1925. Canad. Ent. 57: 33. ♂.

trifoliama Sandhouse. Oreg. Pollen: Unknown, but visits flowers of *Trifolium hybridum, T. pratense*.
Osmia (*Acanthosmioides*) *trifoliama* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 44. ♀.

unca Michener. Oreg., Wash., B. C., Idaho, Mont., Colo., Utah. Ecology: Cells are constructed with a leaf mastic lining surrounded by mud.
Osmia (*Acanthosmioides*) *uncinata* Michener, 1936. Canad. Ent. 68: 39. ♂. Preocc.
Osmia (*Acanthosmioides*) *unca* Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 406. N. name.
Osmia (*Acanthosmioides*) *hicksi* Sandhouse, 1939. Ent. Soc. Amer., Mem. 1: 53. ♂.
Osmia (*Acanthosmioides*) *depressa* Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 406. ♂.

Biology: Stephen, Bohart and Torchio, 1969. The biology and external morphology of bees, pp. 76, 100, 104 (nest, cell construction).

watsoni Cockerell. N. Mex. (Albuquerque).
Osmia watsoni Cockerell, 1911. Amer. Ent. Soc., Trans. 37: 235. ♂.

Genus OSMIA Subgenus NOTHOSMIA Ashmead

Nothosmia Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 75.
Type-species: *Osmia distincta* Cresson. Orig. desig. and monotypic.
Leucosmia Robertson, 1903. Amer. Ent. Soc., Trans. 29: 166.
Type-species: *Osmia albiventris* Cresson. Orig. desig. and monotypic.
Xanthosmia Robertson, 1903. Amer. Ent. Soc., Trans. 29: 166.
Type-species: *Osmia cordata* Robertson. Orig. desig. and monotypic.

albiventris Cresson. Que. to Ga., west to Ill. and Minn. Pollen: Unknown, but visits flowers of *Brassica, Geranium, Gillenia, Malus, Penstemon, Rubus, Trifolium, Vicia*.
Osmia albiventris Cresson, 1864. Ent. Soc. Phila., Proc. 3: 31. ♀, ♂.

Biology: Medler, 1967. Ent. Soc. Amer., Ann. 60: 341-342, fig. 1, table 1 (nest architecture, supersedure, life history).

cordata Robertson. Colo., N. Mex., N. Dak., Ill., Mo., Ohio, Ind. Ecology: Nests in abandoned mud-dauber cells, and in borings in wood. Parasite: *Monodontomerus mandibularis* Gahan, *M. montivagus* Ashm., *M. obscurus* Westw., *Sapyga confluenta* Cress. Pollen: Unknown, but visits flowers of *Aesculus, Cardamine, Lithospermum, Penstemon, Phlox, Rubus, Salvia, Trifolium, Verbena*.
Osmia cordata Robertson, 1902. Ent. News 13: 79. ♂.

Osmia hesperella Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 227. ♀.
Osmia coloradella Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 229. ♀.
Osmia Ramaleyi Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 126. ♂, ♀.
Osmia figginsi Cockerell, 1935. Amer. Mus. Novitates 766: 2. ♂.

Taxonomy: Cockerell, 1911. Canad. Ent. 43: 389 (tax. characters, synonymy).

Biology: Turner, 1911. Jour. Anim. Behavior 1: 374 (as "*Stelidae*"). —Rau, 1916. Jour. Anim. Behavior 6: 39. —Rau, 1923. Ent. News 34: 308. —Rau, 1928. Acad. Sci. St. Louis, Trans. 25: 363. —Hicks, 1934. Colo. Univ., Studies 21: 265. —Rau, 1937. Ent. Soc. Amer., Ann. 30: 324 (nest architecture, life history, parasite). —Chandler, 1959 (1958). Indiana Acad. Sci., Proc. 68: 199-204 (life history). —Chandler, 1962. Ent. Soc. Amer., North Central Branch, Proc. 16: 18-19 (interspecific competition). —Chandler, 1963. Ent. Soc. Amer., North Central Branch, Proc. 18: 30 (interspecific competition).

distincta Cresson. Ont. and Que., Maine to N. C., west to N. Dak., and Colo. Pollen: Unknown, but visits flowers of *Blephilia, Dianthera, Gillenia, Hypoxis, Lithospermum, Penstemon, Rubus, Trifolium.*
Osmia distincta Cresson, 1864. Ent. Soc. Phila., Proc. 3: 30. ♀.

enixa Sandhouse. Colo., Calif.
Osmia enixa Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 347. ♂.

grindeliae Cockerell. Alta., Colo., Wash., Oreg., Calif. Pollen: Unknown, but visits flowers of *Grindelia.*
Osmia grindeliae Cockerell, 1910. Psyche 17: 246. ♀.

inspergens Lovell and Cockerell. Que. and Maine, south to Ga. Pollen: Unknown, but visits flowers of *Baptisia, Polycodium, Trifolium, Vaccinium.*
Osmia inspergens Lovell and Cockerell, 1907. Psyche 14: 17. ♀.

liogastra Cockerell. Calif. Pollen: Unknown, but visits flowers of *Lotus, Lupinus, Phacelia distans.*
Osmia liogastra Cockerell, 1933. Pan-Pacific Ent. 9: 26. ♀.

lupinicola Cockerell. Calif. Pollen: Unknown, but visits flowers of *Astragalus douglasii, Chaetopappa aurea, Cryptantha, Lotus davidsonii, Lupinus, Nolina.*
Osmia lupinicola Cockerell, 1937. Amer. Mus. Novitates 948: 12. ♀.

marginata Michener. South. Calif., desert. Parasite: *Nemognatha macswaini* Enns. Pollen: Polylectic, visits flowers of *Amsinckia douglasiana, Antirrhinum filipes, Astragalus coulteri, Beleperone californica, Chaenactis glabriuscula, Dalea mollis, D. saundersii, Helianthus annuus, H. gracilentus, Hyptis emoryi, Isomeris arborea, Larrea tridentata, Lotus scoparius, Lupinus sparsifolius, Mirabilis glutinosa, Prosopis, Salvia carduacea.*
Osmia marginata Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 86. ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 37 (floral relationships).

melanopleura Cockerell. Calif.
Osmia melanopleura Cockerell, 1916. Pomona Col. Jour. Ent. Zool. 8: 52. ♀.

michiganensis Mitchell. Mich. (Grand Traverse Co.).
Osmia (*Nothosmia*) *michiganensis* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 92. ♂.

mixta Michener. Calif.
Osmia mixta Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 88. ♀.

Taxonomy: Michener, 1949. Kans. Ent. Soc., Jour. 22: 56.

morongana Cockerell. Calif. Pollen: Unknown, but visits flowers of *Amsinckia, Lupinus odoratus, Orthocarpus ornatus, Hyptis emoryi.*
Osmia morongana Cockerell, 1937. Amer. Mus. Novitates 948: 11. ♀.

nigritula Friese. No locality known.
Osmia parva Provancher, 1883. Nat. Canad. 14: 37. ♂. Preocc.
Osmia parvula Dalla Torre, 1896. Cat. Hym., v. 10, p. 405. N. name. Preocc.
Osmia nigritula Friese, 1902. Ztschr. System. Hym. Dipt. 2: 109. N. name.

novaescotiae Cockerell. N. S. Probably a synonym of *simillima* or *proxima.*
Osmia novaescotiae Cockerell, 1912. Canad. Ent. 44: 355. ♀.

phenax Cockerell. N. Mex.
Osmia phenax Cockerell, 1897. Canad. Ent. 29: 66. ♀.

prunorum Cockerell. N. Mex.
Osmia prunorum Cockerell, 1897. Canad. Ent. 29: 65. ♀ (♂ misdet.).

pumila Cresson. Que. to Ga., west to Ill., Minn., Kans. Ecology: Readily nests in borings. Parasite: *Chaetodactylus?* sp., *Chrysura pacifica* (Say), *Leucospis affinis* Say, *Melittobia chalybii* Ashm., *Pyemotes ventricosus* (Newport), *Sapypa centrata* Say. Pollen: Apparently polylectic, visits a wide variety of flowers including *Anemonella, Antennaria, Arabis, Astragalus, Barbarea, Camassia, Cardamine, Cercis, Chaerophyllum, Claytonia, Collinsia, Comandra, Cornus, Crataegus, Dentaria, Diospyros, Ellisia, Erigenia, Erythronium, Fragaria, Geranium, Houstonia, Isopyrum, Krigia, Malus, Malva, Melilotus, Mertensia, Nepeta, Oxalis, Pedicularis, Penstemon, Polemonium, Potentilla, Ranunculus, Ribes, Rosa, Rubus, Salix, Sassafras, Scutellaria, Sisyrinchium, Smilax, Taraxacum, Trifolium, Vaccinium, Viburnum, Vicia, Viola, Zanthoxylum, Zizia.*
Osmia pumila Cresson, 1864. Ent. Soc. Phila., Proc. 3: 35. ♀.
Osmia vicina Cresson, 1864. Ent. Soc. Phila., Proc. 3: 38. ♂.
Osmia pumilia(!) Pearson, 1933. Ecol. Monogr. 3: 381.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 312-318, tables 32-33 (nest architecture, life history, supersedure, parasites). —Medler, 1967. Ent. Soc. Amer., Ann. 60: 342, table 1 (nest architecture, life history, parasite).

sandhouseae Mitchell. New England to Fla., west to Tex. Pollen: Unknown, but visits flowers of *Astragalus, Claytonia, Crataegus, Fragaria, Gaylussacia, Geranium, Ilex, Iris, Linaria, Lupinus, Oenothera, Pedicularis, Penstemon, Polycodium, Rubus, Tephrosia, Toxicodendron, Trifolium, Vaccinium, Vicia.*
Osmia albohirta Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 164. ♀. Preocc.
Osmia sandhouseae Mitchell, 1927. Psyche 34: 178. N. name.

solitaria Sandhouse. Calif.
Osmia solitaria Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 346. ♂.

Taxonomy: Michener, 1949. Kans. Ent. Soc., Jour. 22: 55.

titusi Cockerell. South. Calif., N. Mex.? Pollen: Unknown, but visits flowers of *Astragalus fremontii, Lotus, Larrea tridentata, Lupinus sparsifolius, Phacelia fremontii.*
Osmia titusi Cockerell, 1905. Canad. Ent. 37: 370. ♀.

Genus OSMIA Subgenus CHENOSMIA Sinha

Osmia Subg. *Chenosmia* Sinha, 1958. Kans. Univ. Sci. Bul. 39: 233.
Type-species: *Osmia pentstemonis* Cockerell. Orig. desig.

atriventris Cresson. N. S. to Alta., south to Ia., Ill., Tenn. and Ga. Ecology: Readily nests in artificial nesting devices. Parasite: *Chrysis coeruleans* Fabr., *Dibrachys maculipennis* Szelenyi?, *Leucospis affinis* Say, *Sapyga* sp., *Stelis foederalis* Sm. Pollen: Unknown, but visits flowers of *Arabis, Astragalus, Barbarea, Cardamine, Cercis canadensis, Chrysanthemum leucanthemum, Claytonia, Collinsia, Ellisia, Erigenia, Fragaria, Geranium, Gillenia, Hydrangea, Hypoxis, Lithospermum, Mertensia, Nothoscordum, Penstemon, Polemonium, Psoralea, Rubus, Trifolium, Uvularia, Vaccinium, Vicia, Viola, Zizia.*
Osmia atriventris Cresson, 1864. Ent. Soc. Phila., Proc. 3: 29. ♀.

Biology: Fye, 1965. Canad. Ent. 97: 872-874, fig. 4, tables 3-4 (nest architecture, life history, parasites).

bruneri Cockerell. Mont. to N. Mex., west to B. C. and Calif. Pollen: Unknown, but visits flowers of *Chamaebatia foliolosa, Clarkia rhomboidea, Collinsia heterophylla, Eriodictyon californicum, Erysimum perenne, Geranium molle, Gilia capitata, Hesperochiron, Lepechinia calycina, Lotus argophyllus, L. scoparius, Limnanthes douglasii, Lupinus lobbii* var. *lyallii, Malacothamnus arcuatus, Medicago sativa, Mimulus guttatus, Monardella lanceolata, Nemophila spatulata, Penstemon heterophyllus, P. spectabilis, Phacelia distans, P. frigida, P. heterophylla, P. imbricata,*

Sidalcea malvaeflora, Solidago multiradiata, Stellaria crispa, Streptanthus tortuosus, Taraxacum, Trifolium microcephalum, T. repens, Verbena californica, V. lasiostachys, Vicia americana, V. californica, V. cracca.

Osmia bruneri Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 337. ♀.

Osmia Bennettae Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 122. ♂.

Osmia holochlora Cockerell, 1923. Canad. Ent. 55: 205. ♂.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 242, 243 (nesting habits).

calla Cockerell. Idaho to Colo., west to Calif. and B. C. Pollen: Unknown, but visits flowers of *Astragalus, Brassica geniculata, Brodiaea lutea, Cirsium californicum, Clarkia rhomboidea, Cryptantha intermedia, C. lepida, Eriodictyon trichocalyx, Lepechenia calycina, Lotus corniculatus, Lotus davidsonii, L. scoparius, Lupinus albifrons, Malacothamnus arcuatus, Marrubium vulgare, Nama parryi, Nemophila integrifolia, Penstemon grinnellii, P. labrosus, Phacelia distans, P. heterophylla, P. imbricata, P. ramosissima, Phalacoseris bolanderi, Potentilla glandulosa, Streptanthus bernardinus, Trichostema lanatum, Trifolium involucratum, T. microcephalum, T. repens, T. variegatum, Verbena lasiostachys.*

Osmia calla Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 337. ♂.

Osmia Ednae Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 123. "♀" = ♂.

caulicola Cockerell. Wyo., Colo.

Osmia caulicola Cockerell, 1934. Brooklyn Ent. Soc., Bul. 29: 17. ♀, ♂.

cerasi Cockerell. N. Mex.

Osmia cerasi Cockerell, 1897. Canad. Ent. 29: 66. ♀.

clarescens Cockerell. South. Calif., N. Mex., Sask.? Ecology: Nest in abandoned cells of *Sceliphron.* Pollen: Polylectic, visits flowers of *Amsinckia douglasii, Arctostaphylos patula, Astragalus parishii, A. pomonensis, Beleperone californica, Chaenactis glabriuscula, Cirsium californicum, Cryptantha intermedia, Dalea saundersii, Eriodictyon crassifolium, Helianthus gracilentus, Heliotropium curassavicum, Hyptis emoryi, Isomeris arborea, Larrea tridentata, Koeberlinia, Lotus davidsonii, L. glaber, L. scoparius, Marrubium vulgare, Penstemon antirrhinoides, P. spectabilis, Phacelia davidsonii, P. distans, P. fremontii, Rhus trilobata, Ribes indecorum, Salvia carnosa, S. columbariae, S. mellifera, Sphaeralcea ambigua, Trifolium repens, T. variegatum.*

Osmia clarescens Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 764. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 36-37 (floral relationships).

cobaltina Cresson. Idaho to Colo., west to B. C. and Calif., Ariz.? Pollen: Unknown, but visits a wide variety of flowers including *Ambrosia, Arctostaphylos drupacea, A. patula, Chamaebatia foliolosa, Clarkia pulchella, C. rhomboidea, Eriogonum inflatum, Horkelia bolanderi, H. tillingi, Lotus argophyllus, L. davidsonii, L. glaber, Lupinus austromontanus, Mimulus primuloides, Monardella stricta, M. linoides, M. stricta, Orthocarpus purpurascens, Penstemon bridgesii, P. grinnellii, P. labrosus, P. palmeri, Phacelia heterophylla, P. imbricata, P. ramosissima, Phalacoseris bolanderi, Potentilla glandulosa, Ribes, Sambucus nevadensis, Senecio lugens, Streptanthus bernardinus, S. major, Vicia americana.*

Osmia cobaltina Cresson, 1878. Amer. Ent. Soc., Trans. 7: 104. ♀.

Osmia bella Cresson, 1878. Amer. Ent. Soc., Trans. 7: 107. ♂.

Osmia basilissa Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 764. ♀.

Osmia kerminesina Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 349. ♀.

cockerelli Sandhouse. Colo., N. Mex.

Osmia (Nothosmia) cockerelli Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 104. ♂.

collinsiae Robertson. Maine to N. C., west to Minn. and Ill. Pollen: Unknown, but visits flowers of *Astragalus, Cardamine, Cercis, Claytonia, Collinsia, Dicentra, Erythronium, Geranium, Lupinus, Nepeta, Pedicularis, Penstemon, Rubus, Trifolium, Vicia, Viola.*

Osmia collinsiae Robertson, 1905. Canad. Ent. 37: 236. ♂.

cyanopoda Cockerell. Idaho, Nev., Wash., Oreg., Calif. Pollen: Unknown, but visits flowers of *Amsinckia intermedia, Castilleia, Cryptantha intermedia, Erysimum asperum, Lotus scoparius, Salvia columbariae, S. mellifera.*

Osmia cyanopoda Cockerell, 1916. Pomona Col. Jour. Zool. 8: 52. ♀.

Osmia parallela Michener, 1936. Amer. Mus. Novitates 875: 19. ♂.

dolerosa Sandhouse. B. C., Wash., Oreg., Calif. Pollen: Unknown, but visits flowers of *Clarkia rhomboidea, Collinsia tinctoria, Horkelia fusca, Limnanthes douglasii, Lotus argophyllus, Rosa, Stachys, Trifolium microcephalum, T. gracilentum.*
Osmia dolerosa Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 123. ♀.

exigua Cresson. South. Colo., N. Mex., Calif. Pollen: Unknown, but visits flowers of *Allium parvum, Anagallis arvensis, Brodiaea elegans, B. laxa, B. lutea, Centaurea melitensis, Cirsium vulgare, Clarkia unguiculata, Diplacus aurantiacus, Epilobium minutum, Eriodictyon californicum, Eriophyllum confertiflorum, Geranium molle, Helianthella californica, Hesperochiron, Lepechinia calycina, Lotus scoparius, L. subpinnatus, Lupinus densiflorus, Mimulus guttatus, Monardella villosa, Navarretia heterodoxa, Penstemon speciosus, Phacelia cicutaria, P. distans, Plectritis macrocera, Satureja douglasii, Streptanthus tortuosus, Trifolium microcephalum, T. variegatum, Verbena lasiostachys, Viola purpurea.*
Osmia exigua Cresson, 1878. Amer. Ent. Soc., Trans. 7: 107. ♂.
Osmia granulosa Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 767. ♀, ♂.
Osmia exiguua(!) Cresson, 1916. Amer. Ent. Soc., Mem. 1: 118.
Osmia vana Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 349. ♀.

Taxonomy: Michener, 1962. Kans. Ent. Soc., Jour. 35: 253-254 (tax. characters, geogr. records).

gaudiosa Cockerell. N. Mex., Colo., Ariz., Calif. Pollen: Analyzed pollen masses from two cells revealed 96 per cent Papillionoideae (cf. *Astragalus, Vicia,* or *Lathyrus*) and 4 per cent probably Scrophulariaceae (cf. *Stemodia);* visitation records include *Arctostaphylos patula, Astragalus, Dalea californica, Fragaria californica, Gilia multicaulis, Lathyrus, Lotus davidsonii, L. scoparius, Mirabilis laevis, Nemophila integrifolia, Phacelia davidsonii, P. distans, Rhus trilobata, Ribes indecorum, Salvia columbariae, Sambucus caerulea.* Predator: *Metaponium* sp., *Telabis* sp.
Osmia gaudiosa Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 538. ♂.

Taxonomy: Michener, 1962. Kans. Ent. Soc., Jour. 35: 253-254 (tax. characters, geogr. records).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 318-320 (nest architecture, life history, larval food, supersedure, predators).

hemera Sandhouse. Calif.
Osmia (*Nothosmia*) *hemera* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 114. ♂.

illinoensis Robertson. South. Ill., Tex. Pollen: Unknown, but visits flowers of *Astragalus, Fragaria, Hypoxis, Lithospermum, Ranunculus.*
Osmia illinoensis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 347. ♂.

indeprensa Sandhouse. Idaho, Nev., Wash., Oreg., Calif. Pollen: Unknown, but visits flowers of *Calyptridium umbellatum, Clarkia pulchella, Collinsia torreyi, Limnanthes douglasii, Lotus nevadensis, Phacelia hydrophylloides.*
Osmia (*Nothosmia*) *indeprensa* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 115. ♀, ♂.

inermis (Zetterstedt). Holarctic; Labrador, Que., N. B., Ont., Maine, Mass., Wis., Colo., N. W. T., Alta., Mont., B. C., Wash., Oreg., Calif.; Eurasia. Pollen: Unknown, but visits flowers of *Kalmia polifolia, Ledum glandulosum, Phyllodoce breweri, Rubus, Salix, Vaccinium.*
Anthophora (*Osmia*) *inermis* Zetterstedt, 1838. Ins. Lapponica, v. 1, p. 466. ♀.
Osmia parietina Smith, 1844. Zoologist 2: 743. ♀.
Osmia globosa Cresson, 1864. Ent. Soc. Phila., Proc. 3: 36. ♀.
Osmia vulpecula Gerstaecker, 1869. Stettin. Ent. Ztg. 30: 335. ♀.
Osmia globosiformis Cockerell, 1910. Canad. Ent. 42: 311. ♂.

inurbana Cresson. Wyo., Colo., Idaho, Wash., Oreg., Calif., Que.?, Man., Alta.?, B. C.? Pollen: Unknown, but visits flowers of *Gilia multicaulis, Lotus davidsonii, Nemophila integrifolia, Potentilla glandulosa, Senecio lugens, Streptanthus tortuosus.*
Osmia inurbana Cresson, 1878. Amer. Ent. Soc., Trans. 7: 107. ♂.
Osmia eutrichosa Cockerell, 1910. Canad. Ent. 42: 312. ♂.

kincaidii Cockerell. Nebr., N. Mex., Idaho, B. C., Wash., Oreg., Calif. Parasite: *Chrysura sonorensis* (Cam.), *Epistenia* sp., *Leucospis affinis* Say, *Nemognatha scutellaris* LeC. Pollen: Unknown, but visits flowers of *Allium parvum*, *Amsinckia douglasiana*, *Brodiaea*, *Calochortus nudus*, *Chamaebatia foliolosa*, *Clarkia rhomboidea*, *C. unguiculata*, *Fragaria californica*, *Geranium molle*, *Heterogaura heterandra*, *Linanthus montanus*, *Lotus scoparius*, *L. subpinnatus*, *Lupinus micranthus*, *Monardella villosa*, *Nemophila spatulata*, *Phacelia distans*, *Rhamnus californica*, *Sida hederacea*, *Trifolium microcephalum*, *Vicia*.
Osmia kincaidii Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 334. ♀, ♂.

lacus Sandhouse. Oreg., Calif.
Osmia (*Nothosmia*) *lacus* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 125. ♂.

laeta Sandhouse. Calif., N. Mex.? Parasite: *Nemognatha scutellaris* LeC. Pollen: Unknown, but visits flowers of *Arctostaphylos drupacea*, *A. patula*, *Astragalus*, *Brassica geniculata*, *Cryptantha intermedia*, *Eriodictyon trichocalyx*, *Gilia exilis*, *Lotus argophyllus*, *L. davidsonii*, *L. glaber*, *L. nevadensis*, *L. scoparius*, *L. strigosus*, *Nama parryi*, *Nemophila integrifolia*, *Penstemon centranthifolius*, *P. labrosus*, *P. spectabilis*, *Phacelia imbricata*, *P. heterophylla*, *P. ramosissima*, *Rubus leucodermis*, *Trifolium variegatum*, *Vicia villosa*.
Osmia laeta Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 350. ♀.
Osmia aglaia Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 112. ♀.

malina Cockerell. Wash., Calif., Colo. Pollen: Unknown, but visits flowers of *Arctostaphylos drupacea*, *Ceanothus cordulatus*, *C. leucodermis*, *C. integerrimus*, *Chamaebatia foliolosa*, *Comandra umbellata*, *Lotus argophyllus*, *L. crassifolius*, *L. davidsonii*, *L. nevadensis*, *Lupinus austromontanus*, *Mimulus guttatus*, *Phacelia ramosissima*, *Streptanthus tortuosus*, *Trifolium gracilentum*.
Osmia malina Cockerell, 1909. Entomologist 42: 94. ♀.

mertensiae Cockerell. Colo., Calif.?, B. C.? Pollen: Unknown, but visits flowers of *Lappula floribunda*, *Mertensia*.
Osmia mertensiae Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 488. ♂.

Taxonomy: Cockerell, 1934. Amer. Mus. Novitates 732: 5. ♀.

nanula Cockerell. Idaho, Utah, Colo., B. C., Wash., Oreg. Pollen: Unknown, but visits flowers of *Phacelia*.
Osmia nanula Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 339. ♀.
Osmia phaceliae Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 364. ♀.

pagosa Sandhouse. Oreg., Colo., Calif. Pollen: Unknown, but visits flowers of *Vicia californica*.
Osmia (*Nothosmia*) *pagosa* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 89. ♀.

pentstemonis Cockerell. Alta., Idaho, Utah, Colo., B. C., Wash., Oreg., Calif. Pollen: Unknown, but visits flowers of *Fragaria californica*, *Garmania obtusata*, *Penstemon heterodoxus*, *P. newberryi*. Predator: *Philanthus pulcher* Dalla Torre.
Osmia pentstemonis Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 451. ♀.

pingreeana Michener. Colo.
Osmia pingreeana Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 408. ♀.

potentillae Michener. Calif. Pollen: Unknown, but visits flowers of *Calyptridium umbellatum*, *Fragaria californica*, *Lotus nevadensis*, *L. scoparius*, *Navarretia divaricata*, *Nemophila integrifolia*, *Phacelia ramosissima*, *Potentilla glandulosa*.
Osmia potentillae Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 89. ♀.

Taxonomy: Michener, 1949. Kans. Ent. Soc., Jour. 22: 56.

proxima Cresson. Alaska to N. S., south to Oreg., Idaho, Wyo., N. Dak., Ill. and Ga. Parasite: *Stelis subemarginata* (Cress.). Pollen: Unknown, but visits flowers of *Houstonia*, *Penstemon*, *Rubus*, *Trifolium*.
Osmia proxima Cresson, 1864. Ent. Soc. Phila., Proc. 3: 32. ♂.
Osmia sericea Cresson, 1864. Ent. Soc. Phila., Proc. 3: 27. ♂.
Osmia melanotricha Lovell and Cockerell, 1907. Psyche 14: 16. ♀.

Biology: Fye, 1965. Canad. Ent. 97: 874, tables 2-4 (nest, parasite). —Medler, 1967. Ent. Soc. Amer., Ann. 60: 342 (nest, parasite).

pulsatillae Cockerell. Idaho, Wyo., Colo., Wash., Oreg., Calif. Pollen: Unknown, but visits flowers of *Epilobium glaberrimum*.
Osmia pulsatillae Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 363. ♂.

pusilla Cresson. Wash., Oreg., Calif., Colo., N. Mex.? Pollen: Unknown, but visits flowers of *Gayophytum diffusum, Nemophila integrifolia, Phacelia davidsonii, Phalacoseris bolanderi, Potentilla glandulosa, Sanicula nevadensis*.
Osmia pusilla Cresson, 1864. Ent. Soc. Phila., Proc. 3: 35. ♂.

regulina Cockerell. Oreg., Calif. Pollen: Unknown, but visits flowers of *Astragalus, Calandrinia caulescens* var. *menziesii, Chaenactis glabriuscula, Cryptantha intermedia, Gilia multicaulis, Lotus argophyllus, L. scoparius, Salvia mellifera*, Trifolium *involucratum, T. repens, T. variegatum*.
Osmia regulina Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 766. ♀ (♂ misdet.).

sanctaerosae Cockerell. Calif. Pollen: Unknown, but visits flowers of *Eriodictyon californicum, Lotus argophyllus, L. davidsonii, Lupinus confertus*.
Osmia sanctae-rosae Cockerell, 1910. Ent. News 21: 121. ♀.

sequoiae Michener. Calif.
Osmia sequoiae Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 89. ♀.

Taxonomy: Michener, 1949. Kans. Ent. Soc., Jour. 22: 57.

tersula Cockerell. Alaska to Hudson Bay and N. B., south to Oreg., Colo, Wis. and Mich. Parasite: *Sapyga martinii* Sm.? Pollen: Unknown, but visits flowers of *Rubus*.
Osmia tersula Cockerell, 1912. Canad. Ent. 44: 358. ♂.
Osmia subarctica Cockerell, 1912. Canad. Ent. 44: 357. ♀.

Biology: Medler, 1967. Ent. Soc. Amer., Ann. 60: 342-343, figs. 1-2, tables 1-2 (nest architecture, life history, parasite).

tokopahensis Michener. Calif.
Osmia tokopahensis Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 87. ♀.

Taxonomy: Michener, 1949. Kans. Ent. Soc., Jour. 22: 58.

trevoris Cockerell. B. C. and Alta., south to Calif., Nev., Colo., and Wyo.
Osmia trevoris Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 341. ♀.
Osmia subtrevoris Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 451. ♀.
Osmia corkinsi Sandhouse, 1924. Ent. News 35: 351. ♀.

tristella cyanosoma Cockerell. Calif. Pollen: Unknown, but visits flowers of *Ceanothus, Dalea saundersii, Diplacus aurantiacus, Lotus davidsonii, Lupinus longipes, Monardella, Nemophila integrifolia, Penstemon grinnellii, Phacelia hydrophylloides, Prunus emarginata, Rubus vitifolius, Senecio lugens*.
Osmia cyanosoma Cockerell, 1916. Pomona Col. Jour. Ent. Zool. 8: 52. ♀.

tristella tristella Cockerell. B. C., Wash., Oreg., Calif., Idaho, Colo., Que.? Pollen: Unknown, but visits flowers of *Diplacus aurantiacus, Lepechinia calycina, Lotus scoparius*.
Osmia tristella Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 340. ♀.
Osmia hypoleuca Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 366. ♀.

virga Sandhouse. Mass. to Wis., south to Va. Pollen: Unknown, but visits flowers of *Salix*.
Osmia virga Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 130. ♂.

zephyros Sandhouse. Calif. Ecology: Nests in oak gall. Pollen: Unknown, but visits flowers of *Collinsia parviflora*.
Osmia zephyros Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 132. ♂, ♀.

Genus OSMIA Subgenus EUTHOSMIA Sinha

Osmia subg. *Euthosmia* Sinha, 1958. Kans. Univ. Sci. Bul. 39: 235.
Type-species: *Heriades glaucum* Fowler. Orig. desig.

glauca (Fowler). Calif. Ecology: Nests in abandoned burrows and also trap-nests; uses mud for cell construction. Parasite: *Stelis sexmaculata* Ashm. Pollen: Oligolege of *Collinsia*

including *C. bicolor, C. heterophylla, C. sparsifolia,* but visits other flowers presumably for nectar including *Alyssum maritimum, Convolvulus, Cryptantha, Geranium dissectum, G. molle, Gilia tricolor, Lasthenia chrysostoma, Lupinus bicolor, L. micranthus, Melilotus indica, Mimulus, Nemophila integrifolia, N. pulchella, Phacelia distans, P. douglasii, P. rattani, Platystemon californicus, Plectritis macrocera, Rhus trilobata, Trifolium microcephalum.*

Heriades glaucum Fowler, 1899. Psyche 8: 405. ♂.

Osmia exilis Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 351. ♀.

Taxonomy: Snelling, 1967. South. Calif. Acad. Sci., Bul. 66: 103 (tax. status).

Biology: Linsley and MacSwain, 1941. South. Calif. Acad. Sci., Bul. 40: 129 (nest). —Rust and Clement, 1972. Kans. Ent. Soc., Jour. 45: 523-528, 1 fig., 1 table (nest architecture, life history, floral relationships, parasite, biological characteristics).

Genus OSMIA Subgenus MYSTACOSMIA Snelling

Osmia subg. *Mystacosmia* Snelling, 1967. South. Calif. Acad. Sci., Bul. 66: 104.
Type-species: *Osmia nemoris* Sandhouse. Orig. desig.

nemoris Sandhouse. B. C., Idaho and Mont., south to Calif. and Utah. Ecology: Nests in abandoned burrows of *Diadasia diminuta* Cress. as well as trap-nests; uses masticated leaf material from *Malva rotundifolia* and *Sphaeralcea coccinea* cemented with resin for cell construction. Pollen: Collects pollen primarily from flowers of *Penstemon* and various legumes; visitation records include *Astragalus, Brassica, Brodiaea congesta, B. elegans, B. laxa, B. lutea, B. pulchella, Calochortus luteus, C. venustus, Chamaebatia foliolosa, Chaenactis glabriuscula, Cirsium, Clarkia biloba, C. cylindrica, C. dudleyana, C. gracilis, C. pulchella, C. purpurea viminea, C. speciosa, C. unguiculata, Collinsia callosa, Convolvulus malacophyllus, C. subacaulis, Cryptantha, Dodecatheon hendersoni, Eriogonum fasciculatum, Geranium molle, Grindelia, Lasthenia chrysostoma, Layia platyglossa, Linanthus parviflorus, Lotus scoparius, L. subpinnatus, Lupinus, Medicago sativa, Mimulus, Monardella villosa, Orthocarpus purpurascens, Penstemon, Phacelia ciliata, P. distans, Plectritis macrocera, Prunus ilicifolia, Raphanus sativus, Rhus ovata, Rosa californica, Rubus, Salvia, Satureja, Sisymbrium, Trifolium involucratum, T. microcephalum, T. repens, T. tridentatum, Vicia americana, Wyethia.*

Osmia nemoris Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 345. ♂.

Osmia seclusa Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 352. ♀.

Osmia abdominalis Michener, 1935. Pan-Pacific Ent. 11: 184. ♂.

Taxonomy: Snelling, 1967. South. Calif. Acad. Sci., Bul. 66: 103 (synonymy).

Biology: Bohart, 1955. Ent. Soc. Wash., Proc. 57: 235-236 (nest architecture, life history). —Rust and Clement, 1972. Kans. Ent. Soc., Jour. 45: 523-528, table 1 (nest architecture, life history, biological characteristics). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 52 (floral relationships, as *seclusa*).

Genus OSMIA Subgenus MONILOSMIA Robertson

Monilosmia Robertson, 1903. Amer. Ent. Soc., Trans. 29: 166.
Type-species: *Osmia simillima* Smith. Orig. desig. and monotypic. (=*Osmia canadensis* Cresson).

albolateralis albolateralis Cockerell. Alta. to N. Mex., west to B. C. and Wash.

Osmia dubia Cresson, 1864. Ent. Soc. Phila., Proc. 3: 29. ♀. Preocc.

Osmia albolateralis Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 450. ♀.

?Osmia enena Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 448. ♂.

albolateralis visenda Sandhouse. Oreg., Calif. Pollen: Unknown, but visits flowers of *Astragalus antisellii, A. douglasii, Clarkia cylindrica, C. rhomboidea, Collinsia tinctoria, Erysimum asperum, Horkelia tillingi, Iris hartwegii, Lathyrus alfeldii, Lotus argophyllus, L. davidsonii, Montia perfoliata, Nemophila integrifolia, Penstemon*

spectabilis, Phacelia, Senecio lugens, Sidalcea malvaeflora, Vicia californica, V. truncata, Viola purpurea.

Osmia visenda Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 355. ♀.

atrocyanea atrocyanea Cockerell. Wash., Oreg., Calif., Colo., Utah, Nev. Parasite: *Sapyga angustata* Cress. Pollen: Unknown, but visits flowers of *Clarkia rhomboidea, Cryptantha intermedia, Cirsium, Eriodictyon californicum, Lotus glaber, L. scoparius, Lupinus, Penstemon laetus, Phacelia, Ribes, Rubus ursinus, Sidalcea malvaeflora, Trifolium involucratum, T. variegatum, Verbena lasiostachys, Vicia californica, V. villosa.*

Osmia atrocyanea Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 344. ♀.

Osmia senior Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 368. ♀.

Osmia pseudamala Cockerell, 1910. Canad. Ent. 42: 312. ♂.

Taxonomy: Cockerell, 1930. Ann. and Mag. Nat. Hist. (10) 5: 163. ♂, ♀.

atrocyanea putata Cockerell. South. Calif. Pollen: Unknown, but visits flowers of *Arctostaphylos drupacea, A. patula, Cryptantha intermedia, Iris hartwegii, Lathyrus californicus, Lupinus confertus, L. latifolius, Nemophila integrifolia, Penstemon spectabilis, Ribes roezlii, Vicia californica.*

Osmia putata Cockerell, 1910. Ent. News 21: 272. ♀.

brevis brevis Cresson. Wyo., Colo., Utah, Ariz., B. C., Oreg., north. and cent. Calif.

Osmia brevis Cresson, 1864. Ent. Soc. Phila., Proc. 3: 36. ♀.

Osmia wilmattae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 228. ♀.

?Osmia wheeleri Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 449. ♂.

brevis peridonea Sandhouse. South. Calif. Pollen: Unknown, but visits flowers of *Astragalus antisellii, Arctostaphylos drupacea, Castilleia, Clarkia, Collinsia heterophylla, C. tinctoria, Cryptantha intermedia, C. lepida, Eriodictyon californicum, E. crassifolium, Fragaria californica, Gilia exilis, Horkelia tillingii, Lotus davidsonii, L. scoparius, Lupinus bicolor, Nama parryi, Penstemon antirrhinoides, P. grinnellii, P. heterophyllus, P. spectabilis, Phacelia andersonii, P. davidsonii, Phalacoseris bolanderi, Psoralea californica, Rhus trilobata, Salvia carnosa, Streptanthus bernardinus, S. tortuosus, Taraxacum.*

Osmia peridonea Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 348. ♂.

bridwelli Sandhouse. Nev., Calif. Pollen: Unknown, but visits flowers of *Agastache urticifolia, Brodiaea coronaria, B. lutea, Chamaebatia foliolosa, Glycyrrhiza lepidota, Iris hartwegii, Lathyrus sulphureus, Lotus nevadensis, Lupinus albifrons, L. densiflorus, L. succulentus, Mimulus guttatus, Penstemon spectabilis, Psoralea physodes, Sedum, Streptanthus tortuosus, Vicia californica, Wyethia helenioides.*

Osmia (Nothosmia) bridwelli Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 100. ♂, ♀.

cara Cockerell. South. Calif., Nev. Pollen: Unknown, but visits flowers of *Cirsium californicum, Clarkia, Dicentra chrysantha, Eriodictyon californicum, E. trichocalyx, Lotus crassifolius, L. davidsonii, L. glaber, L. scoparius, Lupinus densiflorus, L. nanus, Mimulus, Nama parryi, Penstemon heterophyllus, P. laetus, P. spectabilis, Trichostema parishii.*

Osmia cara Cockerell, 1910. Ent. News 21: 271. ♀.

cyanella Cockerell. Wash., Oreg., Calif., Colo., Utah, Nev. Pollen: Unknown, but visits flowers of *Chamaebatia foliolosa, Cirsium californicum, Collinsia heterophylla, C. tinctoria, Cryptantha intermedia, Eriodictyon californicum, Eriophyllum confertiflorum, Fragaria californica, Heterogaura californica, Iris hartwegii, Lepechinia calycina, Linanthus parviflorus, Lotus davidsonii, L. nevadensis, L. scoparius, Lupinus, Mimulus guttatus, Penstemon grinnellii, P. heterodoxus, P. speciosus, Phacelia californica, P. heterophylla, P. imbricata, P. ramosissima, Potentilla glandulosa, Ranunculus californicus, Streptanthus tortuosus.*

Osmia cyanella Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 340. ♀.

Osmia aprilina Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 364. ♂.

Osmia aprilina atrovirens Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 347. ♂.

Osmia brevior Michener, 1936. Amer. Mus. Novitates 875: 20. ♀.

cyaneonitens Cockerell. S. Dak., Colo.

Osmia cyaneonitens Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 448. ♂.

Osmia brevihirta Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 365. ♀.

densa densa Cresson. Mont. to N. Mex., west to B. C., cent. Calif., and Ariz. Pollen: Polylectic, visits a wide variety of flowers including *Arctostaphylos crustacea, A. mariposa, Brodiaea lutea, B. pulchella, Calochortus nudus, Ceanothus integerrimus, Chamaebatia foliolosa, Cirsium californicum, Clarkia breweri, C. dudleyana, C. rhomboidea, C. unguiculata, Convolvulus malacophyllus, Eriodictyon californicum, Eriogonum inflatum, Gilia capitata, Hackelia jessicae, Horkelia fusca, Iris hartwegii, Lathyrus graminifolius, L. sulphureus, Limnanthes douglasii, Lotus argophyllus, Lupinus albifrons, L. bicolor, L. latifolius, L. micranthus, L. stiversi, Mimulus guttatus, M. primuloides, M. suksdorfii, Monardella lanceolata, Penstemon spectabilis, Phacelia heterophylla, Ranunculus californicus, Ribes nevadensis, Spraguea umbellata, Streptanthus tortuosus, Thermopsis malacophyllus, Verbena lasiostachys, Vicia californica.*

Osmia densa Cresson, 1864. Ent. Soc. Phila., Proc. 3: 25. ♀.

Osmia olivacea Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 362. ♂.

Osmia proposita Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 354. ♀.

densa pogonigera Cockerell. Calif. Parasite: *Tricrania stansburyi* Hald. Pollen: Polylectic, visits a wide variety of flowers including *Arctostaphylos drupacea, A. patula, Astragalus antiselli, A. parishii, Barbarea orthoceras, Ceanothus cordulatus, Clarkia breweri, C. unguiculata, Convolvulus, Cryptantha intermedia, Dicentra chrysantha, Epilobium angustifolium, Horkelia bernardina, Lathyrus, Lotus crassifolius, L. davidsonii, L. scoparius, Lupinus austromontanus, L. confertus, L. formosus, L. grayi, Malus, Marrubium vulgare, Nemophila integrifolia, Penstemon grinnellii, P. spectabilis, Phacelia davidsonii, P. distans, P. heterophylla, Rhamnus californica, Rhododendron occidentale, Ribes cereum, R. roezlii, Vicia arvensis, V. californica.*

Osmia pogonigera Cockerell, 1910. Ent. News 21: 121. ♀.

Osmia celsa Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 354. ♀.

felti Cockerell. New England to Minn., south to West Va.

Osmia felti Cockerell, 1911. Ent. News 22: 18. ♀.

gabrielis Cockerell. Oreg., Calif. Pollen: Unknown, but visits flowers of *Brodiaea lutea, Castilleia, Clarkia cylindrica, Diplacus aurantiacus, Glycyrrhiza lepidota, Iris hartwegii, Lathyrus sulphureus, Lotus glaber, L. scoparius, Lupinus albifrons, L. formosus, L. subspicata, Marrubium vulgare, Orthocarpus lithospermoides, Penstemon speciosus, Psoralea physodes, P. rigida, Salvia mellifera, Streptanthus bernardinus, Trifolium variegatum, Vicia californica.*

Osmia gabrielis Cockerell, 1910. Ent. News 21: 120. ♀.

hendersoni Cockerell. Mont., Wyo., Colo., Utah, Oreg. Calif. (Sierra Nevada Mts.).

Osmia Hendersoni Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 365. ♀.

hesperos Sandhouse. Calif., Oreg.

Osmia hesperos Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 131. ♂.

iridis Cockerell and Titus. Colo., N. Mex., Calif. Pollen: Unknown, but visits flowers *Collinsia callosa, Malus.*

Osmia iridis Cockerell and Titus, 1902. Amer. Nat. 36: 816. ♂.

juxta juxta Cresson. Alta. to N. Mex., west to Idaho and Ariz.

Osmia juxta Cresson, 1864. Ent. Soc. Phila., Proc. 3: 19. ♀.

Osmia theta Sandhouse, 1925. Canad. Ent. 57: 34. ♂.

Osmia subpurpurea jamesi Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 409. ♀.

juxta subpurpurea Cockerell. B. C. to Calif. Pollen: Unknown, but visits flowers of *Brodiaea congesta, Geranium, Lotus scoparius, Lupinus lobbii* var. *lyallii, L. longipes, Mertensia, Penstemon speciosus, Phalacoseris bolanderi, Plectritis macrocera, Salvia columbariae, Trifolium microcephalum, Wyethia angustifolia.*

Osmia subpurpurea Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 344. ♀.

paradisica Sandhouse. Wash., Oreg., Calif. (Sierra Nevada Mts.). Pollen: Unknown, but visits flowers of *Eriogonum.*

Osmia paradisica Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 343. ♂.

rawlinsi Sandhouse. Wyo., Calif.

Osmia (*Nothosmia*) *rawlinsi* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 115. ♀.

rostrata Sandhouse. Calif. Pollen: Unknown, but visits flowers of *Amsinckia douglasiana, Grossularia, Phacelia tanacetifolia.*
Osmia rostrata Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 351. ♀.

sculleni Sandhouse. Oreg., Calif., Utah, Colo. Pollen: Unknown, but visits flowers of *Hackelia jessicae.*
Osmia (*Nothosmia*) *sculleni* Sandhouse, 1939. Ent. Soc. Wash., Mem. 1: 82. ♀.

simillima Smith. N. S., west to N. W. T. and B. C., south to Oreg., Ariz., and N. C. Parasite: *Leucospis affinis* Say, *Stelis subemarginata* (Cress.). Pollen: Unknown, but visits flowers of *Althaea, Barbarea, Oxalis, Penstemon, Ranunculus, Rubus, Vicia, Viola.*
Osmia simillima Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 142. ♀, ♂.
Osmia canadensis Cresson, 1864. Ent. Soc. Phila., Proc. 3: 33. ♂.
Osmia cognata Cresson, 1864. Ent. Soc. Phila., Proc. 3: 33. ♂.
Osmia major Robertson, 1902. Ent. News 13: 79. ♀ (♂ misdet.).
Osmia chlorops Cockerell and Titus, 1902. Amer. Nat. 36: 816. ♂.
Osmia stasima Lovell, 1909. Ent. News 20: 125. ♀.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 332. —Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 448. ♂. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 80-81, figs. 28, 32, 35 (redescription, synonymy).

Biology: Packard, 1867. Amer. Nat. 1: 377 (nest). —Saunders, 1872. Canad. Ent. 4: 237 (nest, as *canadensis*). —Graenicher, 1935. Ent. Soc. Amer., Ann. 28: 285 (nest, parasite).

Genus OSMIA Subgenus TRICHINOSMIA Sinha

Osmia subg. *Trichinosmia* Sinha, 1958. Kans. Univ. Sci. Bul. 39: 244.
Type-species: *Osmia latisulcata* Michener. Monotypic and orig. desig.

latisulcata Michener. Ariz., Nev., Calif. Pollen: Unknown, but visits flowers of *Amsinckia, Arctostaphylos glandulosa, Astragalus douglasii, Chaetopappa aurea, Dalea, Cryptantha intermedia, Eriodictyon californicum, Lotus scoparius, L. strigosus, Lupinus, Salix, Salvia carnosa, S. columbariae.*
Osmia latisulcata Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 86. ♀.

Genus OSMIA Subgenus DICERATOSMIA Robertson

Diceratosmia Robertson, 1904. Amer. Ent. Soc., Trans. 29: 166.
Type-species: *Osmia conjuncta* Cresson. Monotypic and orig. desig. (=*Osmia quadridentata* Cresson).

Revision: Michener, 1949. Ent. Soc. Amer., Ann. 42: 258-264 (Nearctic spp.).

Taxonomy: Hurd and Michener, 1955. Calif. Ins. Surv., Bul. 3: 215-217, fig. 4, pl. 11, map 112 (Calif. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 81-85, figs. 29, 31-32, table 4 (eastern U. S. spp.).

botitena (Cockerell). Tex.
Osmia botitena Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 30. ♀.
Osmia conjuncta marilaunidii Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 363. ♂.

conjuncta (Cresson). Ont. to Minn., south to N. C. and Tex. Ecology: Nests in snail shells. Pollen: Polylectic, visits flowers of many families, especially Leguminosae and Scrophulariaceae, including *Anemonella, Blephilia, Cardamine, Cercis, Collinsia, Dentaria, Fragaria, Geranium, Hydrophyllum, Lupinus, Osmorrhiza, Polemonium, Psoralea, Ranunculus, Rubus, Scutellaria, Stellaria, Trifolium, Viola.*
Osmia conjuncta Cresson, 1864. Ent. Soc. Phila., Proc. 3: 31. ♀.
Osmia 4-dentata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 107. ♂. Preocc.
Osmia cressoni Dalla Torre, 1896. Cat. Hym., v. 10, p. 392. N. name.
Osmia quadridentata Dalla Torre, 1896. Cat. Hym., v. 10, p. 392. Emend.

Biology: Rau, 1937. Ent. Soc. Amer., Ann. 30: 330 (nest).

subfasciata miamiensis Mitchell. Southern Fla. Pollen: Unknown, but visits flowers of *Crotalaria*.

Osmia (*Diceratosmia*) *subfasciata miamiensis* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 84. ♀, ♂.

subfasciata subfasciata Cresson. N. J. to Fla., west to south. Calif.; northern Mexico. Ecology: Nests in abandoned beetle burrows, also accepts artificial nesting devices. Parasite: *Melittobia chalybii* Ashm. Pollen: Polylectic, visits a wide variety of flowers including *Achillea, Acacia greggii, Amorpha fruticosa, Astragalus, Cercis canadensis, Coreopsis, Gaillardia pulchella, Helenium tenuifolium, Helianthus, Heliotropium curassavicum* var. *oculatum, Larrea tridentata, Lesquerella, Lotus scoparius, Machaeranthera tenacetifolium, Marilaunidium origanifolium, Marrubium vulgare, Medicago sativa, Melilotus officinalis, Monarda citriodora, Oxalis, Palafoxia linearis, Parkinsonia aculeata, Phacelia, Pluchea sericea, Prosopis juliflora, Prunus, Rhus, Rubus, Salix, Sphaeralcea, Vicia.*

Osmia subfasciata Cresson, 1872. Amer. Ent. Soc., Trans. 4: 261. ♀, ♂.
Osmia conjunctoides Robertson, 1893. Amer. Ent. Soc., Trans. 20: 276. ♂.
Osmia punctata Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 85. ♀.

Biology: Linsley, 1946. Econ. Ent., Jour. 39: 24 (nest sites, pollination of alfalfa). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 84 (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 311-312 (nest architecture, life history, parasite).

Genus OSMIA Subgenus Unassigned

angustipes Cockerell. Colo.

Osmia angustipes Cockerell, 1933. Pan-Pacific Ent. 9: 158. ♂.

claremontensis Michener. Mont., Wash., Oreg., Calif. Pollen: Unknown, but visits flowers of *Arctostaphylos patula, Collinsia heterophylla, Cryptantha intermedia, Phacelia distans, Trifolium repens.*

Osmia claremontensis Michener, 1936. South. Calif. Acad. Sci., Bul. 35: 84. ♂.

Taxonomy: Snelling, 1967. South. Calif. Acad. Sci., Bul. 66: 106-107 (tax. status).

foxi Cameron. N. Mex.

Osmia Foxi Cameron, 1901. Amer. Ent. Soc., Trans. 27: 316. ♂.

Nomen Nudum in Osmia

Osmia pacifica Packard, 1892. Psyche 6: 340.

Genus MEGACHILE Latreille

This genus, which is nearly cosmopolitan in distribution, has until recently included all of the so-called leaf-cutter bees regardless of whether the various species cut leaves with which to make their nests or not. As currently restricted, those species which make their nests with pieces of leaves or petals belong to the genus *Megachile* while those which use resin, mud, or other such material have been assigned to *Chalicodoma* Lepeletier and *Creightonella* Cockerell. The latter genus does not occur in the Western Hemisphere. Some authors have concluded that *Chelostomoides* Robertson warrants generic rank rather than subgeneric status within the genus *Chalicodoma* as it is treated here.

Revision: Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 295-361, pls. XX-XXI (Part I, classification of Nearctic subgenera including key; n. spp.). —Mitchell, 1935. Amer. Ent. Soc., Trans. 61: 1-44, pl. I (Part II, treats Nearctic spp. of subgenera *Cressoniella, Litomegachile, Neomegachile*). —Mitchell, 1935. Ent. Soc. Amer., Trans. 61: 155-205, pls. VIII-IX (Part III, treats Nearctic spp. of the subgenera *Authemois* and *Delomegachile*). —Mitchell, 1936. Amer. Ent. Soc., Trans. 62: 117-166, pls. VIII-XI (Part IV, treats Nearctic spp. of the subgenera *Derotropis, Megachiloides, Phaenosarus*, and *Xanthosarus*). —Mitchell, 1937. Amer. Ent. Soc., Trans. 62: 323-382, pls. XXII-XXVI (Part V, treats Nearctic spp. of the subgenus *Xeromegachile*). —Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 45-83, pls. V-VI (Part VI, treats Nearctic spp. of the subgenera *Acentron, Argyropile, Leptorachis, Melanosarus* and *Pseudocentron*). —Mitchell, 1937.

Amer. Ent. Soc., Trans. 63: 175-206, pls. XII-XIII (Part VII, treats Nearctic spp. of the subgenus *Sayapis*). —Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 381-426, pls. XXVI-XXIX (Part VIII, treats Nearctic spp. of the subgenus *Chelostomoides;* addenda and index to Parts I-VIII).

Taxonomy: Michener, 1962. N. Y. Ent. Soc., Jour. 70: 17-29 (classification). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 108-191, figs. 1, 36-62, tables 5-6 (eastern U. S. spp.). —Pasteels, 1965. Mus. Royal l' Afrique Centr., Ann. Sci. Zool. 137: ix, 579 pp. (classification). —Butler, 1965. Ariz. Agr. Expt. Sta. Tech. Bul. 187: 1-19 (Ariz. spp.). —Michener, 1965. Amer. Mus. Nat. Hist., Bul. 130: 185-186 (classification). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 1-80 (Wis. spp.). —Stephen, Bohart and Torchio, 1969. The biology and external morphology of bees, pp. 53-54 (classification).

Biology: Hobbs and Lilly, 1954. Ecology 35: 453-462 (alfalfa pollination in southern Alberta). —Krombein, 1967. Trap-nesting wasps and bees, pp. 320-337, pl. 19, figs. 92-97; pl. 20, figs. 98-100 (life histories, nest associates). —Holm and Skou, 1972. Ent. Scandinavica 3: 169-180, 6 figs., 8 tables (nesting habits, parasites). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 37-38 (*Larrea* visiting spp.).

Morphology: Mitchell, 1935. Amer. Ent. Soc., Trans. 61: 3-9 (male sternites and genital armature). —Pasteels and Pasteels, 1971. Acad. Sci. Paris, Compt. Rend. 273: 1481-1483 (tergal glands).

Genus MEGACHILE Subgenus LITOMEGACHILE Mitchell

Megachile subg. *Litomegachile* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 301, 308.
Type-species: *Megachile brevis* Cresson. Orig. desig.

brevis brevis Say. U. S. and south. Canada. Ecology: Nests in a wide variety of situations including within dead plant stalks of *Ambrosia trifida, Cirsium, Helianthus annuus, H. tuberosa, Vernonia interior, Zea mays,* in a rolled leaf of *Eupatorium perfoliatum,* among green leaves of *Erigeron canadensis,* among rocks and under dried cow chips, in a termite tunnel, and in various burrows and holes in the soil. Parasite: *Anthrax irroratus* Say, *Coelioxys novomexicana* Ckll., *C. octodentata* Say, *C. salinaria* Ckll., *C. sayi* Robt., *Leucospis affinis* Say, *Nemognatha nigripennis* Lec. Pollen: Polylectic, visits a wide variety of flowers especially Compositae, Leguminosae and Labiatae; visitation records include *Abutilon, Acerates, Althaea rosea, Amorpha, Apios, Asclepias eriocarpa, Aster canescens, Astragalus, Baptisia, Bidens laevis, Blephilia, Boltonia, Brauneria, Campanula, Cassia, Ceanothus, Cephalanthus, Chaenactis glabriuscula, Chamacrista fasciculata, Chrysanthemum, Chrysothamnus, Cicuta, Clarkia bottae, Convolvulus occidentalis, Coreopsis lanceolata, Cornus, Crotalaria, Croton californicus, Cryptantha intermedia, Cuscuta, Cynoglossum, Desmodium, Dianthera, Encelia farinosa, Engelmania, Erechthites, Erigeron stenophyllus, Eryngium, Eupatorium, Fayopyrum, Frankenia grandiflora, Gaillardia pulchella, Galactia, Geranium maculatum, Gerardia, Gilia, Gossypium, Grindelia elata, Gutierrezia californica, G. sarothrae, Haplopappus palmeri, H. vernonioides, Helenium, Helianthus annuus, Heliopsis, Heliotropium curassavicum, Hemizonia fasciculata, Hieracium, Heterotheca grandiflora, Hibiscus, Hydrophyllum, Hypericum perfoliatum, Impatiens, Koellia, Krigia, Kuhnistera, Lactuca, Lepidospartum squamatum, Linaria, Lippia, Lobelia, Lotus scoparius, Lupinus parryi, Lycopus, Lythrum, Marrubium vulgare, Medicago sativa, Melilotus alba, Mentha piperita, Nepeta, Nutilla stricta, Oenothera, Onobrychis, Penstemon, Petalostemon compactus, Phacelia distans, P. heterophylla, P. ramosissima, Phaseolus, Phyla lanceolata, P. nodiflora rosea, Physostegia, Pluchea camphorata, Polygala, Polygonum auberti, Psoralea, Psoralioides, Pycnanthemum, Rhus, Rosa, Rubus, Rudbeckia hirta, Ruellia, Sabatia, Saggittaria, Salix lasiolepis, Salvia, Schinus molle, Scutellaria, Senecio, Sidalcea reticulata, Silphium, Solidago canadensis, Sphaeralcea fasciculata, Stachys, Stephanomeria exigua, S. virgata, Strophostyles, Suriana, Tephrosia, Tecrium, Tradescantia, Trifolium pratense, T. repens, Verbena, Verbesina, Vicia.*

Megachile brevis Say, 1837. Boston Jour. Nat. Hist. 1: 407. ♂, ♀.
Megachile lanuginosa Smith, 1853. Cat. Hym. Ins. Coll. Brit. Mus., v. 1, p. 190. ♀, ♂.
?Megachile nupta Cresson, 1872. Amer. Ent. Soc., Trans. 4: 268. ♀.

Megachile perbrevis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 127. ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1057, figs. 151-153, 157 (larva). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1663 (tax. status).

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 39 (nesting habits). —Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 220 (nesting habits). —Rockwood, 1951. Pan-Pacific Ent. 27: 155 (nest, parasite). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1659-1748, 31 figs. (life history, nest and associates). —Donahue, 1954. Nature Mag. 47: 300-302 (life history). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 19-20 (life history, parasites).

brevis onobrychidis Cockerell. Southwest. U. S., intergrading with typical *brevis* Say in a wide area from Nebr. and Tex. to Pacific Coast from Calif. to B. C. and Idaho. Ecology: Uses grape leaves for nesting material. Parasite: *Coelioxys octodentata* Say. Pollen: Polylectic, visits a wide variety of flowers especially Compositae, Leguminosae and Labiatae, visitation records include *Achillea lanulosa, A. millefolium, Agastache, Asclepias eriocarpa, A. mexicana, Bigelovia, Brassica geniculata, Calochortus luteus, C. venustus, Calycadenia multiglandulosa, Calyptridium umbellatum, Centaurea solstitialis, Cercidium, Chamaebatia foliolosa, Chrysothamnus nauseosus speciosus, C. viscidiflorus typicus, Cirsium californicum, Clarkia dudleyana, C. speciosa speciosa, C. unguiculata, Cleomella obtusifolia, Convolvulus aridus, Cordylanthus filifolius, C. pilosus, Coreopsis lanceolata, Corethrogyne bernardina, Crepis vesicaria, Croton californicus, Cryptantha intermedia, Eriastrum virgatum, Erigeron canadensis, Eriodictyon, Eriogonum fasciculatum, E. gracile, E. latifolium* var. *nudum, Eryngium aristatulum, Eschscholzia californica, Foeniculum vulgare, Frankenia grandiflora, Grindelia camporum, G. hallii, Gutierrezia californica, G. lucida, G. sarothrae, Haplopappus arborescens, H. bloomeri* var. *augustatus, H. pachylepis, H. palmeri, H. venetus, Helenium, Helianthus, Heliotropium curassavicum, Hemizonia fasciculata, H. luzulaefolia, H. pungens, H. wrightii, Heterotheca grandiflora, Hoffmanseggia microphylla, Lotus americanus, L. glaber, L. hamatus, L. humistratus, L. purshianus, L. scoparius, L. strigosus, Lupinus micranthus, Lythrum californicum, Malacothamnus arcuatus, Marrubium vulgare, Medicago sativa, Melilotus alba, M. indica, Mimulus brevipes, Onobrychis, Phacelia distans, P. ramosissima, Phyla lanceolata, P. nodiflora* var. *rosea, Polygonum aubertii, Ribes, Rudbeckia serotina, Prosopis, Salix, Salvia clevelandii, Sida hederacea, Solidago californica, S. occidentalis, Spiraea, Stanleya pinnata, Stephanomeria exigua, S. virgata, Trichostema lanceolatum laxum, T. parishii, T. repens, T. variegatum, Verbena lasiostachys, Wislizenia refracta.*

Megachile onobrychidis Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 266. ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1663 (tax. status).

brevis pseudobrevis Mitchell. N. C. to Fla. and Miss. Pollen: Presumably polylectic, visits flowers of *Afzelia, Chrysopsis, Crotalaria, Erigeron, Galactia, Gaylussacia, Helenium, Helianthus, Lupinus, Melilotus, Opuntia, Polygonum, Rhus, Rubus, Solidago, Suriana, Trilisa, Vaccinium.*

Megachile (*Litomegachile*) *brevis* var. *pseudobrevis* Mitchell, 1936. Amer. Ent. Soc., Trans. 61: 20. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 116 (tax. status).

coquilletti Cockerell. Idaho and Utah, west to B. C. to south. Calif. and Ariz. Pollen: Apparently polylectic, visits a wide variety of flowers including *Asclepias erosa, A. mexicana, A. speciosa, Baccharis, Brassica geniculata, B. incana, Brodiaea crocea, Centaurea solstitialis, Cercidium torreyanum, Cirsium vulgare, Clarkia unguiculata, Cleome serrulata, Cordylanthus pilosus, C. rigidus, Croton californicus, Cryptantha intermedia, Eriastrum virgatum, Erigeron stenophyllus, E. elatum, E. fasciculatum* var. *polifolium, E. latifolium* var. *nudum, E. plumatella, Eriophyllum confertiflorum, Frasera parryi, Grindelia, Gutierrezia sarothrae, Helianthus gracilentus, Lotus americanus, L. glaber, L. scoparius, Marrubium vulgare, Medicago sativa, Melilotus alba, Phacelia ramosissima, Pluchea camphorata, Phyla filiformis, P. lanceolata, Rhamnus californicus, Solidago, Swertia parryi.*

Megachile mendica coquilletti Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 15: 535. ♂.

gentilis Cresson. Tex. to Calif., Nev., Oreg. and Idaho, adventive and established in Hawaii. Ecology: Nests in twigs of *Sambucus* and also in trap-nests. Parasite: *Anthrax atriplex* Marston, *A. daphne* (O. S.), *A. irroratus* Say, *A. melanopogon* (Bigot), *Aritranis notata sierrae* Townes, *Coelioxys novomexicana* Ckll., *Leucospis affinis* Say, *Tetrastichus megachilidis* Burks. Pollen: Apparently polylectic, visits flowers of *Acacia, Amorpha fruticosa, Asclepias erosa, A. speciosa, Aster canescens, A. spinosus, Bigelovia, Baccharis, Brassica geniculata, B. incana, Cercidium, Cereus engelmannii, Chamaebatia foliolosa, Chrysopsis fastigiata, Chrysothamnus, Clarkia amoena, C. dudleyana, C. unguiculata, Clematis, Cleomella obtusifolia, Collinsia tinctoria, Condalia, Cordylanthus filifolius, C. nevinii, C. pilosus, C. rigidus, Croton californicus, Cryptantha intermedia, Dalea, Echinocactus, Erigeron stenophyllus, Eriogonum fasciculatum, E. gracile, E. latifolium* var. *nudum, Eriophyllum confertiflorum, Grindelia camporum, Gutierrezia sarothrae, Haplopappus acradenius, H. arborescens, H. bloomeri* var. *angustatus, H. vernonioides, Helenium bigelovii, Helianthus annuus, Hemizonia pungens, Heteromeles arbutifolia, Heterotheca grandiflora, Hyptis emoryi, Larrea tridentata, Lathyrus splendens, Lepidium, Lessingia glandulifera, Lippia, Lotus argophyllus, L. glaber, L. heermannii, L. nevadensis, L. purshianus, Lupinus longipes, Marrubium vulgare, Medicago sativa, Melilotus alba, M. indica, Monarda citriodora, Nolina parryi, Opuntia, Phacelia distans, P. heterophylla, P. ramosissima, Phyla nodiflora* var. *rosea, Pluchea camphorata, Polygonum, Prosopis, Ratibida columnaris, Rhamnus californica, Sapindus, Senecio douglasii, Sisymbrium altissimum, Solidago confinis, S. occidentalis, Spraguea umbellatum, Swertia neglecta, Trifolium repens, T. variegatum, Vauquelinia, Verbena lasiostachys, Verbesina, Viguiera multiflora, Wislizenia refracta.* Predator: *Trichodes horni* Wolcott and Chapin.

Megachile gentilis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 267. ♂.

Megachile palmarum Perkins, 1899. Fauna Hawaii., v. 1, p. 114. ♂, ♀.

Megachile murinella Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 263. ♀.

Biology: Bechtel, 1958. Pan-Pacific Ent. 34: 12 (nest, parasite). —Krombein, 1967. Trap-nesting wasps and bees, pp. 320-321, pl. 20, figs. 99-100 (nest architecture, life history, supersedure, parasites, predator).

lippiae Cockerell. Mont., Nebr., Tex., west to Utah and Calif. Ecology: Uses cuttings from rose leaves for nest material. Pollen: Apparently polylectic, visits a wide variety of flowers including *Acacia, Agave, Althaea rosea, Amorpha, Asclepias, Aster, Baccharis, Cercidium, Cirsium, Cucurbita, Erigeron, Eriogonum fasciculatum* var. *polifolium, Haplopappus, Helenium, Helianthus, Hoffmanseggia, Hyptis emoryi, Larrea tridentata, Lippia, Lotus, Marrubium vulgare, Medicago, Melilotus, Mortonia, Nama, Nolina, Opuntia, Petalostemon, Prosopis, Sapindus, Sphaeralcea, Symphoricarpos, Trifolium, Verbesina.*

Megachile cleomis var. *lippiae* Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 15. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 37 (floral relationship with *Larrea*).

mendica mendica Cresson. Ont. and Maine to Fla., west to S. Dak., Colo., Ariz. and Calif. Ecology: Nests in rose canes and trap nests. Parasite: *Coelioxys octodentata* Say, *C. sayi* Robt., *Melittobia chalybii* Ashm., *Physocephala marginata* (Say). Pollen: Polylectic, visits a wide variety of flowers, especially Compositae, Leguminosae, and Labiatae; visitation records include *Acerates, Agastache, Amorpha, Apios, Aralia, Asclepias tuberosa, Aster, Baptisia, Bidens, Blephilia, Boltonia, Borrichia, Brassica nigra, Brauneria, Buddleia campanula, Camassia, Cassia, Ceanothus, Cephalanthus, Chaemaecrista, Chrysanthemum, Chrysopsis, Cicuta, Cirsium, Clematis, Cleomella obtusifolia, Clethra, Conoclinum caelestinum, Coreopsis stellata, Cosmos, Crataegus, Crotalaria, Cyrilla, Daucus, Desmodium, Diospyros, Elephantopus carolinianus, Erigeron, Eriogonum, Eryngium, Eupatorium, Flaveria, Galactia, Gaura, Gaylussacia, Geranium, Haplopappus, Helenium, Helianthus, Heliopsis helianthoides, Hypericum, Ilex, Impatiens, Itea, Koellia mutica, Lepachys, Lespedeza, Linaria, Lupinus, Lycopus, Lythrum, Marrubium vulgare, Medicago, Melilotus alba, Monarda, Nepeta, Nyssa, Ocimum, Oenothera, Opuntia, Phacelia, Phaseolus, Polygala incarnata, Polygonum,*

Prunella, Psedera, Psoralea, Pycnanthemum, Pyrrhopappus, Rhus, Richardia, Robinia, Rosa, Rubus, Rudbeckia, Salix, Senecio, Silphium, Solidago, Specularia, Spiraea, Stachys, Strophostyles, Suriana, Symphoricarpos, Tephrosia, Teucrium, Trifolium, Trilisia, Vaccinium, Verbena, Verbesina, Vernonia glauca, Veronica, Veronicastrum virginicum, Vicia, Zinnia, Zizia. Predator: *Pyemotes ventricosus* (Newport), *Vidia* sp.

Megachile mendica Cresson, 1878. Amer. Ent. Soc., Trans. 7: 126. ♀.

Taxonomy: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 39 (life history).

Biology: Koerber and Medler, 1959. Wis. Acad. Sci., Arts and Letters 47: 56 (geogr. records). —Medler, 1965. Ent. Soc. Wash., Proc. 67: 113-116, 1 table (life history, nest architecture, cocoon, parasites). —Krombein, 1967. Trap-nesting wasps and bees, pp. 322-325 (life history, nest architecture, supersedure, parasites, predators). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 25-26 (nesting habits).

mendica snowi Mitchell. Colo., N. Mex., Ariz. Pollen: Apparently polylectic, visits flowers of *Asclepias, Ceanothus, Chilopsis, Cleome, Eriogonum, Geranium, Gilia, Helenium, Heliopsis, Heterotheca, Ligustrum, Lupinus, Marrubium vulgare, Melilotus, Robinia, Rudbeckia, Verbesina, Viguiera.*

Megachile mendica snowi Mitchell, 1927. Psyche 34: 113. ♀.

texana Cresson. Que. to Fla., west to B. C. and Calif. Ecology: Nests in preexisting holes in the ground. Parasite: *Coelioxys moesta* Cress., *C. octodentata* Say, *C. rufitarsis* Sm., *C. sodalis* Cress. Pollen: Polylectic, visits a wide variety of flowers especially Leguminosae, Compositae, and Labiatae, but also commonly takes pollen from *Larrea tridentata* (Zygophyllaceae) in the southwestern U. S.; visitation records include *Acacia greggii, Acerates, Achillea lanulosa, Afzelia, Agave deserti, Althaea rosea, Alyssum maritimum, Apocynum androsaemifolium, Amorpha fruticosa, Asclepias galioides, A. mexicana, A. speciosa, Aster, Baccharis emoryi, Baptisia, Berberis, Blephilia, Buddleia, Calycadenia multiglandulosa, Chamaecrista fasciculata, Chrysothamnus, Cirsium, Clematis ligusticifolia, Clethra, Convolvulus, Cordylanthus nevinii, Coreopsis, Crotalaria, Croton californicus, Cryptantha, Dianthera, Elephantopus carolinianus, Eriastrum virgatum, Eriogonum elongatum, E. fasciculatum, E. latifolium* var. *undum, E. subscaposum, E. wrightii, Erigeron coulteri, Eupatorium, Euphorbia, Frasera parryi, Galactia, Gilia inconspicua, Gutierrezia sarothrae, Haplopappus, Helenium, bigelovii, Helianthus, Hypericum, Hyptis emoryi, Kuhnistera oligophylla, Larrea tridentata, Liatris, Lotus nevadensis, L. scoparius, Lupinus longipes, Marrubium vulgare, Medicago sativa, Melilotus alba, Monardella lanceolata, Nepeta, Nolina, Opuntia, Oxydendron, Penstemon, Petalostemon candidum, Phacelia heterophylla, Phaseolus, Phyla nodiflora, Pluchea camphorata, Polygala, Polygonum aubertii, Psoralea, Pycnanthemum, Pyrrhopappus, Rhamnus californica, Rhus, Rubus, Sapindus, Schinus molle, Serinea, Silphium, Solidago californica, S. confinis, Stachys, Stanleya pinnata, Strophostyles, Tamarix, Tephrosia, Trifolium, Verbena, Vicia, Viguiera laciniata.*

Megachile texana Cresson, 1878. Amer. Ent. Soc., Trans. 7: 125. ♂ (♀ misdet.).

Megachile generosa Cresson, 1878. Amer. Ent. Soc., Trans. 7: 125. ♀.

Megachile schismatura Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 267. ♂.

Megachile cleomis Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 13. ♀, ♂.

Megachile pruinosa Friese, 1903. Ztschr. System. Hym. Dipt. 3: 246. ♀, ♂. Preocc.

Megachile vernonensis Cockerell, 1912. Canad. Ent. 44: 354. "♀" = ♂.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 38 (nest, as *generosa*). —Hicks, 1926. Colo. Univ. Studies 15: 228 (nest, as *cleomis*). —Krombein, 1953. Ent. Soc. Wash., Proc. 55: 84-85 (nest). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 30 (nest). —Krombein, 1970. Ent. Soc. Wash., Proc. 72: 415 (nest). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 37-38 (floral relationships).

Genus MEGACHILE Subgenus NEOMEGACHILE Mitchell

Megachile subg. *Neomegachile* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 302, 307.
Type-species: *Megachile chichimeca* Cresson. Orig. desig.

aegra Mitchell. South. Tex., south to Brazil.
Megachile aegra Mitchell, 1930. Amer. Ent. Soc., Trans. 56: 283. ♂.
chichimeca Cresson. South. Tex.; Mexico.
Megachile chichimeca Cresson, 1878. Amer. Ent. Soc., Trans. 7: 130. ♀.
Megachile disparipennis Cockerell, 1917. *In* W. P. Cockerell, N. Y. Ent. Soc., Jour. 25: 192. ♀.

Genus MEGACHILE Subgenus CRESSONIELLA Mitchell

Megachile subg. *Cressoniella* Mitchell, 1943. Amer. Ent. Soc., Trans. 59: 302, 307.
Type-species: *Megachile zapoteca* Cresson. Orig. desig.
zapoteca Cresson. South. Ariz., south to Costa Rica. Pollen: Unknown, but visits flowers of *Asclepias, Helenium, Helianthus, Lathyrus, Melilotus, Monarda.*
Megachile zapoteca Cresson, 1878. Amer. Ent. Soc., Trans. 7: 128. ♀.
Megachile tuxtla Cresson, 1878. Amer. Ent. Soc., Trans. 7: 128. ♂.

Genus MEGACHILE Subgenus MEGACHILE Latreille

Megachile Latreille, 1802. Hist. Nat. Formis, p. 413, 433.
Type-species: *Apis centuncularis* Linnaeus. Desig. by Curtis, 1828.
Anthophora Fabricius, 1804. Systema piezatorum, p. 372. Preocc.
Type-species: *Apis centuncularis* Linnaeus. Desig. by Michener, 1951.
Anthemois Robertson, 1903. Amer. Ent. Soc., Trans. 29: 168.
Type-species: *Apis centuncularis* Linnaeus. Monotypic and orig. desig. (=*Megachile infragilis* Cresson).
Cyphopyga Robertson, 1903. Amer. Ent. Soc., Trans. 29: 169.
Type-species: *Megachile montivaga* Cresson. Monotypic and orig. desig.
Megalochila Schulz, 1906. Spolia Hym., p. 64. Emend.
centuncularis (Linnaeus). Holarctic, in America principally northern, but occurs south to Fla. Mo., Colo., Nev., Ariz. Ecology: Nests both below and above ground in preexisting holes or cavities. Parasite: *Coelioxys modesta* Sm., *C. moesta* Cress., *C. octodentata* Say, *Dibrachys* sp., *Melittobia chalybii, M. megachilidis* (Pack.), *Monodontomerus montivagus* Ashm., *Ptinus* sp. nr. *hirtellus* Sturm. Pollen: Apparently polylectic, visits a wide variety of flowers, especially Compositae and Leguminosae; visitation records include *Althaea rosea, Aster, Carduus undulatus, Centaurea cyanus, C. jacea, Epilobium angustifolium, Fendlera, Gladiolus, Grindelia squarrosa, Helianthus annuus, H. maximillianus, Inula helenium, Medicago sativa, Melilotus alba, M. officinalis, Psoralea, Pyracantha, Sedum, Solidago, Taraxacum taraxacum, Trifolium, Vernonia fasciculata, Zinnia.*
Apis centuncularis Linnaeus, 1758. Syst. Nat., Ed. 10, p. 575. ♀.
Apis rotundata Fabricius, 1787. Mantissa Insectorum, v. 1, p. 303. ♂.
Megachile infragilis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 127. ♂.
Megachile leoni Titus, 1906. Ent. Soc. Wash., Proc. 7: 150. ♀.
Perezia maura Ferton, 1914. Soc. Ent. France, Ann. 83: 233. Intersex.

Taxonomy: Hurd, 1967. Ent. Medd. 35: 5-6 (synonymy). —Pasteels, 1969. Soc. Ent. France, Bul. 74: 248 (intersex, synonymy).

Biology: Gentry, 1874. Canad. Ent. 6: 171-175 (nest, supersedure). —Packard, 1874. Guide to the study of insects, 4th ed., pp. 136-137 (nest). —Hicks, 1926. Colo. Univ. Studies 15: 231 (nest, as *infragilis*). —Michelbacher and Hurd, 1954. Pan-Pacific Ent. 20: 146 (nest, parasite). —Medler, 1959. Canad. Ent. 91: 113-115, 1 fig. (nest). —Krombein, 1967. Trap-nesting wasps and bees, pp. 325-326 (life history, nest architecture, parasite). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 20-21 (life history, parasite). —Holm and Skou, 1972. Ent. Scand. 3: 169-180, 6 figs., 8 tables (life history, nest architecture, sex ratio, rate of emergence, parasite, diseases).
inermis Provancher. N. S. to Ga., west to B. C., south to Calif., Utah., Colo., N. Mex. and Tex. Ecology: Nests in decaying poplar and in borings in wood. Parasite: *Coelioxys funeraria* Sm., *Dibrachys maculipennis* Szelenyi, *Leucospis affinis* Say. Pollen: Apparently

polylectic, especially Compositae and Leguminosae; visitation records include *Baptisia tinctoria, Carduus undulatus, Inula helenium, Lathyrus venosus, Medicago sativa, Nepeta cararia, Penstemon, Polymnia uvedalia, Rhododendron, Rubus strigosus, R. villosus, Sanicula marylandica, Taraxacum officinale, Tephrosia virginiana, Vernonia.*

Megachile simplex Provancher, 1882. Nat. Canad. 13: 229. ♂. Preocc.

Megachile inermis Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 323. ♂.

Megachile simplicissima Dalla Torre, 1896. Cat. Hym., v. 10, p. 449. N. name.

Megachile sapellonis Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 7. ♀.

Megachile temporalis Friese, 1903. Ztschr. System. Hym. Dipt. 3: 247. ♂ (♀ misdet.).

Megachile decipiens Lovell and Cockerell, 1907. Psyche 14: 19. ♂.

Taxonomy: Titus, 1906. Ent. Soc. Wash., Proc. 7: 150 (synonymy).

Biology: Stephen, 1955. Econ. Ent., Jour. 48: 543 (effectiveness as pollinator of alfalfa). —Stephen, 1956. Pan-Pacific Ent. 32: 98-101 (nest). —Koerber and Medler, 1958. Wis. Acad. Sci., Arts and Letters 47: 56 (life history). —Medler, 1958. Canad. Ent. 90: 325-327, 1 fig. (life history). —Medler, 1958. Ent. News 66: 21 (parasite). —Fye, 1965. Canad. Ent. 97: 874-875, tables 2-4 (life history, nest architecture, sex ratio, parasite). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 22-23 (life history, parasite).

montivaga Cresson. N. S. to N. C., west to B. C. and Calif.; Mexico. Ecology: Uses petals of *Clarkia* for nest construction. Parasite: *Coelioxys insita* Cress., *C. rufitarsis* Sm., *Leucospis affinis* Say, *Nemognatha dubia* LeC., *Phaenaera* sp. Pollen: Polylectic, especially Compositae, visits flowers of *Argemone intermedia, A. platyceros, Asclepias, Aster parishii, Blephilia, Brauneria, Campanula, Carduus undulatus, Centaurea jacea, C. solstitialis, Chaenactis artemisiaefolia, Chilopsis linearis, Chrysopsis villosa, Chrysothamnus, Cirsium californicum, C. lanceolatum, Clarkia amoena huntiana, C. biloba, C. cylindrica, C. dudleyana, C. elegans, C. rubicunda, C. unguiculata, C. viminea, C. williamsoni, Cleome, Convolvulus occidentalis, Coreopsis stellata, Cryptantha intermedia, Dianthera, Echinacea, Epilobium, Euphorbia albomarginata, Geranium maculatum, Gilia, Grindelia camporum, G. hallii, Gutierrezia, Haplopappus bloomeri* var. *angustatus, Hedonia, Helenium bigelovii, Helianthus annuus, H. gracilentus, Iris hartwegii, Lactuca, Lotus scoparius, Marrubium vulgare, Medicago sativa, Melilotus, Monarda, Monardella, Oenothera, Opuntia, Palafoxia linearis, Parthenium, Penstemon, Phacelia, Polymnia uvedalia, Rosa, Rudbeckia, Salix, Salvia carduacea, S. mellifera, Scrophularia, Senecio douglasii, Sidalcea, Silphium, Solidago, Trifolium, Verbena lasiostachys, Verbesina encelioides, Vernonia, Viguiera laciniata, V. multiflora.*

Megachile montivaga Cresson, 1878. Amer. Ent. Soc., Trans. 7: 124. ♀, ♂.

Biology: Hicks, 1926. Colo. Univ. Studies 15: 232 (nest).

nivalis Friese. Alaska, south to Oreg., east to Que. and Maine. Parasite: *Anthrax irroratus* Say. Pollen: Unknown, but visits flowers of *Elaeagnus, Taraxacum.*

Megachile nivalis Friese, 1903. Ztschr. System. Hym. Dipt. 3: 246. ♀ (♂ misdet.).

Megachile (Anthemois) santiamensis Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 311. ♀.

Taxonomy: Mitchell, 1942. Pan-Pacific Ent. 18: 115. ♂, ♀.

relativa Cresson. Mackenzie to Newfoundland, south to Calif., Ariz., Ill., Tenn., and Ga. Ecology: Nests in borings in wood. Parasite: *Coelioxys banksi* Cwfd., *C. funeraria* Say, *C. modesta* Sm., *C. moesta* Cress., *C. porterae* Ckll., *Dibrachys maculipennis Szelenyi, Leucospis affinis* Say, *Melittobia chalybii* Ashm., *Pteromalus venustus* Walker. Pollen: Apparently polylectic, visits flowers of *Amorpha, Apocynum, Aster punicus, A. umbellatus, Baptisia, Besseya plantagineae, Brassica, Chamaenerion angustifolium, Chrysanthemum leucanthemum, Epilobium, Erigeron coulteri, Frasera, Geranium, Gilia, Houstonia, Iris, Melilotus, Mertensia, Phacelia, Physalis, Prenanthes, Ranunculus, Rhodora, Rosa, Rubus, Rudbeckia hirta, Senecio subnudus, Solidago, Trifolium, Valeriana.*

Megachile relativa Cresson, 1878. Amer. Ent. Soc., Trans. 7: 126. ♀.

Megachile (Xanthosarus) exclamans Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 743. ♀.

Megachile aspera Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 158. ♀.

Biology: Medler and Koerber, 1958. Ent. Soc. Amer., Ann. 51: 337-344, 3 figs. (life history, parasite). —Koerber and Medler, 1958. Wis. Acad. Sci., Arts and Letters 47: 56 (life history, parasite).

Genus MEGACHILE Subgenus EUTRICHARAEA Thomson

Megachile subg. *Eutricharaea* Thomson, 1872. Hym. Scand., v. 2, p. 228.
Type-species: *Apis argentata* Fabricius. Monotypic.
Megachile subg. *Paramegachile* Friese, 1898. Termesz. Fus. 21: 198.
Type-species: *Apis argentata* Fabricius. Desig. by Mitchell, 1934.
Megachile subg. *Paramegalochila* Schulz, 1906. Spolia Hym., p. 71. Emend.
Androgynella Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 7: 313.
Type-species: *Megachile detersa* Cockerell. Monotypic and orig. desig.
Megachile subg. *Neoeutricharaea* Rebmann, 1967. Ent. Ztschr. (N. S.) 17: 36.
Type-species: *Megachile rotundata* (F.). Orig. desig. (name of type-species placed originally in quotation marks).

Taxonomy: Rebmann, 1967. Ent. Ztschr. (n. s.) 77: 33-38. —Hurd, 1967. Ent. Medd. 35: 3-10. —Rebmann, 1967. Deut. Ent. Ztschr. (n. s.) 15: 21-48. —Rebmann, 1967. Ent. Ztschr. 77: 169-171.

Biology: Parker, Torchio, Nye and Pedersen, 1976. Jour. Apicult. Res. 15: 89-92 (field-cage studies).

apicalis Spinola. Canada, N. J., Va. Presumably introduced from Europe. Pollen: Unknown, but visits flowers of *Centaurea cyanus*.
Megachile apicalis Spinola, 1808. Insectorum Liguriae, v. 2, p. 259. ♀.
Megachile mixta Costa, 1863. Accad. delle Sci. Fis. e Mat. Napoli, Atti 1 (2): 44. ♀.
Megachile dimidiati-ventris Dours, 1873. Rev. Mag. Zool. (3) 1: 300. ♀.
Megachile virginiana Mitchell, 1926. Amer. Ent. Soc., Trans. 52: 113. ♀.

concinna Smith. Holarctic; Pa. and Ohio south to Fla. and Ala., Kans., Okla., Ariz., Nev., Calif., Utah, Wash.; Mexico. Ecology: Nests in borings in wood. Presumably introduced from West Indies after World War II and was probably introduced from Africa into the West Indies during the early part of the nineteenth century. Parasite: *Anthrax cintalapa* Cole, *Coelioxys moesta* Cress., *Nemognatha lurida* LeC., *Tetrastichus megachilidis* Burks. Pollen: Polylectic, visits a variety of native and introduced flowers including *Acacia, Asclepias, Aster, Baccharis, Bidens, Centromadia pungens, Citrus, Croton californicus, Euphorbia albomarginata, Heliotropium curassavicum, Hemizonia pungens, Ipamoea, Lepidium, Lippia, Lotus purshianus, Medicago sativa, Melilotus alba, M. indica, Onobrychis vicaefolia, Polygonum aubertii, Prosopis, Raphanus sativus, Senecio, Sicyos, Tamarix, Trifolium repens, Vernonia, Wislizenia refracta.* Predator: *Trogoderma* sp.
Megachile concinna Smith, 1879. Descr. n. spp. Hym., p. 79. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 121-122, fig. 39 (redescription, other possible synonyms).

Biology: Butler and Wargo, 1963. Pan-Pacific Ent. 39: 201-206, 1 fig. (life history, nest architecture, parasite, predator). —Butler and Ritchie, 1965. Pan-Pacific Ent. 41: 153-157 (life history, pollination). —Krombein, 1967. Trap-nesting wasps and bees, pp. 326-327 (life history, nest architecture, predator).

pacifica (Panzer). Holarctic; Mass. to Va., west to B. C., Wash., Oreg. and Calif. Ecology: Nests in borings in wood as well as in a wide variety of native and artificial burrows. Presumably introduced some time during or just after World War II; also adventive in S. Amer. (Chile and Argentina). Parasite: *Coelioxys funeraria* Sm., *C. gilensis* Ckll., *C. moesta* Cress., *C. novomexicana* Ckll., *C. octodentata* Say, *C. sodalis* Cress., *Dibrachys maculipennis* Szelenyi, *Melittobia acasta* Walker, *M. hawaiiensis* Perkins, *Monodontomerus montivagus* Ashm., *M. obscurus* Westw., *Sapyga pumila* Cress., *Tetrastichus albipes* Crosby. Pollen: Polylectic, visits a wide variety of both native and introduced flowers and is an exceptionally valuable pollinator of alfalfa; visitation records include *Asclepias, Centromadia pungens, Cichorium intybus, Cosmos,*

Euphorbia albomarginata, Heliotropium curassavicum var. *oculatum, Lotus corniculatus, Medicago sativa, Melilotus alba, Phacelia ramosissima, Polygonum aubertii, Senecio douglasii, Solidago, Veronica.* The name adopted by the International Bee Research Association for this species is *Megachile pacifica* (Panzer); however, an application pending before the International Commission on Zoological Nomenclature requests that the Commission use its plenary powers to set aside all type selections for *Apis rotundata* Fabricius, 1793, and to rule that the species is to be interpreted by reference to a newly established neotype specimen. Thus, if the Commission rules affirmatively on this application, the correct name for this species will be *Megachile rotundata* (Fabricius) which is currently considered to be a synonym of *Megachile centuncularis* (Linnaeus) and is so treated in this catalog.

Apis pacifica Panzer, 1798. Faunae Ins. German., v. 55, p. 16. ♀.

Megachile imbecilla Gerstaecker, 1869. Stettin. Ent. Ztg. 30: 359. ♀.

Taxonomy: Krombein, 1948. Ent. Soc. Wash., Proc. 50: 14 (as *rotundata*). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 122-124, figs. 38-39 (redescription, possible identity, as *rotundata?*). —Hurd, 1967. Ent. Medd. 35: 3-10 (tax. status of *rotundata* Fabr.). —Rebmann, 1967. Ent. Ztschr. 77: 169-171 (tax. status of *rotundata* Fabr. and *pacifica* Panz.). —Holm and Skou, 1972. Ent. Scand. 3: 169-170 (review of tax. status of *rotundata* Fabr. and *pacifica* Panz.). —Roberts, 1974. Zool. Nomencl., Bul. 30: 190-192 (proposed suppression of lectotype and designation of neotype in accord with *Megachile rotundata auct.*). —Anonymous, 1975. Bee World 56: 164 (identity problems, adoption by International Bee Research Association of *Megachile pacifica* (Panzer) as correct name for this species).

Biology: Daly, 1952. Ent. News 63: 210-211 (geogr. and floral records in midwest. U. S.). —Hurd, 1954. Ent. News 65: 93-95 (geogr. and floral records in Calif.). —Stephen and Torchio, 1961. Pan-Pacific Ent. 37: 85-93 (nest sites, emergence, cells, adult behavior, leaf-cuttings, larval development, historical notes). —Stephen, 1961. Econ. Ent., Jour. 54: 989-993 (artificial nest sites and propagation for alfalfa pollination). —Bohart, 1962. Utah Agr. Expt. Sta., Circ. 144: 1. (management for alfalfa pollination). —Stephen, 1962. Oreg. Agr. Expt. Sta., Bul. 586, 16 pp., 9 figs. (propagation for alfalfa seed production). —Johansen, Jaycox and Hutt, 1963. Wash. Agr. Expt. Sta., Circ. 418:1. (effect of pesticides). —Torchio, 1963. Utah Farm Home Sci. 24: 70-71 (parasite). —Nye and Bohart, 1964. Utah State Univ. Agr. Expt. Sta., Circ. 145: 1-7, 6 figs. (equipment for making nesting holes). —Stephen, 1965. XII. Int. Congr. Ent. London, Proc. p. 350 (circadian rhythms). —Stephen and Osgood, 1965. Econ. Ent., Jour. 58: 284-286, 1 table (induction of emergence). —Bacon, Barton, MacSwain, Marble and Stanger, 1965. Calif. Univ. Agr. Ext. Serv., AXT 160: 1-13 (management for alfalfa pollination). —Hobbs, 1965. Canada Dept. Agr., Pub. 1209: 1-11, 5 figs. (importation and management for alfalfa pollination). —Stephen and Osgood, 1965. Econ. Ent. Jour. 58: 965-968 (effect of tunnel size on sex ratio). —Johansen and Eves, 1966. Wash. State Univ. Agr. Expt. Sta., Circ. 469: 1-12 (parasites and nest destroyers). —Hobbs, 1967. Canada Dept. Agr., Pub. 1313: 1-19 (domestication). —Krombein, 1967. Trap-nesting wasps and bees, pp. 327-329 (life history, nest architecture). —Bohart and Knowlton, 1967. Utah. Ext. Serv., EL 104 (rev): 1-7, 1 pl. (management for higher alfalfa seed yields). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 29-30 (life history, parasites). —Waters, 1968. Idaho Agr. Expt. Sta., Current Information Series 97: 1-4 (beetle excluder trap). —Williams, 1968. Idaho Coll. Forestry, Wildlife and Range Sci., Station Note 10: 1-4 (nesting boards). —Hobbs, 1968. Canad. Ent. 100: 781-784 (control of insect enemies). —Johansen and Eves, 1969. Wash. Agr. Ext. Series, EM 2631 (rev.): 1-10 (control of natural enemies). —Klostermeyer and Gerber, 1969. Ent. Soc. Amer., Ann. 62: 1321-1325 (nesting behavior monitored by an event recorder). —Eves, 1970. Melanderia 4: 1-18, 7 figs., 11 tables (parasite). —Torchio, 1970. Ark. Agr. Ext. Serv., Mis. Publ. 127: 84-90 (parasite). —Johansen and Eves, 1971. Wash. Agr. Ext. Serv., EM 2631 (rev.): 1-10 (control of natural enemies). —Waters, 1971. Idaho Univ. Agr. Expt. Sta., Current Information Ser. 163: 1-4 (insect enemies and their control). —Hobbs and Krunic, 1971. Canad. Ent. 103: 674-685 (parasites). —Holm and Skou, 1972. Ent. Scand. 3: 169-180, 6 figs., 8 tables (life history, nest architecture, sex ratio). —Torchio, 1972. Melanderia 10: 1-22, 55 figs., 1 table (*Sapyga pumila* Cress., a parasite). —Torchio,

1972. Melanderia 10: 23-30, 7 figs. (control of *Sapyga pumila* Cress.). —Telford, Johansen and Eves, 1972. Mededel. Fakult. Landbouwwetensch. Gent 37: 776-783 (management practices and insecticide poisoning). —Szabo and Smith, 1972. Apiculture Res., Jour. 11: 157-165 (influence of light and temperature on adult activity). —Hobbs, 1972. Bee World 53: 167-173 (beekeeping with alfalfa leafcutter bees in Canada). —Thorp and Briggs, 1972. Environ. Ent. 1: 399-401 (mortality of immatures in relation to alfalfa saponins). —Klostermeyer, Mech and Rasmussen, 1973. Kans. Ent. Soc., Jour. 46: 536-548 (sex and weight of progeny with provision weights). —Santis, 1973. Cienc. e Abejas 2: 15-19 (parasites). —Hobbs, 1973. Canada Dept. Agr., Publ. 1495: 1-30 (use in alfalfa pollination). —Torchio, 1974. Utah State Univ. Agr. Expt. Sta., UMC 48, Res. Rept. 16: 1-13, 18 figs. (biology and control of *Sapyga pumila* Cress., a parasite). —Parker and Pedersen, 1975. Environ. Ent. 4: 103-104 (effect of alfalfa saponins on larval mortality). —Tasei, 1975. Apidologie 6: 1-57 (adaptation of N. Amer. population introduced into France). —Davis, Johansen, and Eves, 1975. Apiculture Research, Jour. 14: 101-104, table (synthetic attractants). —Stephen and Undurraga, 1976. Jour. Apicult. Res. 15: 81-87, 4 figs. (x-radiography, an analytical tool in population studies). —Hobbs and Richards, 1976. Canad. Ent. 108: 165-167 (selection for univoltine strain). —Batra, 1976. Kans. Ent. Soc., Jour. 49: 18-22, tables 1-2 (comparative efficiency in alfalfa pollination).

Morphology: Gerber and Akre, 1969. Melanderia 1: 1-36 (external). —Wachmann, Richter and Schricker, 1973. Ztschr. f. Morph. Tiere 76: 109-128 (fine structure of compound eye).

Genus MEGACHILE Subgenus DELOMEGACHILE Viereck

Megachile subg. *Delomegachile* Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 745.

Type-species: *Megachile frigida* Smith. Monotypic. (=*Megachile vidua* Smith).

addenda Cresson. Que., Ont. and N. H. to Fla., west to Mich., Kans., Tex., and Calif. Pollen: Apparently polylectic, visits flowers of *Amorpha canescens, Asclepias, Baptisia tinctoria, Coreopsis, Dianthera, Encelia californica, Gillenia, Hieracium, Hypericum, Oenothera, Opuntia vulgaris, Penstemon, Polycodium, Psoralea floribunda, Rosa, Rubus, Tephrosia virginiana, Vaccinium.*

Megachile addenda Cresson, 1878. Amer. Ent. Soc., Trans. 7: 124. ♀, ♂.
Megachile manumuskin Viereck, 1902. Canad. Ent. 34: 328. ♀, ♂.

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc. 3: 160-162 (nest).

frigida appalachensis Mitchell. N. Y. to Ga. in the Appalachian Mts. Pollen: Unknown, but visits flowers of *Apocynum, Baptisia, Coreopsis, Galax, Koellia, Penstemon, Pycnanthemum, Rhododendron catawabiense, Vernonia glauca.*

Megachile (Delomegachile) vidua var. *appalachensis* Mitchell, 1935. Amer. Ent. Soc., Trans. 61: 205. ♀, ♂.

frigida frigida Smith. Alaska and Canada, south to Pa., Mich., and Nebr. and in the mts. to N. Mex., Ariz. and cent. Calif. Ecology: Nesting in decaying poplar and also in borings in wood. Parasite: *Coelioxys funeraria* Sm., *C. moesta* Cress., *C. porterae* Ckll., *C. sodalis* Ckll. Pollen: Unknown, but visits flowers of *Apocynum, Astragalus, Campanula, Castilleia, Chamaenerion angustifolium, Epilobium, Iris, Malvastrum, Marrubium vulgare, Medicago sativa, Melilotus, Mimulus, Monarda, Penstemon, Phacelia, Polemonium, Robinia, Rosa, Symphoricarpos, Trifolium, Verbena, Vicia.*

Megachile frigida Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 193. ♂.
Megachile monardarum Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 11. ♀.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 338. —Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 337. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 133-134, figs. 43-45 (redescription).

Biology: Stephen, 1956. Pan-Pacific Ent. 32: 95-98 (life history). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 21-22 (life history, parasite).

gemula cressonii Dalla Torre. Wash., Nev., Ariz.

Megachile carbonaria Cresson, 1879. Amer. Ent. Soc., Trans. 7: 208. ♀. Preocc.
Megachile cressonii Dalla Torre, 1896. Cat. Hym., v. 10, p. 427. N. name.
Megachile vandykei Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 205. ♀.

gemula gemula Cresson. MacKenzie to N. S., south to Ga., west to Ill., Nebr., N. Mex., and Calif. north to B. C. and N. W. T., principally montane in south. part of range. Pollen: Unknown, but visits flowers of *Apocynum androsaemifolium, Asclepias speciosa, Baptisia tinctoria, Campanula rotundifolia, Chrysanthemum leucanthemum, Clematis, Coreopsis, Geranium maculata, Gerardia, Hydrangea, Philadelphus, Pycnanthemum, Rhododendron catawabiense, Rubus, Rudbeckia, Solidago lanceolata, Trifolium, Vaccinium, Vicia.*

Megachile gemula Cresson, 1878. Amer. Ent. Soc., Trans. 7: 118. ♂ (♀ misdet.).
Megachile avaria Cresson, 1878. Amer. Ent. Soc., Trans. 7: 123. ♂.
Megachile Vancouveriensis Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 424. ♂.
Megachile albula Lovell and Cockerell, 1907. Psyche 14: 18. ♂.
Megachile (Delomegachile) gemula var. *fulvogemula* Mitchell, 1936. Amer. Ent. Soc., Trans. 61: 185. ♀.

Taxonomy: Titus, 1906. Ent. Soc. Wash., Proc. 7: 151 (synonymy).

Biology: Fye, 1965. Canad. Ent. 97: 876-877, fig. 6, tables 2-4 (nest). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 22 (nest).

giliae Cockerell. Alaska, N. W. T., B. C., Alta., Colo. Pollen: Unknown, but visits flowers of *Gilia.*

Megachile giliae Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 452. ♂.

ingenua Cresson. Pa. to Fla., west to Ill. Pollen: Possibly oligolectic on *Tephrosia* including *T. virginiana*, but also visits flowers of *Lupinus* and *Vaccinium* presumably for nectar.

Megachile ingenua Cresson, 1878. Amer. Ent. Soc., Trans. 7: 122. ♂.
Megachile tephrosiana Mitchell, 1927. Psyche 34: 179. ♀.

melanophaea calogaster Cockerell. B. C. and Idaho to mts. of cent. Calif. Pollen: Apparently polylectic, visits flowers of *Astragalus, Hackelia jessicae, Haplopappus aparagoides, Horkelia fusca, Lotus oblongifolius, Lupinus lyallii lyallii, L. superbus, Mimulus moschatus, M. tillingi, Pedicularis frigida, P. groenlandica, Phyllodoce breweri, Polemonium occidentale, Streptanthus tortuosus.*

Megachile calogaster Cockerell, 1898. Acad. Nat. Sci. Phila., Proc. 50: 55. ♂, ♀.

melanophaea melanophaea Smith. MacKenzie to Newfoundland, south to Calif., Ariz., Colo., Penn. and Ga.? Parasite: *Coelioxys rufitarsis* Sm., *C. sodalis* Cress. Pollen: Apparently polylectic, visits a wide variety of flowers including *Agastache occidentalis, Apocynum, Astragalus bisulcatus, Azalea, Campanula rotundifolia, Chamaenerion angustifolium, Cypripedium reginae, Epibolium angustifolium, Helianthus, Hemilobus tenellus, Lupinus argenteus, L. rootkatensis, Medicago sativa, Mimulus, Nolina, Phacelia, Psoralea argophylla, Ranunculus, Raphanus, Rhodora, Robinia, Rosa, Rubus, Rudbeckia, Solidago, Symphoricarpos occidentalis, Sisymbrium, Taraxacum, Vicia eracea.*

Megachile melanophaea Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 191. ♀, ♂.
Megachile canadensis Friese, 1903. Ztschr. System. Hym. Dipt. 3: 248.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 336 (synonymy).

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 162-163 (life history, parasite).

melanophaea rohweri Cockerell. Colo., Utah, Ariz., N. Mex. Ecology: Uses pieces of *Symphoricarpos* leaves for nesting material. Pollen: Presumably polylectic, visits flowers of *Cirsium, Erysimum, Lupinus, Nolina, Robinia, Sisymbrium, Trifolium.*

Megachile wootoni rohweri Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 453. ♀.
Megachile pseudolatimanus Strand, 1917. Arch. f. Naturgesch. 83 (abt. A, h. 11): 65. ♂.
Megachile tuala Strand, 1917. Arch. f. Naturgesch. 83 (abt. A, h. 11): 66. ♀.

melanophaea submelanophaea Mitchell. South. Calif., mts., Maine, Mich. Pollen: Presumably polylectic, visits flowers of *Dicentra chrysantha, Lupinus.*

Megachile (Delomegachile) melanophaea var. *submelanophaea* Mitchell, 1935. Amer. Ent. Soc., Trans. 61: 197. ♀.

melanophaea wootoni Cockerell. Mont., Nebr., Colo., N. Mex. Parasite: *Coelioxys sodalis* Cress., *C. rufitarsis* Sm. Pollen: Presumably polylectic, visits flowers of *Astragalus, Medicago sativa.*
Megachile wootoni Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 1: 125. ♂.

mucida Cresson. N. J., N. C., Ga., Tex. Pollen: Unknown, but visits flowers of *Lupinus, Polycodium, Rubus, Tephrosia virginiana.*
Megachile mucida Cresson, 1878. Amer. Ent. Soc., Trans. 7: 118. ♂ (♀ misdet.).
Megachile mucida semimucida Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 26. ♀, ♂.
Megachile audax Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 161. ♂.

Genus MEGACHILE Subgenus PHAENOSARUS Mitchell

Megachile subg. *Phaenosarus* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 303, 309.
Type-species: *Megachile fortis* Cresson. Orig. desig.

agustini Cockerell. Colo., N. Mex., Utah, Ariz. Pollen: Unknown, but visits flowers of *Baileya, Helianthus, Heterotheca, Verbesina, Viguiera, Zexmenia.*
Megachile agustini Cockerell, 1905. Ent. News 16: 82. ♂.
Megachile (*Phaenosarus*) *subfortis* Mitchell, 1936. Amer. Ent. Soc., Trans. 62: 145. ♂.

fortis Cresson. Ill., Iowa, Wis., S. Dak., Nebr., Kans., La., Tex., Colo., N. Mex., Ariz. Parasite: *Coelioxys rufitarsis* Sm. Pollen: Unknown, but visits flowers of *Dicrophyllum marginatum, Helianthus peliolaris, H. subrhomboideus, Silphium integrifolium, Solidago canadensis, Vernonia fasciculata.*
Megachile fortis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 262. ♂.
Megachile emoryi Cockerell, 1904. Entomologist 37: 7. ♀.
Megachile fortis var. *vestali* Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 530. ♂.

Biology: Hicks, 1926. Colo. Univ. Studies 15: 229 (nest, parasite).

Morphology: Fischer, 1957 (1956). Canad. Ent. 88: 657-673, 9 figs. (musculature of male metasoma and genitalia).

Genus MEGACHILE Subgenus MEGACHILOIDES Mitchell

Megachiloides Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 154.
Type-species: *Megachiloides oenotherae* Mitchell. Monotypic.

The bees of this subgenus appear to be specialists of the Onagraceae, collecting pollen especially from the large flowered species of the genus *Oenothera.* Apparently the species also differ in that some excavate their own nesting burrows while at least one species appropriates preexisting tunnels of other bees.

Taxonomy: Bohart and Youssef, 1972. Royal Ent. Soc. London, Trans. 124: 18 (biol. characters).

amica Cresson. Kans., Tex. Pollen: Unknown, but visits flowers of *Anogra pallida, Monarda punctata, Opuntia, Verbesina encelioides.*
Megachile amica Cresson, 1872. Amer. Ent. Soc., Trans. 4: 265. ♂.

oenotherae (Mitchell). N. J., N. C., Okla., Tex. Ecology: Nests in preexisting burrows of *Andrena macra* Mitchell in sandy loam soil, using cut leaves for cells and caps them with cut piecies of petals from *Oenothera laciniata.* Parasite: *Coelioxys piercei* Cwfd.?. Pollen: Collects pollen from the flowers of *Oenothera laciniata,* but also visits flowers of *Ceanothus americanus, Meriolex drummondiana, Penstemon.*
Megachiloides oenotherae Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 154. ♀, ♂.

Biology: Sivik, 1954. Ent. News 65: 256 (nest, parasite).

umatillensis (Mitchell). Wash., Utah, Colo. Ecology: Excavates nesting burrows in partially stabilized sand dunes, uses *Oenothera* petals for cell walls and folds cell walls over at top to cap the cell. Parasite: *Coelioxys mesae* Ckll., *Nemognatha lutea* LeC. Pollen: Collects pollen from flowers of *Oenothera pallida.*
Megachiloides umatillensis Mitchell, 1927. Psyche 34: 118. ♂, ♀.

Biology: Bohart and Youssef, 1972. Royal Ent. Soc. London, Trans. 124: 1-19, 23 figs. (life history, foraging behavior, nest architecture, parasites).

Genus MEGACHILE Subgenus DEROTROPIS Mitchell

Megachile subg. *Derotropis* Mitchell, 1936. Amer. Ent. Soc., Trans. 62: 119, 156.
Type-species: *Megachile pascoensis* Mitchell. Orig. desig.

Taxonomy: Mitchell, 1944. Pan-Pacific Ent. 20: 142-144 (Key to spp.).

alamosana Mitchell. Oreg., Wyo., Colo.
Megachile (*Xeromegachile*) *alamosana* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 329. ♂.

anograe Cockerell. Mont., Wyo., Nebr., Colo., Kans., Tex., Oreg., Calif. Ecology: Excavates nesting burrows in sandy soil. Pollen: Collects pollen from flowers of *Opuntia* and *Oenothera albicaulis*, but visits other flowers presumably for nectar including *Anogra coronopifolia*, *Astragalus*.
Megachile anograe Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 261. ♀.

astragali Mitchell. Calif. (Mojave Desert). Pollen: Unknown, but visits flowers of *Astragalus lentiginosus* var. *fremontii*.
Megachile (*Derotropis*) *astragali* Mitchell, 1938. Pan-Pacific Ent. 14: 174. ♂, ♀.

gravita Mitchell. Wash., Oreg., Calif. Pollen: Collects pollen from flowers of *Clarkia* including *C. amoena amoena*, *C. amoena huntiana*, *C. cylindrica*, *C. dudleyana*, *C. gracilis albicaulis*, *C. purpurea quadrivulnera*, *C. rubicunda*, *C. speciosa nitens*, *C. speciosa polyantha*, *C. speciosa speciosa*, *C. unguiculata*, *C. viminea*, *C. williamsonii*, but visits other flowers for nectar including *Chaenactis glabriuscula*, *Malacothamnus densiflorus*.
Megachile (*Xeromegachile*) *gravita* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 322. ♂.
Megachile (*Xeromegachile*) *astata* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 345. ♀.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 20-23 (floral relationships).

laurita Mitchell. Wash., Oreg., Utah. Pollen: Collects pollen from flowers of *Oenothera pallida*, *O. trichocalyx*.
Megachile laurita Mitchell, 1927. Psyche 34: 115. ♀.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 41 (floral relationships).

melanderi Mitchell. Tex., Calif. (Inyo Co.).
Megachile (*Derotropis*) *melanderi* Mitchell, 1944. Pan-Pacific Ent. 20: 140. ♀.

pascoensis Mitchell. Mont., Idaho, Wash., Oreg., Calif. Parasite: Lines cells with pieces of petals cut from flowers of *Clarkia cylindrica* and *C. speciosa*. Pollen: Oligolege of *Clarkia* including *C. amoena*, *C. biloba*, *C. bottae*, *C. cylindrica*, *C. dudleyana*, *C. elegans*, *C. gracilis albicaulis*, *C. pulchella*, *C. purpurea*, *C. rhomboidea*, *C. rubicunda*, *C. speciosa*, *C. unguiculata*, *C. xantiana*, but also visits other flowers for nectar including *Chamaebatia foliolosa*, *Convolvulus villosus*, *Cordylanthus pilosus*, *Sidalcea malvaeflora*, *Trifolium*, *Wyethia angustifolia*.
Megachile (*Xeromegachile*) *bakeri* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 316. ♂. Preocc.
Megachile (*Xeromegachile*) *pascoensis* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 320. ♂.
Megachile (*Xeromegachile*) *gabrielensis* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 346. ♀.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 23-26 (floral relationships).

semilaurita Mitchell. Utah.
Megachile laurita semilaurita Mitchell, 1927. Psyche 34: 116. ♀.

subanograe Mitchell. Tex., Wyo., Utah, Nev., east. Calif. Pollen: Unknown, but visits flowers of *Sphaeralcea ambigua*.
Megachile (*Megachiloides*) *subanograe* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 344. ♀.

sublaurita Mitchell. Utah.
Megachile laurita sublaurita Mitchell, 1927. Psyche 34: 117. ♀.

xerophila Cockerell. South. Calif., deserts., Ariz. Pollen: Unknown, but visits flowers of *Baileya*, *Chaenactis stevioides*, *Encelia*, *Geraea canescens*, *Helianthus niveus*, *Larrea*

tridentata, Melilotus, Oenothera deltoides, Palafoxia linearis, Sphaeralcea ambigua, S. emoryi, S. rosacea.

Megachile xerophila Cockerell, 1933. Pan-Pacific Ent. 9: 27. ♀.

yumensis Mitchell. Ariz. (Wickenburg).

Megachile (Derotropis) yumensis Mitchell, 1944. Pan-Pacific Ent. 20: 141. ♀.

Genus MEGACHILE Subgenus XEROMEGACHILE Mitchell

Megachile subg. *Xeromegachile* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 302, 309. Type-species: *Megachile integra* Cresson. Orig. desig.

alata Mitchell. South. and east. Calif., Ariz.; Mexico (Baja California). Pollen: Unknown, but visits principally flowers of the Compositae including *Bebbia juncea, Chrysothamnus, Encelia californica, E. farinosa, Eschscholzia, Helianthus gracilentus, Prosopis, Viguiera parishii.*

Megachile (Xeromegachile) alata Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 324. ♂.

Megachile (Xeromegachile) redlandica Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 331. ♀.

boharti Mitchell. South. Calif., Ariz.; Mexico (Sonora). Pollen: Unknown, but visits flowers of *Cercidium, Prosopis.*

Megachile (Xeromegachile) boharti Mitchell, 1942. Pan-Pacific Ent. 18: 74. ♀.

bradleyi Mitchell. Utah, Nev., Calif. (Antioch).

Megachile (Xeromegachile) bradleyi Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 340. ♀.

brimleyi Mitchell. N. C., Fla. Pollen: Unknown, visits principally flowers of *Galactia*, but has also been found at flowers of *Erigeron volubilis.*

Megachile brimleyi Mitchell, 1926. Amer. Ent. Soc., Trans. 52: 114. ♂.

bruneri Mitchell. Colo., east. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Chrysothamnus.*

Megachile (Xeromegachile) bruneri Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 328. ♂.

casadae Cockerell. S. Dak., Nebr., Okla., Tex., Wyo., Colo., N. Mex., Utah, Calif., Ariz. Pollen: Unknown, but visits flowers of *Helianthus, Opuntia, Populus.*

Megachile casadae Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 1: 127. ♂.

Megachile populi Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 17. ♀.

Megachile opuntiarum Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 229. ♀.

Megachile austinensis Mitchell, 1927. Psyche 34: 105. ♀.

coloradensis Mitchell. Colo.

Megachile (Xeromegachile) coloradensis Mitchell, 1936. Amer. Ent. Soc., Trans. 62: 379. ♀.

dakotensis Mitchell. Minn., Iowa, Ill., Mont., N. Dak., S. Dak., Nebr., Tex. Pollen: Unknown, but visits flowers of *Amorpha canescens, Cleome serrulata, Helianthus, Kuhnistera candida, K. oligophylla, Petalostemon violaceus, Verbena.*

Megachile dakotensis Mitchell, 1926. Psyche 33: 164. ♂, ♀.

deflexa Cresson. N. C., Fla., Nebr., Kans., Okla., Tex. Pollen: Unknown, but visits flowers of *Bidens, Clethra, Coreopsis, Erigeron, Gaillardia amblydon, Geobanus pallidus, Petalostemon, Phaseolus, Rubus, Strophostyles.*

Megachile deflexa Cresson, 1878. Amer. Ent. Soc., Trans. 7: 125. ♂.

Megachile megagyna Cockerell, 1909. Canad. Ent. 41: 394. ♀.

Megachile indianorum Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 533. ♂.

Megachile (Xeromegachile) coreopsana Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 319. ♂.

dulciana Mitchell. South. Calif.

Megachile (Xeromegachile) dulciana Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 343. ♀.

fucata Mitchell. Colo., N. Mex., Utah, Ariz., Calif., deserts. Pollen: Possibly polylectic, is known to collect pollen from *Larrea tridentata*, but visits other flowers including *Argemone platyceros, Aster abatus, A. tortifolius, Baileya, Cercidium, Encelia frutescens, Palafoxia linearis, Prosopis, Senecio douglasii* var. *longilobus.*

Megachile (Xeromegachile) fucata Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 323. ♂.

Megachile (Xeromegachile) histrata Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 334. ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 38 (floral relationships).

hilata Mitchell. Colo., Utah, east. Calif.
Megachile (*Xeromegachile*) *hilata* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 332. ♀.

hookeri Cockerell. Colo., Utah.
Megachile hookeri Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 15: 533. ♀.

impartita Mitchell. Colo., east. Calif.
Megachile (*Xeromegachile*) *impartita* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 333. ♀.

instita Mitchell. N. Mex., Calif., Ariz.; north. Mexico. Pollen: Possibly an oligolege of the Leguminosae, visits flowers of *Acacia, Cercidium, Cirsium, Prosopis.*
Megachile (*Xeromegachile*) *instita* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 326. ♂.

integra Cresson. N. J. to Fla., west to Ill., Kans., and Tex. Pollen: Unknown, but visits flowers of *Erigeron, Galactia, Glycina, Koellia, Phaseolus, Pycnanthemum, Strophostyles umbellata.*
Megachile integra Cresson, 1878. Amer. Ent. Soc., Trans. 7: 121. ♂.
Megachile strophostylis Robertson, 1904. Canad. Ent. 36: 277. ♀.

integrella Mitchell. N. C., Fla. Pollen: Unknown, but visits flowers of *Hypericum, Oxydendrum.*
Megachile integrella Mitchell, 1926. Amer. Ent. Soc., Trans. 52: 116. ♀.

inyoensis Mitchell. Calif., Ariz. Pollen: Unknown, but visits flowers of *Encelia.*
Megachile (*Xeromegachile*) *inyoensis* Mitchell, 1942. Pan-Pacific Ent. 18: 117. ♀.

laguniana Mitchell. South. Calif.
Megachile (*Xeromegachile*) *laguniana* Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 419. ♀.

latita Mitchell. Wyo., Colo.
Megachile (*Xeromegachile*) *latita* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 335. ♀.

legalis Cresson. Colo., Nev., Ariz., Wash., Oreg., east. Calif. Pollen: Unknown, but visits flowers of *Cirsium, Encelia farinosa, Iris, Senecio.*
Megachile legalis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 209. ♂.
Megachile (*Xeromegachile*) *couleeana* Mitchell, 1938. Pan-Pacific Ent. 14: 171. ♀.

macneilli Mitchell. Calif. (Riverside Co.).
Megachile (*Xeromegachile*) *macneilli* Mitchell, 1957. Pan-Pacific Ent. 33: 24. ♂.

manifesta Cresson. Alta., Mont., N. Dak. to N. Mex., Ariz., south. Calif. Pollen: Unknown, but visits flowers of *Aster, Chrysothamnus nauseosus speciosus, Cleome, Grindelia squarrosa, G. sarothrae, Haplopappus, Helianthus, Viguiera.*
Megachile manifesta Cresson, 1878. Amer. Ent. Soc., Trans. 7: 122. ♂.
Megachile chrysothamni Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 262. ♀.

maurata Mitchell. Wyo., east. Calif., Ariz. Pollen: Unknown, but visits flowers of *Encelia, Sphaeralcea.* This is probably the male of *M.* (*Derotropis*) *subanograe* Mitchell.
Megachile (*Xeromegachile*) *maurata* Mitchell, 1936. Amer. Ent. Soc., Trans. 62: 369. ♂.

micheneri Mitchell. Colo., Calif. Pollen: Unknown, but visits flowers of *Viguiera multiflora.*
Megachile (*Xeromegachile*) *micheneri* Mitchell, 1936. Amer. Ent. Soc., Trans. 62: 373. ♂.

mojavensis Mitchell. South. and east. Calif., Ariz. Pollen: Unknown, but visits flowers of *Aster, Chaenactis, Encelia, Phacelia.*
Megachile (*Xeromegachile*) *mojavensis* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 340. ♀.

mucorosa Cockerell. Nebr., Kans., Tex., Wyo., Colo., N. Mex., Utah, Ariz. Pollen: Unknown, but visits flowers of *Eustoma issenianum, Helianthus, Monarda, Ratibida columnaris.*
Megachile mucorosa Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 265. ♂.
Megachile (*Argyropile*) *nebraskana* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 347. ♀.

nelsoni Mitchell. Colo.
Megachile (*Xeromegachile*) *nelsoni* Mitchell, 1936. Amer. Ent. Soc., Trans. 62: 381. ♀.

nevadensis Cresson. Mont. and Wyo. to N. Mex., west to Wash. and Calif., La. (Winnfield). Pollen: Apparently an oligolege of autumnal flowering Compositae, including *Chrysopsis villosa, Chrysothamnus bernardina, C. nauseosus, C. n. consimilis, C. n. mohavensis, C. n. speciosus, C. pumilis, C. viridulus, C. viscidiflorus typicus, Grindelia camporum, Haplopappus acradenius, H. bloomeri* var. *angustatus, H. linearifolius, H. vernonioides, Helianthus, Heterotheca grandiflora, Pluchea camphorata, Senecio douglasii, Solidago*

californica, S. confinis, but also visits flowers of *Cleome* and *Melilotus* presumably for nectar.

Megachile nevadensis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 209. ♀, ♂.

oslari Mitchell. Colo.

Megachile (Xeromegachile) oslari Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 330. ♀.

pagosiana Mitchell. Colo.

Megachile (Xeromegachile) pagosiana Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 333. ♀.

palmensis Mitchell. South. Calif., Ariz. Pollen: Unknown, but visits flowers of *Bebbia juncea, Cirsium, Echinocactus engelmannii, Echinocereus, Encelia farinosa, Sphaeralcea rosacea, Viguiera.*

Megachile (Xeromegachile) palmensis Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 317. ♂.

Megachile (Xeromegachile) smithi Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 337. ♀.

parksi Mitchell. Tex.

Megachile (Xeromegachile) parksi Mitchell, 1936. Amer. Ent. Soc., Trans. 62: 346. ♀.

pseudolegalis Mitchell. Calif. (Riverside Co.). Pollen: Unknown, but visits flowers of *Larrea tridentata.*

Megachile (Xeromegachile) pseudolegalis Mitchell, 1957. Pan-Pacific Ent. 33: 22. ♂.

pseudonigra Mitchell. Oreg., Calif., Ariz. Pollen: Unknown, but visits flowers of *Chaenactis glabriuscula, Cirsium, Oenothera campestris.*

Megachile pseudonigra Mitchell, 1927. Psyche 34: 112. ♀.

rubi Mitchell. N. C. to Fla. Ecology: Nests in sandy loam. Pollen: Unknown, but visits flowers of *Crataegus, Cuscuta, Ilex, Rubus, Senecio.*

Megachile rubi Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 159. ♀.

Megachile neglecta Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 160. ♂.

Biology: Sivik, 1954. Ent. News 65: 255-256 (nest).

seducta Mitchell. Calif. Pollen: Unknown, but visits flowers of *Lotus.*

Megachile (Xeromegachile) seducta Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 342. ♀.

soledadensis Cockerell. Tex., N. Mex., Ariz., south. Calif. Parasite: *Coelioxys soledadensis* Ckll. Pollen: Apparently an oligolege of Compositae, visits flowers of *Baccharis, Baileya multiradiata, Bebbia juncea, Chrysothamnus, Encelia, Haplopappus, Heterotheca, Hymenothrix, Verbesina, Viguiera.*

Megachile soledadensis Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 12. ♂, ♀.

stoddardensis Mitchell. Calif. (San Bernardino Co.)., Ariz.

Megachile (Xeromegachile) stoddardensis Mitchell, 1957. Pan-Pacific Ent. 33: 25. ♂.

subnigra angelica Mitchell. Oreg., Calif., Ariz. Pollen: Unknown, although principally visits flowers of the Compositae, records include *Amsinckia intermedia, Achillea millefolium, Aster, Baccharis viminea, Balsamorrhiza deltoides, Bebbia juncea, Chaenactis artemisiaefolia, C. fremontii, C. glabriuscula, Coreopsis lanceolata, Cryptantha intermedia, Encelia actoni, E. californica, E. farinosa, Eriogonum fasciculatum, E. confertiflorum, Erysimum, Ferrocactus acanthodes, Haplopappus cooperi, H. linearifolius, H. pinifolius, Hesperochiron californicus, Isomeris arborea, Lupinus nanus, Oenothera campestris, Salvia, Sonchus oleraceus, Swertia parryi, Viguiera laciniata.*

Megachile (Xeromegachile) angelica Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 318. ♂.

Megachile (Xeromegachile) blaisdelli Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 336. ♀.

Megachile (Xeromegachile) moschata Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 338. ♀.

subnigra subnigra Cresson. Mont., Wyo., Colo., Utah, Idaho, Nev., B. C., Wash., Oreg., Calif., restricted to high mts. in south. part of range. Pollen: Unknown, but visits flowers of *Lupinus densiflorus.*

Megachile subnigra Cresson, 1879. Amer. Ent. Soc., Trans. 7: 208. ♀, ♂.

toscata Mitchell. Colo.

Megachile (Xeromegachile) toscata Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 341. ♀.

victoriana Mitchell. Tex. (Victoria).

Megachile (Xeromegachile) victoriana Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 315. ♂.

wheeleri Mitchell. Sask., N. Dak., Colo. to B. C. and mts. of Calif. and Ariz. Pollen: Unknown, but visits flowers of *Aster foliaceus, Chaenactis glabriuscula, Chenopodium, Chrysopsis, Chrysothamnus nauseosus speciosus, Cryptantha, Encelia, Grindelia maritima, G. squarrosa, Lasthenia, Layia glandulosa, Lygodesmia juncea, Medicago sativa, Solidago, Sphaeralcea ambigua.*

Megachile wheeleri Mitchell, 1927. Psyche 34: 107. ♀.

Megachile spokanensis Mitchell, 1927. Psyche 34: 109. ♂.

wyomingensis Mitchell. Wyo.

Megachile (*Xeromegachile*) *wyomingensis* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 327. ♂.

Genus MEGACHILE Subgenus ARGYROPILE Mitchell

Megachile subg. *Argyropile* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 302, 308. Type-species: *Megachile parallela* Smith. Orig. desig.

Taxonomy: Mitchell, 1943. Pan-Pacific Ent. 19: 16 (Key to spp.).

asterae Mitchell. Utah. Pollen: Unknown, but visits flowers of *Aster.*

Megachile (*Argyropile*) *asterae* Mitchell, 1943. Pan-Pacific Ent. 19: 13. ♀.

parallela Smith. Transcont. U. S., south. Canada; Mexico. Ecology: Nests in ground, uses leaf-cuttings from *Spiraea* and *Trifolium*, but also accepts trap-nests for nesting. Pollen: Unknown, but visits a wide variety of flowers, notably of the family Compositae, including *Agoseris, Asclepias, Aster, Baccharis, Boltonia, Brassica geniculata, Calycadenia multiglandulosa, Ceanothus, Centaurea melitensis, C. solstitialis, Cephalanthus, Chrysanthemum, Chrysothamnus, Cirsium, Clarkia williamsonii, Coreopsis grandiflora, C. lanceolata, C. tinctoria, Corethrogyne, Encelia farinosa, Ericameria parishii, Erigeron pygmaeus, Eriophyllum confertiflorum, Gaillardia pulchella, Gilia, Gossypium, Grindelia camporum, Gutierrezia californica, G. sarothrae, Haplopappus squarrosus, H. vernonioides, Helenium bigelovii, Helianthus annuus, H. atrorubens, H. gracilentus, H. nuttallii, H. petiolaris, Heliopsis, Hemizonia lobbii, H. wrightii, Heterotheca grandiflora, H. subaxillaris, Hypericum, Lepachys, Lotus scoparius, Malacothrix tenuifolia, Medicago sativa, Melilotus alba, Palafoxia linearis, Phaseolus, Petalostemon, Ratibida, Rudbeckia, Senecio douglasii, silphium, Stephanomeria exigua, Verbena, Verbesina, Viguiera, Xanthocephalum, Zexmenia.*

Megachile parallela Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 191. ♂.

Megachile facunda Cresson, 1872. Amer. Ent. Soc., Trans. 4: 266. ♂. N. syn.

Megachile sexdentata Robertson, 1895. Amer. Ent. Soc., Trans. 22: 125. ♂.

Megachile verbesinae Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 264. ♀.

Megachile (*Argyropile*) *parallela* var. *rita* Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 53. ♀.

Biology: Fischer, 1951. Kans. Ent. Soc., Jour. 24: 49-50 (nest). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 26 (nest).

rossi Mitchell. Ariz. Pollen: Unknown, but visits flowers of *Aster, Bidens, Cercidium, Encelia, Verbesina, Viguiera.*

Megachile (*Argyropile*) *rossi* Mitchell, 1943. Pan-Pacific Ent. 19: 14. ♀.

sabinensis Mitchell. Ariz., Tex. Pollen: Unknown, but visits flowers of *Aster, Baileya, Eriogonum, Haplopappus, Helianthus.*

Megachile (*Argyropile*) *sabinensis* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 348. ♀.

Megachile (*Xeromegachile*) *pararubi* Mitchell, 1957. Pan-Pacific Ent. 33: 21. ♀.

subparallela Mitchell. Ariz. Ecology: Nests in ground under *Braya linea densa*, uses entire leaves of *Desmodium* for cell construction. Pollen: Unknown, but visits flowers of *Eriogonum, Haplopappus, Heterotheca.*

Megachile (*Argyropile*) *subparallela* Mitchell, 1944. Pan-Pacific Ent. 20: 132. ♂.

townsendiana Cockerell. N. C. to Fla., west to Okla., Tex., Colo., N. Mex., Ariz., and southeast. Calif., Mexico. Ecology: Nests in sandy soil. Pollen: Unknown, but visits flowers of *Actinella, Baileya pleniradiata, Chrysopis, Encelia frutescens, Geraea canescens, Helianthus debilis, Hoffmanseggia, Medicago sativa, Melanthera parviflora, Prosopis, Verbesina, Wislizenia refracta.*

Megachile townsendiana Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 1: 129. ♂.

Megachile bishoppi Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 15: 535. ♂.

tulariana Mitchell. Calif. (Lemon Cove).
Megachile (*Argyropile*) *parallela* var. *tulariana* Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 53. ♀.

Genus MEGACHILE Subgenus XANTHOSARUS Robertson

Xanthosarus Robertson, 1903. Amer. Ent. Soc., Trans. 29: 168.
Type-species: *Megachile latimanus* Say. Monotypic and orig. desig.

cochisiana Mitchell. N. Mex., Ariz., Nev., south. and east. Calif., Mexico. Ecology: Uses pieces cut from leaves of grape for nest construction. Pollen: Unknown, but visits flowers of *Cercidium*, *Lotus americanus*, *Medicago sativa*.
Megachile (*Xanthosarus*) *cochisiana* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 313. ♂.
Megachile (*Xanthosarus*) *pallidiana* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 314. ♀.

Taxonomy: Mitchell, 1942. Pan-Pacific Ent. 18: 116. ♀.

comata Cresson. Kans., Tex., Colo., N. Mex., Ariz., Calif.; Mexico. Pollen: Unknown, but visits flowers of *Asclepias*, *Gilia*, *Lotus*, *Marrubium vulgare*, *Phacelia*, *Senecio*.
Megachile comata Cresson, 1872. Amer. Ent. Soc., Trans. 4: 262. ♂.
Megachile armata Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 80. ♂.
Megachile paratexana Mitchell, 1930. Amer. Ent. Soc., Trans. 56: 226. ♀.

dentitarsus Sladen. Alta., Wash., Mont., N. Dak., S. Dak., Wyo., Nebr., Colo., Utah, N. Mex., Ariz. Ecology: Cuts pieces of grape leaves for nesting material. Pollen: Unknown, but visits flowers of *Aster*, *Cleome serrulata*, *Grindelia squarrosa*, *Gutierrezia sarothrae*, *Helianthus petiolaris*, *Medicago sativa*, *Melilotus*, *Solidago*, *Trifolium pratense*, *Verbena*.
Megachile diligens Sladen, 1918. Agr. Gaz. Canada 5: 125. ♂, ♀. Preocc.
Megachile dentitarsus Sladen, 1919. Canad. Ent. 51: 85. N. name.

Taxonomy: Sladen, 1918. Canad. Ent. 50: 303.

innupta Cockerell. Colo.
Megachile innupta Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 15: 534. ♀.

latimanus Say. Alta. to N. S., south to Ga., Kans., Wyo. and Colo. Parasite: *Coelioxys funeraria* Sm., *C. rufitarsis* Sm. Pollen: Polylectic, visits a wide variety of flowers including *Abutilon*, *Agastache*, *Althaea rosea*, *Amorpha*, *Apocynum androsaemifolium*, *Arabis*, *Asclepias*, *Aster*, *Astragalus*, *Baptisia*, *Bidens*, *Blephilia*, *Boltonia*, *Campanula petiolata*, *Carduus*, *Cassia*, *Cephalanthus*, *Chamaenerion*, *Chrysopsis*, *Cirsium*, *Cleome*, *Convolvulus*, *Coreopsis*, *Epilobium angustifolium*, *Eupatorium*, *Gaillardia*, *Gerardia*, *Grindelia*, *Helenium*, *Helianthus*, *Hieracium*, *Hydrophyllum*, *Kuhnistera*, *Lactuca*, *Lepachys*, *Lespedeza*, *Liatris*, *Malvastrum*, *Medicago sativa*, *Melilotus alba*, *Mentzelia*, *Monarda*, *Penstemon cyanthus*, *Petalostemon*, *Physostegia*, *Polemonium*, *Potentilla*, *Psoralea*, *Pycnanthemum*, *Rosa*, *Rudbeckia*, *Ruellia*, *Solidago*, *Sonchus*, *Stachys*, *Strophostyles*, *Taraxacum*, *Teucrium*, *Traumeria*, *Trifolium repens*, *Verbena*, *Verbesina*, *Vernonia*, *Vicia*.
Megachile latimanus Say, 1823. West. Quart. Rptr. 2: 81. ♂.
Megachile femorata Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 188. ♂.
Megachile acuta Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 192. ♀.
Megachile vidua Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 192. ♀.

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 162-163, figs. 4, 4a, 5 (life history, nest architecture, parasite). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 24 (nest, parasite).

Morphology: Mitchell, 1932. Elisha Mitchell Sci. Soc., Jour. 47: 52-54, pl. 4 (gynandromorph).

perihirta Cockerell. Alta. to Nebr. and Tex., west to B. C. and Calif., Mich.?; Mexico. Parasite: *Coelioxys grindeliae* Ckll., *C. octodentata* Say, *C. rufitarsis* Sm., *Dasymutilla fulvohirta* (Cress.) *Nemognatha lutea* LeC., *Physocephala fronto* (Will.). Pollen: Polylectic, visits flowers of many families, especially those of the family Compositae; visitation records include *Arnica*, *Asclepias galioides*, *Aster adscendens*, *A. canescens*, *A. foliaceus*,

Astragalus parishii, Bidens laevis, Castilleia miniata, Calendula, Centaurea solstitialis, Chrysopsis villosa, Chrysothamnus nauseosus, C. n. speciosus, C. viscidiflorus typicus, Cirsium andersonii, C. californicum, C. lanceolatum, C. tioganum, Clarkia viminea, Cleome serrulata, Coreopsis lanceolata, Cosmos bipinnatus, Dicentra chrysantha, Encelia farinosa, Epilobium angustifolium, Erigeron glaucus, Eriogonum fasciculatum, E. f. var. *polifolium, E. latifolium* var. *nudum, Eschscholzia californica, Eupatorium occidentale, Gormania obtusata, Grindelia platyphylla, G. stricta* var. *procumbens, Gutierrezia sarothrae, Haplopappus apargioides, H. vernonioides, Helenium bigelovii, Helianthus annuus, H. petiolaris, Horkelia bernardina, Lathyrus odoratus, Lotus argophyllus, L. glaber, L. oblongifolius, Lotus scoparius, Lupinus paynei, Medicago sativa, Melilotus officinalis, Microseris nutans, Mimulus tillingii, Phacelia frigida, P. ramosissima, Pluchea camphorata, Potentilla, Robinia, Rosa californica, Senecio douglasii, S. integerrimus, Solidago californica, S. confinis, S. multiradiata, S. occidentalis, Spiraea densiflora, Stephanomeria virgata, Symphoricarpos, Taraxacum officinale, Trichostema lanceolatum, T. involucratum, Verbena, Vicia, Wyethia.*

Megachile perihirta Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 1: 126. ♂.

Megachile latimanus grindeliarum Cockerell, 1904. Ent. News 15: 33. ♀.

Biology: Hicks, 1926. Colo. Univ. Studies 15: 233 (nest, parasite). —Hicks, 1936. Canad. Ent. 68: 49 (nest, parasite). —Hobbs, 1957 (1956). Canad. Ent. 88: 625-631 (life history, parasites).

Genus MEGACHILE Subgenus LEPTORACHIS Mitchell

Megachile subg. *Leptorachis* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 301, 308. Type-species: *Megachile petulans* Cresson. Orig. desig.

petulans Cresson. N. J. to Fla., west to N. Dak., Nebr., and Ariz., Mexico. Pollen: Polylectic, visits many flowers, especially Compositae, Labiatae, Leguminosae; visitation records include flowers of *Achillea, Apocynum, Asclepias, Aster, Baptisia, Bidens, Blephilia, Buddleia, Brauneria, Campanula rotundifolia, Cassia, Cephalanthus, Chamaecrista, Chrysanthemum leucanthemum, Cicuta, Cirsium, Coreopsis stellata, Crotalaria, Desmodium, Eryngium, Flaveria, Galactia, Gerardia, Grindelia, Helenium, Helianthus atrorubens, Houstonia purpurea, Hydrolea, Hypericum, Hyptis, Ilex, Koellia, Lespedeza repens, Liatris, Lobelia, Ludwigia, Lycopus, Lythrum, Melilotus alba, Nepeta, Pastinaca, Phaseolus, Polygonum, Psoralea, Pycnanthemum, Rhododendron, Rhus, Rubus, Rudbeckia, Senecio, Silphium, Solidago, Strophostyles, Tephrosia, Trifolium, Verbena, Verbesina, Vernonia glauca, Vicia.*

Megachile petulans Cresson, 1878. Amer. Ent. Soc., Trans. 7: 127. ♂.

Megachile mexicana Cresson, 1878. Amer. Ent. Soc., Trans. 7: 127. ♀, ♂.

Genus MEGACHILE Subgenus PSEUDOCENTRON Mitchell

Megachile subg. *Pseudocentron* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 303, 307. Type-species: *Megachile pruina* Smith. Orig. desig.

bidentata (Fabricius). Supposedly North American, but probably Neotropical.

Andrena bidentata Fabricius, 1775. Syst. Ent., p. 377. ♂.

morio Smith. "North America."

Megachile morio Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 189. ♀. Probably a form of *pruina*.

pruina nigropinguis Mitchell. Tex.

Megachile (*Pseudocentron*) *pruina* var. *nigropinguis* Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 68. ♀.

pruina pruina Smith. N. C., Ga., Fla., Bermuda. Pollen: Unknown, but visits flowers of *Asclepias tuberosa, Crotalaria, Croton linearis, Cuscuta, Dalbergia ecastophyllum, Gaillardia, Galactia floridana, Helianthus, Melanthera parviflora, Ocimum, Rhus, Strophostyles, Vernonia blodgettii.*

Megachile pruina Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 190. ♀.

Megachile pinguis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 125. ♂.

Megachile floridana Robertson, 1895. Amer. Ent. Soc., Trans. 22: 125. ♂.
Megachile shermani Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 163. ♂.
Megachile pruina var. *bermudensis* Mitchell, 1929. Psyche 36: 93. ♀.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 337.

sidalceae Cockerell. Tex., N. Mex., Ariz., south. Calif., Mexico. Ecology: Uses pieces of leaves cut from *Amaranthus, Boerhaavia, Fraxinus,* alfalfa, chinaberry, cotton, cottonwood, rose, and umbrella tree for nesting material. Parasite: *Coelioxys novomexicana* Ckll. Pollen: Polylectic, visits a wide variety of flowers including *Acacia, Aloysia, Asclepias, Asparagus, Baccharis, Cephalanthus, Cercidium, Cleome, Condalia, Croton californicus, Encelia, Eriogonum, Ferocactus, Franseria, Funastrum, Gutierrezia, Haplopappus, Helianthus, Hoffmanseggia, Hymenothrix, Kallstroemia grandiflora, Larrea tridentata, Lepidium, Lotus, Medicago sativa, Melilotus, Mimosa, Mortonia, Olneya tesota, Opuntia, Pectis papposa, Prosopis glandulosa* var. *glandulosa, Psilostrophe cooperi, Salix, Salsola, Sapindus, Senecio douglasii, Sidalcea malvaeflora, Tamarix, Verbesina, Wislizenia.*
Megachile sidalceae Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 158. ♂.
Megachile abducta Mitchell, 1926. Amer. Ent. Soc., Trans. 52: 111. ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 38 (floral relationships with *Larrea*).

Genus MEGACHILE Subgenus ACENTRON Mitchell

Megachile subg. *Acentron* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 303, 307.
Type-species: *Megachile albitarsis* Cresson. Orig. desig.

albitarsis Cresson. Mich., Ind., N. C., Ga., Fla., Ala., Miss., La., Tex., N. Mex., Ariz.; Mexico. Pollen: Apparently polylectic, visits flowers of *Asclepias, Aster, Bidens, Cassia, Cephalanthus, Chrysopsis, Coreopsis, Cyrilla, Eryngium, Flaveria, Gaillardia, Galactia, Helenium, Helianthus, Ilex, Ipomoea, Kallstroemia grandiflora, Lespedeza repens, Liatris, Melilotus, Phaseolus, Pycnanthemum hypsopifolia, Rhus, Rudbeckia, Solidago, Stokesia, Verbena, Xyris caroliana.*
Megachile albitarsis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 263. ♂.
Megachile optiva Cresson, 1872. Amer. Ent. Soc., Trans. 4: 268. ♀.
Megachile newelli Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 262. ♀.
Megachile kallstroemiae Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 264. ♀.

Genus MEGACHILE Subgenus MELANOSARUS Mitchell

Megachile subg. *Melanosarus* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 303, 307.
Type-species: *Megachile xylocopoides* Smith. Orig. desig.

bahamensis Mitchell. Fla.; Bahamas. Pollen: Unknown, but visits flowers of *Bidens leucantha, Flaveria, Melanthera brevifolia, Poinsettia cyathophora.*
Megachile bahamensis Mitchell, 1927. Psyche 34: 47. ♀.
Megachile (Melanosarus) floridensis Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 349. ♂, ♀.

xylocopoides Smith. Md., N. C., Ga., Fla., Ala., Miss., La., Tex. Parasite: *Coelioxys dolichos* Fox, *Leucospis affinis* Say, *Melittobia* possibly *megachilis* (Pack.), *Tetrastichus megachilidis* Burks. Pollen: Polylectic, visits flowers of *Bidens leucantha, Borrichia, Cephalanthus, Citrus limonum, Elephantopus carolinianus, Gaillardia, Helenium, Helianthus, Ilex, Itea, Mikania, Oxypolis, Phaseolus, Poinsettia cyathophora, Polygonum, Rhus, Rubus, Rudbeckia hirta, Senecio, Solidago, Trifolium, Vernonia.*
Megachile xylocopoides Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 189. ♀, ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 329-331, pl. 20, fig. 98 (life history, nest architecture, supersedure, parasites).

Genus MEGACHILE Subgenus SAYAPIS Titus

Gnathocera Provancher, 1883. Nat. Canad. 13: 232. Preocc.
Type-species: *Megachile pugnatus* Say. Monotypic. (=*Gnathocera cephalica* Provancher).

Ceratias Robertson, 1903. Amer. Ent. Soc., Trans. 29: 168. Preocc.
Type-species: *Megachile pugnatus* Say. Orig. desig.
Sayapis Titus, 1905. Ent. Soc. Wash., Proc. 7: 154. Proposed to replace *Gnathocera* Provancher and *Ceratias* Robertson.

dentipes Vachal. South. Tex. to Paraguay.
Megachile dentipes Vachal, 1909. Rev. de Ent. 28: 12. ♂.
Megachile poculifera Cockerell, 1919. U. S. Natl. Mus., Proc. 55: 217. ♂.

fidelis Cresson. Mont. and S. Dak., Nebr., N. Mex., west to Idaho, Oreg., Calif. Pollen: Polylectic, visits a wide variety of flowers, notably those of the family Compositae; visitation records include *Aster canescens, A. delectabilis, Calycadenia multiglandulosa, Ceanothus leucodermis, Chrysopsis fastigiata, C. villosa, Chrysothamnus nauseosus, C. viscidiflorus typicus, Cirsium, Cleome serrulata, Cleomella, Coreopsis lanceolata, Croton californicus, Cosmos, Daucus carota, Erigeron divergens, E. stenophyllus, Eriogonum fasciculatum* var. *polifolium, E. latifolium* var. *nudum, E. subscaposum, E. wrightii, Grindelia camporum, G. stricta* var. *procumbens, Gutierrezia californica, G. sarothrae, Haplopappus arborescens, H. bloomeri* var. *augustatus, Helenium bigelovii, H. puberulum, Helianthus gracilentus, H. petiolaris, Heliopsis, Heterotheca, Lotus scoparius, Lupinus, Marrubium vulgare, Mentha pulegium, Monarda, Phacelia, Rhamnus californica, Rudbeckia californica, Senecio douglasii, Solidago californica, S. confinis, Verbena, Viguiera.*
Megachile fidelis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 120. ♀, ♂.
Megachile fidelis var. *concinnula* Cockerell, 1899. Entomologist 32: 158. ♂.

frugalis frugalis Cresson. Pa. and N. J., to Fla., west to Calif.; Mexico. Pollen: Polylectic, visits flowers of *Croton, Erigeron, Eriogonum fasciculatum, Helianthus, Lotus, Marrubium vulgare, Opuntia, Perezia microcephala, Tephrosia virginiana.*
Megachile frugalis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 266. ♂.

frugalis pseudofrugalis Mitchell. Ariz., Calif. Pollen: Polylectic, visits a wide variety of flowers including *Acacia greggii, Asclepias erosa, Aster spinosus, Bebbia juncea, Cercidium, Chaenactis, Chilopsis linearis, Clarkia, Cirsium vulgare, Cissus, Cleome serrulata, Croton californicus, Cryptantha, Dalea emoryi, Encelia californica, E. farinosa, Eriodictyon crassifolium, Eriogonum elongatum, E. fasciculatum, E. f.* var. *polifolium, E. wrightii, Grindelia, Gutierrezia camporum, G. sarothrae, Haplopappus squarrosus, Helianthus gracilentus, Hemizonia fasciculata, Hyptis emoryi, Lotus hamatus, L. scoparius, Marrubium vulgare, Melilotus, Perezia microcephala, Penstemon, Petalonyx thurberi, Prosopis glandulosa* var. *torreyanum, P. pubescens, Salvia clevelandii, Sapindus, Senecio douglasii, Tamarix gallica, Trichostema parishii, Verbesina encelioides, Wislizenia refracta.*
Megachile (Sayapis) frugalis var. *pseudofrugalis* Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 186. ♂, ♀.

helianthi Cockerell. Colo. Pollen: Unknown, but visits flowers of *Helianthus lenticularis.*
Megachile helianthi Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 259. ♀.

inimica inimica Cresson. Fla. to Tex., Ariz.; Mexico south to Guatemala. Ecology: Nests in holes in mesquite trees and mesquite fence posts, and uses leaves of *Monisia pallida* to line their nests; also nests in trap nests which were plugged with 5mm. of firmly agglutinated sand by this species. Parasite: *Melittobia chalybii* Ashm. Pollen: Polylectic, visits flowers of *Achyranthes, Avicennia, Bidens leucantha, Borrichia frutescens, Coccoloba, Crotalaria pumila, Helenium, Heliopsis, Heterotheca, Lacinaria punctata, Melilotus, Ocimum, Salvia ballotaeflora, Sphaeralcea, Vitex negundo* var. *incisa, Ximensia encelioides.*
Megachile inimica Cresson, 1872. Amer. Ent. Soc., Trans. 4: 267. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 331-332 (life history, nest architecture, parasite).

inimica jacumbensis Mitchell. Calif.; Mexico (Baja California). Pollen: Apparently polylectic, visits flowers of *Chrysothamnus, Eriogonum fasciculatum, Haplopappus arborescens, Heterotheca grandiflora, Grindelia camporum, Senecio douglasii, Solidago.*
Megachile inimica var. *jacumbensis* Mitchell, 1927. Psyche 34: 109.

inimica sayi Cresson. Pa. to Fla., west to Idaho and Calif.; Mexico. Ecology: Nests in borings, and closing plug is 5mm. thick consisting of leaf cuttings, pebbles, and leaf pulp. Pollen: Polylectic, especially on flowers of the family Compositae (Heliantheae, Cynarieae, Eupatorieae), visits a wide variety of these and other flowers including *Arctium, Aster, Bidens, Blephilia, Brauneria, Cephalanthus, Chrysopsis mariana, Chrysothamnus nauseosus consimilis, Cleome, Coreopsis stellata, Gilia, Gutierrezia californica, Haplopappus, Helenium, Helianthus petiolaris, Heliopsis helianthoides, Heterotheca, Kallstroemia grandiflora, Lepachys, Liatris, Lythrum, Marrubium vulgare, Melilotus alba, Penstemon, Petalostemon, Pycnanthemum, Rudbeckia, Senecio, Silphium, Solidago, Strophostyles, Teucrium, Verbena, Verbesina encelioides, Vernonia fasciculata, V. glauca, Vicia, Viguiera, Zexmenia.*

Megachile sayi Cresson, 1878. Amer. Ent. Soc., Trans. 7: 119. ♂, ♀.
Megachile heterodonta Cockerell, 1900. Ann. and Mag. Hist. (7) 6: 18. ♀.
Megachile sayi paludicola Cockerell, 1911. U. S. Natl. Mus., Proc. 40: 254. ♀.
Megachile sayi var. *sancta* Cockerell, 1912. Ann. and Mag. Nat. Hist. (8) 10: 487. ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 332-334 (life history, nest architecture, supersedure). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 23-24 (life history, nest).

mellitarsis Cresson. B. C., Wash., Oreg., Calif., Nev., Colo., N. Mex., Ariz. Pollen: Apparently polylectic, visits flowers of *Aster, Chrysothamnus, Encelia, Eriogonum, Phacelia, Solidago multiradiata.*

Megachile mellitarsis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 121. ♂.
Megachile terrestris Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 1: 260. ♀. Preocc.
Megachile geophila Cockerell, 1908. Canad. Ent. 40: 460. N. name.

newberryae Cockerell. N. Mex., Ariz., Calif., Mexico, deserts. Ecology: Nests in holes in *Prosopis* and uses pieces of leaves cut from *Celtis* for cell construction. Pollen: Apparently polylectic, visits flowers of *Acacia greggii, Asclepias, Aster, Cercidium torreyanum, Encelia, Funastrum, Helenium, Larrea tridentata, Melilotus alba, Olneya tesota, Opuntia, Pittosporum, Prosopis glandulosa* var. *torreyanum, P. juliflora, P. pubescens, Senecio douglasii, Verbesina encelioides.*

Megachile newberryae Cockerell, 1900. Entomologist 33: 244. ♂.
Megachile howardi Cockerell, 1919. U. S. Natl. Mus., Proc. 55: 216. ♂ (♀ misdet.).

Biology: Butler, 1965. Ariz. Agr. Exp. Sta. Tech. Bul. 187: 14 (nest).

policaris Say. Fla., La., Nebr., Kans., Okla., Tex., Colo., N. Mex., Ariz., Calif.; Mexico. Ecology: Uses leaflets from *Eysenhardtia polystachya, Mimosa biuncifera,* and *Prosopis* for plug construction; nests in trap nests, the larvae develop amicably in a single large brood cell with no apparent cannibalism. Parasite: *Coelioxys texana* Cress., *Leucospis affinis* Say, *Melittobia chalybii* Ashm. Pollen: Polylectic, especially flowers of the Compositae (Heliantheae), but in some localities uses pollen solely from *Prosopis* for nest provision; visitation records include *Acacia, Amorpha fruticosa, Asclepias, Baccharis, Bidens, Brauneria pallida, Chrysothamnus, Condalia, Coreopsis lanceolata, Croton californicus, Encelia californica, Erigeron, Eriogonum inflatum, Gutierrezia sarothrae, Haplopappus acradenius, Helianthus, Larrea tridentata, Melilotus, Oenothera, Opuntia, Palafoxia linearis, Petalostemon, Salsola, Salvia ballotaeflora, Senecio douglasii, Silphium, Solidago, Tamarix, Verbena, Verbesina encelioides, Viguiera multiflora.*
Predator: *Pyemotes ventricosus* (Newport).

Megatchile policaris Say, 1831. Descr. New Spp. No. Amer. Ins. Found in La. by J. Barabino, p. 17. ♀.
Megachile pollicaris Say, 1837. Boston Jour. Nat. Hist. 1: 406. ♂. Emend.
Megachile grandis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 268. ♀. Preocc.
Megachile pollicaris var. *perexima* Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 12. ♂.
Megachile vallorum Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 18. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 334-337, pl. 19, figs. 92-97 (life history, nest architecture, larval food, supersedure, parasite). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 38 (floral relationships).

pugnata pomonae Cockerell. Nev., Calif., Ariz. Pollen: Presumably polylectic, visits flowers of *Arctium, Chrysothamnus, Cirsium, Dicentra chrysantha, Mimulus, Raillardella scaposa, Senecio, Solidago, Sphenosciadium capitellatum, Symphoricarpos, Taraxacum officinale, Viguiera multiflora, Wyethia mollis.*

Megachile pugnata var. *pomonae* Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 278. ♀.

pugnata pugnata Say. U. S. and south. Canada except lower Mississippi Valley, Gulf Coast, and Calif., principally at moderate to high altitudes in southern part of range. Ecology: Nests in borings in sumac twigs. Parasite: *Coelioxys alternata* Say. Pollen: Polylectic, especially flowers of Compositae (Heliantheae; Cynarieae), visits flowers of *Achillea lanulosa, Arctium minus, Asclepias, Aster, Besseya plantaginea, Blephilia, Brauneria pallida, Carduus plattinus, C. undulatus, Chrysanthemum leucanthemum, Cicuta, Cirsium californicum, Cleome, Coreopsis, Dianthera, Erigeron, Helianthus tuberosus, Lepachys, Marrubium vulgare, Melilotus, Nepeta, Phacelia, Rudbeckia hirta, R. occidentalis, Senecio, Silphium, Solidago, Taraxacum officinale, Trifolium repens, Verbena, Verbesina, Vernonia.*

Megachile pugnatus Say, 1837. Boston Jour. Nat. Hist. 1: 408. ♂, ♀.
Megachile scobiculata Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 191. ♂.
Megachile bucephala Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 193. ♀.
Megachile disparilis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 264. ♂.
Megachile lucrosa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 267. ♀.
Gnathocera cephalica Provancher, 1882. Nat. Canad. 13: 233. ♀.
Megachile temporalis Friese, 1903. Ztschr. System. Hym. Dipt. 3: 247. ♀ (♂ misdet.).

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 337.

Biology: Medler, 1964. Canad. Ent. 96: 918-921, 1 fig. (life history, nest architecture, parasite). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 27 (nest, parasites).

Nomina Nuda in Megachile

Megachile coloradensis Uhler, 1877. U. S. Geol. Geog. Survey, Bul. 3: 784.
Megachile consimilis Evans, 1896. Canad. Ent. 28: 13.

Genus CHALICODOMA Lepeletier

This genus, which is represented in North America by two subgenera, contains a number of subgenera in the Old World and one subgenus is present in South America. The bees of this genus do not use pieces of leaves or petals in the construction of their nests, but rather use resin, mud and other such materials.

Revision: Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 381-426, pls. XXVI-XXIX (Part VIII, treats Nearctic spp. of the subgenus *Chelostomoides;* addenda and index to previous parts).

Taxonomy: Mitchell, 1956. Pan-Pacific Ent. 32: 129-138 (Key to Nearctic and Neotropical spp.). —Michener, 1962. N. Y. Ent. Soc., Jour. 70: 17-29 (classification). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 181-190, figs. 59-62, table 6 (eastern U. S. spp.). —Pasteels, 1965. Mus. Royal l' Afrique Centr., Ann. Sci. Zool. 137: ix and 579 pp. (classification). —Butler, 1965. Ariz. Agr. Expt. Sta. Tech. Bul. 187: 1-19 (Ariz. spp.). —Michener, 1965. Amer. Mus. Nat. Hist., Bul. 130: 185-186 (classification). —Stephen, Bohart and Torchio, 1969. The biology and external morphology of bees, pp. 53-54 (classification).

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 337-344 (life histories, nests, associates). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 38-39, fig. 16 (*Larrea* visiting spp.).

Genus CHALICODOMA Subgenus CHALICODOMA Lepeletier

Chalicodoma Lepeletier, 1841. Hist. Nat. Ins., Hym. 2: 309.
Type-species: *Apis muraria* Fabricius. Desig. by Girard, 1879.

The typical subgenus does not occur in North America.

Genus CHALICODOMA Subgenus CHELOSTOMOIDES Robertson

Chelostomoides Robertson, 1901. Canad. Ent. 33: 231.
Type-species: *Chelostoma rugifrons* Smith. Monotypic and orig. desig. (=*Megachile rufimanus* Robertson).
Oligotropus Robertson, 1903. Amer. Ent. Soc., Trans. 29: 168.
Type-species: *Oligotropus campanulae* Robertson. Monotypic and orig. desig.
Gnathodon Robertson, 1903. Amer. Ent. Soc., Trans. 29: 168. Preocc.
Type-species: *Megachile georgica* Cresson. Monotypic and orig. desig.
Sarogaster Robertson, 1918. Ent. News 29: 92. Proposed to replace *Gnathodon* Robertson.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1059, figs. 162-164 (larva.) —Mitchell, 1956. Pan-Pacific Ent. 32: 134-138 (revised key to spp.). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 30-32 (Wis. spp.).

adelphodonta (Cockerell). Ariz.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Allionia, Kallstroemia grandiflora.*
Megachile adelphodonta Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 548. ♂.
Megachile (*Chelostomoides*) *tucsonensis* Mitchell, 1956. Pan-Pacific Ent. 32: 133. ♀.

angelarum (Cockerell). B. C., Wash., Oreg., Calif., Nev., Ariz. Parasite: *Sapyga angustata* (Cress.). Pollen: Polylectic, visits a wide variety of flowers including *Achillea millefolium, Adenostegia villosa, Amorpha californica, Aster adscendens, A. canescens, Astragalus parishii, Brassica incana, Calycadenia multiglandulosa, Centaurea solsitialis, Cercidium torreyanum, Chamaenerion angustifolium, Chrysopsis fastigiata, C. fremontii, C. villosa, Chrysothamnus nauseosus, Clarkia unguiculata, Cirsium vulgare, Collinsia tinctoria, Cordylanthus filifolius, C. nevinii, C. pilosus, C. rigidus, Corethrogyne filaginifolia, Cryptantha ambigua, C. denticulata, C. intermedia, Dicentra chrysantha, Encelia farinosa, Eriodictyon, Eriogonum fasciculata, E. f.* var. *polifolium, E. latifolium* var. *nudum, E. subscaposum, E. wrightii, Erysimum asperum, Franseria, Geranium richardsonii, Gilia capitata, Glycyrrhiza lepidota, Grindelia camporum, G. hallii, Haplopappus arborescens, Helianthus gracilentus, Heliotropium curvassavicum, Horkelia bernardina, H. bolanderi* var. *parryi, Lathyrus, Lessingia leptoclada, Lonicera interrupta, Lotus americanus, L. argophyllus, L. crassifolius, L. davidsonii, L. glaber, L. humistratus, L. nevadensis, L. oblongifolius, L. scoparius, L. torreyi, Lupinus austromontanus, L. longipes, Marrubium vulgare, Melilotus alba, M. officinalis, Mentzelia laevicaulis, Monardella lanceolata, M. linoides, M. stricta, Penstemon bridgesii, P. grinnellii, P. palmeri, P. rothrocki, Peridendia gairdneri, Phacelia heterophylla, P. imbricata, P. ramosissima, Potentilla bernardina, P. glandulosa, ranunculus, Rhamnus californica, Rudbeckia californica, Salvia apiana, S. pachyphylla, Solidago californica, S. confinis, S. occidentalis, Stachys albens, S. pycnantha, Swertia parryi, Symphoricarpos, Trichostema laxum, T. parishii, Trifolium variegatum, Verbena californica, V. prostrata, Vitex.*
Megachile angelarum Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 70. ♀.

browni (Mitchell). Ariz., south. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Acacia greggii, Asclepias, Canotia, Dalea, Frankenia palmeri, Opuntia, Prosopis juliflora.*
Megachile (*Chelostomoides*) *browni* Mitchell, 1934. Amer. Ent. Soc., Trans. 53: 354. ♂.
Megachile (*Chelostomoides*) *felipiana* Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 405. ♀.

Taxonomy: Timberlake, 1957. Pan-Pacific Ent. 33: 132 (synonymy).

campanulae campanulae (Robertson). Que. and Mass. to Fla., west to Iowa, Wis., Minn., Nebr., Kans. and Tex. Ecology: Nests in borings. Pollen: Unknown, but visits flowers of *Asclepias, Baptisia tinctoria, Campanula americana, C. campanulae, C. rotundifolia, Desmodium canadense, Epilobium angustifolium, Galactia, Helianthus, Lobelia, Lythrum, Malva sylvestris, Melilotus, Nepeta, Oenothera, Psoralea, Pycnanthemum, Rudbeckia, Solidago, Strophostyles, Symphoricarpos, Verbena, Veronica stricta.*
Oligotropus campanulae Robertson, 1903. Amer. Ent. Soc., Trans. 29: 171. ♀, ♂.

Biology: Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 202 (nest). —Krombein, 1967. Trap-nesting wasps and bees, p. 341 (life history, nest architecture). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 31 (nest).

campanulae wilmingtoni (Mitchell). Fla. to Va., coastal. Ecology: Nests in borings. Parasite: *Coelioxys modesta* Sm. Pollen: Unknown, but visits flowers of *Galactia, Melilotus, Pontederia, Solidago, Strophostyles.*
Oligotropus wilmingtoni Mitchell, 1924. Elisha Mitchell Sci. Soc., Jour. 40: 156. ♀, ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 341-342 (life history, nest architecture, parasite).

chilopsidis (Cockerell). Tex., N. Mex., Ariz., Calif., Mexico, deserts. Parasite: *Nemognatha scutellaris* Lec. Pollen: Apparently polylectic, visits flowers of *Acacia greggii, Cercidium floridum, C. microphyllum, C. torreyanum, Chilopsis linearis, Cirsium, Dalea californica, D. spinosa, Encelia farinosa, Helianthus, Heliotropium curassavicum, Hoffmanseggia, Larrea tridentata, Marrubium vulgare, Medicago sativa, Melilotus alba, Mimosa, Olneya tesota, Prosopis glandulosa* var. *torreyanum, Sapindus, Senecio, Vauquelinia, Verbesina encelioides.*
Lithurgus oblongus Fox, 1893. Calif. Acad. Sci., Proc. (2) 4: 20. ♀. Preocc.
Megachile chilopsidis Cockerell, 1900. Ann. and Mag. Hist. (7) 6: 17. ♀.
Megachile longula Fox, 1902. Ent. News 13: 137. N. name.
Megachile pratti Cockerell, 1913. Ann. and Mag. Nat. Hist. (8) 11: 541. ♂ (♀ misdet.).

Taxonomy: Mitchell, 1956. Pan-Pacific Ent. 32: 129-130 (synonymy). —Timberlake, 1957. Pan-Pacific Ent. 33: 132 (synonymy).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 38 (floral relationships).

davidsoni (Cockerell). South. Calif., Ariz. Pollen: Possibly oligolectic on *Dicentra* including *D. chrysantha*, but visits other flowers including *Fremontia, Lupinus austromontanus, Penstemon, Senecio.*
Megachile davidsoni Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 70. ♀.
Megachile occidentalis var. *leucotricha* Cockerell, 1902. South. Calif. Acad. Sci., Bul. 1: 137. ♂.

discorhina (Cockerell). Calif., Ariz., N. Mex.; Mexico (Baja California). Parasite: *Leucospis affinis* Say. Pollen: Polylectic, visits flowers of *Acacia greggii, Baileya, Cercidium floridum, C. torreyanum, Coursetia, Dalea schottii, Encelia farinosa, Hyptis emoryi, Larrea tridentata, Lepidium, Medicago sativa, Melilotus, Prosopis glandulosa* var. *torreyanum, Senecio, Sphaeralcea ambigua.*
Megachile discorhina Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 549. ♀.

Taxonomy: Mitchell, 1956. Pan-Pacific Ent. 32: 131 (tax. status).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 38-39, fig. 16 (floral relationships).

exilis exilis (Cresson). Tex., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Baptisia tinctoria, Chilopsis, Coreopsis, Dalea, Lespedeza repens, Melilotus, Polygala, Tephrosia virginiana.*
Megachile exilis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 265. ♂.
Megachile studiosa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 269. ♀.

exilis parexilis (Mitchell). Md., Va., N. C., Ga., Fla., Ind., Ala., Miss., Ark., Tex., Ariz. Ecology: Nests in borings. Pollen: Unknown, but visits flowers of *Asclepias, Baccharis, Baptisia, Ceanothus, Chilopsis, Condalia, Crotalaria, Erigeron, Galactia, Hydrolea, Ilex, Melilotus, Mentha, Monarda, Oenothera, Phaseolus, Rhus, Tephrosia, Trifolium, Vaccinium, Vicia.*
Megachile (*Chelostomoides*) *exilis* var. *parexilis* Mitchell, 1937. Amer. Ent. Soc., Trans. 63: 393. ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 339-340 (life history, nest architecture).

georgica (Cresson). N. J. to Fla., west to Ark. and Tex. Ecology: Nests in borings. Parasite: *Coelioxys modesta* Sm., *Leucospis affinis floridana* Cress. Pollen: Unknown, but visits flowers of *Afzelia cassinoides, Amorpha, Baptisia tinctoria, Chrysopsis, Clethra alnifolia, Crotalaria, Desmodium, Erigeron, Galactia, Helenium, Hypericum, Lobelia,*

Melilotus, Penstemon, Phaseolus, Psoralea, Pycnanthemum hypsifolia, Stachys, Strophostyles, Tephrosia virginiana, Vaccinium.
Megachile georgica Cresson, 1878. Amer. Ent. Soc., Trans. 7: 123. ♀, ♂.
Megachile penicillata Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 15: 536. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 337-339 (life history, nest architecture, supersedure, parasite).

lobatifrons (Cockerell). N. Mex., Ariz., south. and east. Calif., Mexico. Pollen: Unknown, but visits flowers of *Acacia greggii, Cercidium, Dalea emoryi, Eriogonum fasciculatum, E. trichopes, Larrea tridentata, Olneya tesota, Prosopis glandulosa* var. *torreyanum, P. pubescens, Wislizenia refracta.*
Megachile lobatifrons Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 547. ♀, ♂.

manni (Mitchell). Ariz.
Megachile (*Chelostomoides*) *manni* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 355. ♀, ♂.

occidentalis (Fox). Tex., N. Mex., Ariz., south. Calif.; Mexico; deserts. Ecology: Nests in adobe and brick walls as well as in dead wood of a pepper tree and trap nests. Parasite: *Nemognatha lurida* LeC. Pollen: Unknown, but visits flowers of *Caleopsis, Cercidium torreyanum, Chilopsis linearis, Cleome, Croton californicus, Duranta plumieri, Geraea canescens, Helianthus, Hoffmanseggia densiflora, Larrea tridentata, Lotus, Marrubium vulgare, Medicago sativa, Nolina parryi, Phacelia, Phyla nodiflora, Pluchea camphorata, Prosopis, Schinus molle, Ruellia, Senecio, Tamarix gallica, Verbesina, Vernonia, Vicia cracca, Wislizenia refracta.*
Megachile occidentalis Fox, 1894. Calif. Acad. Sci., Proc. (2) 4: 117. ♂.
Megachile prosopidis Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 6: 16. ♀.
Megachile prosopidis var. *testudinis* Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 550. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 343-344 (life history, nest architecture, supersedure). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 39 (floral relationships).

odontostoma (Cockerell). N. Mex., Ariz., south. Calif., Mexico, deserts. Pollen: Unknown, but visits flowers of *Acacia greggii, Asclepias, Baileya, Cercidium floridum, Chaenactis stevioides, Encelia farinosa, Helianthus, Heliotropium, Lepidium, Medicago sativa, Melilotus, Palafoxia linearis, Prosopis glandulosa* var. *torreyanum, Senecio, Verbesina encelioides.*
Megachile odontostoma Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 27: 550. ♀.
Megachile (*Chelostomoides*) *duplexa* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 353. ♂.

Taxonomy: Mitchell, 1956. Pan-Pacific Ent. 32: 131 (synonymy).

rugifrons (Smith). N. C., Ga., Fla., Mich., Ill., Nebr., Kans., Ark., Tex. Pollen: Unknown, but visits flowers of *Apocynum, Blephilia, Coreopsis, Erigeron, Hypericum, Lobelia, Nepeta, Pontederia, Psoralea, Tephrosia, Vaccinium, Verbena, Veronicastrum virginicum.*
Chelostoma rugifrons Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 220. ♀.
Chelostomoides rugifrons Cockerell, 1904. Canad. Ent. 36: 301. ♀.
Megachile rufimanus Robertson, 1891. Amer. Ent. Soc., Trans. 18: 65. ♀, ♂.

spinotulata (Mitchell). Tex., N. Mex., Ariz., south. Calif. Parasite: *Leucospis affinis* Say. Pollen: Polyleetic, visits flowers of *Adenostegia filifolia, Allionia, Asclepias erosa, Boerhaavia spicata, Calochortus splendens, Cercidium, Chrysopsis fastigiata, Cordylanthus filifolius, C. nevinii, C. rigidus, Croton californicus, Cryptantha, Dalea californica, Eriodictyon, Eriogonum fasciculatum, E. inflatum, E. subscaposum, E. trichopes, Geranium, Helianthus, Lotus americanus, L. argophyllus, L. Hamatus, L. scoparius, Marrubium vulgare, Mentzelia laevicaulis, Phacelia ramosissima, Robinia, Senecio, Sapindus, Swertia parryi.*
Megachile (*Chelostomoides*) *spinotulata* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 357. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 39 (floral relationships).

subexilis (Cockerell). Nebr., Colo., N. Mex., Utah, Ariz., Nev., Calif. Ecology: Nests in adobe wall and also in borings. Parasite: *Coelioxys gilensis* Ckll., *Dioxys pomonae* Ckll. Pollen:

Unknown, but visits flowers of *Amorpha, Chamaebatia millefolium, Geranium, Helianthus, Lathyrus odoratus, Lotus, Marrubium vulgare, Medicago sativa, Melilotus, Monarda, Opuntia, Phacelia, Phaseolus, Psoralea tenuiflora, Salvia, Trifolium, Verbesina encelioides, Vicia.*

Megachile subexilis Cockerell, 1908. Entomologist 41: 292. ♀.

Megachile semiexilis Cockerell, 1908. Entomologist 41: 292. ♀, ♂.

Biology: Hicks, 1927. Ent. News 38: 17-21 (nest architecture, parasite). —Hurd, 1958. Calif. Univ. Pubs. Ent. 14: 273 (parasite). —Krombein, 1967. Trap-nesting wasps and bees, p. 343 (life history, nest architecture).

subspinotulata (Mitchell). Ariz.

Megachile (*Chelostomoides*) *subspinotulata* Mitchell, 1934. Amer. Ent. Soc., Trans. 59: 360. ♀.

texensis (Mitchell). Tex. (Southmost in Cameron Co.). Pollen: Unknown, but visits flowers of *Parkinsonia.*

Megachile (*Chelostomoides*) *texensis* Mitchell, 1956. Pan-Pacific Ent. 32: 132. ♀.

Genus CHALICODOMA Subgenus PSEUDOMEGACHILE Friese

Megachile subg. *Pseudomegachile* Friese, 1899. Die Bienen Europas 5: 36.
Type-species: *Megachile ericetorum* Lepeletier. Desig. by Alfken, 1933.

Megachile subg. *Archimegachile* Alfken, 1933. Konowia 12: 56.
Type-species: *Megachile flavipes* Spinola. Orig. desig.

Taxonomy: Pasteels, 1965. Mus. Royal l'Afrique Cent., An. ser. 8, Zool. 137: 377 (synonymy).

lanata (Fabricius). Fla. (Miami). Ecology: Builds clay cells in cavities. An Indian species, probably introduced into U. S. from Cuba, where it is also adventive.

Apis lanata Fabricius, 1775. Systema Ent., p. 385. ♀.

Apis purpurea Christ, 1791. Naturgesch. Insekt. Bienen, Wespen u. Ameisengeschl., p. 168, pl. 13, fig. 7.

Megachile Martindalei Fox, 1891. Amer. Ent. Soc., Trans. 18: 344. ♀, ♂.

Taxonomy: Moure, 1960. Studia Ent. 3: 108-109 (notes on type). —Pasteels, 1965. Mus. Royal l'Afrique Cent., An. ser. 8, Zool. 137: 402-404 (synonymy).

Biology: Horne, 1870. Zool. Soc. London, Trans. 7: 176-177, pl. 19, figs. 11, 11a, 11b. —Bodkin, 1918. Ent. Soc. London, Trans. p. 303.

Genus COELIOXYS Latreille

These bees are primarily cleptoparasitic in the nests of *Megachile,* but some species have been reared from the nests of *Chalicodoma* as well as other bees including *Xylocopa* in India.

Revision: Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. 129 pp., 61 figs., frontis. (subgenera of Western Hemisphere). —Baker, 1975. Kans. Univ. Sci. Bul. 50: 649-730, 49 figs., 1 table (Nearctic spp. of subg. *Boreocoelioxys, Coelioxys, Schizocoelioxys, Xerocoelioxys*).

Taxonomy: Cockerell, 1905. Psyche 12: 87. —Cockerell, 1912. Canad. Ent. 44: 168. —Crawford, 1914. Ent. Soc. Amer., Ann. 7: 148. —Sladen, 1915. Canad. Ent. 47: 205 (Ontario spp.). —Cockerell, 1921. Amer. Mus. Novitates 21: 7. —Cockerell, 1925. Pan-Pacific Ent. 1: 150. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 192-232, figs. 1, 63-66, table 7 (eastern U. S. spp.). —Baker, 1971. Kans. Ent. Soc., Jour. 44: 225-235, 40 figs; 1 table (larval development and sexual dimorphism).

Biology: Graenicher, 1927. Ent. News 38: 231-235, 273-276 (life history)

Morphology: Pasteels and Pasteels, 1971. Acad. Sci. Paris, Compt. Rend. 273: 1580-1581 (structure of tergal plates).

Genus COELIOXYS Subgenus COELIOXYS Latreille

Coelioxys Latreille, 1809. Gen. Crust. Ins., v. 4, p. 166.

Type-species: *Apis quadridentata* Linnaeus. Desig. by Latreille, 1810.
(=*Anthophora conica* Fabricius = *Apis conica* Linnaeus).

Coelioxys subg. *Paracoelioxys* Gribodo, 1884. Soc. Ent. Ital., Bol. 16: 274.
Type-species: *Coelioxys montandoni* Gribodo. Monotypic.

Paracoelioxys Radoszkowski, 1893. Soc. Ent. Rossica, Horae 27: 53. Preocc.
Type-species: *Paracoelioxys barrei* Radoszkowski. Desig. by Sandhouse, 1943.

Coelioxys subg. *Liothyrapis* Cockerell, 1911. U. S. Natl. Mus., Proc. 40: 246.
Type-species: *Coelioxys apicata* Smith. Monotypic. (=*Coelioxys decipiens* Spinola).

Coelioxys subg. *Hemicoelioxys* Pasteels, 1968. Mus. Roy. l' Afr. Centr., Ann. Sci. Zool. (8) 167: 133.
Type-species: *Coelioxys* (*Hemicoelioxys*) *gracilis* Pasteels. Monotypic and orig. desig.

hirsutissima Cockerell. Tex. to Calif.
Coelioxys hirsutissima Cockerell, 1912. Canad. Ent. 44: 168. ♂.

immaculata Cockerell. Mass. to Fla., Ind., Kans., Okla., Ark., Tex.
Coelioxys immaculata Cockerell, 1912. Canad. Ent. 44: 165. ♂.
Coelioxys sculptifrons Crawford, 1914. Ent. Soc. Amer., Ann. 7: 153. ♀.

mitchelli Baker. N. C., Fla., Kans., Nev., Calif.
Coelioxys (*Coelioxys*) *mitchelli* Baker, 1975. Kans. Univ. Sci. Bul. 50: 726, figs. 42B, 43, 46H-I. ♀, ♂.

serricauda Baker. Wash., Oreg., Calif.
Coelioxys (*Coelioxys*) *serricauda* Baker, 1975. Kans. Univ. Sci. Bul. 50: 728, figs. 45B, F, H, 46J, 49. ♀, ♂.

sodalis Cresson. Alaska and N. W. T., south to Calif., Ariz. and N. Mex. in the west and Great Lakes and New England states in the east. Host: *Megachile frigida* Sm., *M. melanophaea* Sm., *M. melanophaea wootoni* Ckll., *M. pacifica* (Panz.), *M. texana* Cress.
Coelioxys sodalis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 99. ♂.
Coelioxys ribis Cockerell, 1900. Canad. Ent. 32: 301. ♀.
Coelioxys ribis var. *kincaidii* Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 33. ♀.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 226 (searching behavior, as *quadridentata*). —Graenicher, 1927. Ent. News 38: 233, 273 (host, as *ribis*). —Graenicher, 1935. Ent. Soc. Amer., Ann. 28: 300, 304 (life history, as *ribis*). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 58 (host). —Hobbs, 1968. Canad. Ent. 100: 781 (host).

Genus COELIOXYS Subgenus BOREOCOELIOXYS Mitchell

Coelioxys subg. *Boreocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 37.
Type-species: *Coelioxys rufitarsis* Smith. Orig. desig.

banksi Crawford. Que. to N. C., west to B. C., south to N. Mex., Ariz. and Calif. Host: *Megachile relativa* Cress.
Coelioxys banksi Crawford, 1914. Ent. Soc. Amer., Ann. 7: 155. ♀.
Coelioxys angulifera Cockerell, 1916. Pomona Col. Jour Ent. Zool. 8: 61. ♀, ♂.

Biology: Medler and Koerber, 1958. Ent. Soc. Amer., Ann. 51: 343 (life history, host).

insita Cresson. Nebr. to Tex., west to Colo., N. Mex. and east. Ariz.
Coelioxys insita Cresson, 1872. Amer. Ent. Soc., Trans. 4: 273. ♀.
Coelioxys rudis Cockerell, 1934. Amer. Mus. Novitates 732: 3. ♀, ♂.

moesta Cresson. N. S. south to Va., west to N. W. T. and Alaska, south to Calif., Ariz., and N. Mex. Host: *Megachile centuncularis* (Linn.), *M. concinna* Sm., *M. frigida* Sm., *M. pacifica* (Panz.), *M. relativa* Cress., *M. texana* Cress.
Coelioxys moesta Cresson, 1864. Ent. Soc. Phila., Proc. 2: 403. ♀.
Coelioxys tristis Provancher, 1882. Nat. Canad. 13: 241. ♀.
Coelioxys maesta(!) Dalla Torre, 1896. Cat. Hym., v. 10, p. 488.
Coelioxys lutzi Cockerell, 1921. Amer. Mus. Novitates 21: 5. ♀, ♂.

Taxonomy: Bohart, 1970. Utah State Univ. 41st Faculty Honor Lecture, p. 9 (immatures).

Biology: Graenicher, 1927. Ent. News 38: 233, 274 (life history, host). —Medler and Koerber, 1958. Ent. Soc. Amer., Ann. 51: 337, 343 (life history, host). —Medler, 1959. Canad. Ent. 9: 114-115 (life history, host). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 54 (host). —Hobbs, 1968. Canad. Ent. 100: 781 (host).

novomexicana Cockerell. Tex. west to Calif. and Oreg.; Mexico (Chihuahua, Durango, Nuevo Leon and Tamaulipas). Host: *Megachile brevis* Say, *M. gentilis* Cress., *M. pacifica* (Panz.), *M. sidalceae* Ckll.

Coelioxys sayi var. *novomexicana* Cockerell, 1909. Ent. News 20: 9. ♀.

Taxonomy: Cockerell, 1921. Amer. Mus. Novitates 21: 1. ♂.

Biology: Bechtel, 1958. Pan-Pacific Ent. 34: 12-13 (host).

octodentata Say. Transcont. U. S. and south. Canada; Mexico. Host: *Megachile brevis* Say, *M. centuncularis* (Linn.), *M. mendica* Cress., *M. onobrychidis* Ckll., *M. pacifica* (Panz.), *M. perihirta* Ckll., *M. texana* Cress.

Coelioxys 8-dentata Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 353. ♂.
Coelioxys brevis Cresson, 1864. Ent. Soc. Phila., Proc. 2: 402. ♀, ♂. Preocc.
Coelioxys altilis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 219. N. name for *brevis* Cresson.
Coelioxys cressoni Dalla Torre, 1896. Cat. Hym., v. 10, p. 485. N. name for *brevis* Cresson.
Coelioxys coquilletti Crawford, 1914. Ent. Soc. Amer., Ann. 7: 157, fig. ♀.
Coelioxys megatricha Cockerell, 1916. Pomona Col. Jour. Ent. Zool. 80: 60. ♂.
Coelioxys crassula Cockerell, 1919. Canad. Ent. 51: 27. ♀.
Coelioxys mediata Cockerell, 1925. Pan-Pacific Ent. 1: 146. ♀, ♂.
Coelioxys catalinica Cockerell, 1940. South. Calif. Acad. Sci., Bul. 38: 136. ♂.
Coelioxys atlantica Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 198, fig. 65. ♀, ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1060, figs. 159-161, 165, 166 (larva). —Stephen, Bohart and Torchio, 1969. The biology and external morphology of bees, p. 29 (immatures). —Baker, 1971. Kans. Ent. Soc., Jour. 44: 225-235, figs. (immatures).

Biology: Fox, 1900. Ent. News 11: 553 (host). —Hicks, 1926. Colo. Univ., Studies 15: 227 (life history, host). —Robertson, 1926. Psyche 33: 116 (host). —Graenicher, 1935. Ent. Soc. Amer., Ann. 28: 300, 304 (host). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1737-1742, figs. 24-26 (life history, host, immature stages). —Linsley, 1958. Hilgardia 27: 582 (ecology). —Medler, 1965. Ent. Soc. Wash., Proc. 67: 113-115 (life history, host). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 55 (hosts).

porterae Cockerell. Newfoundland, south to N. C., west to B. C., south to Calif., Ariz. and N. Mex. Host: *Megachile frigida* Sm., *M. relativa* Cress.

Coelioxys porterae Cockerell, 1900. Canad. Ent. 32: 298. ♀.
Coelioxys dubitata var. *melanopoda* Viereck, 1917 (1916). Conn. State Geol. and Nat. Hist. Survey, Bul. 22: 747. ♂.
Coelioxys hypodonta Cockerell, 1925. Pan-Pacific Ent. 1: 150. ♂.

pratti Crawford. Tex. (Kerrville); Mexico and Cent. Amer.

Coelioxys pratti Crawford, 1914. Ent. Soc. Amer., Ann. 7: 159. ♀.

rufitarsis Smith. Transcont. U. S. and south. Canada; Mexico. Host: *Megachile fortis* Cress., *M. latimanus* Say, *M. melanophaea* Sm., *M. m. wootoni* Ckll., *M. montivaga* Cress., *M. perihirta* Ckll., *M. texana* Cress.

Coelioxys rufitarsus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 271. ♂.
Coelioxys dubitata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 272. ♀.
Coelioxys comstockii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 96. ♀.
Coelioxys coloradensis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 98. ♂.
Coelioxys rufitarsis rhois Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 452. ♀.
Coelioxys rufitarsis claripes Cockerell, 1925. Pan-Pacific Ent. 1: 146. ♂.

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 162-163 (host). —Graenicher, 1906. Wis. Nat. Hist. Soc., Bul. 4: 138 (life history, host). —Robertson, 1926. Psyche 33: 116 (host). —Hicks, 1926. Colo. Univ., Studies 15: 230, 233 (as *coloradensis* and *rufitarsis*). —Graenicher, 1927. Ent. News 38: 233 (life history, host). —Graenicher, 1935. Ent. Soc. Amer., Ann. 28: 300, 304 (host, as *dubitata*). —Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 57 (life history).

salinaria Cockerell. Utah. Host: *Megachile brevis* Say.
Coelioxys salinaria Cockerell, 1925. Pan-Pacific Ent. 1: 148. ♂.

sayi Robertson. N. Y. to Fla., west to Nebr., Colo. and Ariz. Host: *Megachile brevis* Say, *M. mendica* Cress.
Coelioxys sayi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 346. ♀, ♂.
Coelioxys mendacina Cockerell, 1921. Amer. Mus. Novitates 21: 3. ♀, ♂.

Biology: Krombein, 1967. Trap-nesting wasps and bees, p. 483 (host).

Genus COELIOXYS Subgenus XEROCOELIOXYS Mitchell

Coelioxys subg. *Xerocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 44.
Type-species: *Coelioxys edita* Cresson. Orig. desig.

aperta Cresson. Colo., N. Mex., Ariz.; Mexico (Jalisco).
Coelioxys aperta Cresson, 1878. Amer. Ent. Soc., Trans. 7: 95, fig. ♀.

Taxonomy: Cockerell, 1921. Amer. Mus. Novitates 21: 4. ♂.

bisoncornua Hill. Nebr., Minn., Kans.
Coelioxys bisoncornua Hill, 1936. Ent. News 47: 205. ♀, ♂.

boharti Mitchell. Fla. (Cocoa and Labelle), Tex. (College Station).
Coelioxys boharti Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 206. ♀.

edita Cresson. Fla., Ill., Mo., Ark., and Tex., west to Alta., Wash., Oreg. and Calif.; Mexico.
Coelioxys edita Cresson, 1872. Amer. Ent. Soc., Trans. 4: 272. ♂.
Coelioxys deplanata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 96. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 160-161, fig. 7 (sleep).

galactiae Mitchell. N. C., Fla., Ill.
Coelioxys galactiae Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 204, figs. 65, 66. ♀, ♂.

grindeliae Cockerell. N. Dak. to N. Mex., west to B. C., Wash., Oreg. and Calif. Host: *Megachile perihirta* Ckll.
Coelioxys grindeliae Cockerell, 1900. Canad. Ent. 32: 300. ♀, ♂.
Coelioxys grindeliae denverensis Cockerell, 1912. Canad. Ent. 44: 166. ♂.
Coelioxys lamellicauda Cockerell, 1921. Amer. Mus. Novitates 21: 6. ♂.

Biology: Hicks, 1925. Colo. Univ., Studies 15: 237 (host).

mesae Cockerell. Colo., Utah, Idaho, Oreg. and Wash. Host: *Megachile umatillensis* Mitchell.
Coelioxys mesae Cockerell, 1921. Amer. Mus. Novitates 21: 6. ♂.
Coelioxys flagrata Baker, 1972. *In* Bohart and Youssef, Royal Ent. Soc. Lond., Trans. 124: 1, 13-16, 19, figs. 2, 16-19. ♀. N. syn.

Biology: Bohart and Youssef, 1972. Royal Ent. Soc. London, Trans. 124: 1, 13-16, 19, figs. 2, 16-19 (host, life history, immature stages, as *flagrata*).

nodis Baker. Ill., Kans. and Nebr.
Coelioxys (*Xerocoelioxys*) *nodis* Baker, 1975. Kans. Univ. Sci. Bul. 50: 716. ♂.

piercei Crawford. Tex. (Cotulla).
Coelioxys piercei Crawford, 1914. Ent. Soc. Amer., Ann. 7: 152, fig. ♀.

soledadensis Cockerell. N. Mex., Ariz. Host: *Megachile soledadensis* Cockerell?
Coelioxys soledadensis cockerell, 1909. Ent. News 20: 9. ♂.

Genus COELIOXYS Subgenus SCHIZOCOELIOXYS Mitchell

Coelioxys subg. *Schizocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 50.
Type-species: *Coelioxys funeraria* Smith. Orig. desig. and monotypic.

funeraria Smith. Alaska, Yukon and B. C., east to N. S., south to Ill., Ind. Pa. and Ga. in the east, and south to Calif., Utah, and N. Mex. in the west. Host: *Megachile frigida* Sm., *M. inermis* Prov., *M. latimanus* Say, *M. pacifica* (Panz.), *M. relativa* Cress.
Coelioxys funeraria Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 272. ♂.
Coelioxys lateralis Cresson, 1864. Ent. Soc. Phila., Proc. 2: 405. ♂.

Coelioxys lucrosa Cresson, 1878. Amer. Ent. Soc., Trans. 7: 97. ♀.
Coelioxys hicksi Cockerell, 1934. Amer. Mus. Novitates 732: 3. ♀.

Biology: Graenicher, 1905. Nat. Hist. Soc. Wis., Bul. 3: 160 (host, as *lucrosa*). —Graenicher, 1927. Ent. News 38: 233 (host, life history, as *lucrosa*). —Graenicher, 1935. Ent. Soc. Amer., Ann. 28: 300, 304 (host, life history, as *lucrosa*). —Medler, 1958. Canad. Ent. 90: 326-327 (host, life history, as *lucrosa*). —Medler and Koerber, 1958. Ent. Soc. Amer., Ann. 51: 343 (host, life history, as *lucrosa*). —Hobbs, 1968. Canad. Ent. 100: 783 (host).

Genus COELIOXYS Subgenus SYNOCOELIOXYS Mitchell

Coelioxys subg. *Synocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 57.
Type-species: *Coelioxys texana* Cresson. Orig. desig.

alternata Say. Que. to N. C., west to B. C., Wash., Utah and Ariz. Host: *Megachile pugnata* Say.
Coelioxys alternata Say, 1837. Boston Jour. Nat. Hist. 1: 401. ♀, ♂.
Coelioxys texana vegana Cockerell, 1912. Canad. Ent. 41: 166. ♂.
Coelioxys cockerelli Crawford, 1915. Insecutor Inscitiae Menstruus 3: 108. ♀.
Coelioxys wisconsinensis Cockerell, 1925. Pan-Pacific Ent. 1: 145. ♀.

Biology: Medler and Lussenhop, 1968. Wis. Univ. Res. Bul. 274: 51-52 (host, life history).

apacheorum Cockerell. B. C. to Calif., east to S. Dak., Colo., and Tex.
Coelioxys apacheorum Cockerell, 1900. Canad. Ent. 32: 299. ♀.
Coelioxys fragariae Cockerell, 1912. Canad. Ent. 44: 167. ♂.
Coelioxys quercina Cockerell, 1912. Canad. Ent. 44: 167. ♂.

erysimi Cockerell. B. C., Idaho, Oreg., Calif., Nev. and Colo.
Coelioxys erysimi Cockerell, 1912. Canad. Ent. 44: 166. ♂.

hunteri Crawford. N. Y. to Fla., west to Oreg., Utah and Ariz.; Mexico. Possibly this is the female of *C. floridana* Cress.
Coelioxys hunteri Crawford, 1914. Ent. Soc. Amer., Ann. 7: 151, figs. ♀.

texana Cresson. Fla., Mo., Kans., Okla. and Tex., west to south. Calif.; Mexico and Cent. Amer. Host: *Megachile policaris* Say.
Coelioxys texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 272. ♀.
Coelioxys texana sonorensis Cockerell, 1914. Entomologist 47: 116. ♂.

Biology: Schwarz, 1896. Ent. Soc. Wash., Proc. 4: 24 (sleep). —Banks, 1902. N. Y. Ent. Soc., Jour. 10: 212 (sleep). —Robertson, 1926. Psyche 33: 177 (phenology). —Krombein, 1967. Trap-nesting wasps and bees, pp. 483-484 (host, life history).

Genus COELIOXYS Subgenus NEOCOELIOXYS Mitchell

Coelioxys subg. *Neocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 64.
Type-species: *Coelioxys assumptionis* Schrottky. Orig. desig.

menthae Cockerell. N. Mex., Ariz.; Mexico to El Salvador.
Coelioxys menthae Cockerell, 1897. Canad. Ent. 29: 120. ♂.

slossoni arenicola Crawford. N. C. to Ga., west to Tex.; Mexico to El Salvador.
Coelioxys slossoni var. *arenicola* Crawford, 1914. Ent. Soc. Amer., Ann. 7: 156. ♀, ♂.

slossoni slossoni Viereck. Fla.
Coelioxys slossoni Viereck, 1902. Canad. Ent. 34: 327. ♀, ♂.

Genus COELIOXYS Subgenus MELANOCOELIOXYS Mitchell

Coelioxys subg. *Melanocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 78.
Type-species: *Coelioxys tolteca* Cresson. Orig. desig.

dolichos Fox. N. C. to Fla. Host: *Megachile xylocopoides* Sm.
Coelioxys dolichos Fox, 1890. Ent. News 1: 107. ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 482-483 (host, life history).

Genus COELIOXYS Subgenus HAPLOCOELIOXYS Mitchell

Coelioxys subg. *Haplocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 85.
Type-species: *Coelioxys mexicana* Cresson. Orig. desig.

mexicana Cresson. N. C. to Fla., west to Tex.; Mexico.
Coelioxys mexicana Cresson, 1878. Amer. Ent. Soc., Trans. 7: 99. ♀, ♂.
Coelioxys asteris Crawford, 1914. Ent. Soc. Amer., Ann. 7: 156, fig. ♀.

Genus COELIOXYS Subgenus GLYPTOCOELIOXYS Mitchell

Coelioxys subg. *Glyptocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 92.
Type-species: *Coelioxys vidua* Smith. Orig. desig.

germana Cresson. Ill. to N. J., south to Fla.
Coelioxys germana Cresson, 1878. Amer. Ent. Soc., Trans. 7: 102. ♀.

Genus COELIOXYS Subgenus CYRTOCOELIOXYS Mitchell

Coelioxys subg. *Cyrtocoelioxys* Mitchell, 1973. N. C. State Univ., Contrib. Dept. Ent. p. 106.
Type-species: *Coelioxys costaricensis* Cockerell. Orig. desig.

angelica Cockerell. Calif.
Coelioxys angelica Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 201. ♀.

deani Cockerell. Colo., Calif.
Coelioxys deani Cockerell, 1909. Ent. News 20: 8. ♂.

floridana Cresson. Ind. to Fla., west to Tex. This is possibly the male of *C. hunteri* Cwfd.
Coelioxys floridana Cresson, 1878. Amer. Ent. Soc., Trans. 7: 98. ♂.

gilensis Cockerell. Ariz., Calif., Utah. Host: *Chalicodoma subexilis* (Ckll.).
Coelioxys gilensis Cockerell, 1896. N. Mex. Univ., Bul. 1: 62. ♂.

Biology: Hicks, 1927. Ent. News 38: 17 (host).

gonaspis Cockerell. Calif.; Mexico (Baja California).
Coelioxys gonaspis Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 560. ♀.

modesta Smith. Que. and New England States, west to Nebr., south to Fla. and Tex. Host: *Chalicodoma campanulae wilmingtoni* (Mitchell), *C. georgica* (Cress.), *Megachile centuncularis* (Linn.), *M. relativa* Cress.
Coelioxys modesta Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 271. ♀.

Biology: Graenicher, 1927. Ent. News 38: 233, 274 (host). —Fye, 1965. Canad. Ent. 97: 876 (host). —Krombein, 1967. Trap-nesting wasps and bees, pp. 484-486 (host, validity of previously published host records, life history).

obtusiventris Crawford. Fla.
Coelioxys obtusiventris Crawford, 1914. Ent. Soc. Amer., Ann. 7: 150. ♀.

scitula Cresson. Tex.
Coelioxys scitula Cresson, 1872. Amer. Ent. Soc., Trans. 4: 273. ♀, ♂.

Genus COELIOXYS Subgenus UNASSIGNED

asclepiadis Cockerell. Ariz. Possibly belongs to the subgenus *Cyrtocoelioxys*.
Coelioxys asclepiadis Cockerell, 1925. Pan-Pacific Ent. 1: 149. ♂.

Family ANTHOPHORIDAE

This is one of the very largest, if not the largest, family of bees in the world. It is present on all the continents, although it is neither as abundant nor as well developed in the Australian and Oriental regions as it is in the Holarctic, Ethiopian and Neotropical regions. The family is exceptionally well represented in the New World by numerous species and is perhaps the most diverse and largest assemblage of these bees in the world. The Anthophoridae contain three subfamilies, the Nomadinae which are cleptoparasites in the nests of pollen-collecting bees, the

Anthophorinae which are chiefly pollen-collecting species, and the Xylocopinae which are also largely pollen-collecting bees. Apart from the cleptoparasites, most anthophorids make their nests in the ground although the majority of the Xylocopinae and some others (e.g., *Clisodon*) nest in wood of various sorts. While many and perhaps most of the pollen-collecting anthophorids are clearly polylectic in their intrafloral relationships, a number of species as well as certain groups of species (e.g., Melitomini, *Peponapis*, *Xenoglossa*, etc.) have established an oligolectic relationship with the flora.

There are more than two dozen tribes of anthophorid bees and, with the exception of the Palaearctic Ammobatoidini and Ancylini, all of these tribes either contain representatives in the New World (11 tribes) or are found only here (14 tribes). Of the tribes found in the New World only the Neotropical Caenoprosopidini, Canephorulini, Eucerinodini, Osirini, Rathymini and Tetrapediini are not known to be present in America north of Mexico.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 233-512, figs. 67-127, tables 8-17 (eastern U. S. spp.).

Subfamily NOMADINAE

This is a very large, diverse and widespread group of cleptoparasitic bees being found on all the continents and many of the islands. It is especially well represented in the Holarctic, Ethiopian, and Neotropical regions. Members of this subfamily are parasitic in the nests of all families of bees, except the Megachilidae (including the Fideliinae) and the Apidae. All the species of some genera (e.g., *Epeolus*, *Neolarra* and *Triopasites*) are apparently parasitic only in the nests of certain genera of pollen-collecting bees. However, the more usual pattern is that a particular genus (e.g., *Nomada* and *Triepeolus*) has established through its component species a broad spectrum of host relationships involving several genera or families of host bees.

The subfamily contains nearly a dozen tribes and all except the Ammobatoidini, Caenoprosopidini and the Osirini are endemic to or represented in the Nearctic Region.

This subfamily occupies an anomalous position within the family Anthophoridae and perhaps would be better considered as an independent family, a status formerly accorded this group by Linsley and Michener (1939. Amer. Ent. Soc., Trans. 65: 265-305, pls. XV-XVIII). Subsequently it has generally been recognized and treated alternatively as a number of independent tribes assignable either to the subfamily Anthophorinae (e.g., Michener, 1944. Amer. Mus. Nat. Hist., Bul. 82: 270-271) or to the subfamily Nomadinae in the family Anthophoridae (e.g., Michener, 1974. The social behavior of bees, Chapter 2, fig. 2.2). The limits of several tribes are imperfectly known (e.g., Epeolini, Osirini, etc.) and therefore a thorough reevaluation of the position and classification of these cleptoparasitic bees treated here as a subfamily of the Anthophoridae is clearly indicated. Superficially at least, it appears that these bees bear the same relationship within the superfamily Apoidea as do the Sapygidae within the superfamily Scolioidea.

Revision: Linsley and Michener, 1939. Amer. Ent. Soc., Trans. 65: 265-305 (classification).

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 338-437, figs. 98-107, tables 11-13 (eastern U. S. spp.). —Rozen, 1966. Amer. Mus. Novitates 2244: 1-38, 83 figs. (larva).

Tribe BIASTINI

Included in this tribe are two genera, *Biastes* which occurs in the Palaearctic Region and *Neopasites* which is found only in the Nearctic Region.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 33-36, figs. 72-78 (larva).

Genus NEOPASITES Ashmead

Revision: Linsley, 1943. Amer. Ent. Soc., Trans. 69: 141 (as *Gnathopasites*).

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1067, figs. 180-185 (larva).

Genus NEOPASITES Subgenus NEOPASITES Ashmead

Neopasites Ashmead, 1898. Psyche 8: 284.
Type-species: *Phileremus fulviventris* Cresson. Monotypic and orig. desig.
Gnathopasites Linsley and Michener, 1939. Amer. Ent. Soc., Trans. 65: 272.
Type-species: *Phileremus fulviventris* Cresson. Orig. desig.

fulviventris (Cresson). Calif. Host: *Dufourea dentipes* Bohart?
Phileremus fulviventris Cresson, 1873. Amer. Ent. Soc., Trans. 8: 83. ♂.

sierrae (Linsley). Calif.
Gnathopasites (*Gnathopasites*) *sierrae* Linsley, 1943. Amer. Ent. Soc., Trans. 6: 144. ♀, ♂.

Genus NEOPASITES Subgenus MICROPASITES Linsley

Gnathopasites subg. *Micropasites* Linsley, 1942. Pan-Pacific Ent. 18: 130.
Type-species: *Neopasites cressoni* Crawford. Monotypic and orig. desig.

An undescribed species of this subgenus has been reared from *Dufourea* (*Halictoides*) *trochantera* Bohart.

cressoni Crawford. Calif., Ariz. Host: *Dufourea mulleri* (Ckll.).
Neopasites cressoni Crawford, 1916. Insecutor Inscitiae Menstruus 4: 136. ♂.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 33-36, figs. 72-83 (larva).

Biology: Torchio, Rozen, Bohart and Favreau, 1967. N. Y. Ent. Soc., Jour. 75: 143-145, figs. 7-9 (adult activity, oviposition, egg, host).

mojavensis (Linsley). Calif.
Gnathopasites (*Micropasites*) *mojavensis* Linsley, 1943. Amer. Ent. Soc., Trans. 69: 148. ♀.

timberlakei (Linsley). Calif.
Gnathopasites (*Micropasites*) *timberlakei* Linsley, 1943. Amer. Ent. Soc., Trans. 69: 147. ♀, ♂.

Tribe TOWNSENDIELLINI

Townsendiella is the only genus included in this tribe and, so far as known, the species are cleptoparasites in the nests of *Conanthalictus* and *Hesperapis*.

Genus TOWNSENDIELLA Crawford

Revision: Linsley, 1943. Amer. Ent. Soc., Trans. 69: 93 (included spp.).

Genus TOWNSENDIELLA Subgenus TOWNSENDIELLA Crawford

Townsendiella Crawford, 1916. Insecutor Inscitiae Menstruus 4: 138.
Type-species: *Townsendiella pulchra* Crawford. Monotypic.

pulchra Crawford. N. Mex., south. Calif.; Mexico (Baja California).
Townsendiella pulchra Crawford, 1916. Insecutor Inscitiae Menstruus 4: 138. ♀.

Genus TOWNSENDIELLA Subgenus XEROPASITES Linsley

Townsendiella subg. *Xeropasites* Linsley, 1942. Pan-Pacific Ent. 18: 130.
Type-species: *Townsendiella* (*Xeropasites*) *rufiventris* Linsley. Monotypic and orig. desig.

rufiventris Linsley. South. Calif.
Townsendiella (*Xeropasites*) *rufiventris* Linsley, 1942. Pan-Pacific Ent. 18: 130. ♀, ♂.

Genus TOWNSENDIELLA Subgenus EREMOPASITES Linsley

Townsendiella subg. *Eremopasites* Linsley, 1942. Pan-Pacific Ent. 18: 131.
Type-species: *Townsendiella californica* Michener. Monotypic and orig. desig.

californica Michener. South. Calif. Host: *Hesperapis rufipes* (Ashm.).
Townsendiella californica Michener, 1936. Ent. News 47: 181. ♀, ♂.

Tribe NEOLARRINI

This tribe contains only the Nearctic genus *Neolarra* whose species are parasitic in the nests of the andrenid genus *Perdita* and possibly also *Nomadopsis*.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 36-37, figs. 79-83 (larva).

Genus NEOLARRA Ashmead

Revision: Michener, 1939. Amer. Ent. Soc., Trans. 65: 347-362.

Genus NEOLARRA Subgenus NEOLARRA Ashmead

Neolarra Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 8.
Type-species: *Neolarra pruinosa* Ashmead. Monotypic.

abdominalis Michener. Mont.
Neolarra (*Neolarra*) *abdominalis* Michener, 1939. Amer. Ent. Soc., Trans. 65: 352. ♀, ♂.

alba Cockerell. South. Calif.
Neolarra alba Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 285. ♂.

californica Michener. South. Calif.
Neolarra (*Neolarra*) *californica* Michener, 1939. Amer. Ent. Soc., Trans. 65: 356. ♀, ♂.

congregata Crawford. Tex., N. Mex.
Neolarra congregata Crawford, 1907. N. Y. Ent. Soc., Jour. 15: 181. ♀, ♂.

helianthi Cockerell. Colo.
Neolarra congregata helianthi Cockerell, 1936. Amer. Mus. Novitates 831: 5. ♂.

linsleyi Michener. South. Calif.
Neolarra (*Neolarra*) *linsleyi* Michener, 1939. Amer. Ent. Soc., Trans. 65: 357. ♀, ♂.

pruinosa Ashmead. Alta. to Colo., N. Mex. and Calif. Host: *Perdita* (*Cockerellula*) *opuntiae* Ckll., *P.* (*Perdita*) *zebrata zebrata* Cress.
Neolarra pruinosa Ashmead, 1890. Colo. Biol. Assoc., Bul. 1: 8. ♀.
Neolarra vittata Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 285. ♂.

Taxonomy: Baker, 1896. Ent. Soc. Wash., Proc. 4: 23. ♀, ♂. —Rozen, 1966. Amer. Mus. Novitates 2244: 36-37 (larva).

Biology: Rozen, 1965. N. Y. Ent. Soc., Jour. 73: 87-88 (adult activity, host).

vandykei Michener. Calif. (Oakley).
Neolarra (*Neolarra*) *vandykei* Michener, 1939. Amer. Ent. Soc., Trans. 65: 353. ♀, ♂.

verbesinae (Cockerell). Nebr. to N. Mex.
Phileremus verbesinae Cockerell, 1895. Psyche 7 (sup.): 10. ♀, ♂.

Genus NEOLARRA Subgenus PHILEREMULUS Cockerell

Phileremulus Cockerell, 1895. Psyche 7 (sup.): 9.
Type-species: *Phileremulus vigilans* Cockerell. Monotypic and orig. desig.

cockerelli (Crawford). Tex., Tenn., Ga. Host: *Perdita* (*Alloperdita*) *obscurata* Cress.?
Phileremulus cockerelli Crawford, 1916. Insecutor Inscitiae Menstruus 4: 139. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 490 (redescription, possible parasite).

coloradensis Michener. Colo.
Neolarra (*Phileremulus*) *coloradensis* Michener, 1939. Amer. Ent. Soc., Trans. 65: 352. ♀, ♂.

mallochi (Crawford). Alta.
Phileremulus mallochi Crawford, 1912. Canad. Ent. 44: 359. ♂.

vigilans (Cockerell). N. Mex., south. Calif. Host: *Perdita* (*Perdita*) *indioensis* Timb.
Phileremulus vigilans Cockerell, 1895. Psyche 7 (sup.): 9. ♂, ♀.
Phileremulus nanus Cockerell, 1895. Psyche 7 (sup.): 9. ♀.

Tribe HOLCOPASITINI

This tribe contains only two genera, *Holcopasites* from the Nearctic Region and *Schmiedeknechtia* of the Palaearctic Region.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 30-33, figs. 66-71 (larva).

Genus HOLCOPASITES Ashmead

Insofar as known the species of this genus are cleptoparasites in the nests of pollen-collecting bees belonging to the subfamily Panurginae of the family Andrenidae. Although a definite host association has been established with the genera *Calliopsis*, *Heterosarus*, *Hypomacrotera*, *Pseudopanurgus* and *Pterosarus*, thus far none of the other genera of the formerly recognized tribe Panurgini (*Nomadopsis*, *Panurginus*, *Perdita*, *Protandrena*, etc.) which occur within the geographic range of *Holcopasites* has been implicated as a possible host.

Revision: Linsley, 1943. Amer. Ent. Soc., Trans. 69: 119 (as *Neopasites*). —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 1-41, 16 figs., 1 table (Nearctic spp., including biology).

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 30-33, figs. 66-71 (larva).

Biology: Rozen, 1965. N. Y. Ent. Soc., Jour. 73: 88-91, figs. 1-4 (life history). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 928-932. —Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 2, table 1 (host associations, summary of literature).

Genus HOLCOPASITES Subgenus TRICHOPASITES Linsley

Neopasites subg. *Trichopasites* Linsley, 1942. Pan-Pacific Ent. 18: 127.
Type-species: *Neopasites* (*Trichopasites*) *insoletus* Linsley. Monotypic and orig. desig.

Neopasites subg. *Odontopasites* Linsley, 1942. Pan-Pacific Ent. 18: 128.
Type-species: *Neopasites* (*Odontopasites*) *arizonicus* Linsley. Monotypic and orig. desig.

arizonicus (Linsley). Idaho, Utah, Colo., Ariz., N. Mex., south into Mexico (Baja California and Zacatecas). Host: *Calliopsis coloradensis* Cress., *C. pectidis* Shinn?, *Pterosarus occidus* (Timb.)?, *P. timberlakei* Ckll.?
Neopasites (*Odontopasites*) *arizonicus* Linsley, 1942. Pan-Pacific Ent. 18: 129. ♀, ♂.

insoletus (Linsley). Ariz., N. Mex. Host: *Pterosarus boylei* (Ckll.)?, *P. perlaevis* (Ckll.)?, *P. timberlakei* (Ckll.)?
Neopasites (*Trichopasites*) *insoletus* Linsley, 1942. Pan-Pacific Ent. 18: 128. ♀.

rozeni Hurd and Linsley. Ariz.; Mexico (Sinaloa and Sonora).
Holcopasites (*Trichopasites*) *rozeni* Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 10. ♀, ♂.

Genus HOLCOPASITES Subgenus HOLCOPASITES Ashmead

Holcopasites Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 82.
Type-species: *Phileremus illinoiensis* Robertson. Desig. by Crawford, 1915.

Spotted Species Group

apacheorum Hurd and Linsley. Ariz., N. Mex.
Holcopasites (*Holcopasites*) *apacheorum* Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 14. ♀.

bohartorum Hurd and Linsley. Ariz., Calif. (Blythe).
Holcopasites (*Holcopasites*) *bohartorum* Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 18, fig. 8. ♀, ♂.

calliopsidis calliopsidis (Linsley). Mont. to N. Y., south to Tenn., Tex. and Ariz.; Mexico (Zacatecas). Host: *Calliopsis andreniformis* Sm., *Pseudopanurgus* sp.?
Neopasites calliopsidis Linsley, 1943. Amer. Ent. Soc., Trans. 69: 137. ♀, ♂.
Holcopasites pseudocarinatus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 489. ♀.

Biology: Ainslie, 1937. Canad. Ent. 69: 99 (as *stevensi*). —Shinn, 1967. Kans. Univ. Sci. Bul. 46: 928-932 (life history).

calliopsidis carinatus (Linsley). South. Tex.; Mexico (Hidalgo, San Luis Potosi and Veracruz).
Neopasites carinatus Linsley, 1943. Amer. Ent. Soc., Trans. 69: 127. ♀.

heliopsis (Robertson). Alta., Mont., Colo. and Ill., south to Ark. and Kans. Host: *Calliopsis nebraskensis* Cwfd.?
Ammobates heliopsis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 350. ♂.
Holcopasites lutzi Cockerell, 1934. Amer. Mus. Novitates 697: 12. ♂.

pulchellus (Cresson). Alta., Sask. to N. Dak., south to Tex., N. Mex. and Ariz.; Mexico (Durango, Michoacan and Zacatecas). Host: *Pseudopanurgus* sp.?
Phileremus pulchellus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 84. ♀, ♂.
Neopasites robertsoni Crawford, 1906. Canad. Ent. 38: 283. ♀, ♂.
Neopasites robertsoni pubescens Linsley, 1943. Amer. Ent. Soc., Trans. 69: 131. ♂.

tegularis Hurd and Linsley. Ariz. Host: *Heterosarus nanulus* (Timb.).
Holcopasites (*Holcopasites*) *tegularis* Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 24. ♀, ♂.

Banded Species Group

bigibbosus Hurd and Linsley. Ariz. (Willcox); N. Mex. (Rodeo).
Holcopasites (*Holcopasites*) *bigibbosus* Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 28, fig. 1, 14. ♀, ♂.

cazieri Hurd and Linsley. Ariz., N. Mex.
Holcopasites (*Holcopasites*) *cazieri* Hurd and Linsley, 1972. Smithsn. Contrib. Zool. 114: 29, figs. 4, 16. ♀, ♂.

eamia (Cockerell). Tex., Okla.
Neopasites eamia Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 4: 29. ♂.
Holcopasites acanthochilus Crawford, 1915. Insecutor Inscitiae Menstruus 3: 125. ♀.
Holcopasites texanus Crawford, 1915. Insecutor Inscitiae Menstruus 3: 126. ♂.

haematurus Cockerell and Hicks. Iowa, Nebr., Kans., Colo.
Holcopasites haematurus Cockerell and Hicks, 1926. Ent. News 37: 107. ♂.

illinoiensis illinoiensis (Robertson). Ill. to Mass., south to Ga., La. and Tex. Host: *Calliopsis andreniformis* Sm.
Phileremus illinoiensis Robertson, 1891. Amer. Ent. Soc., Trans. 18: 64. ♀.
Holcopasites pratti Ashmead *In* Crawford, 1915. Insecutor Inscitiae Menstruus 3: 123. ♀.
Neopasites punctulatus Linsley, 1943. Amer. Ent. Soc., Trans. 69: 135. ♂.

illinoiensis minimus (Linsley). Ariz., N. Mex.; Mexico (Sonora). Host: *Hypomacrotera callops persimilis* Ckll., *H. callops callops* Ckll.?
Neopasites minimus Linsley, 1943. Amer. Ent. Soc., Trans. 69: 126. ♀.

stevensi Crawford. Alta., N. Dak., Nebr., Tex., N. Mex., Ariz. Host: *Calliopsis crypta* Shinn, *C. rozeni* Shinn?
Holcopasites stevensi Crawford, 1915. Insecutor Inscitiae Menstruus 3: 125. ♀, ♂.
Neopasites elegans Linsley, 1944. N. Y. Ent. Soc., Jour. 52: 277. ♀.
Neopasites knulli Linsley, 1944. N. Y. Ent. Soc., Jour. 52: 278. ♀.

Tribe AMMOBATINI

Although this tribe is represented in the Palaearctic and Ethiopian regions by several genera, only the Nearctic genus *Oreopasites* is present in the New World and its species are apparently all cleptoparasitic in the nests of the andrenid genera *Nomadopsis* and *Hypomacrotera*.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 28-30, figs. 56-60 (larvae). —Rozen, 1974. Amer. Mus. Novitates 2551: 1-16, 33 figs. (larvae, pupae).

Genus OREOPASITES Cockerell

Oreopasites Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 442.
Type-species: *Oreopasites scituli* Cockerell. Monotypic.

Revision: Linsley, 1941. Amer. Ent. Soc., Trans. 66: 307.

Taxonomy: Rozen, 1954. Pan-Pacific Ent. 30: 203-207, 6 figs. (larva). —Rozen, 1966. Amer. Mus. Novitates 2244: 28-30, figs. 56-58. —Rozen, 1974. Amer. Mus. Novitates 2551: 12-15, figs. 26-28 (larvae, pupae).

albinota Linsley. Calif.
Oreopasites albinota Linsley, 1941. Amer. Ent. Soc., Trans. 66: 313. ♀.

arizonica Linsley. Ariz.
Oreopasites arizonica Linsley, 1941. Amer. Ent. Soc., Trans. 66: 310. ♀.

euphorbiae Cockerell. South. Calif. Host: *Nomadopsis euphorbiae* (Ckll.).
Oreopasites euphorbiae Cockerell, 1929. Pan-Pacific Ent. 5: 105. ♀, ♂.

scituli Cockerell. Colo. Host: *Nomadopsis scitula* (Cress.).
Oreopasites scituli Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 442. ♀, ♂.

vanduzeei diabloensis Linsley. North. Calif. Host: *Nomadopsis* sp.
Oreopasites vanduzeei diabloensis Linsley, 1941. Amer. Ent. Soc., Trans. 66: 315. ♀, ♂.

vanduzeei melanantha Linsley. North. Calif. (Sierra Nevada). Host: *Nomadopsis anthidia* (Fowler).
Oreopasites vanduzeei melanantha Linsley, 1941. Amer. Ent. Soc., Trans. 66: 316. ♀, ♂.

vanduzeei vanduzeei Cockerell. North. Calif. (Cent. Valley). Host: *Nomadopsis equina* (Ckll.).
Oreopasites vanduzeei Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 202. ♀.

vanduzeei vernalis Linsley. South Calif. Host: *Nomadopsis* sp.
Oreopasites vanduzeei vernalis Linsley, 1941. Amer. Ent. Soc., Trans. 66: 317. ♀, ♂.

vanduzeei xerophila Linsley. Ariz., South. Calif. (deserts). Host: *Nomadopsis puellae* (Ckll.).
Oreopasites vanduzeei xerophila Linsley, 1941. Amer. Ent. Soc., Trans. 66: 318. ♀, ♂.

Tribe PROTEPEOLINI

This is a small group found only in the Americas. In addition to the genus *Protepeolus* it contains *Isepeolus* and possibly one other Neotropical genus.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 10-12, figs. 2-7 (larva).

Genus PROTEPEOLUS Linsley and Michener

Protepeolus Linsley and Michener, 1937. Pan-Pacific Ent. 13: 75.
Type-species: *Protepeolus singularis* Linsley and Michener. Monotypic and orig. desig.

integer Linsley. South Calif. to west. Tex.; Mexico (Durango and Jalisco). Host: *Diadasia ochracea* (Ckll.)?
Protepeolus integer Linsley, 1939. Pan-Pacific Ent. 15: 4. ♂.

Taxonomy: Hurd and Linsley, 1963. Kans. Ent. Soc., Jour. 36: 253-255. ♂, ♀ (possible parasite).

singularis Linsley and Michener. N. Mex. Host: *Diadasia ochracea* (Ckll.).
Protepeolus singularis Linsley and Michener, 1937. Pan-Pacific Ent. 13: 76. ♀.

Biology: Eickwort, Eickwort and Linsley, 1977. Kans. Ent. Soc., Jour. 50: 2, 9 (host, as *Diadasia olivacea*).

Tribe EPEOLOIDINI

Although there is a South American species attributed to the genus *Epeoloides*, the tribe is apparently represented only in the Holarctic Region by the genus *Epeoloides*. It is believed that the species are cleptoparasitic in the nests of the melittid genus *Macropis*.

Genus EPEOLOIDES Giraud

Epeoloides Giraud, 1863. Zool.-Bot. Gesell, Wien., Verh. 13: 45.
Type-species: *Apis coecutiens* Fabricius. Monotypic. (=*Epeoloides ambiguus* Giraud).
Viereckella Swenk, 1907. Ent. News 18: 298.
Type-species: *Viereckella obscura* Swenk. Orig. desig.

obscura (Swenk). Nebr.
Viereckella obscura Swenk, 1907. Ent. News 18: 299. ♀.

pilosula (Cresson). Canada (Cap. Rouge), New England to Ga., west to Wis. and N. Dak.
Nomada pilosula Cresson, 1878. Amer. Ent. Soc., Trans. 7: 77. ♂.
Nomia compacta Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 337. ♂.
Epeolus pilosulus Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 426. ♀.
Viereckella ceanothina Cockerell, 1907. Ent. News 18: 300. ♀.
Epeoloides nearcticus Ducke, 1909. Rev. Ent. Caen 27: 39. ♀.

Taxonomy: Crawford, 1917. Ent. Soc. Wash., Proc. 19: 167. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 491-492, figs. 115, 116 (redescription, synonymy).

Tribe EPEOLINI

The members of this tribe share many features with the Nomadini and perhaps, as has been suggested, they should be placed together in the Nomadini. With the exception of the primarily Holarctic genus *Epeolus* and a few Old World species of the predominantly New World genus *Triepeolus*, the epeoline bees are centered in the Americas and are especially well represented in the Neotropical Region by several genera. Only the genera *Epeolus* and *Triepeolus* are present in America north of Mexico, but it appears that a few of our species belong to the genus *Trophocleptria*.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 12-22, figs. 8-38 (larva).

Genus EPEOLUS Latreille

Epeolus Latreille, 1802. Hist. Nat. Fourmis, p. 427.
Type-species: *Apis variegata* Linnaeus. Monotypic. (=*Nomada variegata* Fabricius).
Pyrrhomelecta Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 66.
Type-species: *Epeolus glabratus* Cresson. Monotypic and orig. desig.
Argyroselenis Robertson, 1903. Canad. Ent. 35: 284.
Type-species: *Triepeolus minimus* Robertson. Monotypic and orig. desig.

Insofar as known, the species of this chiefly Holarctic genus are cleptoparasitic in the nests of the genus *Colletes*.

Taxonomy: Cockerell, 1928. Colo. Univ., Studies 16: 105 (key). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1072, figs. 195, 196, 198 (larva). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 438-458, figs. 108-110 (eastern U. S. spp.). —Rozen, 1966. Amer. Mus. Novitates 2244: 19-20, figs. 25-32 (larva).

ainsliei Crawford. Iowa.
Epeolus ainsliei Crawford, 1932. Ent. Soc. Wash., Proc. 34: 74. ♀.

americanus (Cresson). Canada; Colo., Calif.
Phileremus americanus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 83. ♂, ♀.

Taxonomy: Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 33. —Linsley, 1939. Pan-Pacific Ent. 15: 1.

arciferus Cockerell. Calif.
Epeolus arciferus Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 13: 319. ♀.

asperatus Cockerell. Calif.
Epeolus asperatus Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 5: 25. ♀.

Taxonomy: Cockerell, 1934. Amer. Mus. Novitates 697: 12. ♀.

australis Mitchell. N. C., Ga.
Epeolus australis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 441, fig. 110. ♀, ♂.

autumnalis Robertson. Minn. to Maine, south to N. C. Host: *Colletes compactus* Cress.?
Epeolus autumnalis Robertson, 1902. Ent. News 13: 81. ♀.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 287, 288. ♀.

banksi (Cockerell). Minn. to N. J. and N. C.
Triepeolus banksi Cockerell, 1907. Entomologist 40: 135. ♂.

barberiellus Cockerell. N. Mex.
Epeolus barberiellus Cockerell, 1907. Entomologist 40: 266. ♀.

beulahensis Cockerell. N. Mex., Colo., Iowa.
Epeolus beulahensis Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 40. ♀.

bifasciatus bifasciatus Cresson. New England to Fla., west to Minn., Colo., Tex.; Mexico (northern). Host: *Colletes latitarsis* Robertson? Another subspecies occurs in Mexico and Panama.
Epeolus bifasciatus Cresson, 1864. Ent. Soc. Phila., Proc. 3: 38. ♂.

Taxonomy: Robertson, 1903. Canad. Ent. 33: 287, 288. ♀, ♂ (key).

canadensis Mitchell. N. S., Que., N. Y., Ont., Mich., Ind.
Epeolus canadensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 444, fig. 110. ♀, ♂.

carolinus Mitchell. N. C., Fla.
Epeolus carolinus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 445, fig. 110. ♀, ♂.

compactus Cresson. Tex. to Colo., Nev., Calif.
Epeolus compactus Cresson, 1878. Amer. Ent. Soc., Trans. 7. 89. ♀, ♂.

Taxonomy: Brues, 1903. Ent. News 14: 79 (key).

crucis Cockerell. N. Mex.
Epeolus crucis Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 39. ♀.

eastwoodae Cockerell. Calif. (San Miguel Isl.).
Epeolus eastwoodae Cockerell, 1937. Pan-Pacific Ent. 13: 149. ♂.

erigeronis Mitchell. N. C., Ga., Fla.
Epeolus erigeronis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 445, fig. 110. ♀, ♂.

floridensis Mitchell. Fla.
Epeolus floridensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 446, fig. 110. ♀, ♂.

fumipennis Say. Tex., north. Mex.
Epeolus fumipennis Say, 1837. Boston Jour. Nat. Hist. 1: 403.

gabrielis Cockerell. Calif.
Epeolus gabrielis Cockerell, 1909. Ann. and Mag. Nat. Hist. (8) 5: 26. ♂.
Epeolus geminatus Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 315. ♀, ♂.

glabratus Cresson. Ga., Fla.
Epeolus glabratus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 90. ♂.

hitei Cockerell. Colo.
Epeolus hitei Cockerell, 1908. Entomologist 41: 60. ♀.

howardi Mitchell. N. C. (Southern Pines). Host: *Colletes howardi* Sw.?
Epeolus howardi Mitchell, 1962. N. C. Agr. Expt. St. Tech. Bul. 152: 447, fig. 110. ♀, ♂.

humillimus Cockerell. Wash., Oreg.
Epeolus humillimus Cockerell, 1918. Ann. and Mag. Nat. Hist. 9: 160. ♂.

ilicis Mitchell. R. I. and Mass. to Ga., Tenn.
Epeolus ilicis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 448, fig. 110. ♀, ♂.

interruptus Robertson. N. J. to Ga., west to Colo., Calif. and Tex. Host: *Colletes aestivalis* Patton?
Epeolus interruptus Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 55. ♀.

Taxonomy: Robertson, 1903. Canad. Ent. 33: 287, 288. ♀, ♂ (key).

lanhami Mitchell. Maine, Pa., Mich.
Epeolus lanhami Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 450, fig. 110. ♀, ♂.

lectiformis Cockerell. Colo.
Epeolus lectiformis Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 623. ♀.

lectoides Robertson. Ill. to New England, south to Ga.
Epeolus lectoides Robertson, 1901. Canad. Ent. 33: 231. ♀.
Epeolus semilectus Cockerell, 1907. Entomologist 40: 136. ♂.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 287, 288. ♀, ♂ (key).

lectus Cresson. Kans., S. Dak.
Epeolus lectus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 88. ♀.

Epeolus agnathus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 89. ♂.

lutzi Cockerell. Colo., Utah, Alta.
Epeolus lutzi Cockerell, 1921. Amer. Mus. Novitates 23: 16. ♂, ♀.
Epeolus lutzi dimissus Cockerell, 1921. Amer. Mus. Novitates 23: 16. ♀.

melectimimus Cockerell and Sandhouse. Calif.
Epeolus melectimimus Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 317. ♂.

mercatus Fabricius. "Carolina."
Epeolus mercatus Fabricius, 1804. Systema Piezatorum, p. 389.

mesillae mesillae (Cockerell). N. Mex. to south. Calif. Host: *Colletes clypeonitens* Swenk? *Phileremus mesillae* Cockerell, 1895. Psyche 7 (sup.): 10. ♂.

Taxonomy: Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 42. ♀. —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193:40 (*Larrea* visitation).

mesillae palmarum Linsley. South. Calif. Host: *Colletes clypeonitens* Swenk?
Epeolus mesillae palmarum Linsley, 1939. Pan-Pacific Ent. 15: 2. ♀.

minimus (Robertson). Ill., Mich., Wis., west to Colo. and Calif. Host: *Colletes eulophi* Robertson.
Triepeolus minimus Robertson, 1902. Ent. News 13: 81.

Biology: Graenicher, 1906. Wis. Nat. Hist. Soc., Bul. 4: 135.

montanus (Cresson). Nev.
Phileremus montanus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 83. ♂.

novomexicanus Cockerell. N. Mex.
Epeolus novomexicanus Cockerell, 1912. Ann. and Mag. Nat. Hist. (8) 10: 487. ♂.

olympiellus Cockerell. Wash.
Epeolus olympiellus Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 41. ♂.

oswegoensis Mitchell. N. Y. (Oswego).
Epeolus oswegoensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 453. ♂.

pilatei Cockerell. Calif.
Epeolus pilatei Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 13: 320. ♀.

piscatoris Cockerell. South. Calif. Is.
Epeolus piscatoris Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 432. ♀.

pusillus Cresson. Maine to Fla., west to Tex., Calif., Utah, Colo. and Wyo. Host: *Colletes americanus* Cresson?, *C. ciliatoides* Stephen, *C. compactus compactus* Cress., *C. deserticola* Timb.
Epeolus pusillus Cresson, 1864. Ent. Soc. Phila., Proc. 2: 393. ♀.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 287, 288. ♀, ♂ (key). —Brues, 1903. Ent. News 14: 80, 82 (key). —Rozen, 1966. Amer. Mus. Novitates 2244: 19-20, figs. 28-32 (larva).

rubrostictus Cockerell and Sandhouse. Calif.
Epeolus rubrostictus Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 318. ♀.

rufomaculatus Cockerell and Sandhouse. Calif., Utah, Colo.
Epeolus rufomaculatus Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 314. ♀, ♂.

rufulus Cockerell. Colo.
Epeolus rufulus Cockerell, 1941. Canad. Ent. 73: 36. ♀.

scelestus Cresson. Tex.
Epeolus scelestus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 86. ♀.
Epeolus scelestus var. *tuberculatis* Brues, 1903. Ent. News 14: 79. ♀.

scutellaris Say. N. S. to N. C. and Fla., west to Minn. and Tex.
Epeolus scutellaris Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 355. ♀.
Epeolus vernoniae Cockerell, 1907. Entomologist 40: 136. ♂.

Taxonomy: Cresson, 1864. Ent. Soc. Phila., Proc. 2: 397. ♀. —Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 343. ♀, ♂.

tristicolor Viereck. B. C.
Epeolus tristicolor Viereck, 1905. Canad. Ent. 37: 280. ♀.

vernalis Mitchell. N. C. (Holly Shelter).
Epeolus vernalis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 455. ♀.

weemsi Mitchell. Fla. (Alachua Co.).
Epeolus weemsi Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 455. ♂.

zonatus Smith. Fla.
Epeolus zonatus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 257. ♂, ♀.

Taxonomy: Cresson, 1864. Ent. Soc. Phila., Proc. 2: 397. ♀, ♂.

Genus TRIEPEOLUS Robertson

Triepeolus Robertson, 1901. Canad. Ent. 33: 231.
Type-species: *Epeolus concavus* Cresson. Orig. desig.
Triepeolus subg. *Synepeolus* Cockerell, 1921. Amer. Mus. Novitates 23: 6.
Type-species: *Triepeolus* (*Synepeolus*) *insolitus* Cockerell. Monotypic.

While most of the known host information suggests that these bees are cleptoparasites in the nests of eucerine bees (e.g., *Melissodes*, *Peponapis*, *Svastra*, and *Xenoglossa*), at least some species are known to be parasites of other Anthophoridae (e.g., *Anthophora*, *Centris*) as well as Colletidae (*Ptiloglossa*), Oxaeidae (*Protoxaea*) and Halictidae (*Nomia*).

Taxonomy: Cockerell, 1928. Colo. Univ., Studies 16: 107 (key). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1070, figs. 190-194, 197 (larva). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 459-485, fig. 111 (eastern U. S. spp.). —Rozen, 1966. Amer. Mus. Novitates 2244: 12-19, figs. 15-24 (larva).

agaricifer Cockerell. N. Mex.
Triepeolus agaricifer Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 60. ♂.

alachuensis Mitchell. Fla. (Alachua Co.).
Triepeolus alachuensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 462. ♀.

alpestris Cockerell. Colo.
Triepeolus alpestris Cockerell, 1921. Amer. Mus. Novitates 21: 13. ♀.

amandus Cockerell. Colo.
Triepeolus amandus Cockerell, 1921. Amer. Mus. Novitates 23: 10. ♂.

ancoratus Cockerell. Calif.
Triepeolus ancoratus Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 63. ♀.

argyreus (Cockerell). Wash., Oreg., Calif..
Epeolus argyreus Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 60. ♂.

balteatus Cockerell. Colo.
Triepeolus balteatus Cockerell, 1921. Amer. Mus. Novitates 23: 5. ♂.

bardus (Cresson). Tex. to Minn. Host: *Nomia* sp.?
Epeolus bardus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 84. ♀.

Taxonomy: Brues, 1903. Ent. News 14: 80 (key). —Cockerell, 1935. Amer. Mus. Novitates 766: 7. ♀, ♂ (possible host).

bihamatus (Cockerell). Wash.
Epeolus bihamatus Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 61. ♂.

blaisdelli Cockerell and Sandhouse. Calif. (Mokelumne).
Triepeolus blaisdelli Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 310. ♂.

brittaini Cockerell. N. S.
Triepeolus brittaini Cockerell, 1931. Canad. Ent. 63: 297. ♂.

brunnescens Cockerell and Sandhouse. Calif.
Triepeolus brunnescens Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 313. ♂.

brunneus Cockerell. Colo.
Triepeolus brunneus Cockerell, 1921. Amer. Mus. Novitates 23: 7. ♀.

californicus (Cresson). Calif.
Epeolus californicus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 86. ♀.

callopus Cockerell. Calif.
Triepeolus callopus Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 202. ♀.

Taxonomy: Cockerell, 1916. Pomona Col. Jour. Ent. Zool. 8: 63-64. ♂, ♀.

charlottensis Mitchell. N. B. (Charlotte Co.).
Triepeolus charlottensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 462, fig. 112. ♀.

cirsianus Mitchell. Ind. (Warren Co.).
Triepeolus cirsianus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 463. ♂.

concavus (Cresson). N. C. and Fla., west to Ill., Wis., Colo. and Calif. Host: *Svastra obliqua obliqua* (Say).
Epeolus concavus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 85. ♀.

Taxonomy: Brues, 1903. Ent. News 14: 81, fig. ♀, ♂. —Robertson, 1903. Canad. Ent. 33: 284, 285. ♀, ♂ (key). —Linsley and Michener, 1939. Amer. Ent. Soc., Trans. 65: pls. 15, 18.

Biology: Custer, 1928. Canad. Ent. 60: 28. —Custer, 1929. Psyche 36: 293.

coquilletti Cockerell. Calif., Miss.
Triepeolus coquilletti Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 106. ♀.

cressonii cressonii (Robertson). Minn. to New England, south to Tenn. and N. C.
Epeolus cressonii Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 344. ♂, ♀.

cressonii fraserae Cockerell. N. Mex.
Triepeolus cressoni var. *fraserae* Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 39. ♂.

custeri Cockerell. Colo.
Triepeolus custeri Cockerell, 1926. Ann. and Mag. Nat. Hist. (9) 17: 306. ♂.

cyclurus Cockerell. Colo.
Triepeolus cyclurus Cockerell, 1923. Ent. News 34: 49. ♀.

dacotensis (Stevens). N. Dak., Utah. Parasite: *Anthrax limatulus* Say.
Epeolus dacotensis Stevens, 1919. Canad. Ent. 51: 210. ♀, ♂.

Biology: Bohart, 1970. The Evolution of Parasitism among bees. Utah State Univ. Ann. Honor lecture p. 22, fig. 20, 22, 24, 27 (egg, larva, parasite).

denverensis Cockerell. Colo.
Triepeolus denverensis Cockerell, 1910. Entomologist, 43:91. ♂.

dichropus Cockerell. Colo.
Triepeolus dichropus Cockerell, 1921. Amer. Mus. Novitates 23: 11. ♂.

distinctus (Cresson). Ga., Fla.
Epeolus distinctus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 84. ♂, ♀.

diversipes Cockerell. Calif.
Triepeolus diversipes Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 13: 314. ♂.

donatus (Smith). Wis. to New England and South. Canada, south to Ga. Host: *Melitoma taurea* Say.
Epeolus donatus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 256. ♀, ♂.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 285, 286. ♀, ♂ (key).

Biology: Lutz and Cockerell, 1920. Amer. Mus. Nat. Hist., Bul. 42: 592 (host).

eldoradensis (Cockerell). Colo.
Epeolus eldoradensis Cockerell, 1910. Psyche 17: 245. ♂.

eldredi Cockerell. Wash., Utah, Wyo. Host: *Melissodes rustica* (Say).
Triepeolus eldredi Cockerell, 1907. Canad. Ent. 39: 52. ♂.

Biology: Clement, 1973. Kans. Ent. Soc., Jour. 46: 516-525 (host).

floridanus Mitchell. Fla. (Gainesville).
Triepeolus floridanus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 468. ♂.

fortis Cockerell. Colo., Calif.
Triepeolus fortis Cockerell, 1921. Amer. Mus. Novitates 23: 3. ♀, ♂.

fraseri Cockerell. N. Mex.
Triepeolus fraseri Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 39. ♂.

Taxonomy: Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 62. ♂ (key).

georgicus Mitchell. Ga. (Fort Gordon).
Triepeolus georgicus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 469, fig. 112. ♀.

grindeliae Cockerell. Colo.
Triepeolus grindeliae Cockerell, 1907. Canad. Ent. 39: 51. ♀.

haematurus Cockerell and Sandhouse. Utah.
Triepeolus haematurus Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 311. ♀.

helianthi arizonensis Cockerell. Ariz.
Triepeolus helianthi var. *arizonensis* Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 39. ♂.

helianthi grandior Cockerell. Colo., N. Mex.
Triepeolus helianthi grandior Cockerell, 1919. N. Y. Ent. Soc., Jour. 27: 300. ♀, ♂.

helianthi helianthi (Robertson). Ind., Ill., and Wis., west to Colo., Wyo. and Ariz. Host: *Melissodes trinodus* Robt., *M. composita* Tucker?
Epeolus helianthi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 344. ♀.

Taxonomy: Cockerell, 1921. Amer. Mus. Novitates 23: 3, 15 (key).

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 164-166, figs. —Hurd and Linsley, 1959. Ent. News 70: 141-146 (?host).

helianthi pacificus Cockerell. Colo.
Triepeolus helianthi pacificus Cockerell, 1919. N. Y. Ent. Soc., Jour. 27: 300. ♂.

Taxonomy: Cockerell, 1921. Amer. Mus. Novitates 23: 4, 15 (key).

heterurus (Cockerell and Sandhouse). Calif., Oreg.
Epeolus heterurus Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 316. ♀, ♂.

hopkinsi Cockerell. Ariz.
Triepeolus hopkinsi Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 184. ♂.

insolitus Cockerell. Colo.
Triepeolus (*Synepeolus*) *insolitus* Cockerell, 1921. Amer. Mus. Novitates 23: 6. ♂.

inyoensis Cockerell and Sandhouse. Calif.
Triepeolus inyoensis Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. 4 (13): 309. ♂.

isocomae Cockerell. N. Mex.
Triepeolus isocomae Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 38. ♂.

junctus Mitchell. N. Y., N. C.
Triepeolus junctus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 471. ♀, ♂.

laticaudus Cockerell. Colo.
Triepeolus laticaudus Cockerell, 1921. Amer. Mus. Novitates 23: 12. ♀.

lestes Cockerell. Colo., Calif.
Triepeolus lestes Cockerell, 1921. Amer. Mus. Novitates 23: 11. ♀.

Taxonomy: Cockerell, 1929. Pan-Pacific Ent. 5: 102. ♀, ♂.

lineatulus Cockerell and Sandhouse. Calif., Ariz. Host: *Melissodes tepida timberlakei* Ckll.
Triepeolus lineatulus Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 306. ♀, ♂.

loganensis Cockerell. Colo.
Triepeolus loganensis Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 624. ♂.

lunatus concolor (Robertson). Minn. to Pa., south to Fla. and Tex. Host: *Melissodes bimaculata bimaculata* (LeP.).
Epeolus lunatus var. *concolor* Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 51.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 285, 286. ♀, ♂ (key). —Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 35. ♂ (key). —Cockerell, 1921. Amer. Mus. Novitates 23: 14 (key).

lunatus lunatus (Say). Minn. to New England, south to Fla., west to Tex., N. Mex. and Colo.
Epeolus lunatus Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 354. ♀, ♂.

Taxonomy: Brues, 1903. Ent. News 14: 79, 80. ♀, ♂ (key). —Robertson, 1903. Canad. Ent. 35: 284, 286. ♀, ♂ (key). —Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 62. ♂ (key). —Cockerell, 1921. Amer. Mus. Novitates 23: 2, 14. (key).

lusor Cockerell. Colo.
Triepeolus lusor Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 625. ♂.

maculiventris Cockerell. Colo.
Triepeolus maculiventris Cockerell, 1921. Amer. Mus. Novitates 23: 11. ♀.

martini (Cockerell). N. Mex., Colo.
Epeolus remigatus var. *martini* Cockerell, 1900. Canad. Ent. 32: 362. ♂, ♀.

Taxonomy: Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 24 (tax. status).

mensae Cockerell. Oreg.
Triepeolus mensae Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 13: 313. ♂.

mesillae Cockerell. Kans., N. Mex. Host: *Nomia triangulifera* Vachal.
Triepeolus mesillae Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 36. ♀.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 16-17, figs. 19-23 (larva).

michiganensis Mitchell. Conn., N. Y., Mich.
Triepeolus michiganensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 473. ♀, ♂.

micropygius atripes Mitchell. Pa., N. C., Ga.
Triepeolus micropygius atripes Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 474, fig. 112. ♀, ♂.

micropygius micropygius Robertson. Ill.
Triepeolus micropygius Robertson, 1903. Canad. Ent. 35: 286. ♀.

mitchelli Hurd, n. name. N. C. (Marion).
Triepeolus sublunatus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 483. ♂. Preocc.

mojavensis Linsley. Calif. Host: *Anthophora linsleyi* Timberlake.
Triepeolus mojavensis Linsley, 1939. Pan-Pacific Ent. 15: 2. ♀.

Biology: Linsley and MacSwain, 1942. Amer. Midland Nat. 27: 409.

monardae Mitchell. N. C.
Triepeolus monardae Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 475, fig. 112. ♂.

nevadensis (Cresson). N. C. and Ga., west to Nebr., Tex., N. Mex. and Nev.
Epeolus nevadensis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 86. ♀.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 285, 286. ♀, ♂ (key).

nigriceps (Smith). Calif., Tex.
Epeolus nigriceps Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 103. ♀.

nigrihirtus Mitchell. N. C. (Chatham Co.).
Triepeolus nigrihirtus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 476. ♂.

norae Cockerell. N. Mex.
Triepeolus norae Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 59. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 161.

obliteratus Graenicher. Wis.
Triepeolus obliteratus Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1: 242. ♀, ♂.

occidentalis (Cresson). Pacific Coast to Kans., N. Mex., Tex. Host: *Melissodes mizeae* Cockerell?
Epeolus occidentalis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 87. ♂, ♀.

Taxonomy: Brues, 1903. Ent. News 14: 80 (key). —Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 34, 35. ♀, ♂ (key).

Biology: Hicks, 1926. Colo. Univ., Studies 15: 225.

paenepectoralis Viereck. B. C. to Wash., Colo.
Triepeolus paenepectoralis Viereck, 1905. Canad. Ent. 37: 278. ♀.

Taxonomy: Cockerell, 1921. Amer. Mus. Novitates 23: 15 (key).

pallidiventris Cockerell and Sandhouse. Utah.
Triepeolus pallidiventris Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 308. ♂.

pectoralis (Robertson). Maine to Ga., west to Minn., Colo. and Utah. Host: *Melissodes rustica* (Say)?
Epeolus pectoralis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 345. ♀.
Epeolus virginiensis Cockerell, 1907. Entomologist 40: 137. ♂.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 285. ♀ (key). —Lovell and Cockerell, 1905. Psyche 12: 42. ♂.

penicilliferus (Brues). Tex.
Epeolus penicilliferus Brues, 1903. Ent. News 14: 81. ♀, ♂.

Taxonomy: Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 34. ♀.

perelegans Cockerell. Ariz.
Triepeolus perelegans Cockerell, 1921. Amer. Mus. Novitates 23: 8. ♂.

permixtus (Cockerell). Calif.; Mexico (Baja California).
Epeolus permixtus Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 94. ♂, ♀.

pimarum Cockerell. Ariz.
Triepeolus pimarum Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 36. ♀.

pomonalis Cockerell. Calif.
Triepeolus pomonalis Cockerell, 1916. Canad. Ent. 48: 392. ♂.

quadrifasciatus atlanticus Mitchell. Md. to Fla., Mo.
Triepeolus 4-fasciatus atlanticus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 479, fig. 112. ♀, ♂.

quadrifasciatus quadrifasciatus (Say). Ark., Tex.
Epeolus 4-fasciatus Say, 1823. West. Quart. Rptr. 2: 81.

Taxonomy: Brues, 1903. Ent. News 14: 80 (key).

rectangularis Cockerell. Colo., Utah, Oreg., Calif.
Triepeolus rectangularis Cockerell, 1921. Amer. Mus. Novitates 23: 9. ♂.

remigatus (Fabricius). N. J. to Fla., west to Minn., Colo. and Calif., south to Tex., N. Mex. and Ariz.; Mexico (northern). Host: *Peponapis pruinosa* (Say)?, *Xenoglossa strenua* (Cress.).
Melecta remigata Fabricius, 1804. Systema Piezatorum, p. 387.

Taxonomy: Cresson, 1864. Ent. Soc. Phila., Proc. 2: 293. ♀, ♂. —Brues, 1903. Ent. News 14: 79 (key). —Robertson, 1903. Canad. Ent. 35: 285, 286. ♀, ♂ (key). —Rozen, 1966. Amer. Mus. Novitates 2244: 17-19, fig. 24 (larva).

Biology: Bohart, 1966. Pan-Pacific Ent. 42: 255-262 (life history, immature stages).

rhododontus Cockerell. Colo.
Triepeolus rhododontus Cockerell, 1921. Amer. Mus. Novitates 23: 5. ♂.

robustus (Cresson). N. Mex.
Epeolus robustus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 85. ♀.

rohweri Cockerell. Colo.
Triepeolus rohweri Cockerell, 1911. Ann. and Mag. Nat. Hist. (8) 8: 668. ♂.

rufithorax Graenicher. Fla. Host: *Svastra obliqua obliqua* (Say).
Triepeolus rufithorax Graenicher, 1928. Ent. News 39: 279. ♀, ♂.

Biology: Rozen, 1964. Amer. Mus. Novitates 2170: 9.

rugosus Mitchell. Fla.
Triepeolus rugosus Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 482, fig. 112. ♀.

sandhousei Cockerell. Colo.
Triepeolus sandhousei Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 624. ♂.

sarothrinus (Cockerell). Calif.
Epeolus sarothrinus Cockerell, 1929. Pan-Pacific Ent. 5: 103. ♀, ♂.
Epeolus sarothrinus var. *confluens* Cockerell, 1929. Pan-Pacific Ent. 5: 104. ♂.

saturninus Cockerell and Sandhouse. Calif.
Triepeolus saturninus Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 312. ♂.

schwarzi schwarzi Cockerell. Colo.
Triepeolus schwarzi Cockerell, 1921. Amer. Mus. Novitates 23: 4. ♂.

schwarzi subcalens Cockerell and Sandhouse. Calif.
Triepeolus schwarzi subcalens Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 309. ♂, ♀.

segregatus (Cockerell). N. Mex.
Epeolus occidentalis var. *segregatus* Cockerell, 1900. Canad. Ent. 32: 361. ♂ (♀ misdet. ?).

Taxonomy: Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 62. ♀, ♂ (key).

sequior Cockerell. Colo.
Triepeolus sequior Cockerell, 1921. Amer. Mus. Novitates 23: 8. ♂.

simplex Robertson. Wis., Ill. and Mich, south to N. C. and Ga.
Triepeolus simplex Robertson, 1903. Canad. Ent. 35: 285, 286. ♀, ♂.

stricklandi Cockerell. Alta.
Triepeolus stricklandi Cockerell, 1937. Canad. Ent. 69: 86. ♀.

subalpinus Cockerell. Colo.
Triepeolus subalpinus Cockerell, 1910. Psyche 17: 245. ♀.

sublunatus Cockerell. N. Mex.
Triepeolus sublunatus Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 62. ♂.

subnitens Cockerell and Timberlake. Calif.
Triepeolus subnitens Cockerell and Timberlake, 1929. Pan-Pacific Ent. 5: 167. ♂, ♀.

superbus (Provancher). Calif.
Epeolus superbus Provancher, 1895. Nat. Canad. 22: 190.

tanneri Cockerell. Utah.
Triepeolus tanneri Cockerell, 1928. Psyche 35: 232. ♂.

texanus nigripes Cockerell. N. Mex.
Triepeolus texanus var. *nigripes* Cockerell, 1898. N. Mex. Univ., Bul. 1: 61. ♂.

texanus texanus (Cresson). Tex.
Epeolus texanus Cresson, 1878. Amer. Ent. Soc., Trans. 7: 87. ♂.

Taxonomy: Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 13: 34. ♀ (key).

timberlakei Cockerell. Calif., Utah. Host: *Melissodes tepida timberlakei* Ckll.
Triepeolus timberlakei Cockerell, 1929. Pan-Pacific Ent. 5: 101. ♀, ♂.
Triepeolus timberlakei var. *heterodoxus* Cockerell, 1929. Pan-Pacific Ent. 5: 101. ♀.

townsendi Cockerell. N. Mex.
Triepeolus townsendi Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 20: 63. ♂, ♀.

trichopygus Cockerell and Timberlake. Calif.
Triepeolus trichopygus Cockerell and Timberlake, 1929. Pan-Pacific Ent. 5: 169. ♀, ♂.

trilobatus Cockerell. Colo.
Triepeolus trilobatus Cockerell, 1921. Amer. Mus. Novitates 23: 7. ♂.

utahensis (Cockerell). Utah.
Epeolus utahensis Cockerell, 1921. Amer. Mus. Novitates 23: 15. ♂.

vandykei Cockerell and Sandhouse. Calif.
Triepeolus vandykei Cockerell and Sandhouse, 1924. Calif. Acad. Sci., Proc. (4) 13: 307. ♀.

verbesinae (Cockerell). N. Mex. to Calif.; Mexico (Baja California).
Epeolus verbesinae Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 156. ♂, ♀.

Taxonomy: Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 11: 60. ♂ (key).

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 161.

wyomingensis Cockerell. Wyo. to Utah.
Triepeolus wyomingensis Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 201. ♂.

Tribe NOMADINI

Although this tribe is represented in the Old World especially by numerous species of *Nomada*, it is chiefly an American group inhabiting both North and South America. In America north of Mexico there are nearly 300 species of *Nomada* as well as several small genera which are mostly centered in the more arid parts of the southwestern United States and adjacent Mexico. While there is some evidence to suggest that the members of this tribe and those of the tribe Epeolini should be grouped together, these tribes are maintained as distinct in this catalog.

On the basis of our current knowledge concerning host relationships most of the species are cleptoparasites in the nests of the family Andrenidae, especially the genus *Andrena*, but some of the species (and even groups of species) also parasitize the nests of Halictidae, Melittidae, and Anthophoridae.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 22-28, figs. 39-55 (larvae).

Genus NOMADA Scopoli

The bees of this genus are wasp-like in appearance and are present on all the continents and many of the islands. The genus is represented in the Nearctic Region by numerous species of several subgenera. These bees are cleptoparasitic in the nests of other bees, principally the genus *Andrena*, but are also known to parasitize the nests of certain Halictidae, Melittidae and Anthophoridae. As with many cleptoparasitic bees, they are frequently encountered either flying about the nesting sites of their hosts or sipping nectar with them at the same flowers.

Taxonomy: Cresson, 1887. Amer. Ent. Soc., Trans., Sup. (2): 296-297. —Robertson, 1903. Canad. Ent. 35: 172-179. —Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 559-579, 580-610. —Cockerell, 1904 (1903). Colo. Expt. Sta., Rpt. of Ent., Bul. 94: 65-85. —Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 309-312 (notes on British Museum types). —Cockerell, 1911. U. S. Natl. Mus., Proc. 41: 225-243. —Swenk, 1912. Nebr. Univ., Studies 2 (1): 1-113. —Rodeck, 1931. Amer. Mus. Novitates 496: 1-11. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 338-437, figs. 98-107, tables 11-13 (eastern U. S. spp.).

Morphology: Cockerell and Atkins, 1902. Ann. and Mag. Nat. Hist. (7) 10: 40-44. —Beck, 1933. Utah Acad. Sci., Arts and Letters, Proc. 10: 101, figs. 60-64. —Linsley and Michener, 1939. Amer. Ent. Soc., Trans. 65: 265-305, 4 pls. —Snodgrass, 1941. Smithsn. Misc. Coll. 99: 55-56, pl. 27 F-J.

Genus NOMADA Subgenus NOMADA Scopoli

Nomada Scopoli, 1770. Historico Naturalis, Ann. 4: 44.
Type-species: *Nomada ruficornis* (Linnaeus). Desig. by Curtis, 1832.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 174-175, 178-179. —Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 569-579, 589 (in part), etc. —Viereck *et al.*, 1905. Canad. Ent. 37: 285-287. —Swenk, 1913. Nebr. Univ., Studies 12: 10-11, 15-57. —Swenk, 1915. Nebr. Univ., Studies 15: 155-163. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 402-436, figs. 106-107 (eastern U. S. spp.).

accepta Cresson. Colo., Kans.
Nomada accepta Cresson, 1878. Amer. Ent. Soc., Trans. 7: 77. ♀, ♂.
Nomada pacata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 81. ♀.

aldrichi Cockerell. Idaho, Wash., B. C.
Nomada vicinalis aldrichi Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 368. ♂.

amoena Cresson. Ill.
Nomada amoena Cresson, 1863. Ent. Soc. Phila., Proc. 2: 300. ♀.

angelarum Cockerell. Calif.
Nomada (*Nomada*) *angelarum* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 574. ♀.

angulata Swenk. Nebr.
Nomada (*Nomada*) *angulata* Swenk, 1913. Nebr. Univ., Studies 12: 40. ♀.

aprilina Swenk. Nebr.
Nomada (*Nomada*) *aprilina* Swenk, 1913. Nebr. Univ., Studies 12: 28. ♂.

armatella Cockerell. Mich. to New England.
Nomada armatella Cockerell. 1903. Acad. Nat. Sci. Phila., Proc. 55: 606. ♂.

astori Cockerell. Oreg.
Nomada astori Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 206. ♀. Var. a = *mediana* Swenk.

atrofrontata Cockerell. South. Calif.
Nomada (*Nomada*) *atrofrontata* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 573. ♀.

augustiana Mitchell. Ga. (Augusta).
Nomada augustiana Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 402. ♀.

azaleae Mitchell. N. C. (Highlands).
Nomada azaleae Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 403, fig. 107. ♂.

banksi Cockerell. Ont. and N. Y., south to Ill. and N. C.
Nomada banksi Cockerell, 1907. Entomologist 40: 98. ♀.

beulahensis Cockerell. N. Mex., N. Dak.
Nomada beulahensis Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 209. ♀.

bicrista Swenk. Nebr.
Nomada (*Nomada*) *bicrista* Swenk, 1913. Nebr. Univ., Studies 12: 27. ♂.

bifurcata Cockerell. Calif.
Nomada (*Nomada*) *bifurcata* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 577. ♂.

bisetosa Swenk. Nebr.
Nomada (*Nomada*) *bisetosa* Swenk, 1913. Nebr. Univ., Studies 12: 30. ♀.

bisignata Say. "United States."
Nomada bisignata Say, 1824. *In* Keating, Narr. Long's 2nd Exped., v. 2, p. 354. ♀.
Nomada bicincta(!) Howard, 1902. Insect Book, pl. 3, fig. 32.

californiae Cockerell. Calif.
Nomada (*Nomada*) *Californiae* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 571. ♀.

capillata Mitchell. Mass. (Milton).
Nomada capillata Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 406. ♂.

carinicauda Cockerell. Colo.
Nomada carinicauda Cockerell, 1921. Amer. Mus. Novitates 24: 7. ♀.

ceanothi Cockerell. N. Y. to N. C.
Nomada (*Nomada*) *ceanothi* Cockerell, 1907. Entomologist 40: 97. ♀.

clarkii Cockerell. Oreg.
Nomada Clarkii Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 203. ♀.

coloradella Cockerell. Colo.
Nomada coloradella Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 83. ♂, ♀.

composita Mitchell. Conn., Mich.
Nomada composita Mitchell, 1962. N. C. Agr. Expt. Sta., Tech. Bul. 152: 408. ♀.

cordleyi Cockerell. Oreg.
Nomada Cordleyi Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 445. ♂.

corvallisensis Cockerell. Oreg.
Nomada corvallisensis Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 207. ♀.

cressonii cressonii Robertson. Colo., N. Dak. to N. S. south to Tenn. and N. C.
Nomada cressonii Robertson, 1893. Amer. Ent. Soc., Trans. 20: 275. ♀, ♂.
Nomada mera Cockerell, 1908. Ent. Soc. Wash., Proc. 10: 83. ♀.

cressonii trevoriana Cockerell. Wash.
Nomada (*Nomada*) *Cressonii Trevoriana* Cockerell, 1905. Canad. Ent. 37: 285.

crudelis Cresson. Ga. Host: *Andrena obscuripennis* Sm?
Nomada crudelis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 82. ♀.

cymbalariae Cockerell. Colo.
Nomada cymbalariae Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 439. ♀.

davidsoni Cockerell. Calif.
Nomada (*Nomada*) *davidsoni* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 575. ♀.

decepta Mitchell. N. Y., Mich.
Nomada decepta Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 411. ♀.

denticulata Robertson. Minn. to N. Y., south to Ga.
Nomada denticulata Robertson, 1902. Canad. Ent. 34: 49.
Nomada simplex Robertson, 1902. Ent. News 13: 80. ♂.

depressa Cresson. Nebr., Mich. to Maine, south to N. C.
Nomada depressa Cresson, 1863. Ent. Soc. Phila., Proc. 2: 302. ♀.
Nomada depressicauda Cockerell, 1908. Ent. News 19: 323. ♀.

detrita Mitchell. N. H. (Randolph).
Nomada detrita Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 414, figs. 106, 107. ♂.

dreisbachi Mitchell. Maine, Mass., Mich.
Nomada dreisbachi Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 414. ♂.

elegantula Cockerell. Calif., Idaho.
Nomada (*Nomada*) *elegantula* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 578. ♀.

erythraea Dalla Torre. Calif.
Nomada rubra Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym. p. 427. ♀. Preocc.
Nomada erythraea Dalla Torre, 1896. Cat. Hym., v. 10, p. 343. N. name.

flammigera Cockerell. Wash.
Nomada (*Nomada*) *flammigera* Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 18: 71. ♀.

florilega Lovell and Cockerell. Mich. to Maine, south to N. C.
Nomada (*Nomada*) *florilega* Lovell and Cockerell, 1905. Psyche 12: 41. ♀.

fontis Cockerell. Colo.
Nomada (*Nomada*) *fontis* Cockerell, 1910. Canad. Ent. 42: 367. ♀.

gibbosa Viereck. Oreg.
Nomada gibbosa Viereck, 1905. Canad. Ent. 37: 285. ♂.

gracilis Cresson. N. Y. and New England.
Nomada gracilis Cresson, 1863. Ent. Soc. Phila., Proc. 2: 295. ♂.

hoodiana Cockerell. Oreg.
Nomada hoodiana Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 608. ♀.

idahoensis Swenk. Idaho.
Nomada (*Nomada*) *idahoensis* Swenk, 1913. Nebr. Univ., Studies 12: 53. ♂.

illinoensis Robertson. Minn. to Mass., south to Ga. Predator: *Pselliopus barberi* Davis.
Nomada Illinoiensis Robertson, 1900. Canad. Ent. 32: 294. ♀, ♂.
Nomada illinoensis Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 657. Emend.
Nomada illinoensis Cockerell, 1921. Amer. Mus. Novitates 24: 7. ♀. Emend.; diaeresis placed over e in *illinoensis*.

Biology: Bouseman, 1976. Kans. Ent. Soc., Jour. 49: 384 (predator).

indusata Mitchell. N. C., Ga.
Nomada indusata Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 418, fig. 107. ♂.

inepta Mitchell. Maine to N. C., Minn.
Nomada inepta Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 419. ♀.

interruptella Fowler. Calif.
Nomada interrupta Fowler, 1899. Ent. News 10: 159. ♂. Preocc.
Nomada interruptella Fowler, 1902. Calif. Agr. Expt. Sta., Rpt., 1898-1901, p. 329. N. name.

itamera Cockerell. Wash.
Nomada itamera Cockerell, 1910. Psyche 17: 95. ♀.

kincaidiana Cockerell. Wash.
Nomada kincaidiana Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 614. ♀.

kingstonensis Mitchell. R. I. (Kingston).
Nomada kingstonensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 420. ♀.

latifrons Cockerell. Calif., Nev.
Nomada (*Nomada*) *latifrons* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 572. ♀.

lehighensis Cockerell. Mich. to N. S., south to Ga.
Nomada lehighensis Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 605. ♀, ♂.

lewisi Cockerell. Oreg.
Nomada Lewisi Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 205. ♀.

libata Cresson. Colo.
Nomada libata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 80. ♀, ♂.
Nomada limbata(!) Dalla Torre, 1896. Cat. Hym., v. 10, p. 354.

luteopicta Cockerell. Colo.
Nomada luteopicta Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 83. ♂, ♀.

malonella Cockerell. Wash.
Nomada (*Nomada*) *malonella* Cockerell, 1910. Psyche 17: 93. ♀, ♂ ?

malonina Cockerell. Wash.
Nomada (*Nomada*) *malonina* Cockerell, 1910. Psyche 17: 94. ♂.

marginella Cockerell. Calif.
Nomada (*Nomada*) *marginella* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 576. ♀.

mckenziei Timberlake and Cockerell. Calif.
Nomada mckenziei Timberlake and Cockerell, 1937. Amer. Mus. Novitates 948: 4. ♀, ♂.

media Mitchell. N. C., Tenn.
Nomada media Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 421, fig. 107. ♀, ♂.

mediana Swenk. Oreg., Calif.
Nomada (*Nomada*) *mediana* Swenk, 1913. Nebr. Univ., Studies 12: 49. ♀.

melanosoma Cockerell. Calif.
Nomada melanosoma Cockerell, 1916. Pomona Col. Jour. Ent. Zool. 8: 55. ♂.

mendica Mitchell. Vt., N. H.
Nomada mendica Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 422, fig. 107. ♂.

minima Mitchell. Md. to N. C.
Nomada minima Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 423. ♂.

minuta Swenk. Nebr.
Nomada (*Nomada*) *minuta* Swenk, 1913. Nebr. Univ., Studies 12: 44. ♀.

munda Cresson. Colo.
Nomada munda Cresson, 1878. Amer. Ent. Soc., Trans. 7: 80. ♀.

nigrociliata Swenk. Nebr.
Nomada (*Nomada*) *nigrociliata* Swenk, 1913. Nebr. Univ., Studies 12: 32. ♀.

nigrocincta Smith. "Arctic America," Maine, Oreg.
Nomada nigrocincta Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 99. ♀.

nigrofasciata Swenk. Nebr.
Nomada (*Nomada*) *nigrofasciata* Swenk, 1913. Nebr. Univ., Studies 12: 24. ♀.

obliquella Fowler. Calif. Host: *Andrena suavis* Timberlake.
Nomada obliqua Fowler, 1899. Ent. News 10: 160. ♂. Preocc.
Nomada obliquella Fowler, 1902. Calif. Agr. Expt. Sta., Rpt., 1898-1901, p. 329. N. name.

Biology: Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 26 (habits, host).

obscurella Fowler. Calif., Oreg. Host: *Andrena caerulea* Smith.
Nomada obscura Fowler, 1899. Ent. News 10: 160. ♂. Preocc.
Nomada obscurella Fowler, 1902. Calif. Agr. Expt. Sta., Rpt., 1898-1901, p. 329. N. name.
Nomada Fowleri Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 204. ♀.

Taxonomy: Rozen, 1966. Amer. Mus. Novitates 2244: 22-24, figs. 39-40 (larva).

Biology: Linsley and MacSwain, 1955. Wasmann Jour. Biol. 13: 275, pl. 1, fig. 4 (life history).

obtusata Swenk. N. Dak.
Nomada (*Nomada*) *obstusata*(!) Swenk, 1915. Nebr. Univ., Studies 15: 159. ♀. Lapsus *calami*, *fide* Swenk, personal communication with Dr. Hugo Rodeck.

ochrohirta Swenk. Nebr.
Nomada (*Nomada*) *ochrohirta* Swenk, 1913. Nebr. Univ., Studies 12: 34. ♀.

odontocera Cockerell. Calif.
Nomada odontocera Cockerell, 1916. Pomona Col. Jour. Ent. Zool. 8: 57. ♂.

opposita Cresson. Calif.
Nomada opposita Cresson, 1878. Amer. Ent. Soc., Trans. 8: 73. ♀.

orba Mitchell. N. Y. (Ithaca).
Nomada orba Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 424, fig. 107. ♂.

orcusella Cockerell. Wash.
Nomada (*Nomada*) *orcusella* Cockerell, 1910. Psyche 17: 95. ♀.

oregonica Cockerell. Oreg., Calif.
Nomada oregonica Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 205. ♀, ♂.

osborni Cockerell. Ariz.
Nomada (*Nomada*) *osborni* Cockerell, 1911. U. S. Natl. Mus., Proc. 41: 243. ♂.

packardiella Cockerell. Colo., Wash.?
Nomada Packardiella Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 225. ♀.

pallidipicta Swenk. Nebr.
Nomada (*Nomada*) *pallidipicta* Swenk, 1913. Nebr. Univ., Studies 12: 48. ♂.

parallela Swenk. Nebr.
Nomada (*Nomada*) *parallela* Swenk, 1913. Nebr. Univ., Studies 12: 36. ♂.

parata Cresson. Colo.
Nomada parata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 81. ♀.

parva Robertson. Mich. to New England, south to Miss. and Tex.
Nomada parva Robertson, 1900. Canad. Ent. 32: 294. ♀, ♂.
Nomada infantula Cockerell, 1907. Entomologist 40: 98. ♀, ♂.

propinqua Swenk. Nebr.
Nomada (*Nomada*) *propinqua* Swenk, 1913. Nebr. Univ., Studies 12: 46. ♀, ♂.

pulsatillae Cockerell. Colo., Wash.?
Nomada pulsatillae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 18: 69. ♀.

pygmaea Cresson. Minn. to Maine, south to Va., ?Colo.
Nomada pygmaea Cresson, 1863. Ent. Soc. Phila., Proc. 2: 299. ♂.

rhodosoma rhodosoma Cockerell. Calif., Nev.
Nomada (*Nomada*) *rhodosoma* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 571. ♀, ♂ ?

rhodosoma rhodosomella Cockerell. Colo.
Nomada rhodosoma var. *rhodosomella* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 571. ♂, ♀ ?

robertsonella Cockerell. Nev.
Nomada robertsonella Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 613. ♀.

rubrica Provancher. Calif.
Nomada rubrica Provancher, 1896. Nat. Canad. 23: 8. ♀.

Taxonomy: Fowler, 1899. Ent. News 10: 162.

salicicola Swenk. Nebr.
Nomada (*Nomada*) *salicicola* Swenk, 1913. Nebr. Univ., Studies 12: 35. ♂.

salicis Robertson. Ill.
Nomada salicis Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 52. ♂.

sayi Robertson. Minn. to Que. and Maine, south to Ga.
Nomada sayi Robertson, 1893. Amer. Ent. Soc., Trans. 20: 276. ♀, ♂.

Taxonomy: Robertson, 1900. Canad. Ent. 32: 293-294. ♀, ♂ (redescribed, restricted).

sedi Cockerell. Colo.
Nomada sedae Cockerell, 1919. Ent. News 30: 292. ♀.
Nomada sedi Cockerell, 1920. Ann. and Mag. Nat. Hist. (9) 6: 201. Emend.

semirugosa Cockerell. Colo.
Nomada semirugosa Cockerell, 1929. Ann. and Mag. Nat. Hist. (10) 4: 297.

skinneri Cockerell. Conn. to N. C.
Nomada skinneri Cockerell, 1908. Ent. News 19: 323. ♀.

sobrina Mitchell. Mich. (Macomb Co.).
Nomada sobrina Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 431, fig. 107. ♂.

sphaerogaster Cockerell. N. J., Wis.
Nomada sphaerogaster Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 611. ♀.

subaccepta Cockerell. Colo.
Nomada subaccepta Cockerell, 1907. Entomologist 40: 267. ♂.

subangusta Cockerell. Calif.
Nomada (*Nomada*) *subangusta* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 570. ♂.

subpacata Swenk. N. Dak.
Nomada (*Nomada*) *subpacata* Swenk, 1913. Nebr. Univ., Studies 12: 55. ♀.

subvicinalis Cockerell. Calif.
Nomada (*Nomada*) *subvicinalis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 576. ♂.

taraxacella Cockerell. N. Mex., Colo., Nebr., Wash.?
Nomada ultima taraxacella Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 589. ♀.

Taxonomy: Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 74. —Cockerell, 1911. U. S. Natl. Mus., Proc. 41: 238. ♀, ♂. —Swenk, 1913. Nebr. Univ., Studies 12: 22.

tintinnabulum Cockerell. Calif.
Nomada (*Nomada*) *tintinnabulum* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 572. ♀.

townesi Mitchell. Md. (Takoma Park).
Nomada townesi Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 432. ♂.

tyrrellensis Mitchell. N. C., Fla.
Nomada tyrrellensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 433. ♀.

ulsterensis Mitchell. N. Y., D. C.
Nomada ulsterensis Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 433, fig. 107. ♂.

ultima Cockerell. Wash., Oreg., Calif.
Nomada ultima Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 206. ♀.
Nomada modocorum Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 444. ♂.

ultimella septentrionalis Swenk. Wash.
Nomada (*Nomada*) *ultimella septentrionalis* Swenk, 1913. Nebr. Univ., Studies 12: 50. ♀.

ultimella ultimella Cockerell. Calif.
Nomada (*Nomada*) *ultimella* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 572. ♀.

undulaticornis Cockerell. Colo.
Nomada undulaticornis Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 18: 70. ♂.

valida Smith. N. S. and N. Y. to B. C.
Nomada valida Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 246. ♀.

velutina Swenk. Nebr.
Nomada (*Nomada*) *velutina* Swenk, 1913. Nebr. Univ., Studies 12: 39. ♀.

vicina stevensi Swenk. N. Dak.
Nomada (*Nomada*) *vicina stevensi* Swenk, 1913. Nebr. Univ., Studies 12: 56. ♀, ♂.

vicina vicina Cresson. Mich. to Que., New England, N. J. and Nebr. Host: *Andrena vicina* Sm.
Nomada vicina Cresson, 1863. Ent. Soc. Phila., Proc. 2: 292. ♀ (♂ misdet.).

Biology: Packard, 1878. Guide ... study of insects, 6th ed., p. 142 (life history).

vicinalis infrarubens Cockerell. Oreg.
Nomada vicinalis var. *infrarubens* Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 84. ♂.

vicinalis vicinalis Cresson. Nebr., Colo.
Nomada vicinalis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 78. ♂.

Taxonomy: Swenk, 1913. Nebr. Univ., Studies 12: 41. ♂, ♀.

wootonella Cockerell. N. Mex.
Nomada wootonella Cockerell, 1909. Entomologist 42: 93. ♂.

wyomingensis Swenk. Wyo.
Nomada (*Nomada*) *wyomingensis* Swenk, 1913. Nebr. Univ., Studies 12: 52. ♀.

ziziae Swenk. N. Dak.
Nomada (*Nomada*) *ziziae* Swenk, 1915. Nebr. Univ., Studies 15: 4. ♀, ♂.

Genus NOMADA Subgenus GNATHIAS Robertson

Gnathias Robertson, 1903. Canad. Ent. 35: 173.
Type-species: *Nomada bella* Cresson. Orig. desig.

Taxonomy: Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 594-603. —Viereck *et al.*, 1905. Canad. Ent. 37: 282-283. —Swenk, 1913. Nebr. Univ., Studies 12: 11-15, 90-99. —Swenk, 1915. Nebr. Univ., Studies 15: 172-179. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 346-354, fig. 98 (eastern U. S. spp.).

bella bella Cresson. Minn. to Que. and Maine, south to Fla.
Nomada bella Cresson, 1863. Ent. Soc. Phila., Proc. 2: 287. ♂.
Nomada albofasciata Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 100. ♂.

Morphology: Snodgrass, 1941. Smithsn. Misc. Coll. 99: 55-56, pl. 27, figs. F-J.

bella callura Cockerell. Colo.
Nomada (*Gnathias*) *bella callura* Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 657. ♂.

clarescens Cockerell. Colo.
Nomada (*Gnathias*) *clarescens* Cockerell, 1921. Amer. Mus. Novitates 24: 10. ♀.

cuneata (Robertson). Minn. to N. S., south to N. C.
Gnathias cuneatus Robertson, 1903. Canad. Ent. 35: 175. ♀, ♂ ?
Gnathias cuneatus form *decemnotatus* Robertson, 1903. Canad. Ent. 35: 175. ♀.
Gnathias cuneatus form *octonotatus* Robertson, 1903. Canad. Ent. 35: 175. ♀.
Gnathias cuneatus form *sexnotatus* Robertson, 1903. Canad. Ent. 35: 176. ♀.
Gnathias cuneatus form *quadrisignatus* Robertson, 1903. Canad. Ent. 35: 176. ♀.

custeriana Cockerell. Colo.
Nomada (*Gnathias*) *custeriana* Cockerell, 1911. U. S. Natl. Mus., Proc. 41: 241. ♂.

debilis Timberlake. Calif.
Nomada (*Gnathias*) *debilis* Timberlake, 1954. Pan-Pacific Ent. 30: 135. ♀, ♂.
Nomada (*Gnathias*) *debilis* var. *a* Timberlake, 1954. Pan-Pacific Ent. 30: 136. ♀.

fuscicincta Swenk. N. Dak.
Nomada (*Gnathias*) *fuscicincta* Swenk, 1915. Nebr. Univ., Studies 15: 24. ♀, ♂.

grayi eastonensis Cockerell. Wash.
Nomada (*Gnathias*) *grayi eastonensis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 597. ♀.

grayi grayi Cockerell. Oreg.
Nomada Grayi Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 203. ♀.

heterosticta Cockerell. Idaho.
Nomada (*Gnathias*) *heterosticta* Cockerell, 1921. Amer. Mus. Novitates 24: 9. ♀.

hydrophylli Swenk. N. Dak., Ill., Md.
Nomada (*Gnathias*) *hydrophylli* Swenk, 1915. Nebr. Univ., Studies 15: 25. ♂.
Gnathias xanthoparius Robertson, 1928. Flowers and Insects, Carlinville, Ill., pp. 9, 101, 111, 152. ♂. Nomen nudum.

klamathensis Fox. Oreg.
Nomada (*Gnathias*) *klamathensis* Fox, 1926. Pan-Pacific Ent. 5: 212. ♂.

lepida Cresson. Minn. to Maine, south to Ga.
Nomada lepida Cresson, 1863. Ent. Soc. Phila., Proc. 2: 288. ♂.

leucozona Rodeck. Colo.
Nomada (*Gnathias*) *leucozona* Rodeck, 1931. Amer. Mus. Novitates 496: 4. ♂.

louisianae Cockerell. Nebr. and Minn. to N. Y., S. C. and La.
Nomada (*Gnathias*) *louisianae* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 602. ♀.

maculata Cresson. Minn. to Maine, south to Va.
Nomada maculata Cresson, 1863. Ent. Soc. Phila., Proc. 2: 303. ♀, ♂ ?
Nomada volatilis Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 100. ♂.

opacella Timberlake. Calif. Host: *Andrena caerulea* Sm., *A. suavis* Timb.
Nomada (*Gnathias*) *opacella* Timberlake, 1954. Pan-Pacific Ent. 30: 133. ♀, ♂.

Biology: Linsley and MacSwain, 1955. Wasmann Jour. Biol. 13: 256-270, pl. 1, fig. 1; pls. 2 and 3 (life history, hosts). —Linsley and MacSwain, 1959. Calif. Univ. Pubs. Ent. 16: 25-26 (habits, hosts).

orophila Cockerell. Colo., Wyo.
Nomada (*Gnathias*) *orophila* Cockerell, 1921. Amer. Mus. Novitates 24: 8. ♂, ♀.

ovata (Robertson). Wyo., Minn. to Maine, south to S. C.
Gnathias ovatus Robertson, 1903. Canad. Ent. 35: 175. ♀, ♂.
Gnathias ovatus form *plenus* Robertson, 1903. Canad. Ent. 35: 175. ♀.
Gnathias ovatus form *octomaculatus* Robertson, 1903. Canad. Ent. 35: 175. ♀.
Gnathias ovatus form *sexmaculatus* Robertson, 1903. Canad. Ent. 35: 175. ♀.
Gnathias ovatus form *quadrimaculatus* Robertson, 1903. Canad. Ent. 35: 175. ♀.
Gnathias ovatus form *binotatus* Robertson, 1903. Canad. Ent. 35: 175. ♀.
Gnathias ovatus form *unicolor* Robertson, 1903. Canad. Ent. 35: 175. ♀.
Nomada (*Gnathias*) *carolinae* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 602. ♀.

perbella (Viereck). Oreg., Wash., B. C.
Gnathias perbella Viereck, 1905. Canad. Ent. 37: 282. ♀, ♂.

perplexa Cresson. Minn. to Mass., south to Tenn. and N. C., ?Wyo.
Nomada perplexa Cresson, 1863. Ent. Soc. Phila., Proc. 2: 306. ♀, ♂ ?

Taxonomy: Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 600. ♂, ♀.
Nomada (*Gnathias*) *cornelliana* Cockerell, 1908. Ent. Soc. Wash., Proc. 10: 84. ♂.

perplexans Cockerell. Wash.
Nomada (*Gnathias*) *perplexans* Cockerell, 1910. Psyche 17: 94. ♂.

physura Cockerell. Nev.
Nomada (*Gnathias*) *physura* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 599. ♂.

rhodalis Cockerell. Nev.
Nomada (*Gnathias*) *rhodalis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 600. ♀.

rhodomelas Cockerell. Oreg., B. C.
Nomada (*Gnathias*) *rhodomelas* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 598. ♂, ♀?

rubi Swenk. N. Dak., Minn.
Nomada (*Gnathias*) *rubi* Swenk, 1915. Nebr. Univ., Studies 15: 20. ♀, ♂.

rubrella Cockerell. Colo.
Nomada (*Gnathias*) *rubrella* Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 75. ♀.

schwarzi contractula Cockerell. N. Mex.
Nomada (*Gnathias*) *schwarzi contractula* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 600. ♂.

schwarzi schwarzi Cockerell. Colo.
Nomada (*Gnathias*) *schwarzi* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 599. ♂ (♀ misdet.).

siouxensis Swenk. Nebr., Wyo.
Nomada (*Gnathias*) *siouxensis* Swenk, 1913. Nebr. Univ., Studies 12: 96. ♀.

subnigrocincta Swenk. Mass., N. J., Pa., N. C.
Nomada (*Nomada*) *subnigrocincta* Swenk, 1915. Nebr. Univ., Studies 15: 155. ♀, (♂ misdet.).

subrubi Swenk. N. Dak.
Nomada (*Gnathias*) *Subrubi* Swenk, 1915. Nebr. Univ. Studies 15: 176. ♀, ♂.

utensis Swenk. Colo.
Nomada (*Gnathias*) *utensis* Swenk, 1913. Nebr. Univ., Studies 12: 97. ♀, ♂.

vulpis Cockerell. Wyo.
Nomada (*Gnathias*) *vulpis* Cockerell, 1921. Amer. Mus. Novitates 24: 10. ♀.

washingtoni Cockerell. Wash.
Nomada (*Gnathias*) *washingtoni* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 598. ♀.

Genus NOMADA Subgenus PHOR Robertson

Phor Robertson, 1903. Canad. Ent. 35: 173, 177.
Type-species: *Nomada integerrima* Dalla Torre. Orig. desig. and monotypic. (=*Nomada integra* Robertson) (preocc.).

Taxonomy: Swenk, 1913. Nebr. Univ., Studies 12: 12, 14. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 377-379 (eastern U. S. spp.).

integerrima Dalla Torre. Minn. to Que. and New England, south to N. C. and La.
Nomada integra Robertson, 1893. Amer. Ent. Soc., Trans. 20: 276. ♀, ♂. Preocc.
Nomada integerrima Dalla Torre, 1896. Cat. Hym. v. 10, p. 353. N. name.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 174, 175, 177. ♀, ♂.

proxima Cresson. Maine, ?Conn.
Nomada proxima Cresson, 1863. Ent. Soc. Phila., Proc. 2: 294. ♂.

Taxonomy: Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey, Bul. 22 (3): 726.

siccorum Cockerell. Colo.
Nomada (*Phor*) *siccorum* Cockerell, 1919. Ent. News 30: 291. ♂.

subgracilis Cockerell. Calif.
Nomada (*Phor*) *subgracilis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 569. ♂.

vexator Cockerell. Colo.
Nomada vexator Cockerell, 1909. Entomologist 42: 92. ♀, ♂.

Genus NOMADA Subgenus HEMINOMADA Cockerell and Atkins

Nomada subg. *Heminomada* Cockerell and Atkins, 1902. Ann. and Mag. Nat. Hist. (7) 10: 42.
Type-species: *Nomada obliterata* Cresson. Orig. desig. and monotypic.
Xanthidium Robertson, 1903. Canad. Ent. 35: 174, 177. Preocc.
Type-species: *Nomada luteola* Olivier. Orig. desig.

Taxonomy: Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 564-569, 580-587 (part). —Robertson, 1903. Canad. Ent. 35: 173, 174-175, 177. —Viereck *et al.*, 1905. Canad. Ent. 37: 284-285. —Swenk, 1913. Nebr. Univ., Studies 12: 8-11, 13-15, 57-76. —Swenk, 1915. Nebr. Univ., Studies 15: 163-169. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 380-400, fig. 105 (eastern U. S. spp.).

agynia Cockerell. Colo.
Nomada agynia Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 81. ♂.

alpha alpha Cockerell. Colo.
Nomada alpha Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 84. ♀.

Taxonomy: Swenk, 1913. Nebr. Univ., Studies 12: 71. ♀, ♂.

alpha dialpha Cockerell. Colo. June.
Nomada alpha var. *dialpha* Cockerell, 1921. Amer. Mus. Novitates 24: 3. ♀.

alpha paralpha Cockerell. Colo.
Nomada alpha var. *paralpha* Cockerell, 1921. Amer. Mus. Novitates 24: 3. ♀.

annulata Smith. N. C. Host: *Andrena macra* Mitch.
Nomada annulata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 248. ♀, (♂ misdet.).

arizonica Cockerell. Ariz.
Nomada (*Xanthidium*) *arizonica* Cockerell, 1911. U. S. Natl. Mus., Proc. 41: 242. ♂.

ashmeadi Cockerell. Calif.
Nomada (*Xanthidium*) *ashmeadi* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 568. ♀.

autumnalis Mitchell. Mich. (Oakland Co.).
Nomada (*?Xanthidium*) *autumnalis* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 382. ♂.

avalonica Cockerell. Calif.
Nomada (*Holonomada*) *avalonica* Cockerell, 1938. Ann. and Mag. Nat. Hist. (11) 2: 152. ♀.

bethunei Cockerell. Mich., Ohio.
Nomada bethunei Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 607. ♂.

bishoppi Cockerell. Minn. to Maine, south to Miss. and Fla.
Nomada (*Xanthidium*) *luteola bishoppi* Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 655. ♀.

calloxantha Cockerell. Wyo.
Nomada (*Xanthidium*) *calloxantha* Cockerell, 1921. Amer. Mus. Novitates 24: 4. ♀.

capitalis Mitchell. N. H., Mich., N. C., Tenn.
Nomada (*Heminomada*) *capitalis* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 385. ♀.

citrina citrina Cresson. Pacific Coast.
Nomada citrina Cresson, 1878. Amer. Ent. Soc., Trans. 7: 79 ♀.

citrina flavomarginata Swenk. Nebr.
Nomada (*Heminomada*) *citrina flavomarginata* Swenk, 1913. Nebr. Univ., Studies 12: 67-71. ♀, ♂.

citrina rufula Cockerell. Idaho.
Nomada citrina var. *rufula* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 586. ♀.

civilis civilis Cresson. United States west of Nebr.
Nomada civilis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 78. ♂.

civilis spokanensis Cockerell. Wash.
Nomada civilis spokanensis Cockerell, 1910. Psyche 17: 92. ♀.

collinsiana Cockerell. Colo.
Nomada (*Xanthidium*) *collinsiana* Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 79. ♀.

coloradensis Cockerell. Colo.
Nomada coloradensis Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 603. ♀.

Taxonomy: Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 84. ♀, ♂.

colorata Mitchell. N. Y., Mich.
Nomada (*Heminomada*) *colorata* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 386. ♀.

concinnula Cockerell. Colo.
Nomada (*Xanthidium*) *concinnula* Cockerell, 1921. Amer. Mus. Novitates 24: 6. ♀.

coquilletti Cockerell. Calif., Wash., Idaho.
Nomada (*Xanthidium*) *coquilletti* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 567. ♂.

crawfordi crawfordi Cockerell. Colo., Nebr., Wyo.
Nomada (*Xanthidium*) *crawfordi* Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 79. ♀.

Taxonomy: Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 437. ♀, ♂.

crawfordi lachrymosa Cockerell. Wyo.
Nomada (*Xanthidium*) *crawfordi lachrymosa* Cockerell, 1921. Amer. Mus. Novitates 24: 5. ♀.

decempunctata Cockerell. Calif.
Nomada (*Xanthidium*) *decempunctata* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 565. ♂.

dentariae (Robertson). Ill. to N. Y., south to Great Smokies Natl. Park.
Xanthidium dentariae Robertson, 1903. Canad. Ent. 35: 178. ♂.

dilucida Cresson. Colo.
Nomada dilucida Cresson, 1878. Amer. Ent. Soc., Trans. 7: 80. ♀.

ednae Cockerell. Colo.
Nomada (*Xanthidium*) *Ednae* Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 537. ♂.

electa Cresson. Ill., Conn., Mass., Va.
Nomada electa Cresson, 1863. Ent. Soc. Phila., Proc. 2: 290. ♀, ♂.
Nomada (*Xanthidium?*) *mimula* Cockerell, 1908. Ent. Soc. Wash., Proc. 10: 66. ♀.

electella Cockerell. R. I. to Ga.
Nomada electella Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 612. ♀.

elrodi Cockerell. Mont., Nebr., Colo., Tex.
Nomada (*Xanthidium*) *elrodi* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 583. ♂.

Taxonomy: Swenk, 1913. Nebr. Univ., Studies 12: 62. ♀, ♂ (variety).

festiva Cresson. Mass., N. J.
Nomada festiva Cresson, 1863. Ent. Soc. Phila., Proc. 2: 289. ♀.

fragariae Mitchell. Va., N. C., Fla.
Nomada (Heminomada) fragariae Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 391, fig. 105. ♂.

fragilis fragilis Cresson. Colo., Nebr., N. Mex., Calif.
Nomada fragilis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 79. ♂.

fragilis mesosticta Cockerell. Calif.
Nomada fragilis mesosticta Cockerell, 1939. Ann. and Mag. Nat. Hist. (11) 3: 182. ♂.

gillettei Cockerell. Colo.
Nomada gillettei Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 81. ♂.

graenicheri Cockerell. Wis.
Nomada (Xanthidium) Graenicheri Cockerell, 1905. Canad. Ent. 37: 189. ♀.

Taxonomy: Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1: 238. ♀, ♂.

imbricata Smith. N. Y. to N. S. Host: *Andrena vicina* Sm., *Halictus rubicundus* (Chr.)?
Nomada imbricata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 246. ♀.

Taxonomy: Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey, Bul. 22 (3): 727. ♀.

Morphology: Packard, 1897. N. Y. Ent. Soc., Jour. 5: 83-84.

jocularis Cresson. Nev.
Nomada jocularis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 202. ♀.

laramiensis Swenk. Wyo.
Nomada (Heminomada) laramiensis Swenk, 1913. Nebr. Univ., Studies 12: 75. ♂.

luteola Olivier. East. United States.
Nomada luteola Olivier, 1811. Encycl. Meth., v. 8, p. 365.

maculiventer Swenk. N. Dak.
Nomada (Heminomada) maculiventer Swenk, 1915. Nebr. Univ., Studies 15: 163. ♀, ♂.

miniata Smith. Ga.
Nomada miniata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 250. ♀.

obliterata Cresson. Minn. to N. Y., south to S. C. Host: *Andrena vicina* Sm.
?Nomada pulchella Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 247. ♂.
Nomada obliterata Cresson, 1863. Ent. Soc. Phila., Proc. 2: 301. ♀.
Nomada viburni Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 341. ♂.

ochlerata Mitchell. Mich. (Ann Arbor).
Nomada (?Heminomada) ochlerata Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 396. ♂.

ornithica Cockerell. Colo.
Nomada (Xanthidium) ornithica Cockerell, 1906. Canad. Ent. 38: 161. ♂.

pallidella Cockerell. Colo.
Nomada pallidella Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 82. ♂.

perivincta perivincta Cockerell. Colo.
Nomada (Xanthidium) perivincta Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 80. ♂.

perivincta semirufula Cockerell. Colo.
Nomada (Xanthidium) perivincta var. *semirufula* Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 80. ♀.

placitensis Cockerell. N. Mex.
Nomada placitensis Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 446. ♀.

pseudops Cockerell. Wis. to Mass.
Nomada (Xanthidium) pseudops Cockerell, 1905. Canad. Ent. 37: 189. ♀.

pyrrha Cockerell. Calif.
Nomada (Xanthidium) pyrrha Cockerell, 1916. Pomona Col. Jour. Ent. Zool. 8: 55. ♀.

rhodoxantha Cockerell. Colo.
Nomada (Xanthidium) rhodoxantha Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 78. ♀.

rivalis Cresson. Calif., Wash.
Nomada rivalis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 79. ♂.

Taxonomy: Cockerell, 1910. Psyche 17: 97.

ruidosensis Cockerell. N. Mex., Colo.
Nomada ruidosensis Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 594. ♂.

sanctaecrucis Cockerell. Calif.
Nomada (*Xanthidium*) *sanctaecrucis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 566. ♂.

subrutila Lovell and Cockerell. Mich. to New England, ?Colo.
Nomada (*Xanthidium*) *subrutila* Lovell and Cockerell, 1905. Psyche 12: 40. ♂.

subsimilis Cockerell. Calif.
Nomada (*Xanthidium*) *subsimilis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 567. ♂.

suda Cresson. Nev.
Nomada suda Cresson, 1879. Amer. Ent. Soc., Trans. 7: 203. ♀.

sulphurata Smith. Minn. to Mass., south to Miss. and Ga., ?Utah.
Nomada sulphurata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 249. ♀.
Nomada luteoloides Robertson, 1895. Amer. Ent. Soc., Trans. 22: 124. ♀.

Taxonomy: Rodeck, 1931. Amer. Mus. Novitates 496: 11 (Utah record).

tricurta Swenk. N. Dak.
Nomada (*Heminomada*) *tricurta* Swenk, 1915. Nebr. Univ., Studies 15: 11. ♀, ♂.

truttarum Cockerell. N. Mex.
Nomada (*Xanthidium*) *Truttarum* Cockerell, 1909. Entomologist 42: 94. ♂.

vallesina honorata Cockerell. Colo.
Nomada (*Xanthidium*) *vallesina* var. *honorata* Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 269. ♀.

vallesina vallesina Cockerell. N. Mex., Colo. Host: *Andrena irana* Ckll.?
Nomada vallesina Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 226. ♀.

Biology: Hicks, 1934. Colo. Univ., Studies 21: 267 (host).

vernonensis Cockerell. B. C.
Nomada vernonensis Cockerell, 1916. Canad. Ent. 48: 273. ♂.

xantholepis Cockerell. Colo.
Nomada (*Xanthidium*) *xantholepis* Cockerell, 1911. U. S. Natl. Mus., Proc. 41: 239. ♂.

xanthophila Cockerell. N. Mex.
Nomada xanthophila Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 414. ♂.

xanthura Cockerell. N. Y. to N. S.
Nomada xanthura Cockerell, 1908. Ent. Soc. Wash., Proc. 10: 84. ♀.

Genus NOMADA Subgenus HOLONOMADA Robertson

Holonomada Robertson, 1903. Canad. Ent. 35: 174, 177.
Type-species: *Nomada superba* Cresson. Orig. desig.

Revision: Evans, 1972. Wasmann Jour. Biol. 30: 1-34, 5 figs. (included spp.).

Taxonomy: Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 561-563, 580-588 (part). —Viereck *et al.*, 1905. Canad. Ent. 37: 283-284, 287. —Swenk, 1913. Nebr. Univ., Studies 12: 8, 77-90. —Swenk, 1915. Nebr. Univ., Studies 15: 169-172. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 361-364, fig. 102 (eastern U. S. spp.).

Species Group Edwardsii

edwardsii edwardsii Cresson. B. C., Wash., Colo., Oreg., Calif.; Mexico (Baja California). Host: *Andrena perimelas* Ckll.
Nomada Edwardsii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 72. "♂" = ♀.
Nomada intercepta Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 100. ♂.
Nomada (*Holonomada*) *edwardsii* var. *australior* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 562. ♂.

Biology: Linsley and MacSwain, 1955. Wasmann Jour. Biol. 13: 270-274, pl. 1, fig. 6; pls. 4 and 5 (habits, host).

edwardsii vinnula Cresson. Nev.
Nomada vinnula Cresson, 1879. Amer. Ent. Soc., Trans. 7: 202. ♀, ♂.

henningeri Evans. N. Mex. (Kenne), Tex. (Olney).
Nomada (*Holonomada*) *henningeri* Evans, 1972. Wasmann Jour. Biol. 30: 21. ♀.

linsleyi Evans. Calif. (Auburn and Westley).
Nomada (*Holonomada*) *linsleyi* Evans, 1972. Wasmann Jour. Biol. 30: 26. ♀.

pecosensis Cockerell. N. Mex., Colo.
Nomada xanthophila var. *pecosensis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 585. ♀.

Taxonomy: Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 78. ♂, ♀.

rhodotricha Cockerell. Calif.
Nomada (*Holonomada*) *rhodotricha* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 562. ♀.

Species Group Superba

affabilis affabilis Cresson. Ill. to Mass., south to Fla.
Nomada affabilis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 74. ♂.

Taxonomy: Robertson, 1895. Amer. Ent. Soc., Trans. 22: 123. ♀, ♂.

affabilis dallasensis Cockerell. Tex and Kans. to D. C.
Nomada affabilis dallasensis Cockerell, 1911. U. S. Natl. Mus., Proc 39: 654. ♀, ♂.

grandis Cresson. Colo., Tex.
Nomada grandis Cresson, 1875. Rpt. Geog. Geol. Expl. and Survey West of 100th Meridian, Ch. 7, p. 725. ♀.
Nomada (*Holonomada*) *magnifica* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 587. ♀.

hurdi Evans. Calif. (Joshua Tree Natl. Mon. and Kramer Hills).
Nomada (*Holonomada*) *hurdi* Evans, 1972. Wasmann Jour. Biol. 30: 22, figs. 1-4. ♂.

parkeri Evans. Ariz., N. Mex.
Nomada (*Holonomada*) *parkeri* Evans, 1972. Wasmann Jour. Biol. 30: 28. ♀.

superba malvastri Swenk. Nebr.
Nomada (*Holonomada*) *superba malvastri* Swenk, 1913. Nebr. Univ., Studies 12: 80. ♂.
Nomada (*Holonomada*) *nebrascensis* Swenk, 1913. Nebr. Univ., Studies 12: 80. ♀.

superba superba Cresson. D. C. and N. C., west to Wis. and Colo.
Nomada superba Cresson, 1863. Ent. Soc. Phila., Proc. 2: 281. ♂.

Taxonomy: Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 340. ♂, ♀.

Species Group Unassigned

hemphilli Cockerell. Wash., Idaho, Oreg., Nev., Calif.; Mexico (Baja California).
Nomada (*Holonomada*) *hemphilli* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 561. ♂.
Nomada (*Holonomada*) *excurrens* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 562. ♂.
Nomada (*Nomada?*) *excellens* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 573. ♀.

Genus NOMADA Subgenus LAMINOMADA Rodeck

Nomada subg. *Laminomada* Rodeck, 1947. Ent. Soc. Amer., Ann. 40: 266.
Type-species: *Nomada* (*Holonomada*) *hesperia* Cockerell. Orig. desig. and monotypic.

hesperia falconis Rodeck. Calif.
Nomada (*Laminomada*) *hesperia falconis* Rodeck, 1947. Ent. Soc. Amer., Ann. 40: 270. ♂, ♀.

hesperia hesperia Cockerell. Calif., Oreg., Wash.
Nomada (*Holonomada*) *hesperia* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 563. ♂.
Nomada (*Holonomada*) *flavopicta* Swenk, 1913. Nebr. Univ., Studies 12: 84. ♀.

Taxonomy: Rodeck, 1947. Ent. Soc. Amer., Ann. 40: 266. ♂, ♀.

Genus NOMADA Subgenus PACHYNOMADA Rodeck

Nomada subg. *Pachynomada* Rodeck, 1945. Ent. News 56: 180.
Type-species: *Nomada* (*Holonomada*) *vincta* Say. Orig. desig.

adducta Cresson. Colo., Nebr.
Nomada adducta Cresson, 1878. Amer. Ent. Soc., Trans. 7: 73. ♂.

Taxonomy: Swenk, 1913. Nebr. Univ., Studies 12: 21. ♀.

asteris Swenk. Kans.
Nomada (*Holonomada*) *asteris* Swenk, 1913. Nebr. Univ., Studies 12: 89. ♀.

besseyi Swenk. Kans.
Nomada (*Holonomada*) *besseyi* Swenk, 1913. Nebr. Univ., Studies 12: 85. ♂.

morrisoni flagellaris Cockerell. Colo.
Nomada (*Xanthidium*) *morrisoni flagellaris* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 587. ♀.

morrisoni morrisoni Cresson. Colo. Host: *Andrena irana* Ckll.
Nomada Morrisoni Cresson, 1878. Amer. Ent. Soc., Trans. 7: 72. ♀.

Biology: Hicks, 1934. Colo. Univ., Studies 21: 267 (host).

victrix Cockerell. Tex.
Nomada victrix Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 657. ♀.

vincta heterochroa Cockerell. Colo.
Nomada vincta var. *heterochroa* Cockerell, 1921. Amer. Mus. Novitates 24: 1. ♂.

vincta vincta Say. Kans. and Nebr., east to N. C.
Nomada vincta Say, 1837. Boston Jour. Nat. Hist. 1: 401. ♀ (♂ misdet.).

Taxonomy: Robertson, 1903. Canad. Ent. 35: 177. ♀, ♂. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 379-380 (redescription).

zebrata Cresson. Colo., Kans., Nebr., N. Mex., ?Ariz.
Nomada zebrata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 73. ♀, ♂.

Genus NOMADA Subgenus CALLINOMADA Rodeck

Nomada subg. *Callinomada* Rodeck, 1945. Ent. News 56: 181.
Type-species: *Nomada* (*Holonomada*) *antonita* Cockerell. Orig. desig.

Taxonomy: Rodeck, 1949. Ent. Soc. Amer., Ann. 42: 174-186. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 372-377 (eastern U. S. spp.).

antonita Cockerell. Colo.
Nomada antonita Cockerell, 1909. Canad. Ent. 41: 35. ♂.

aquilarum Cockerell. North. Great Plains, east to Wis. and South. Canada, ?N. Mex.
Nomada aquilarum Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 208. ♂.
Nomada cockerelli Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1: 240. ♂.
Nomada (*Holonomada*) *dacotensis* Swenk, 1913. Nebr. Univ., Studies 12: 88. ♀.

mutans Cockerell. Oreg., Wash.
Nomada (*Holonomada*) *mutans* Cockerell, 1910. Psyche 17: 91. ♀.

placida Cresson. Nebr. to N. Y., south to N. C.
Nomada placida Cresson, 1863. Ent. Soc. Phila., Proc. 2: 291. ♀, ♂.

Taxonomy: Rodeck, 1945. Ent. News 56: 181 (redescription).

rodecki Mitchell. N. C. (Southern Pines).
Nomada (*Callinomada*) *rodecki* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 376. ♂.

snowii Cresson. Colo., Nebr., S. Dak., N. Dak.
Nomada Snowii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 75. ♀, ♂.
Nomada (*Holonomada*) *omahaensis* Swenk, 1915. Nebr. Univ., Studies 15: 171. ♂.

verecunda Cresson. Oreg., Nev., Calif.
Nomada verecunda Cresson, 1879. Amer. Ent. Soc., Trans. 7: 203. ♀, ♂.

Genus NOMADA Subgenus MICRONOMADA Cockerell and Atkins

Nomada subg. *Micronomada* Cockerell and Atkins, 1902. Ann. and Mag. Nat. Hist. (7) 10: 44.
Type-species: *Nomada modesta* Cresson. Orig. desig. and monotypic.
Cephen Robertson, 1903. Canad. Ent. 35: 174, 176.
Type-species: *Nomada texana* Cresson. Orig. desig. and monotypic.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 173. —Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 593 (part), 608-611. —Swenk, 1913. Nebr. Univ., Studies 12: 12, 104-112. —Swenk, 1915. Nebr. Univ., Studies 15: 181-188. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 354-361, figs. 99-101 (eastern U. S. spp.).

amorphae Swenk. Nebr., Colo.
Nomada (*Micronomada*) *amorphae* Swenk, 1913. Nebr. Univ., Studies 12: 108. ♀, ♂.

arenicola Swenk. Nebr.
Nomada (*Micronomada*) *arenicola* Swenk, 1913. Nebr. Univ., Studies 12: 107. ♀, ♂.

belfragei Cresson. Tex., Kans.
Nomada Belfragei Cresson, 1878. Amer. Ent. Soc., Trans. 7: 72. ♀.
Nomada belfragei var. *xanthogaster* Cockerell, 1911. U. S. Nat. Mus., Proc. 39: 644. ♀.

Taxonomy: Swenk, 1915. Nebr. Univ. Studies 15: 184. ♀, ♂.

crucis Cockerell. Ariz., N. Mex., Tex., Colo., Utah.
Nomada crucis Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 212. ♂.

fervida Smith. S. C. to Fla., La.
Nomada fervida Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 247. ♀.
Nomada (*Micronomada*) *crassula* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 610. "♀" = ♂.

formula Viereck. Calif.
Nomada formula Viereck, 1903. Acad. Nat. Sci. Phila., Proc. 54: 728. ♀.

Taxonomy: Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 658. ♂.

garciana Cockerell. N. Mex., Tex.
Nomada (*Micronomada*) *garciana* Cockerell, 1907. Entomologist 40: 265. ♂.

gutierreziae Cockerell. N. Mex., Ariz., Colo.
Nomada gutierreziae Cockerell, 1896. Canad. Ent. 28: 284. ♀.

heiligbrodtii Cresson. Minn. to New England, south to Fla. and Tex.
Nomada Heiligbrodtii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 75. ♀.
Nomada (*Micronomada*) *tiftonensis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 610. ♂.
Nomada (*Micronomada*) *modesta rivertonensis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 610. ♀.

lamarensis Cockerell. Colo., Tex.
Nomada (*Micronomada*) *lamarensis* Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 76. ♂.

Taxonomy: Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 652. ♂, ♀.

limata Cresson. Mexico; Tex.
Nomada limata Cresson, 1878. Amer. Ent. Soc., Trans 7: 76. ♀.

lippiae lippiae Cockerell. N. Mex.
Nomada lippiae Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 214. ♂.

lippiae sublippiae Cockerell. N. Mex.
Nomada lippiae var. *sublippiae* Cockerell, 1907. Entomologist 40: 265. ♂.

melanoptera Cockerell. Colo.
Nomada (*Micronomada*) *melanoptera* Cockerell, 1921. Amer. Mus. Novitates 24: 5. ♀.

mitchelli Cockerell. Tex.
Nomada (*Micronomada*) *mitchelli* Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 654. ♀, ♂.

modesta Cresson. N. Y. to Ala.
Nomada modesta Cresson, 1863. Ent. Soc. Phila., Proc. 2: 286. ♀, ♂.

Nomada (*Micronomada*) *modesta* var. *vegana* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 610. ♀.

Nomada (*Micronomada*) *vegana* var. *nitescens* Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 76. ♀.

neomexicana Cockerell. N. Mex.

Nomada neomexicana Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 209. ♀, ♂.

pallidelutea Swenk. Ariz.; Mexico (Baja California).

Nomada (*Micronomada*) *pallidelutea* Swenk, 1915. Nebr. Univ., Studies 15: 32. ♀, ♂.

Nomada (*Micronomada*) *penisularis* Cockerell, 1925. Pan-Pacific Ent. 1: 180. ♀, ♂.

putnami Cresson. Utah, Colo., Nebr., Kans., N. Mex.

Nomada Putnami Cresson, 1876. Davenport Acad. Nat. Sci., Proc. 1: 210. ♀, "♀" = ♂.

Taxonomy: Swenk, 1913. Nebr. Univ., Studies 12: 111. ♀.

ridingsii Cresson. Colo.

Nomada Ridingsii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 74. ♀.

semisuavis Cockerell. Wash., Calif.

Nomada (*Micronomada*) *semisuavis* Cockerell, 1910. Psyche 17: 92. ♂.

Taxonomy: Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 658. ♀.

simplicicoxa Swenk. Ariz.

Nomada (*Micronomada*) *simplicicoxa* Swenk, 1915. Nebr. Univ., Studies 15: 182. ♀, ♂.

suavis Cresson. Wash., Idaho, Oreg., Calif. Host: *Nomia melanderi* Ckll.

Nomada suavis Cresson, 1878. Amer. Ent. Soc., Trans. 7: 74. ♀ (♂ misdet.).

Nomada flavipes Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 426. ♀.

texana Cresson. Tex. and La. north to Ill., west to Colo., Ariz.

Nomada texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 271. ♀, ♂.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 176. ♀, ♂.

uhleri Cockerell. Colo.

Nomada (*Micronomada*) *uhleri* Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 77. ♂.

vierecki Cockerell. N. Mex., Tex., Colo., Nebr.; Mexico.

Nomada vierecki Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 211. ♀, ♂.

Nomada (*Micronomada*) *vierecki convolvuli* Swenk, 1913. Nebr. Univ., Studies 12: 109. ♀, ♂.

Nomada vierecki race *cushmani* Cockerell, 1926. Ann. and Mag. Nat. Hist. (9) 17: 307.

wheeleri engelmanniae Cockerell. Tex.

Nomada wheeleri engelmanniae Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 649. ♀ (♂ misdet.).

wheeleri wheeleri Cockerell. Tex.

Nomada (*Micronomada*) *wheeleri* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 604. ♀.

wisconsinensis Graenicher. Minn., Wis., Mich., Ill.

Nomada wisconsinensis Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1: 239.

Genus NOMADA Subgenus CENTRIAS Robertson

Centrias Robertson, 1903. Canad. Ent. 35: 174, 176.
Type-species: *Nomada erigeronis* Robertson. Orig. desig.

Taxonomy: Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 588, 591-593, 608-612. —Viereck *et al.*, 1905. Canad. Ent. 37: 283. —Swenk, 1913. Nebr. Univ., Studies 12: 13, 103-104. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 364-365.

erigeronis Robertson. Kans. and Nebr., east to Mass.

Nomada erigeronis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 341. ♀.

Centrias erigerontis(!) Robertson, 1928. Flowers and Insects, Carlinville, Ill., pp. 9, 66, 69.

Taxonomy: Robertson, 1903. Canad. Ent. 35: 176. ♀, ♂.

Genus NOMADA Subgenus NOMADULA Cockerell

Nomada subg. *Nomadula* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 611.

Type-species: *Nomada articulata* Smith. Orig. desig. (=*Nomada americana* "Kirby," Robertson, Cockerell).

Taxonomy: Viereck *et al.*, 1905. Canad. Ent. 37: 285-287. —Swenk, 1913. Nebr. Univ., Studies 12: 13, 101-103. —Swenk, 1915. Nebr. Univ., Studies 15: 25-27. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 365-371 (eastern U. S. spp.).

articulata Smith. N. Dak. and Nebr., east to New England, south to Fla. and La.
?Nomada americana Kirby, 1837. Fauna Bor.-Amer., p. 269. ♀. Type missing; species uncertain.
Nomada articulata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 248. ♂.
Nomada incerta Cresson, 1863. Ent. Soc. Phila., Proc. 2: 309. ♀.
Nomada (*Centrias*) *americana dacotana* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 592. ♂.
Nomada (*Nomada*) *bilobata* Swenk, 1913. Nebr. Univ., Studies 12: 25. ♂, (♀ misdet.).

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 310.

australis Mitchell. Fla. to N. C., N. Y., Ind.
Nomada (*Nomadula*) *australis* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 367. ♀, ♂.

crotchii crotchii Cresson. Calif.
Nomada Crotchii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 81. ♀.

crotchii nigrior Cockerell. Calif.
Nomada (*Xanthidium*) *crotchii* var. *nigrior* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 564. ♀.

Taxonomy: Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 54. ♂.

erythrochroa Cockerell. Wash., Idaho.
Nomada erythrochroa Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 203. ♀.

erythrospila Cockerell. Calif.
Nomada (*Nomada*) *erythrospila* Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 56. ♂.

frankei Cockerell. Colo.
Nomada frankei Cockerell, 1929. N. Y. Ent. Soc., Jour. 37: 443. ♂.

frieseana Cockerell. Colo.
Nomada Frieseana Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 28. ♀.

Taxonomy: Cockerell, 1911. U. S. Natl. Mus., Proc. 41: 237. ♂.

jennei Cockerell. Wash.
Nomada Jennei Cockerell, 1906. Canad. Ent. 38: 281. ♂.

martinella Cockerell. N. Mex., Colo.
Nomada (*Centrias*) *martinella* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 590. ♀.

Taxonomy: Cockerell, 1905. Colo. Agr. Expt. Sta., Bul. 94: 76. ♀, ♂.

melliventris Cresson. Calif.
Nomada melliventris Cresson, 1878. Amer. Ent. Soc., Trans. 7: 82. ♂.

pascoensis Cockerell. Wash., Calif.
Nomada (*Xanthidium*) *pascoensis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 564. ♂.

rohweri aureopilosa Swenk. Colo.
Nomada (*Micronomada*) *aureopilosa* Swenk, 1913. Nebr. Univ., Studies 12: 111. ♀.

Taxonomy: Swenk, 1915. Nebr. Univ., Studies 15: 32.

rohweri rohweri Cockerell. Colo.
Nomada rohweri Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 438. ♀, ♂.

rubicunda Olivier. Minn. to N. Y., south to Fla.
Nomada rubicunda Olivier, 1811. Encycl. Meth., v. 8, p. 365.
Nomada torrida Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 250. ♀.

scita Cresson. Colo., Nebr., N. Dak.
Nomada scita Cresson, 1878. Amer. Ent. Soc., Trans. 7: 77. ♂.

Taxonomy: Swenk, 1915. Nebr. Univ., Studies 15: 181. ♀, ♂.

scitiformis Cockerell. Oreg.
Nomada (*Centrias*) *scitiformis* Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 591. ♂.

semiscita Cockerell. Colo.
Nomada semiscita Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 28. ♂.

seneciophila Mitchell. N. C., Fla.
Nomada (*Nomadula*) *seneciophila* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 370. ♀, ♂.

sophiarum Cockerell. N. Mex.
Nomada sophiarum Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 213. ♂.

Genus HEXEPEOLUS Linsley and Michener

Hexepeolus Linsley and Michener, 1937. Pan-Pacific Ent. 13: 77.
Type-species: *Hexepeolus mojavensis* Linsley and Michener. Orig. desig.

Revision: Linsley and Michener, 1939. Amer. Ent. Soc., Trans. 65: 287-289. —Michener, 1944. Amer. Mus. Nat. Hist., Bul. 82: 274.

mojavensis Linsley and Michener. Calif.
Hexepeolus mojavensis Linsley and Michener, 1937. Pan-Pacific Ent. 13: 78. ♀, ♂.

rhodogyne Linsley and Michener. Calif. Host: *Ancylandrena larreae* Timb.?
Hexepeolus rhodogyne Linsley and Michener, 1937. Pan-Pacific Ent. 13: 80. ♀, ♂.

Genus PARANOMADA Linsley and Michener

Paranomada Linsley and Michener, 1937. Pan-Pacific Ent. 13: 82.
Type-species: *Paranomada nitida* Linsley and Michener. Monotypic and orig. desig.

The species of this genus may be cleptoparasites in the nests of *Exomalopsis*.

Revision: Linsley and Michener, 1939. Amer. Ent. Soc., Trans. 65: 289-291 (genera). —Linsley, 1943. Amer. Ent. Soc., Trans. 69: 103-104 (species keys). —Michener, 1944. Amer. Mus. Nat. Hist., Bul. 82: 274 (genera). —Linsley, 1945. Ent. News 56: 149-151 (species keys).

californica Linsley. Calif.
Paranomada californica Linsley, 1945. Ent. News 56: 149. ♀, ♂.

nitida Linsley and Michener. Ariz.
Paranomada nitida Linsley and Michener, 1937. Pan-Pacific Ent. 13: 83. ♀.

velutina Linsley. Ariz.; Mexico (Baja California).
Paranomada velutina Linsley, 1939. Pan-Pacific Ent. 15: 10. ♂.

Taxonomy: Linsley, 1943. Amer. Ent. Soc., Trans. 69: 105. ♀, ♂.

Genus HESPERONOMADA Linsley

Hesperonomada Linsley, 1939. Pan-Pacific Ent. 15: 5.
Type-species: *Hesperonomada melanantha* Linsley. Monotypic and orig. desig.

Revision: Linsley and Michener, 1939. Amer. Ent. Soc., Trans. 65: 291-292.

melanantha Linsley. Calif. Host: ?*Exomalopsis* spp.
Hesperonomada melanantha Linsley, 1939. Pan-Pacific Ent. 15: 6. ♀, ♂.

Genus TRIOPASITES Linsley

Triopasites Linsley, 1939. Pan-Pacific Ent. 15: 8.
Type-species: *Triopasites timberlakei* Linsley. Monotypic and orig. desig.

Revision: Linsley and Michener, 1939. Amer. Ent. Soc., Trans. 65: 293-294. —Linsley, 1943. Amer. Ent. Soc., Trans. 69: 99-103.

laguna Linsley. Calif.; Mexico (Baja California).
Triopasites laguna Linsley, 1943. Amer. Ent. Soc., Trans. 69: 102. ♂.

micheneri Linsley. Ariz.
Triopasites micheneri Linsley, 1943. Amer. Ent. Soc., Trans. 69: 101. ♀.

pasitura (Cockerell). Tex. Host: *Exomalopsis compactula* (Ckll.)?
Nomada pasitura Cockerell, 1935. Amer. Mus. Novitates 766: 6. ♂.

penniger (Cockerell). N. Mex.
Nomada penniger Cockerell, 1894. Ent. News 5: 235. ♀.

timberlakei Linsley. Calif.
Triopasites timberlakei Linsley, 1939. Pan-Pacific Ent. 15: 9. ♀.

Genus MELANOMADA Cockerell

Melanomada Cockerell, 1903. Acad. Nat. Sci. Phila., Proc. 55: 587.
Type-species: *Nomada grindeliae* Cockerell. Monotypic and orig. desig.

grindeliae (Cockerell). Nebr., Mont.
Nomada grindeliae Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 210. ♂.

heleniella (Cockerell). Tex., Nebr., Kans.
Nomada (*Melanomada*) *heleniella* Cockerell, 1911. U. S. Natl. Mus., Proc. 39: 648. ♀, ♂.

sidaefloris (Cockerell). N. Mex.
Nomada pennigera var. *sidaefloris* Cockerell, 1898. N. Mex. Univ., Bul. 1: 59. ♂.

Subfamily ANTHOPHORINAE

This is a large assemblage of both pollen-collecting and parasitic bees. It is found on all the continents although it is especially well represented in the Holarctic, Ethiopian and Neotropical regions. The current classification recognizes about a dozen tribes of which seven are represented in America north of Mexico. Insofar as known, all of the pollen-collecting species line their cells with a waxlike substance.

Tribe EXOMALOPSINI

This tribe consists of several American genera which are chiefly or entirely Neotropical in occurrence. Only the genera *Ancyloscelis* and *Exomalopsis* extend northward into the United States. Close relatives of the Exomalopsini include two tribes, the Ancylini (*Ancyla* and *Tarsalia*) which inhabit the more arid areas of the Palaearctic and the Tetrapediini (*Tetrapedia*) which live in the tropics of the Neotropical Region. While most of the studied Exomalopsini nest in the ground and are colonial, if not communal, at least some species of the genus *Paratetrapedia*, like the Tetrapediini, make their nests in wood.

Taxonomy: Michener and Moure, 1957. Amer. Mus. Nat. Hist., Bul. 112: 395-452, 91 figs. (generic classification).

Biology: Torchio, 1974. Kans. Ent. Soc., Jour. 47: 54-63, 21 tables (nest architecture, comparative behavior).

Genus EXOMALOPSIS Spinola

Although primarily a genus of Neotropical bees, there are several subgenera represented in America north of Mexico, especially in the more arid areas of the southwestern United States. The species of *Paranomada*, *Hesperonomada* and *Triopasites* may be cleptoparasitic in the nests of these bees.

Revision: Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 85-106. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 235-240, figs. 68-69 (eastern U. S. spp.).

Genus EXOMALOPSIS Subgenus EXOMALOPSIS Spinola

Exomalopsis Spinola, 1853. Accad. Sci. Torino, Mem. (2) 13: 89.
Type-species: *Exomalopsis aureopilosa* Spinola. Desig. by Taschenberg, 1883. (=*Exomalopsis fulvopilosa* Spinola).

?Epimonispractor Holmberg, 1903. Buenos Aires Mus. Nac. de Hist. Nat., An. (3) 2: 426.
Type-species: *Epimonispractor gratiosus* Holmberg. Orig. desig.

birkmanni Cockerell. Tex. Pollen: Unknown, but visits flowers of *Antigonon leptopus*.
Exomalopsis birkmanni Cockerell, 1922. Ann. and Mag. Nat. Hist. (9) 10: 265. ♀.

pulchella Cresson. Southern Fla.; Cuba.
Exomalopsis pulchella Cresson, 1865. Ent. Soc. Phila., Proc. 4: 191. ♀, ♂.

similis Cresson. Southern Fla.; Cuba, Jamaica, Costa Rica. Pollen: Polylectic, visits a wide variety of flowers for nectar and pollen including *Antigonum leptopus, Borreria laevis, Citrus, Cleome, Cocos nucifera, Comelina, Kallstroemia, Ludwigia, Malpighia punicifolia, Mimosa pudica, Piriqueta cistoides, Psidium guajava, Rhynchospora nervosa, Sida, Solanum, Stachytarpheta, Teliostachya alopecuroidea, Trimezia.*
Exomalopsis similis Cresson, 1865. Ent. Soc. Phila., Proc. 4: 191. ♀.
Exomalopsis penelope Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 161. ♀, ♂.
Exomalopsis ogilviei Cockerell, 1938. Entomologist 71: 281. ♀.

Taxonomy: Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 109 (synonymy).

Biology: Raw, 1977 (1976). Biotropica 8:270-277, 2 figs., 2 tables (seasonal changes in numbers and foraging activities).

zexmeniae Cockerell. South. Tex. to Panama. Pollen: Collects pollen from flowers of grasses, composites and Solanaceae.
Exomalopsis zexmeniae Cockerell, 1912. Ent. News 23: 447. ♀.
Exomalopsis azulensis Cockerell, 1949. U. S. Natl. Mus., Proc. 98: 451. ♀.

Taxonomy: Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 108, figs. 62-64 (synonymy, taxonomic characters, floral relationships).

Genus EXOMALOPSIS Subgenus PHANOMALOPSIS Michener and Moure

Exomalopsis subg. *Phanomalopsis* Michener and Moure, 1957. Amer. Mus. Nat. Hist., Bul. 112: 430.
Type-species: *Exomalopsis jenseni* Friese. Orig. desig.

snowi Cockerell. South. Tex.
Exomalopsis snowi Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 18: 73. ♂.

solani Cockerell. Tex., N. Mex., Colo (Pueblo), Ariz.; Mexico (Zacatecas). Pollen: Polylege of a wide variety of flowers including *Acacia, Baileya, Cassia, Chrysothamnus, Chilopsis linearis, Cleome, Croton, Eriogonum, Flaveria, Haplopappus, Kallstroemia, Larrea, Petalostemon, Solanum, Sphaeralcea, Verbesina.*
Exomalopsis solani Cockerell, 1896. Canad. Ent. 28: 25. ♀.

Biology: Linsley, MacSwain and Smith, 1954. South. Calif. Acad. Sci., Bul. 55: 83-101. —Linsley, MacSwain and Smith, 1954. Pan-Pacific Ent. 30: 263-264 (nest). —Michener, 1966. Kans. Ent. Soc., Jour. 39: 315-317 (cooperative nest provisioning). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 40 (nest sites, floral relationships).

solidaginis Cockerell. N. Mex., Ariz., south. Calif., desert. Pollen: Unknown, but visits flowers of *Gutierrezia lucida, Heterotheca, Lippia wrightii, Solidago canadensis arizonica.*
Exomalopsis solidaginis Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 452. ♂.
Exomalopsis verbesinae Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 21. ♀.

Taxonomy: Cockerell, 1907. Ann. and Mag. Nat. Hist. (7) 19: 539. ♀, ♂.

Genus EXOMALOPSIS Subgenus ANTHOPHORULA Cockerell

Anthophorula Cockerell, 1897. N. Mex. Agr. Expt. Sta., Bul. 24: 44.
Type-species: *Anthophorula compactula* Cockerell. Monotypic.
Diadasiella Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 64.
Type-species: *Synhalonia albicans* Provancher. Monotypic and orig. desig. (=*Diadasiella coquilletti* Ashmead).
Exomalopsis subg. *Pachycerapis* Cockerell, 1922. Amer. Mus. Novitates 47: 4.
Type-species: *Exomalopsis cornigera* Cockerell. Orig. desig.

albata Timberlake. Utah., Ariz., south. Calif., desert. Pollen: Unknown, but visits flowers of *Eriogonum fasciculatum, E. reniforme, E. trichopes, Gutierrezia lucida.*
Exomalopsis (*Anthophorula*) *albata* Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 92. ♀, ♂.

albicans (Provancher). Oreg., Calif. Pollen: Unknown, but visits flowers of *Brassica campestris, B. incana, Cryptantha intermedia, Eriastrum, Eriogonum fasciculatum, Euphorbia, Eschscholzia californica, Stephanomeria virgata, Trichostema lanceolatum.*
Synhalonia albicans Provancher, 1896. Nat. Canad. 23: 27. ♂.
Diadasiella coquilletti Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 64. ♂.

albovestita Timberlake. South. Calif., desert. Pollen: Unknown, but visits flowers of *Cryptantha barbigera, Dalea emoryi, Eriogonum trichopes, Petalonyx thurberi.*
Exomalopsis (Anthophorula) albovestita Timberlake. 1947. N. Y. Ent. Soc., Jour. 55: 98. ♂.

cerei Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Cereus engelmanni.*
Exomalopsis (Anthophorula) cerei Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 100. ♀.

compactula (Cockerell). Tex., N. Mex., Ariz. Parasite: *Triopasites pasitura* (Ckll.)? Pollen: Unknown, but visits flowers of *Aplopappus spinulosus, Convolvulus hermannioides, Dithyraea wislizenii, Grindelia, Phacelia congesta, Verbesina.*
Anthophorula compactula Cockerell, 1897. N. Mex. Agr. Expt. Sta., Bul. 24: 44. ♀.

Taxonomy: Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 415. ♀, ♂.

completa Cockerell. Tex., N. Mex. Pollen: Unknown, but visits flowers of *Convolvulus hermannioides, Phacelia congesta.*
Exomalopsis (Anthophorula) compactula var. *completa* Cockerell, 1935. Amer. Mus. Novitates 766: 5. ♀, ♂.

cornigera Cockerell. Ariz.
Exomalopsis (Pachycerapis) cornigera Cockerell, 1922. Amer. Mus. Novitates 47: 5. ♂.

deserticola Timberlake. South. Calif., desert. Pollen: Unknown, but visits flowers of *Asclepias erosa, Chilopsis linearis, Cleomella obtusifolia, Eriogonum reniforme, Heliotropium spathulatum.*
Exomalopsis (Anthophorula) deserticola Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 95. ♀, ♂.

eriogoni Timberlake. South. Calif., deserts. Pollen: Unknown, but visits flowers of *Cleomella obtusifolia, Eriogonum reniforme, E. trichopes, Heliotropium spathulatum, Hugelia virgata, Pectis papposa.*
Exomalopsis (Anthophorula) eriogoni Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 94. ♀, ♂.

euphorbiae Timberlake. Ariz., Calif. Pollen: Unknown, but visits flowers of *Boerhaavia, Euphorbia.*
Exomalopsis (Anthophorula) euphorbiae Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 102. ♀, ♂.

gutierreziae Timberlake. Ariz. Pollen: Unknown, but visits flowers of *Gutierrezia.*
Exomalopsis (Anthophorula) gutierreziae Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 97. ♀.

palmarum Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Eriogonum inflatum.*
Exomalopsis (Anthophorula) palmarum Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 99. ♂.

rufiventris Timberlake. West. Tex., Ariz. Pollen: Unknown, but visits flowers of *Boerhaavia, Tidestromia lanuginosa.*
Exomalopsis (Anthophorula) rufiventris Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 101. ♀, ♂.

torticornis Cockerell. South. Calif. Pollen: Collects pollen from flowers of *Hugelia virgata,* but also visits flowers of *Calochortus kennedyi, Centaurea melitensis, Chaenactis glabriuscula, Chorizanthe parryi, Convolvulus arvense, Cryptantha intermedia, Encelia farinosa, Eriogonum fasciculatum polifolii, Eschscholzia californica, Gutierrezia californica, Hemizonia tenella, Lotus scoparius, L. strigosus, Marrubium vulgare, Mentzelia lindleyi, Navarretia intertexta, Opuntia vaseyi, Sphaeralcea ambigua.*
Exomalopsis torticornis Cockerell, 1927. Ent. Soc. Amer., Ann. 20: 399. ♂.

Biology: Hicks, 1936. Canad. Ent. 68: 47 (nest).

varleyi Timberlake. South. Calif., desert (Warren's Well).
Exomalopsis (Anthophorula) varleyi Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 96. ♂.

Genus EXOMALOPSIS Subgenus ANTHOPHORISCA Michener and Moure

Exomalopsis subg. *Anthophorisca* Michener and Moure, 1957. Amer. Mus. Nat. Hist., Bul. 112: 433.
Type-species: *Melissodes pygmaea* Cresson. Orig. desig.

asteris Mitchell. Tex., Ind. Pollen: Unknown, but visits flowers of *Aster*.
Exomalopsis (*Anthophorisca*) *asteris* Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 236, fig. 68. ♀, ♂.

chionura Cockerell. Cent. Calif. Pollen: Stores pollen of *Grindelia camporum*.
Exomalopsis (*Anthophorula*) *chionura* Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 203. ♀, ♂.

Taxonomy: Rozen, 1957. Ent. Soc. Amer., Ann. 50: 469-475 (larva).

Biology: Rozen and MacNeill, 1957. Ent. Soc. Amer., Ann. 50: 522-529 (nest, life history).

chlorina Cockerell. N. Mex. Pollen: Unknown, but visits flowers of *Sphaeralcea*.
Exomalopsis chlorina Cockerell, 1918. Ann. and Mag. Nat. Hist. (9) 2: 477. ♀.

micheneri Timberlake. Miss. Pollen: Unknown, but visits flowers of *Gerardia*.
Exomalopsis (*Anthophorula*) *micheneri* Timberlake, 1947. N. Y. Ent. Soc., Jour. 55: 105. ♀, ♂.

morgani (Cockerell). Tex. Pollen: Unknown, but visits flowers of *Helianthus*.
Anthophorula morgani Cockerell, 1914. Entomologist 47: 114. ♀.

nitens Cockerell. South. Calif. Pollen: Unknown, but visits flowers of *Aster*, *Calochortus* splendens, *Calycadenia multiglandulosa*, *Chlorogalum parviflorum*, *Brodiaea crocea*, *B. isioides*, *Grindelia camporum*, *G. rubriflorum*, *Hemizonia fasciculata*, *Lessingia germanorum*, *Lotus scoparius*, *Malacothamnus arcuatus*, *Malvastrum fasciculatum*, *Navarretia heterodoxa*, *Opuntia littoralis*, *O. parryi*.
Exomalopsis nitens Cockerell, 1915. Pomona Col. Jour. Ent. Zool. 7: 231. ♀.

pygmaea (Cresson). Nebr., Colo., Tex. Pollen: Unknown, but visits flowers of *Helianthus annuus*.
Melissodes pygmaea Cresson, 1872. Amer. Ent. Soc., Trans. 4: 279. ♀.
Exomalopsis Bruneri Crawford, 1902. Canad. Ent. 34: 238. ♀, ♂.

Biology: Schwarz, 1896. Ent. Soc. Wash., Proc. 4: 24-26 (sleeping habits).

sidae Cockerell. Tex., N. Mex., Ariz., South. Calif., Mexico (Baja California). Pollen: Apparently an oligolege of the Malvaceae, visiting flowers of *Sida hederacea*, *Sphaeralcea*.
Predator: *Philanthus arizonicus* Bohart.
Exomalopsis sidae Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 160. ♀, ♂.

texana Friese. Tex. Pollen: Unknown, but visits flowers of *Helenium tenuifolium*.
Exomalopsis texana Friese, 1899. K. K. Naturhist. Hofmus., Ann. 14: 264. ♀, ♂.

Genus ANCYLOSCELIS Latreille

Ancyloscelis Latreille, 1829. *In* Cuvier, Le Regne Animal, ed. 2, v. 5, p. 355.
Type-species: *Ancylosceles ursinus* Haliday. First included species.
Ancylosceles(!) Haliday, 1837. Linn. Soc. London, Trans. 17: 320.
Dipedia Friese, 1906. Flora og Fauna, v. 8, p. 92.
Type-species: *Ancyloscelis armatus* Smith. Desig. by Lutz and Cockerell, 1920 (=*Chalcis apiformis* Fabricius).

All species visit flowers of *Ipomoea* for pollen and nectar, but also visit flowers of other plants for nectar.

Revision: Michener, 1942. Pan-Pacific Ent. 18: 108-113.

apiformis (Fabricius). Brazil to Tex. Parasite: *Anthrax limatulus* Say, *Monodontomerus mexicanus* Gahan, *Trophocleptria schraderi* Mich.?
Chalcis apiformis Fabricius, 1793. Ent. System., p. 195. ♂.
Ancyloscelis armatus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 367. ♂.
Nomia tarsalis Westwood, 1875. Ent. Soc. London, Trans. p. 221, pl. 5, fig. 5.
Melissodes toluca Cresson, 1878. Acad. Nat. Sci. Phila., Proc., p. 219. ♀ (♂ misdet.).

Exomalopsis chionocincta Cockerell, 1949. U. S. Natl. Mus., Proc. 98: 453. ♀.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 325. —Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 110, figs. 50-52 (synonymy, characters). —Moure, 1960. Studia Ent. 3: 114-115 (synonymy, notes on type).

Biology: Michener, 1974. Kans. Ent. Soc., Jour. 47: 19-22, 4 figs. (nest architecture, nests intermingled with nests of *Melitoma ?euglossoides;* reported as *?armatus*). —Torchio, 1974. Kans. Ent. Soc., Jour. 47: 54-63, 2 tables (nest architecture, nests intermingled with nests of *Melitoma ?euglossoides,* life history, associates; reported as *?armatus*).

sejunctus Cockerell. Tex., Colo., Ariz.
Ancylosceles sejuncta Cockerell, 1933. Amer. Mus. Novitates 595: 1. ♂.
Ancylosceles maculifera Cockerell, 1934. Amer. Mus. Novitates 697: 8. ♂.

Taxonomy: Cockerell, 1935. Amer. Mus. Novitates 766: 4. ♀.

Tribe MELITOMINI

This tribe is found only in the New World and is represented in America north of Mexico by the genera *Diadasia, Melitoma* and *Ptilothrix.* Although species of these genera occupy both continents, only the genus *Diadasia* contains numerous species in the more arid parts of North and South America. As a group the Melitomini have established a specialized dependency upon the pollens of a limited number of plant families including notably only certain genera in the Cactaceae, Compositae, Convolvulaceae, Malvaceae and Onagraceae.

Taxonomy: Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 128 (generic classification).

Biology: Linsley, MacSwain and Smith, 1956. South. Calif. Acad. Sci., Bul. 55: 83-101, pl. 26 (biological characters). —Linsley and MacSwain, 1952. Calif. Univ. Pubs. Ent. 9: 267-290, pls. 1-6 (biological relationships with Anthophorini).

Genus PTILOTHRIX Smith

Ptilothrix Smith, 1853. Cat. Hym. Brit. Mus., v. 1, p. 131.
Type-species: *Ptilothrix plumatus* Smith. Monotypic.
Ptilothryx Marschall, 1873. Nomenclator Zoologicus, p. 269. Emend.
Emphor Patton, 1879. U. S. Geol. Geog. Survey, Bul. 5: 476.
Type-species: *Melissodes bombiformis* Cresson. Monotypic and orig. desig.
Energoponus Holmberg, 1903. Mus. Nac. Buenos Aires, An. (3) 2: 406.
Type-species: *Ptilothrix plumatus* Smith. Desig. by Sandhouse, 1943.
(=*Energoponus strenuus* Holmberg).

Taxonomy: Moure, 1947. Soc. Ent. Argentina, Rev. 13: 24 (synonymy).

bombiformis (Cresson). Kans. and Ill. to N. J., south to Tex. and Fla.; Mexico. Pollen: Stores pollen of *Hibiscus,* but also visits flowers of *Althaea, Cephalanthus, Cirsium, Ipomoea, Verbena, Vernonia* for nectar.
Melissodes bombiformis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 219. ♀, ♂.
Emphor fuscojubatus Cockerell, 1913. Psyche 20: 107. ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1075, figs. 212-218 (larva). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 240-242, fig. 67 (synonymy, redescription).

Biology: Robertson, 1890. Canad. Ent. 22: 217. —Knab, 1911. Ent. Soc. Wash., Proc. 13: 170. —Grossbeck, 1911. N. Y. Ent. Soc., Jour. 19: 238. —Nichols, 1913. Psyche 20: 107 (as *fuscojubatus*). —Robertson, 1914. Ent. News 25: 70. —Robertson, 1918. Canad. Ent. 50: 320. —Robertson, 1925. Psyche 32: 278. —Davis, 1926. Brooklyn Ent. Soc., Bul. 21: 127. —Rau, 1930. Brooklyn Ent. Soc., Bul. 25: 28. —Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 222. —Michener, 1947. Amer. Midland Nat. 38: 451 (habits).

sumichrasti (Cresson). Ariz. (Marana and Sahuarita); Mexico. Parasite: *Dasymutilla connectens* (Cameron)?, *D. eminentia* Mickel?, *D. foxi* (Ckll.)?, *D. phoenix* (Fox)?, *Lytta variabilis* Duges, *Nemognatha chrysomeloides* L., *Pseudomethoca praeclara* (Blake)?, Pollen: Stores pollen of *Gossypium* (cultivated), *Ipomoea longifolia, I. pringlei,*

Kallstroemia grandiflora, but visits other flowers like *Tribulus terrestis* presumably for nectar.

Melissodes sumichrasti Cresson, 1878. Acad. Nat. Sci. Phila., Proc., p. 218. ♀, ♂.

Biology: Linsley, MacSwain and Smith, 1956. South. Calif. Acad. Sci., Bul. 55: 83-101, pl. 26, figs. 5, 10 (nest, larva, life history). —Butler, 1967. Pan-Pacific Ent. 43: 8-14 (nest, life history). —Cazier and Linsley, 1974. Amer. Mus. Novitates 2546: 13 (nest site, floral relationships).

Genus DIADASIA Patton

Diadasia Patton, 1879. U. S. Geol. Geog. Survey, Bul. 5: 475.
Type-species: *Melissodes enavata* Cresson. Orig. desig.

Dasiapis Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 450.
Type-species: *Dasiapis ochracea* Cockerell. Monotypic.

Leptometria Holmberg, 1903. Mus. Nac. Buenos Aires, An. (3) 2: 409.
Type-species: *Leptometria pereyrae* Holmberg. Desig. by Brethes, 1910.

Coquillettapis Viereck, 1909. Ent. Soc. Wash., Proc. 11: 47.
Type-species: *Melissodes nigrifrons* Cresson. Monotypic and orig. desig. (=*Coquillettapis melittoides* Viereck).

Diadasina Moure, 1950. Dusenia 1: 392.
Type-species: *Melitoma paraensis* Ducke. Orig. desig.

Diadasiana(!) Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 129.

Bees of this genus occur only in the Americas and are distributed chiefly in the warm temperate areas of North and South America, although a few species are present in the moist tropics. The species are oligolectic, obtaining pollen primarily from the Malvaceae (*Callirhoe, Sida, Sidalcea, Sphaeralcea*), Convolvulaceae (*Calystegia, Convolvulus*), Compositae (*Helianthus*), Cactaceae (*Opuntia*) and the Onagraceae (*Clarkia*). The known parasites include species of the family Bombyliidae (*Anthrax, Villa*), Meloidae (*Lytta, Tetraonyx*), Mutillidae (*Dasymutilla, Sphaeropthalma*), and Rhipiphoridae (*Rhipiphorus*). The bee genus *Protepeolus* is a cleptoparasite of at least one species of *Diadasia*.

Revision: Cockerell, 1905. Amer. Nat. 39: 741-743. —Timberlake, 1941. Brooklyn Ent. Soc., Bul. 36: 2-11 (key).

Taxonomy: Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 129-131, table 2 (synonymy, subgeneric characters).

Biology: Lutz and Cockerell, 1920. Amer. Mus. Nat. Hist., Bul. 42:583-587 (floral and seasonal records). —Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 199-235, 2 pls., 2 tables (nesting habits, nest architecture, floral relationships, parasites). —Linsley and MacSwain, 1958. Evolution 12: 219-223 (floral constancy). —Schlissing, 1970. Ecology 51: 1061-1067 (sequence and timing of foraging). —Cazier and Linsley, 1974. Amer. Mus. Novitates 2546: 14 (floral relationships). —Eickwort, Eickwort and Linsley, 1977. Kans. Ent. Soc., Jour. 50:1-17, 9 figs., 3 tables (nest aggregations).

afflicta afflicta (Cresson). N. Mex., Tex. Pollen: Collects pollen from flowers of *Callirhoe*.
Melissodes afflicta Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 217. ♀, ♂.

Biology: Snyder, Barrows and Chabot, 1976. Kans. Ent. Soc., Jour. 49: 200-203, 2 figs. (nest architecture, pollen mass, insertion of egg).

afflicta perafflicta Cockerell. Kans. Pollen: Collects pollen from flowers of *Callirhoe*.
Diadasia afflicta perafflicta Cockerell, 1905. Amer. Nat. 39: 744. ♂, ♀.

afflictula Cockerell. N. Mex.
Diadasia afflictula Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 366. ♂.

albovestita Provancher. Calif.
Diadasia albovestita Provancher, 1896. Nat. Canad. 23: 27. ♀.
Didasia(!) *alboresta*(!) Fowler, 1899. Canad. Ent. 31: 285.

angusticeps Timberlake. Calif. Pollen: Collects pollen from flowers of *Clarkia*.
Diadasia angusticeps Timberlake, 1939. Brooklyn Ent. Soc., Bul. 34: 15. ♂, ♀.

Biology: Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 201 (flower relationships). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 26-29 (flower relationships).

australis australis (Cresson). Colo., N. Mex., Tex., Ariz. Pollen: Collects pollen from flowers of *Opuntia*.

Melissodes australis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 214. ♀, ♂.

australis californica Timberlake. Calif., Colo., N. Mex., Calif.; Mexico (Zacatecas). Pollen: Collects pollen from flowers of Cactaceae, principally *Opuntia*. Other subspecies of *australis* are known from Mexico.

Diadasia australis californica Timberlake, 1940. Brooklyn Ent. Soc., Bul. 35: 28. ♀, ♂.

Biology: Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 201-203.

bituberculata (Cresson). Calif. Parasite: *Lytta melaena* (LeC.), *Rhipiphorus diadasiae* Linsley and MacSwain, *Sphaeropthalma auraria* (Blake), *S. unicolor* (Cress.), *Villa apicola* Cole, *V. tricellula* Cole. Pollen: Collects pollen from flowers of the introduced *Convolvulus arvensis* as well as from the native species of *Calystegia* and *Convolvulus*.

Melissodes bituberculata Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 218. ♂.

Didasia(!) *cinerea* Fowler, 1899. Canad. Ent. 31: 285. ♂.

Biology: Linsley and MacSwain, 1952. Pan-Pacific Ent. 28: 131-135. —Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 203. —Schlising, 1972. Pan-Pacific Ent. 48: 175-188, 1 fig., 3 tables (foraging and nest provisioning behavior).

consociata Timberlake. Calif., Nev., Ariz. Parasite: *Anthrax nidicola* Cole, *Rhipiphorus dammersi* Barber, *R. smithi* Linsley and MacSwain, *Villa apicola* Cole. Pollen: Collects pollen principally from flowers of *Sida* and may also collect pollen from flowers of *Sphaeralcea*.

Diadasia consociata Timberlake, 1939. Brooklyn Ent. Soc., Bul. 34: 11. ♂, ♀.

Biology: Linsley, MacSwain and Smith, 1952. Calif. Univ. Pubs. Ent. 9: 267-290, 6 pls. (bionomics). —Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 203, 205, pl. 1, fig. 1 (nesting habits, flower relationships, parasites).

diminuta (Cresson). B. C. to Calif., east to Nebr., Kans. and Tex.; Mexico. Ecology: Nests are sometimes usurped by *Osmia seclusa* Sandhouse. Parasite: *Dasymutilla foxi* (Ckll.), *Rhipiphorus sexdens* Linsley and MacSwain, *Villa perplexa* (Coq.). Pollen: Collects pollen from flowers of *Sphaeralcea* and *Kallstroemia grandiflora*.

Melissodes diminuta Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 215. ♂.

Melissodes apacha Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 217. ♀.

Biology: Bohart, 1955. Ent. Soc. Wash., Proc. 57:235-236 (nest usurpation). —Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 205-211, pl. 2. (nesting habits, flower relationships, parasites). —Eickwort, Eickwort and Linsley, 1977. Kans. Ent. Soc., Jour. 50:1-17, 9 figs., 3 tables (nest aggregation, life history).

enavata (Cresson). Kans., Colo., N. Mex., Tex., Utah, Ariz., Calif.; Mexico. Parasite: *Anthrax nidicola* Cole, *Dasymutilla fulvohirta* (Cress.). Pollen: Collects pollen from flowers of Compositae, principally those of *Helianthus*. *Diadasia tricincta* listed in synonymy below is almost certainly a synonym of *Synhalonia actuosa* (Cress.), see Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 13.

Melissodes enavata Cresson, 1872. Amer. Ent. Soc., Trans. 4: 280. ♀.

Melissodes ?ursina Cresson, 1872. Amer. Ent. Soc., Trans. 4: 281. ♂.

Melissodes densa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 282. ♂.

Eucera arctos Dalla Torre, 1896. Cat. Hym., v. 10, p. 225. Proposed to replace *ursina*, preoccupied in *Eucera* in Dalla Torre's sense.

?Diadasia 3-cincta Provancher, 1896. Nat. Canad. 23: 28. ♀.

?Diadasia tricincta Fowler, 1899. Canad. Ent. 31: 286. Emend.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1075, figs. 206-211 (larva).

Biology: Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 212, pl. 1, fig. 5 (nesting habits, flower relationships, parasites).

friesei Cockerell. ?Calif., Ariz.

Diadasia friesei Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 192. ♀.

laticauda Cockerell. Calif. Pollen: Collects pollen from flowers of *Malvastrum* and *Sphaeralcea*.
Diadasia laticauda Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 103. ♀.
Diadasia crassicauda Cockerell, 1915. Pomona Jour. Ent. Zool. 7: 231. ♂.

Biology: Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 219 (floral relationships).

lutzi deserticola Timberlake. Calif. (Chocolate Mts.). Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia lutzi deserticola Timberlake, 1940. Brooklyn Ent. Soc., Bul. 35: 23. ♂, ♀.

lutzi difficilis Timberlake. Ariz., Calif.; Mexico (Baja California). Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia lutzi difficilis Timberlake, 1940. Brooklyn Ent. Soc., Bul. 35: 22. ♂, ♀.

lutzi lutzi Cockerell. Wyo., N. Mex., Ariz., Calif.; Mexico (Baja California). Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia lutzi Cockerell, 1924. Amer. Mus. Novitates 113: 2. ♂, ♀.

Biology: Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 212-213, pl. 1, fig. 3 (nesting habits, flower relationships).

martialis Timberlake. South. Calif., Ariz.; Mexico (Baja California). Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia martialis Timberlake, 1940. Brooklyn Ent. Soc., Bul. 35: 25. ♂, ♀.

megamorpha Cockerell. N. Mex. Pollen: Collects pollen from flowers of *Sphaeralcea* and *Kallstroemia grandiflora*.
Diadasia megamorpha Cockerell, 1898. Amer. Ent. Soc., Trans. 25: 192. ♂, ♀.

nigrifrons (Cresson). Idaho, Calif. Pollen: Collects pollen from flowers of *Sidalcea*.
Melissodes nigrifrons Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 195. ♀.
Didasia(!) *nerea* Fowler, 1899. Canad. Ent. 31: 285. ♀, ♂.
Coquillettapis melittoides Viereck, 1909. Ent. Soc. Wash., Proc. 11: 48. ♀.
Diadasia nigrifrons var. *epileuca* Cockerell, 1925. Calif. Acad. Sci., Proc. (4) 14: 203. ♀.

Biology: Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 215.

nitidifrons Cockerell. Wash., Calif., Utah. Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia nitidifrons Cockerell, 1905. South. Calif. Acad. Sci., Proc. 4: 104. ♂.
Diadasia skinneri Cockerell, 1909. Ent. News 20: 206. ♂.

Taxonomy: Michener, 1947. Ann. and Mag. Nat. Hist. (10) 19: 403. ♀.

Biology: Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 215.

ochracea (Cockerell). Wash., Calif., Ariz., Colo., N. Mex., Tex.; Mexico (Zacatecas). Parasite: *Protepeolus singularis* Linsley and Michener, *Rhipiphorus sexdens* Linsley and MacSwain, *Sparnoplius brevicornis* Loew. Pollen: Collects pollen from flowers of *Sphaeralcea* and *Kallstroemia grandiflora*. *Diadasia olivacea* (Cresson, 1878. Acad. Nat. Sci., Phila., Proc. 30: 216), described from Mexico, may be a senior synonym according to Timberlake (1957. *In* Linsley and MacSwain, Wasmann Jour. Biol. 15:215); however, Krombein (1967. U. S. Dept. Agr., Agr. Monog. 2, suppl. 2: 502) deletes the species from the fauna of America north of Mexico. The type of *D. olivacea* was collected by Sumichrast who made his collections of Hymenoptera in the environs of Orizaba and Cordoba (see Cresson, 1868. Amer. Ent. Soc., Trans. 2: 1). This is well to the south of the known southernmost occurrence (Zacatecas) of *D. ochracea*. The types of *D. olivacea* and *D. ochracea*, both males, must be reexamined in order to determine the validity of the proposed synonymy.
Dasiapis ochracea Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 450. ♂.
Diadasia blaisdelli Cockerell, 1924. Pan-Pacific Ent. 1: 54. ♀.

Biology: Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 215-217, pl. 1, fig. 4. —Eickwort, Eickwort and Linsley, 1977. Kans. Ent. Soc., Jour. 50:1-17, 9 figs., 1 table (nest aggregations, nest architecture, life history, parasites, as *olivacea*).

opuntiae Cockerell. Coastal south. Calif. Pollen: Collects pollen from flowers of *Opuntia*.
Diadasia rinconis opuntiae Cockerell, 1901. Canad. Ent. 33: 286. ♀.

palmarum Timberlake. South. Calif. desert. Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia palmarum Timberlake, 1940. Brooklyn Ent. Soc., Bul. 35: 27. ♂, ♀.

piercei Cockerell. Tex., Ariz.
Diadasia piercei Cockerell, 1911. Canad. Ent. 43: 132. ♂, ♀.

rinconis mimetica Cockerell. Calif. (isl. off coast). Pollen: Collects pollen from flowers of *Opuntia*. Another subspecies (*petrina*) is known from Baja California.
Diadasia australis mimetica Cockerell, 1924. Pan-Pacific Ent. 1: 53. ♀.

rinconis rinconis Cockerell. Tex., N. Mex., Ariz., Calif.; Mexico (Baja California). Pollen: Collects pollen from flowers of *Opuntia*.
Diadasia rinconis Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 154. ♀.
Diadasia rinconi(!) Snow, 1906. Kans. Acad. Sci., Trans. 20: 137.

sphaeralcearum affinis Timberlake. Tex. to south. Calif. and Nev. Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia sphaeralcearum affinis Timberlake, 1939. Brooklyn Ent. Soc., Bul. 34: 14. ♂, ♀.

sphaeralcearum sphaeralcearum Cockerell. N. Mex., Ariz. Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia sphaeralcearum Cockerell, 1905. Amer. Nat. 39: 744. ♂.

Taxonomy: Michener, 1937. Ann. and Mag. Nat. Hist. (10) 19: 403. ♀.

tuberculifrons Timberlake. Ariz., Calif., Nev. Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia tuberculifrons Timberlake, 1939. Brooklyn Ent. Soc., Bul. 34: 13. ♂, ♀.

vallicola Timberlake. Ariz., Calif.; Mexico (Baja California). Parasite: *Rhipiphorus diadasiae* Linsley and MacSwain, *Sphaeropthalma blakei* Fox, *Villa* sp. near *flavipilosa* Cole. Pollen: Collects pollen from flowers of *Sphaeralcea*.
Diadasia vallicola Timberlake, 1940. Brooklyn Ent. Soc., Bul. 35: 24. ♂.

Biology: Hall and Hurd *In* Linsley and MacSwain, 1957. Wasmann Jour. Biol. 15: 217-218 (nest, parasites).

vestita Timberlake. N. Mex. (Rio Puerco in Bernalillo Co.).
Diadasia vestita Timberlake, 1956. Pan-Pacific Ent. 32: 91. ♂.

Genus MELITOMA Lepeletier and Serville

Melitoma Lepeletier and Serville, 1828. Encycl. Meth., Hist. Nat. Ins., v. 10, p. 529.
Type-species: *Melitoma euglossoides* Lepeletier and Serville. Monotypic.
Entechnia Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 476.
Type-species: *Anthophora taurea* Say. Monotypic and orig. desig.
Meliphila Schrottky, 1902. Buenos Aires Mus. Nac. de Hist. Nat. An. 7: 310.
Type-species: *Apis segmentaria* Fabricius. Monotypic and orig. desig. (=*Meliphila ipomoeae* Schrottky and *Melitoma euglossoides* Lepeletier and Serville).

All species visit flowers of *Ipomoea* for pollen and nectar, but also visit a wide variety of other flowers for nectar.

grisella (Cockerell and Porter). N. Dak., Nebr., Kans., Colo., N. Mex.
Entechnia grisella Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 409. ♂.
Entechnia dakotensis Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 409. ♀.

Biology: Hungerford and Williams, 1912. Ent. News 23: 258. —Cockerell, 1934. Amer. Mus. Novitates 697: 10. —Linsley, 1960. N. Y. Ent. Soc., Jour. 68: 17-18 (floral relationships).

segmentaria (Fabricius). Tex. to Argentina. Parasite: *Anthrax cintalapa* Cole, *Monodontomerus mandibularis* Gahan, *Trophocleptria schraderi* Michener?
Apis segmentaria Fabricius, 1804. Systema Piezatorum, p. 371. ♀.
Melitoma euglossoides Lepeletier and Serville, 1828. Encyl. Meth., Hist. Nat. Ins. v. 10, p. 529.
Anthophora fulvifrons Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 341.
Melissodes? marginella Cresson, 1872. Amer. Ent. Soc., Trans. 4: 282. ♂, ♀.
Meliphilia ipomoeae Schrottky, 1902. Mus. Nac. Buenos Aires, An. 7: 311.

Taxonomy: Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 131-132, figs. 89-91 (genitalia). —Moure, 1960. Studia Ent. 3: 115-116 (synonymy, notes on types).

Biology: Linsley, MacSwain and Smith, 1956. South Calif. Acad. Sci. Bul. 55: 94, figs. 6, 11 (larva). —Michener, 1974. Kans. Ent. Soc., Jour. 47: 19-22 (intermingled nests with *Ancyloscelis ?apiformis*, reported as *?armatus*). —Torchio, 1974: Kans. Ent. Soc., Jour. 47: 54-63, 2 tables (nest association with *Ancyloscelis ?armatus*).

taurea (Say). N. J. to Fla., west to Ill., Kans. and Mo. Parasite: *Monodontomerus mandibularis* Gahan, *Triepeolus donatus* (Sm.).
Anthophora taurea Say, 1837. Boston Jour. Nat. Hist. 1: 410. ♂, ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 242-244, figs. 7-8 (redescript.).

Biology: Walsh, 1868. Amer. Ent. 1: 10. —Ashmead, 1894. Psyche 7: 25. —Robertson, 1914. Ent. News 25: 68. —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 175. —Rau, 1929. Psyche 36: 155. —Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 222. —Michener, 1975. Kans. Ent. Soc., Jour. 48: 194-200, 3 figs. (nesting site, supersedure by *Paranthidium jugatorium*).

Tribe EUCERINI

This is a very large tribe of pollen-collecting bees which is found on all the continents except Australia. It is especially diverse in the New World, particularly in the Neotropical Region. In America north of Mexico, the Eucerini are represented by 15 of the 18 genera known to occur on the North American continent. Most of the species are solitary, but some live in colonies and all make their nests in the ground.

Taxonomy: Moure and Michener, 1955. Dusenia 6: 239-331, 35 figs. (generic classification of Neotropical genera). —LaBerge, 1957. Amer. Mus. Novitates 1837: 1-44, 42 figs. (generic classification of North and Central American genera). —LaBerge, 1962. Parana Univ., Bol., Zool. 11: 1-12 (types of Eucerine bees in Brit. Mus. Nat. Hist.). —Rozen, 1965. Amer. Mus. Novitates 2233: 3-13, figs. 1-34 (larvae).

Genus SYNHALONIA Patton

Synhalonia Patton, 1879. U. S. Geol. Geog. Survey, Bul. 5: 473.
Type-species: *Melissodes fulvitarsis* Cresson. Orig. desig.
Eusynhalonia Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 63.
Type-species: *Melissodes edwardsii* Cresson. Monotypic and orig. desig.
Synalonia Robertson, 1905. Amer. Ent. Soc., Trans. 31: 365. Emend.

The bees of this North American genus fly primarily during the spring months and are observed only exceptionally during the summer. A second generation may occur in some species since specimens have been collected as late as August. Insofar as known, the females do not collect pollen from the flowers of Compositae, but visit the flowers of a wide range of plant families, including especially the Ranunculaceae, Leguminosae, Hydrophyllaceae, Boraginaceae, and Saxifragaceae. At least some of the species are apparently oligolectic.

Revision: Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 1-76, 80 figs. (spp. of western U. S.).

Taxonomy: Robertson, 1905. Amer. Ent. Soc., Trans. 31: 366-367 (Illinois species). —Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 74-97. —Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 8: 284-286 (partial key). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 312-323, figs. 87-89 (eastern U. S. spp.).

Biology: Rust and Clement, 1977. Kans. Ent. Soc., Jour. 50:41-43, table 3 (spp. visiting flowers of *Collinsia sparsiflora*).

acerba (Cresson). Calif., Oreg., Nev., Utah, Mont. Pollen: Apparently an oligolege of *Arctostaphylos*, but also visits flowers of *Ribes aureum*, *Taraxacum vulgare*.
Melissodes acerba Cresson, 1879. Amer. Ent. Soc., Trans. 7: 210. ♀.
Melissodes nevadensis Cresson, 1879 (not 1874). Amer. Ent. Soc., Trans. 7: 209. ♂. Preocc.
Melissodes intrudens Cresson, 1879. Amer. Ent. Soc., Trans. 7: 225. N. name.

Taxonomy: Fowler, 1899. Canad. Ent. 10: 138. ♂.

actuosa (Cresson). Wash. and Idaho, south to Calif., Utah, Ariz., and N. Mex. Pollen: Polylege, visits a wide variety of flowers including *Agoseris heterophylla, Amsinckia douglasiana, A. intermedia, Antirrhinum, Aplopappus, Astragalus, Brassica campestris, Brodiaea laxa, Calochortus, Chaenactis, Cirsium, Collinsia, Coreopsis californica, Cryptantha intermedia, Dodecatheon, Eriodictyon californicum, Erodium cicutarium, Eschscholzia californica, Haplopappus linearifolius, Helianthus nuttallii, Hesperochiron californica, Lasthenia chrysostoma, L. gracilis, Layia glandulosa, L. platyglossa, Lesquerella gordonii, Linanthus, Lotus, Lupinus bicolor, L. densiflorus, L. nanus, L. succulentus, Medicago hispida, Melilotus, Oenothera pallida, Oreocarya, Orthocarpus purpurascens, Phacelia ciliata, P. distans, P. humilis, Plagiobothrys californicus, Prunus, Ranunculus californicus, Raphanus sativus, Rhamnus, Rhododendron, Salix, Salvia columbariae, Sambucus, Sisyrinchium bellum, Tamarix gallica, Trifolium repens, T. tridentatum, Wyethia. Diadasia tricincta* Provancher, listed in this catalog as possibly a synonym of *Diadasia enavata* (Cresson), may be a synonym of this species (see Timberlake, 1969. Calif. Univ. Pubs. Ent. 57:13).

Melissodes actuosa Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 208. ♀.

Synhalonia californica Fowler, 1899. Canad. Ent. 31: 137. ♀. Preocc.

Synhalonia fowleri Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 28. ♀.

Synhalonia territella Cockerell, 1909. Entomologist 38: 146. ♂.

albescens Timberlake. Calif., Ariz., Nev. Pollen: Polylege, visits flowers of *Amsinckia, Aster abatus, Dalea saundersii, Delphinium parishii, Larrea tridentata, Lycium torreyi, Oenothera clavaeformis, Prosopis, Salvia carduacea, Sphaeralcea ambigua, S. orcuttii, Tamarix.*

Synhalonia albescens Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 14, figs. 5, 6. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 42 (floral information).

amsinckiae Timberlake. Wash. (Pullman and Wawawai), Calif.; Mexico (Baja California). Pollen: Apparently an oligolege of *Amsinckia* including *A. douglasiana, A. intermedia, A. eastwoodae, A. tessellata,* but also visits flowers of *Arctostaphylos glauca, Encelia californica, Lantana sellowiana, Phacelia, Raphanus sativus, Salvia columbariae, S. mellifera.*

Synhalonia amsinckiae Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 15, figs. 7, 8. ♀, ♂.

angustifrons Timberlake. Oreg., Calif., Ariz., Utah; Mexico (Baja California). Pollen: Polylege, visits a wide variety of flowers including *Amsinckia intermedia, Arctostaphylos mariposa, Astragalus pachypus, Brassica incana, Cercidium, Cryptantha, Cynoglossum, Dudleya, Encelia californica, Eriogonum, Lantana sellowiana, Larrea tridentata, Lotus scoparius, Lupinus excubitus, L. formosus, L. paynei, Parkinsonia aculeata, Penstemon antirrhinoides, P. palmeri, P. spectabilis, Phacelia distans, Prunus fasciculata, Rhus trilobata, Salvia apiana, S. columbariae, S. dorrii, S. mellifera, Sambucus, Scrophularia californica.*

Synhalonia angustifrons Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 16, figs. 9, 10. ♀, ♂.

aragalli Cockerell. Colo., Tex. Pollen: Unknown, but visits flowers of *Astragalus, Oxytropis lambertii.*

Synhalonia frater aragalli Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 25. ♀.

argyrophila (Cockerell). Tex. Pollen: Unknown, but visits flowers of *Astragalus, Dalea formosa.*

Tetralonia argyrophila Cockerell, 1909. Entomologist 42: 147. ♂.

atriventris (Smith). Minn. to Mass., south to Ga. Pollen: Unknown, but visits flowers of *Aesculus, Astragalus, Lathyrus, Lupinus, Mertensia, Penstemon hirsutus, Robinia, Vicia.*

Melissodes atriventris Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 310. ♂.

Synhalonia atriventris fuscipes Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 54. ♀. Preocc.

Tetralonia robertsoni Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 13: 283. ♀. N. name.

Taxonomy: Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 353. ♂, ♀.

Biology: Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 211 (nesting habits).

bakeri Timberlake. N. Mex. (Aztec).
Synhalonia bakeri Timberlake, 1973. Ent. Soc. Wash., Proc. 75: 317. ♂.

belfragii (Cresson). Mich., Ill., Ind., Tex. Pollen: Unknown, but visits flowers of *Aesculus, Arabis, Camassia, Cercis canadensis, Claytonia, Collinsia, Dentaria, Dicentra, Erythronium, Geranium, Hydrophyllum, Isopyrum, Lithospermum, Mertensia, Penstemon ambiguus, Phacelia, Polemonium, Ranunculus, Viola.*
Melissodes belfragii Cresson, 1872. Amer. Ent. Soc., Trans. 4: 278. ♀.
Melissodes honesta Cresson, 1872. Amer. Ent. Soc., Trans. 4: 279. ♂.

birkmanniella (Cockerell). Tex.
Tetralonia birkmanniella Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 93. ♂.

californica californica (Cresson). Calif. Pollen: Unknown, but visits flowers of *Raphanus sativus.*
Melissodes Californica Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 196. ♂.

californica deserticola Timberlake. South Calif., desert. Pollen: Apparently polylectic, visits flowers of *Amsinckia, Astragalus, Coreopsis californica, Gilia davyi, G. latifolia, Isomeris, Oenothera, Phacelia, Salvia carduacea, Sphaeralcea, Tamarix gallica.*
Synhalonia californica deserticola Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 24. ♀, ♂.

carolinensis (Dalla Torre). N. C.
Tetralonia atrifrons Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 308. ♀. Preocc.
Eucera carolinensis Dalla Torre, 1896. Cat. Hym., v. 10, p. 228. ♀. N. name.

Taxonomy: LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 950.

cercidis Timberlake. Okla. (Alabaster Caverns State Park). Pollen: Unknown, but visits flowers of *Cercis canadensis.*
Synhalonia cercidis Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 24, figs. 21, 22. ♂.

chrysobotryae (Cockerell). Colo. to Okla., south to Tex. Pollen: Unknown, but visits flowers of *Astragalus* including *A. lindheimeri, Cercis canadensis, Ribes longifolium.*
Tetralonia chrysobotryae Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 2: 332. ♀, ♂.

chrysophila (Cockerell). N. Mex., Colo., ?Idaho. Pollen: Unknown, but visits flowers of *Ribes aureum.*
Tetralonia chrysophila Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 13: 384. ♀.

conformis Timberlake. Okla. (Waurika), Tex. (Midland). Pollen: Unknown, but visits flowers of *Aster tanacetifolius, Astragalus lindheimeri.*
Synhalonia conformis Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 27, figs. 25, 26. ♂, ♀.

cordleyi Viereck. B. C. to Calif., Idaho, Colo., Utah. Pollen: Apparently polylectic, visits flowers of *Agoseris, Amsinckia, Asclepias, Astragalus, Balsamorrhiza, Brodiaea, Camissonia, Cirsium, Convolvulus, Cryptantha, Encelia, Erigeron, Eriogonum, Erysimum, Lupinus, Marrubium, Melilotus, Mesembryanthemum, Mirabilis, Oenothera, Phacelia, Raphanus, Salvia, Sidalcea, Sphaeralcea, Statice, Taraxacum, Thelypodium, Trifolium, Vicia.*
Synhalonia Cordleyi Viereck, 1905. Canad. Ent. 16: 316. ♀, ♂.
Tetralonia poetica Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 13: 424. ♂.
Tetralonia cordleyi postica(!) Cockerell, 1935. Pan-Pacific Ent. 11: 53.
Tetralonia cordleyi orophila Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 13: 284. ♀.

crenulaticornis (Cockerell). Colo., N. Mex.
Melissodes crenulaticornis Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 454. ♂.
Melissodes crenulaticornis form *maculata* Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 455. ♂.

Taxonomy: Cockerell, 1899. Entomologist 32: 157. ♀.

cressoniana Cockerell. Tex., Kans., Nebr., Ariz., Utah. Pollen: Unknown, but visits flowers of *Larrea tridentata.*
Synhalonia cressoniana Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 177. ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 42, tables 14, 15 (floral relationships).

delphinii Timberlake. Wash. to Calif., Utah. Pollen: Unknown, but visits flowers of *Bloomeria, Brodiaea, Delphinium, Platystemon, Trifolium.*
Synhalonia delphinii Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 30, figs. 29, 30. ♀, ♂.

dorsata Timberlake. Calif. Pollen: Apparently polylectic, visits flowers of *Amsinckia intermedia, Brodiaea crocea, Collinsia bicolor, Convolvulus occidentalis, Coreopsis lanceolata, Eriodictyon californicum, E. crassifolium, Eschscholzia californica, Grindelia, Lathyrus, Lotus scoparius, Lupinus bicolor, L. formosus, L. nanus, Penstemon antirrhinoides, Salvia columbariae, S. mellifera, Trichostema parishii.*
Synhalonia dorsata Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 32. ♂, ♀.

douglasiana (Cockerell). Wash. (Steamboat Rock).
Tetralonia Douglasiana Cockerell, 1906. Canad. Ent. 38: 278. ♀.

dubitata (Cresson). Minn. to Pa., south to S. C. and Tex. Pollen: Unknown, but visits flowers of *Aesculus, Astragalus, Dicentra, Melilotus, Mertensia, Robinia, Salvia.*
Melissodes dubitata Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 194. ♀, ♂.

edwardsii (Cresson). B. C. to Calif., Idaho, Mont., Utah, Nev., Colo., Wyo., N. Mex.; Mexico (Baja California). Pollen: Polylectic, visits a wide variety of flowers including *Allium, Amsinckia, Astragalus, Abronia, Arnica, Balsamorrhiza, Brassica, Brodiaea, Besseya, Cirsium, Collinsia sparsiflora, Convolvulus, Conium, Dalea, Daucus, Erysimum, Eschscholzia, Encelia, Erigeron, Helianthus, Hydrophyllum, Ligustrum, Lithosperum, Lotus, Lupinus, Malvastrum, Medicago, Melilotus, Mentha, Mesembryanthemum, Mirabilis, Nemophila, Oenothera, Penstemon, Physocarpus, Phacelia, Phoradendorn, Potentilla, Raphanus Rhamnus, Rubus, Sidalcea, Sphaeralcea, Stachys, Taraxacum, Trifolium, Thelypodium, Vicia, Viola, Zygadenus.*
Melissodes edwardsii Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 195. ♂.
Synhalonia edwardsii race *angustior* Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 347. ♂ (♀ misdet.).
Tetralonia edwardsii vagabunda Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 95. ♂.

Biology: Rust and Clement, 1977. Kans. Ent. Soc., Jour. 50:42, table 3 (floral visitation).

frater albopilosa Fowler. Oreg., Calif. Pollen: Apparently polylectic, visits a wide variety of flowers including *Amsinckia, Astragalus, Brodiaea, Camissonia tanacetifolia, Ceanothus, Chamaebatia, Cirsium, Convolvulus, Lathyrus, Layia, Lotus, Lupinus, Medicago, Penstemon, Ranunculus, Stachys, Thermopsis, Trifolium, Vicia.*
Synhalonia albopilosa Fowler, 1899. Canad. Ent. 10: 138. ♂.

Taxonomy: Cockerell, 1924. Pan-Pacific Ent. 1: 55.

frater frater (Cresson). Colo., Wyo., Utah, Idaho, Oreg., Nev., N. Mex. (Barela Mesa). Pollen: Apparently polylectic, visits flowers of *Astragalus, Hedysarum, Lithospermum, Lupinus, Medicago, Mertensia, Ribes, Vicia.* An unnamed variety of this occurs in Utah, Colorado and Washington in which the metasoma of the female is entirely black beyond tergum I.
Melissodes frater Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 197. ♂.
Tetralonia lata lautipes Cockerell, 1924. Amer. Mus. Novitates 113: 2. ♀.

frater lata (Provancher). B. C., Wash., Oreg. Pollen: Unknown, but visits flowers of *Hydrophyllum.*
Melissodes lata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 302. ♀.
Melissodes nigricornis Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 302. ♂.
Synhalonia edwardsii race *latior* Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 347. ♂.

fulvitarsis annae (Cockerell). Colo., Wyo., Utah, N. Mex.
Tetralonia annae Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 114. ♀.
Tetralonia annae patruelis Cockerell, 1924. Amer. Mus. Novitates 113: 2. ♀.
Tetralonia rotgeri Cockerell, 1937. Ent. News 48: 256. ♀.

fulvitarsis fulvitarsis (Cresson). Alta. and B. C. to Calif., Nev., Idaho, Colo., Wyo., Kans. (Lawrence). Pollen: Unknown, but visits flowers of *Astragalus, Cryptantha, Phlox, Taraxacum, Thelypodium.*
Melissodes fulvitarsis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 196. ♂.
Tetralonia Yakimensis Cockerell, 1906. Canad. Ent. 38: 278. ♂.
Tetralonia medicata Cockerell, 1911. Canad. Ent. 43: 34. ♀.

Taxonomy: Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 474. ♀.

fulvohirta (Cresson). N. C. to Ga. Pollen: Unknown, but visits flowers of *Elaeagnus, Vicia. Melissodes fulvohirta* Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 213. ♂.

fuscotincta Cockerell. Ariz., Colo.
Synhalonia fuscotincta Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 178. ♂.

hamata (Bradley). Eastern U. S., west to S. Dak., Colo., Kans., Nebr. and Mo. Pollen: Apparently polylectic, visits a wide variety of flowers including *Aesculus, Asclepias, Astragalus, Baptisia, Blephilia, Brassica, Camassia, Capsella, Cardamine, Cercis, Claytonia, Collinsia, Commandra, Convolvulus, Cornus, Crataegus, Delphinium, Dianthera, Dodacatheon, Ellisia, Erigeron, Fragaria, Geranium, Gleditsia, Gymnocladus, Heracleum, Hydrophyllum, Iris, Krigia, Lithospermum, Lythrum, Lobelia, Medicago, Melilotus, Mertensia, Monarda, Nepeta, Oenothera, Oxalis, Penstemon, Petalostemon, Phlox, Podophyllum, Polemonium, Prunus, Ptelea, Pyrus, Ranunculus, Ribes, Robinia, Rosa, Rubus, Ruellia, Salix, Salvia, Scutellaria, Senecio, Stellaria, Tradescantia, Trifolium, Verbena, Verbesina, Viburnum, Vicia, Viola, Vitis, Zizia.*
Tetralonia hamata Bradley, 1942. Ent. News 53: 189. ♂, ♀.

hirsutissima (Cockerell). B. C.
Tetralonia hirsutissima Cockerell, 1916. Ann. and Mag. Nat. Hist. (8) 17: 428. ♀.

hurdi Timberlake. B. C. to Calif. Pollen: Apparently polylectic, collects pollen from flowers of *Collinsia sparsiflora*, but also visits flowers of *Allium, Brodiaea, Cryptantha, Lupinus, Phacelia, Taraxacum.*
Synhalonia hurdi Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 42, figs. 43, 44. ♂, ♀.

Biology: Rust and Clement, 1977. Kans. Ent. Soc., Jour. 50:41, 43, table 3 (nest, cell provisions, floral relationships).

illinoensis Robertson. Ill., Mo., Okla. Pollen: Unknown, but visits flowers of *Astragalus lindheimeri, Lithospermum canescens.*
Synhalonia illinoensis Robertson, 1902. Canad. Ent. 34: 49. ♂.

lepida (Cresson). Colo., to Okla. and Tex. Pollen: Unknown, but visits flowers of *Actinia, Astragalus, Cercis, Gaillardia, Lesquerella, Marrubium, Sphaeralcea.*
Melissodes lepida Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 198. ♂.

lunata Timberlake. Oreg., Calif. Utah, Ariz.; Mexico (Baja California). Pollen: Apparently polylectic, visits flowers of *Amsinckia intermedia, Arbutus menziesii, Arctostaphylos glauca, A. mariposa, A. pungens, Brassica, Calendula, Collinsia sparsiflora, Cryptantha, Isomeris arborea, Encelia californica, Lasthenia chrysostoma, Lupinus albifrons, L. densiflorus, L. latifolius, L. micranthus, L. nanus, L. succulentus, Nemophila menziesii, Phacelia, Phlox, Ranunculus occidentalis, Ribes indecorum, Salix, Salvia sonomensis, Sidalcea malvaeflora, Solanum umbelliferum, Trichostema parishii, Trifolium tridentatum, Wyethia angustifolia.*
Synhalonia lunata Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 46. ♂, ♀.

Biology: Rust and Clement, 1977. Kans. Ent. Soc., Jour. 50:42, table 3 (floral visitation).

lutziana (Cockerell). Colo. Pollen: Unknown, but a male visited flowers of *Sphaeralcea concinna.*
Tetralonia lutziana Cockerell, 1933. Amer. Mus. Novitates 595: 2. ♂.

lycii Cockerell. N. Mex. Pollen: Unknown, but visits flowers of *Lycium*, plum, lilac.
Synhalonia lycii Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 348. ♀.

mohavensis Timberlake. Calif., Nev., Ariz.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Sphaeralcea ambigua, S. emoryi, S. orcuttii.*
Synhalonia mohavensis Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 50, figs. 55, 56. ♂.

monozona Timberlake. Oreg. (Klamath Co.), Calif. (Sierra Nevada Mts.).
Synhalonia monozona Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 51. ♀.

pagosana (Cockerell). Colo. (Pagoso Springs).
Tetralonia pagosana Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 228. ♀.

pallidihirta Timberlake. Tex., Mont. Pollen: Unknown, but visits flowers of *Dalea formosa.*
Synhalonia pallidihirta Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 53. ♀.

phaceliae (Cockerell). N. Mex., Utah., Ariz. Pollen: Unknown, but visits flowers of *Descurainia sophia*, *Lesquerella gordonii*, *Phacelia corrungata*, *Sphaeralcea*.
Tetralonia phaceliae Cockerell, 1911. Amer. Ent. Soc., Trans. 37: 238. ♀.

primaveris Timberlake. Calif. (Colorado and Mojave Deserts), Nev., Utah, Ariz. (Mohave Co.). Pollen: Apparently polylectic; visits flowers of *Amsinckia*, *Astragalus*, *Aster*, *Brassica*, *Delphinium*, *Encelia*, *Erysimum*, *Gilia*, *Hyptis*, *Isomeris*, *Larrea*, *Lotus*, *Lupinus*, *Oenothera*, *Phacelia*, *Prunus*, *Salvia*, *Sphaeralcea*, *Tamarix*, *Thelypodium*.
Synhalonia primaveris Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 55, figs. 59, 60. ♂, ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 43 (floral relationships).

quadricincta Timberlake. Calif., Nev., Utah. Pollen: Unknown, but visits flowers of *Astragalus*, *Berberis fremontii*, *Dalea*, *Melilotus officinalis*, *Oenothera clavaeformis* var. *auriantiaca*, *Sphaeralcea ambigua*, *Stanleya*, *Tamarix*, *Thelypodium laciniatum*.
Synhalonia quadricincta Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 57, figs. 61, 62. ♀, ♂.

rosae Robertson. Va. to Ohio, Mo. and Kans., south to Fla. and Tex. Pollen: Apparently polylectic; visits flowers of *Asclepias*, *Batodendron*, *Blephilia*, *Cornus*, *Croton*, *Dianthera*, *Diospyros*, *Elaeagnus*, *Geranium*, *Houstonia*, *Hydrophyllum*, *Iris*, *Linaria*, *Melilotus*, *Monarda*, *Nemophila*, *Oenothera*, *Penstemon*, *Pontederia*, *Rosa*, *Rubus*, *Stachys*, *Trifolium*, *Verbena*, *Xanthisma*.
Synhalonia rosae Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 54. ♀.
Tetralonia fedoris Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 93. ♂.

speciosa (Cresson). S. Dak. to Texas, west to Utah and Idaho. Pollen: Collects pollen from flowers of *Oenothera pallida*, but also visits flowers of *Balsamorrhiza*, *Brazoria*, *Caragana*, *Gaillardia*, *Monarda*, *Penstemon*.
Melissodes speciosa Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 198. ♀.
Melissodes dilecta Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 199. ♂.
Synhalonia gillettei Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 203. ♂.
Synhalonia gillettei snoviana Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 179. ♂.
Synhalonia astragalina Cockerell, 1905. Ent. News 16: 271. ♂.
Tetralonia astragalina clarissima Cockerell, 1933. Ann. and Mag. Nat. Hist. (10) 11: 372. ♂.

Taxonomy: Cockerell, 1905. Entomologist 38: 148. ♂. —Bradley, 1942. Ent. News 53: 190.

Biology: Folsom, 1922. Ent. Soc. Amer., Ann. 15: 182 (nesting habits). —Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 45-46 (floral relationships).

stretchii (Cresson). Oreg., Calif. Pollen: Unknown, but visits flowers of *Cirsium*, *Coreopsis*, *Eriodictyon*, *Fremontodendron*, *Lupinus*, *Vicia*.
Melissodes stretchii Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 207. ♀.
Synhalonia idiotes Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 105. ♀.

suavis (Cresson). Colo.
Melissodes suavis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 210. ♀.

texana Timberlake. Tex. (Dallas). Pollen: Unknown, but visits flowers of *Cercis canadensis*.
Synhalonia texana Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 62, figs. 69, 70. ♂.

tricinctella Timberlake. Calif., Utah. Pollen: Apparently polylectic; visits flowers of *Amsinckia intermedia*, *Aster abatus*, *Astragalus tener*, *Chaenactis fremontii*, *Coreopsis californica*, *Cryptantha intermedia*, *Dalea saundersii*, *Encelia farinosa*, *Erysimum*, *Gilia multicaulis*, *Haplopappus cooperi*, *H. linearifolius*, *Lotus scoparius*, *L. strigosus*, *Malacothrix glabrata*, *Plagiobothrys californicus*, *Rhus trilobata*, *Ribes indecorum*, *Salvia columbariae*, *Sambucus*, *Sphaeralcea*, *Tamarix gallica*.
Synhalonia tricinctella Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 63, figs. 71, 72. ♂, ♀.

truttae Cockerell. N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Iris missouriensis*.
Synhalonia truttae Cockerell, 1905. Entomologist 38: 147. ♂, ♀.

venusta carinata (Timberlake). Calif.; Mexico (Baja California). Pollen: Apparently strictly oligolectic on *Clarkia unguiculata*.
Tetralonia venusta carinata Timberlake, 1961. Pan-Pacific Ent. 37: 212. ♂.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 31-34, 45, fig. 8 (floral relationships).

venusta venusta (Timberlake). Calif., Ariz., Nev.; Mexico (Baja California). Pollen: Apparently oligolectic on *Camissonia clavaeformis*, but visits other flowers evidently for nectar including *Larrea tridentata*, *Sphaeralcea orcuttii*.
Tetralonia venusta Timberlake, 1961. Pan-Pacific Ent. 37: 209. ♀, ♂.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 20, 46 (behavior, floral relationships). —Linsley, MacSwain and Raven, 1964. Calif. Univ. Pubs. Ent. 33: 77 (behavior, floral relationships). —MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 30, fig. 8 (floral relationships). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 43 (floral relationships).

virgata Cockerell. Oreg., Calif. Pollen: Unknown, but visits flowers of *Astragalus pomonensis*, *Brodiaea capitata*, *Cirsium*, *Phacelia*, *Pogogyne parviflora*, *Rhododendron*, *Trichostema lanata*.
Synhalonia belfragei virgata Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 100. ♀.

zonata Timberlake. Oreg., Calif. Pollen: Unknown, but visits flowers of *Amsinckia intermedia*, *Cryptantha*, *Lupinus nanus*, *Nemophila menziesii*, *Plagiobothrys*.
Synhalonia zonata Timberlake, 1969. Calif. Univ. Pubs. Ent. 57: 68, figs. 79, 80. ♀, ♂.

Genus SYNTRICHALONIA LaBerge

Syntrichalonia LaBerge, 1957. Amer. Mus. Novitates 1837: 10.
Type-species: *Melissodes exquisita* Cresson. Monotypic and orig. desig.

exquisita (Cresson). Tex., N. Mex., Ariz.; Mexico (D. F., Durango, Jalisco and Zacatecas). Pollen: Oligolege, principally composite tribes Helenieae and Heliantheae including *Encelia*, *Helenium hoopesii*, *Helianthus annuus*, *Heliopsis parviflora*, *Verbesina encelioides*, *V. oreophila*, *Viguiera dentata*, but visits other flowers for nectar.
Melissodes exquisita Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 213. ♀.
Melissodes herricki Cockerell, 1905. Psyche 12: 98. ♂, ♀.

Biology: Zavortink, 1975. Pan-Pacific Ent. 51: 240-242, table 3 (host plants, behavior, distribution).

Genus EUCERA Scopoli

Eucera Scopoli, 1770. Annus Hist. Nat., v. 4, p. 8.
Type-species: *Apis longicornis* Linnaeus. Desig. by Latreille, 1810.

maculata Lepeletier. America. No doubt exotic or incorrectly assigned to *Eucera*.
Eucera maculata Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 129. ♀.

Genus XENOGLOSSA Smith

The bees of this North and Central American genus are dependent solely upon the pollen and to a large extent upon the nectar of both cultivated and uncultivated *Cucurbita* (squashes, gourds and pumpkins). Like the species of the genus *Peponapis*, the males commonly spend most of the day and a good part of the night in the wilted and closed flowers of these plants. At the beginning of the season and before nesting activities are commenced it is also not unusual to encounter females in the wilted and closed flowers. The pollen collecting devices of the species are species-specific and apparently this has influenced the ability of the different species to collect and utilize pollens of various *Cucurbita*, both wild and domestic. These bees are exceptionally valuable pollinators of the squashes, gourds and pumpkins.

Revision: Hurd and Linsley, 1964. Hilgardia 35: 384-425, figs. 1-11 (U. S. spp.). —Hurd and Linsley, 1967. Ent. Soc. Amer., Ann. 60: 988-1007, 19 figs., 2 tables, 5 maps (North and Centr. Amer. spp.). —Hurd and Linsley, 1970. Calif. Univ. Pubs. Ent. 62: 1-39, 11 figs. 4 tables, 3 maps (classification).

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 246-249, figs. 73-74 (eastern U. S. spp.). —Rozen, 1965. Amer. Mus. Novitates 2233: 6-11, figs. 1-19 (larva).

Biology: Michelbacher, Smith and Hurd, 1964. Calif. Agr. 18: 2-4, figs. (pollination of squashes, gourds and pumpkins). —Hurd and Linsley, 1964. Hilgardia 35: 376-382, 2 tables (biol. summary). —Michelbacher, Hurd and Linsley, 1968. Bee World 49: 159-167, 6 figs. (feasibility of introducing squash bees into the Old World). —Hurd, Linsley and Whitaker, 1971. Evolution 25: 218-234, 4 figs., 3 tables (squash bees and origin of cultivated *Cucurbita*).

Genus XENOGLOSSA Subgenus EOXENOGLOSSA Hurd and Linsley

Xenoglossa subg. *Eoxenoglossa* Hurd and Linsley, 1970. Calif. Univ. Pubs. Ent. 62: 34.
Type-species: *Melissodes strenua* Cresson. Orig. desig.

kansensis Cockerell. N. C. and Ga., west to Colo., N. Mex. and Tex. Pollen: Oligolectic on *Cucurbita foetidissima* and domestic species of *Cucurbita*.
Xenoglossa strenua var. *Kansensis* Cockerell, 1905. Psyche 12: 104. ♂.

strenua (Cresson). Transcont., Md. to Fla., west to south. Calif., south to San Luis Potosi, Durango, Baja California and Sinaloa, Mexico. Parasite: *Triepeolus remigatus* (Fabr.). Pollen: Oligolectic on *Cucurbita foetidissima* and domestic species of *Cucurbita*. Pollen collecting females have been found occasionally at the flowers of *Cucurbita digitata* and *C. palmata*, but these plants do not appear to be preferred pollen sources.
Melissodes strenua Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 213. ♀, ♂.
Xenoglossa cucurbitarum Cockerell, 1896. Canad. Ent. 28: 192. ♂, ♀.

Taxonomy: Bohart, 1964. Pan-Pacific Ent. 40: 174-182, 17 figs. (larva). —Rozen, 1965. Amer. Mus. Novitates 2233: 10-11, figs. 15-19 (larva).

Biology: Bohart, 1964. Pan-Pacific Ent. 40: 174-182, 17 figs. (nesting habits, nest architecture, parasite). —Bohart, 1966. Pan-Pacific Ent. 42: 255-262, 20 figs. (parasite).

Genus XENOGLOSSA Subgenus XENOGLOSSA Smith

Xenoglossa Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 315.
Type-species: *Xenoglossa fulva* Smith. Monotypic.

Species Group Patricia

angustior Cockerell. Calif., Ariz., N. Mex.; Mexico (Baja California and Sonora). Pollen: Oligolectic on *Cucurbita digitata*, *C. foetidissima*, *C. palmata* and most, if not all, domestic *Cucurbita* grown within its geographic range.
Xenoglossa patricia angustior Cockerell, 1899. Entomologist 33: 64. ♂.

Taxonomy: Rozen, 1965. Amer. Mus. Novitates 2233: 8-10, figs. 3-10 (larva).

patricia Cockerell. N. Mex., Tex.; Mexico (Chihuahua, Coahuila, and Durango). Pollen: Oligolectic on *Cucurbita foetidissima* and most, if not all, domestic *Cucurbita* grown within its geographic range.
Xenoglossa patricia Cockerell, 1896. Canad. Ent. 28: 191. ♂, ♀.

Species Group Fulva

gabbii crawfordi Cockerell. South. Ariz.; Mexico (south to Michoacan and Morelos). Pollen: Oligolectic on *Cucurbita martinezii*, *C. sororia* and most, if not all, domestic *Cucurbita* grown within its geographic range. The typical subspecies occurs in southern Mexico (Oaxaca and Chiapas) and Central America (Costa Rica, El Salvador, Guatemala, Nicaragua, and possibly Panama).
Xenoglossa crawfordi Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 367. ♂.
Xenoglossa dugesi Cockerell, 1919. U. S. Natl. Mus., Proc. 55: 194. ♀.

Biology: Michelbacher and Hurd, 1968. Pan-Pacific Ent. 44: 58-68, 1 fig., 3 tables (nest site, late season foraging behavior). —Michelbacher and Hurd, 1968. Folia Ent. Mexicana 18-19: 110-111 (ecology and distribution).

Genus CEMOLOBUS Robertson

Cemolobus Robertson, 1902. Canad. Ent. 34: 324.
Type-species: *Xenoglossa ipomoeae* Robertson. Monotypic and orig. desig.

ipomoeae (Robertson). Ill., Pa., N. C., Ga. Pollen: Oligolectic on species of *Ipomoea*.
Xenoglossa ipomoeae Robertson, 1891. Amer. Ent. Soc., Trans. 18: 65. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 250-251, figs. 75, 76 (redescription).

Genus ANTHEDONIA Michener

Anthedon Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 53. Preocc.
Type-species: *Melissodes compta* Cresson. Monotypic.
Anthedonia Michener, 1942. N. Y. Ent. Soc., Jour. 50: 282. N. name.
Abda Sandhouse, 1943. U. S. Natl. Mus., Proc. 92: 521. N. name.

Taxonomy: LaBerge, 1955. Kans. Ent. Soc., Jour. 28: 132-135, 2 figs. (synopsis). —LaBerge, 1957. Amer. Mus. Novitates 1837: 19-22, figs. 19-21 (generic diagnosis).

compta (Cresson). N. J. and Ga. west to Utah and N. Mex.; Mexico (Durango). Pollen: Oligolectic on *Oenothera biennis*, but visits other flowers for nectar.
Melissodes compta Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 199. ♀, ♂.

Taxonomy: LaBerge, 1955. Kans. Ent. Soc. Jour. 28: 132, fig. 1. ♂, ♀. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 252-253, fig. 77 (redescription).

Biology: Robertson, 1914. Ent. News 25: 72.

nevadensis (Cresson). Tex. west to Calif.; Mexico (Durango). Pollen: Oligolectic on *Oenothera*, but visits other flowers for nectar.
Melissodes nevadensis Cresson, 1874. Amer. Ent. Soc., Trans. 5: 102. ♂.
Melissodes californica Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 114. ♀, ♂ Preocc.
Eucera smithii Dalla Torre, 1896. Cat. Hym., v. 10, p. 247. ♂, ♀. N. name.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 328. —LaBerge, 1955. Kans. Ent. Soc., Jour. 28: 134, fig. 2. ♂, ♀.

Genus SVASTRA Holmberg

Revision: LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 926-1027 (as subg. *Brachymelissodes* and *Epimelissodes* of the genus *Melissodes*).

Taxonomy: Michener, LaBerge and Moure, 1955. Dusenia 6: 219-220. —Moure and Michener, 1955. Dusenia 6: 294-298. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 255-263, figs. 79-80 (spp. of eastern U. S.).

Genus SVASTRA Subgenus SVASTRA Holmberg

Svastra Holmberg, 1884. Acad. Nac. Cienc. Cordoba, Actas 5: 127.
Type-species: *Svastra bombilans* Holmberg. Orig. desig.

The typical subgenus does not occur in North America.

Genus SVASTRA Subgenus BRACHYMELISSODES LaBerge

Melissodes subg. *Brachymelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 926.
Type-species: *Eucera cressonii* Dalla Torre. Orig. desig.

cressonii (Dalla Torre). Iowa, Nebr. and east. Colo. south to Tex.; Mexico (Durango). Pollen: Collects pollen from flowers of *Euphorbia marginata* and possibly *Vernonia*, but also visits other flowers including *Cardia*, *Helianthus*, *Polygonum*.
Melissodes brevicornis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 281. ♂. Preocc.
Eucera cressonii Dalla Torre, 1896. Cat. Hym., v. 10, p. 229. N. name.
Melissodes petulciformis Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 364. ♀.

Taxonomy: Crawford, 1903. Canad. Ent. 35: 334. ♀. —Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 367.

Biology: Cockerell, 1915. Ent. News 26: 364 (resting cluster).

Genus SVASTRA Subgenus EPIMELISSODES Ashmead

Epimelissodes Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 63.
Type-species: *Melissodes atripes* Cresson. Monotypic and orig. desig.

Species Group Atripes

atripes atrimitra (LaBerge). N. J. south to Fla., Ala., Miss. Pollen: Unknown, but visits flowers of *Afzelia, Bradburya virginiana, Buddleia, Chamaecrista, Gerardia, Gossypium herbaceum, Hibiscus, Koellia hysopifolia, Kuhnistera, Monarda punctata, Passiflora incarnata, Primula vulgaris, Rhus.*
Melissodes (*Epimelissodes*) *atripes atrimitra* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 949. ♂, ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 259 (floral records).

atripes atripes (Cresson). Ill., Mo., and La., west to N. Mex. and Colo. Pollen: Unknown, but visits flowers of *Asclepias incarnata, Aster, Bidens aristosa, Cassia fasciculata, Chrysopsis, Cleome serrulata, Dalea lanata, Gaillardia, Gonolobus laevis, Gossypium herbaceum, Helenium, Helianthus annuus, Ipomoea pandurata, Kuhnistera, Lythrum alatum, Melilotus alba, Pycnanthemum virginianum, Thelesperma megapotamicum, Verbena hastata, V. stricta, Vernonia fasciculata.*
Melissodes atripes Cresson, 1872. Amer. Ent. Soc., Trans. 4: 275. ♀.

Taxonomy: Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 54. ♀, ♂. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 257, fig. 80 (redescription, floral records).

atripes georgica (Cresson). East coast of Ga. and Fla. Pollen: Unknown, but visits flowers of *Bidens, Rhus.*
Melissodes georgica Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 200. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 259 (tax. characters, floral records).

Species Group Obliqua

aegis (LaBerge). Tex. to Fla., north to N. C. Pollen: Unknown, but visits flowers of *Aster pruinosa, Chrysopsis, Helenium tenuifolium, Helianthus annuus, H. radula, Kuhnistera, Vernonia glauca.*
Melissodes (*Epimelissodes*) *aegis* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 959. ♂, ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 256-257, fig. 79 (redescription, floral records).

comanche (Cresson). Colo., N. Mex., Tex. Pollen: Unknown, but males visit flowers of *Ximensia californica.*
Melissodes comanche Cresson, 1872. Amer. Ent. Soc., Trans. 4: 276. ♀, ♂.

grandissima (Cockerell). Southeast. Tex. Pollen: Unknown, but the sexes have been collected at flowers of *Ximensia encelioides.*
Melissodes grandissima Cockerell, 1905. Canad. Ent. 37: 334. ♀.
Melissodes atripes var. *acomanche* Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 109. ♂.

Taxonomy: Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 361. ♂. —LaBerge, 1963. Kans. Ent. Soc., Jour. 36: 56 (geogr. records).

helianthelli (Cockerell). Tex., and Kans. west to South. Calif.; Mexico (Baja California). Pollen: Unknown, but has been collected at flowers of *Gossypium herbaceum, Helianthus annuus, Verbesina encelioides.*
Melissodes helianthelli Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 525. ♀.

machaerantherae (Cockerell). Tex. (El Paso) to South. Calif.; Mexico (Chihuahua, Coahuila, Sonora). Pollen: Unknown, but visits flowers of *Asclepias subverticillata, Aster, Baccharis, Cryptantha oblata, Cucurbita palmata, Haplopappus, Helenium hoopesii, Helianthus, Kallstroemia, Machaeranthera, Melilotus alba, Verbesina areophila, Wislizenia refracta.*
Melissodes machaerantherae Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 21. ♂, ♀.

Taxonomy: LaBerge, 1963. Kans. Ent. Soc., Jour. 36: 55 (geogr. and floral records).

obliqua caliginosa (Cresson). N. J. to Ga. Pollen: Unknown, but visits flowers of *Borrichia frutescens, Cirsium, Cucurbita, Helenium tenuifolium, Helianthus atrorubens, H. microcephalum, H. zonatus, Vernonia glauca, V. noveboracensis.*
Melissodes caliginosa Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 192. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 261 (redescript.).

obliqua expurgata (Cockerell). Wash. and Idaho south to Calif., Colo. and Ariz.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Achillea, Artemisia, Asclepias, Brassica adpressa, Centaurea, Centromadia pungens, Chrysopsis grandiflora, C. lanceolata, Coreopsis lanceolata, Engelmannia pinnatidifa, Gaillardia, Geranium atropurpureum, Gilia capitata, Grindelia camporum, G. nana, Haplopappus vernonioides, Helianthus annuus, H. bolanderi, H. ciliaris, H. gracilentus, H. petiolaris, Heliotropium curassavicum, Hemizonia pungens, Lepidospartum squamatum, Medicago sativa, Melilotus alba, Petalostemon flavescens, Pluchea sericea, Ratibida columnaris, Scabiosa, Senecio douglasii, Solidago, Verbesina encelioides, Wislizenia refracta.*
Melissodes obliqua var. *expurgata* Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 230. ♂.

obliqua obliqua (Say). Southern Ont. and eastern Mont., south to N. Mex. and N. J.; west of the Appalachians to Fla.; Mexico (Tamaulipas, Coahuila). Parasite: *Triepeolus concavus* (Cress.), *T. rufithorax* Graenicher, *Timulla vagans rufinota* Mickel? Pollen: Presumably oligolectic on the Compositae, but visits a wide variety of flowers including *Abutilon theophrasti, Ambrosia, Asclepias incarnatus, A. syriaca, Aster ericoides, Bidens involucrata, B. aristosa, Blephilia hirsuta, Boltonia asteroides, Carduus crispus, Cassia, Cephalanthus occidentalis, Chrysopsis, Cirsium discolor, C. lanceolatum, C. undulatus, Cleome serrulata, Coreopsis tinctoria, C. tripteris, Echinacea pallida, Erigeron philadelphus, Euphorbia, Gaillardia, Gossypium herbaceum, Grindelia squarrosa, Helenium altissimum, H. autumnale, Helianthus annuus, H. divaricatus, H. grosse-serratus, H. laetiflorus, H. maximillianus, H. mollis, H. petiolaris, H. scaberimus, H. strumosus, H. tuberosus, Heliopsis helianthioides, H. laevis, Ipomoea pandurata, Kuhnistera purpurea, Lacinaria pycnostachys, Lactuca floridana, Lobelia leptostachys, L. siphillitica, Lythrum alatum, L. salicaria, Medicago sativa, Melilotus alba, Monarda fistulosa, Nepeta cataria, Oenothera biennis, Petalostemon candidens, P. oligophyllum, Prionopsis ciliata, Psoralea tenuiflora, Pycnanthemum flexuosum, P. pilosum, Ratibida columnaris, R. pinnata, Rudbeckia hirta, R. laciniata, R. subtomentosa, R. triloba, Schrankia uncinata, Silphium integrifolium, S. laciniatum, S. perfoliatum, S. speciosum, S. terebinthinaceum, Solidago missouriensis, S. rigida, S. serotina, Teucrium canadense, Trifolium pratense, Verbena stricta, Vernonia baldwinia, V. baldwinia interior, V. fasciculata, Verbesina helianthoides, Zinnia.*
Macrocera obliqua Say, 1837. Boston Jour. Nat. Hist. 1: 403. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 259-261, fig. 80 (redescription). —Rozen, 1964. Amer. Mus. Novitates 2170: 9-12, figs. 6, 7, 9-13 (larva).

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 35. —Custer, 1928. Canad. Ent. 60: 28. —Custer, 1929. Psyche 36: 293 (nesting habits, cocoon construction). —Rozen, 1964. Amer. Mus. Novitates 2170:1-13, 15 figs. (nesting habits, parasites, ecology).

texana eluta (LaBerge). Deserts of south. Calif., Ariz.; Mexico (Chihuahua, Coahuila). Pollen: Unknown, but visits flowers of *Asparagus, Asteraginus, Helianthus annuus, Heterotheca subaxillaris.*
Melissodes (*Epimelissodes*) *texana eluta* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1000. ♂, ♀.

texana texana (Cresson). Kans. and Okla., south to Tex., west to N. Mex. and Colo. Pollen: Unknown, but visits flowers of *Chrysothamnus, Flaveria angustifolia, Helianthus, Prionopsis ciliatus.*
Melissodes texana Cresson, 1878. Amer. Ent. Soc., Trans. 4: 276. ♀, ♂.
Melissodes texana flaveriae Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 108. ♀.

Species Group Sila

pallidior LaBerge. Calif. (Riverside Co.). Pollen: Unknown, but visits flowers of *Hoffmanseggia*.
Svastra (*Epimelissodes*) *pallidior* LaBerge, 1963. Kans. Ent. Soc., Jour. 36: 52. ♀, ♂.

sila (LaBerge). Ariz., Tex.; Mexico (Baja California and Chihuahua). Pollen: Oligolege of Compositae especially *Baileya pleniradiata* and *Heterotheca psammophila*, but also visits flowers of *Heterotheca subaxillaris*, *Kallstroemia grandiflora*, *Psilostrophe cooperi*.
Melissodes (*Epimelissodes*) *sila* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1002. ♂, ♀.

Taxonomy: LaBerge, 1963. Kans. Ent. Soc., Jour. 36: 54 (geogr. and floral records).

Biology: Cazier and Linsley, 1974. Amer. Mus. Novitates 2546: 14-15 (floral relationships).

Species Group Petulca

petulca petulca (Cresson). Eastern Tex. north through Kans. to Ill., east to Fla., and north along coast to N. J. Pollen: Unknown, but visits flowers of *Borrichia frutescens*, *Coreopsis cardaminefolia*, *Gaillardia pulchella*, *Gossypium herbaceum*, *Helenium tenuifolium*, *Helianthus*, *Lepachys pinnata*, *Lithospermum canescens*, *Monarda citriodora*, *M. punctata*, *Pycnanthemum flexuosum*, *Pyrrhopappus geiseri*, *Ratibida columnaris*, *R. columnifera pulcherrima*, *Rudbeckia amplexicaulis*, *R. bicolor*, *R. submentosa*, *Verbesina helianthoides*.
Melissodes petulca Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 201. ♀.
Melissodes illinoensis Robertson, 1895. Amer. Ent. Soc., Trans 22: 126. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 261-262, fig. 80 (redescription).

petulca suffusa (Cresson). Tex. and Kans. west to Colo. and Ariz.; Mexico (Chihuahua, Nuevo Leon, Tamaulipas). Pollen: Unknown, but visits flowers of *Baccharis*, *Borrichia frutescens*, *Chrysopsis hispida*, *Coreopsis*, *Gaillardia pulchella*, *G. suavis*, *Helenium autumnale*, *H. microcephalum*, *Helianthus annuus*, *Medicago sativa*, *Monarda citriodora*, *M. punctata*, *Nepeta cataria*, *Opuntia*, *Phacelia*, *Ratibida columnaris*, *R. tagetes*, *Rudbeckia hirta*, *Sphaeralcea*, *Tetragonothera ludoviciana*, *Thelesperma megapotamicum*.
Melissodes suffusa Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 203. ♀, ♂.
Melissodes townsendi Cockerell, 1896. Entomologist 29: 304. ♂.

sabinensis laterufa (Cockerell). Tex., N. Mex., ?Ariz. (Baboquivari Mts.); Mexico (Coahuila, Durango).
Melissodes suffusa var. *laterufa* Cockerell, 1934. Amer. Mus. Novitates 697: 10. ♀.

sabinensis nubila (LaBerge). South. Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Bebbia juncea*, *Chrysanthemum segetum*, *Chrysothamnus*, *Coreopsis lanceolata*, *Corethrogyne filaginifolia*, *Encelia farinosa*, *Gutierrezia californica*, *G. sarothrae*, *Haplopappus vernonioides*, *Helianthus annuus*, *Hemizonia paniculata*, *Heterotheca grandiflora*, *Senecio douglasii*, *Stephanomeria exigua*.
Melissodes (*Epimelissodes*) *sabinensis nubila* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1024. ♂, ♀.

sabinensis sabinensis (Cockerell). South Calif., Ariz., N. Mex. Pollen: Unknown, but visits flowers of *Acacia*, *Dalea albiflora*, *Haplopappus*, *Heterotheca*, *Kallstroemia grandiflora*, *Petalostemon*, *Psilostrophe cooperi*, *Sida diffusa*, *Sphaeralcea*, *Verbesina*, *Viguiera*.
Melissodes sabinensis Cockerell, 1924. Amer. Mus. Novitates 113: 1. ♂.

Genus SVASTRA Subgenus IDIOMELISSODES LaBerge

Melissodes subg. *Idiomelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1027.
Type-species: *Melissodes duplocincta* Cockerell. Monotypic and orig. desig.

Taxonomy: LaBerge, 1957. Amer. Mus. Novitates 1837: 5, 7, 23-25 (generic status). —LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 284 (as subgenus of *Svastra*).

duplocincta (Cockerell). N. Mex. to Calif. (Colorado Desert); Mexico (Baja California, Chihuahua and Coahuila). Pollen: Collects pollen from flowers of *Ferrocactus wislizeni* and is probably an oligolege of *Ferrocactus* and possibly other cacti, but visits other flowers for nectar including *Asclepias, Cevallia sinuata, Eriogonum, Gossypium herbaceum, Hoffmanseggia densiflora, Lippia wrightii, Melochia tomentosa, Sphaeralcea, Wislizenia refracta* var. *mamillata.*
Melissodes duplocincta Cockerell, 1905. Psyche 12: 103. ♂, ♀.

Biology: Zavortink, 1975. Pan-Pacific Ent. 51: 236-240, tables 1, 2 (host plants, behavior, distribution).

Genus XENOGLOSSODES Ashmead

?Tetraloniella Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 61.
Type-species: *Macrocera graia* Eversmann. Monotypic and orig. desig.
Xenoglossodes Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 63.
Type-species: *Melissodes albata* Cresson. Monotypic and orig. desig.

Revision: Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 74-92.

albata (Cresson). Ill., S. Dak., Kans., Colo., Okla., Tex. Pollen: Unknown, but visits flowers of *Petalostemon purpureum.*
Melissodes albata Cresson, 1872. Amer. Ent. Soc., Trans. 4: 281. ♀, ♂.

Taxonomy: Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 474. ♂, ♀.

arizonica Cockerell. Ariz., Calif. (Imperial Co.).
Xenoglossodes arizonica Cockerell, 1937. Amer. Mus. Novitates 948: 7. ♂.

bishoppi (Cockerell). Tex.
Melissodes bishoppi Cockerell, 1914. Canad. Ent. 46: 414. ♂.

davidsoni (Cockerell). Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Convolvulus occidentalis, Coreopsis maritima, Encelia californica.*
Xenoglossa davidsoni Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 28. ♀.
Synhalonia hirsutior Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 29. ♂.

Taxonomy: Cockerell, 1935. Pan-Pacific Ent. 11: 53. ♂.

eriocarpi (Cockerell). Tex., N. Mex., Ariz., south. Calif. Pollen: Unknown, but visits flowers of *Larrea tridentata, Sideranthus gracilis.*
Exomalopsis eriocarpi Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 453. ♀.

Biology: Hurd and Linsley, 1975. Smithsn. Contr. Zool. 193: 42 (floral relationships).

excurrens Cockerell. Colo., N. Mex. Pollen: Unknown, but visits flowers of *Chrysothamnus wrightii, Verbesina encelioides.*
Xenoglossodes excurrens Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 448. ♀.

Taxonomy: Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 259. —Cockerell, 1923. Ent. News 34: 50.

gutierreziae Cockerell. N. Mex. Pollen: Unknown, but visits flowers of *Gutierrezia.*
Xenoglossides gutierreziae Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 16: 218. ♀.

habrocoma Cockerell. Tex.
Xenoglossodes habrocoma Cockerell, 1935. Amer. Mus. Novitates 766: 7. ♂, ♀.

helianthorum Cockerell. Tex. Pollen: Unknown, but visits flowers of *Helianthus.*
Xenoglossodes helianthorum Cockerell, 1914. Canad. Ent. 46: 415. ♂.

imitatrix Cockerell and Porter. N. Mex. Pollen: Unknown, but visits flowers of *Sphaeralcea lobata.*
Xenoglossodes imitatrix Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 407. ♂, ♀.

lippiae lippiae (Cockerell). N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Lippia wrightii, Phacelia congesta.*
Synhalonia crenulaticornis lippiae Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 25. ♂.

Taxonomy: Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 16: 224. ♀.

lippiae semilippiae (Cockerell). Ariz.
Synhalonia lippiae semilippiae Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 179. ♀.

neotomae Cockerell. N. Mex.
Xenoglossodes neotomae Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 314. ♀, ♂.

pallidicauda Cockerell. Tex.
Xenoglossodes pallidicauda Cockerell, 1934. Amer. Mus. Novitates 697: 11. ♀.

parksi (Cockerell). Tex. (vicinity of San Antonio). Pollen: Unknown, but visits flowers of *Convolvulus hermannioides*.
Melissodes agilis var. *parksi* Cockerell, 1935. Amer. Mus. Novitates 766: 5. ♂.

pimella (Cockerell). Ariz.
Melissodes pimella Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 363. ♂.

pomonae (Cockerell). Calif. (cismontane). Pollen: Possibly an oligolege of *Hemizonia* including *H. fasciculata, H. parryi, H. virgata*.
Tetralonia pomonae Cockerell, 1915. Pomona Jour. Ent. Zool. 7: 230. ♂.
Tetralonia pomona(!) Cockerell, 1930. Ann. and Mag. Nat. Hist. (10) 5: 410.

spissa (Cresson). Colo., Tex.
Melissodes spissa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 280. ♀.

wilmattae Cockerell. Tex.
Xenoglossodes wilmattae Cockerell, 1917. *In* W. P. Cockerell, N. Y. Ent. Soc., Jour. 25: 191. ♀.

Genus PEPONAPIS Robertson

Although the genus *Peponapis* is present in both North and South America, different species occupy each continent, and while these faunas are in near geographic contact in the Panamanian-Colombian region they are evidently isolated from one another. Like the bees of the genus *Xenoglossa*, they are solely dependent upon the pollen and to a large extent upon the nectar of both cultivated and uncultivated *Cucurbita* (squashes, gourds and pumpkins). Also as in *Xenoglossa*, the males commonly spend most of the day and a good part of the night in the wilted and closed flowers of these plants. It is not unusual to encounter females at the beginning of the nesting season in the wilted and closed flowers. One species, *Peponapis pruinosa* (Say) has been introduced into Hawaii (Oahu and Hawaii), but it is not known whether the species has become successfully established. The pollen collecting devices of these bees are species-specific and apparently this has influenced the ability of the different species to collect and utilize pollens of the various *Cucurbita*, both wild and domestic. At least several of the species have extended their ranges well beyond their original distribution following the spread and development of cultivated *Cucurbita*. Unquestionably these bees are the most important pollinators of the squashes, gourds and pumpkins.

Revision: Hurd and Linsley, 1964. Hilgardia 35: 425-472, figs. 1, 2, 12-18 (U. S. spp.). —Hurd and Linsley, 1966. Ent. Soc. Amer., Ann. 59: 835-851, 12 figs., 1 table, 8 maps (U. S. and Mexican spp.). —Hurd and Linsley, 1970. Calif. Univ. Pubs. Ent. 62: 1-39, 11 figs., 4 tables, 3 maps (classification).

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 244-246, fig. 72 (eastern U. S. sp.). —Rozen, 1965. Amer. Mus. Novitates 2233: 6, 11, figs. 20-27 (larva).

Biology: Michelbacher, Smith and Hurd, 1964. Calif. Agr. 18: 2-4, figs. (pollination of squashes, gourds and pumpkins). —Hurd and Linsley, 1964. Hilgardia 35: 376-382, 2 tables (biol. summary). —Michelbacher, Hurd and Linsley, 1968. Bee World 49: 159-167, 6 figs. (feasibility of introducing squash bees into the Old World). —Hurd, Linsley and Whitaker, 1971. Evolution 25: 218-234, 4 figs., 3 tables (squash bees and origin of cultivated *Cucurbita*). —Michelbacher, Hurd and Linsley, 1971. Bee World 52: 156-166, 4 figs. (experimental introduction of squash bees to improve yields of squashes, gourds and pumpkins).

Genus PEPONAPIS Subgenus EOPEPONAPIS Hurd and Linsley

Peponapis subg. *Eopeponapis* Hurd and Linsley, 1970. Calif. Univ. Pubs. Ent. 62: 20.
Type-species: *Xenoglossa utahensis* Cockerell. Orig. desig.

michelbacherorum Hurd and Linsley. South Ariz.; Mexico (Nayarit, Sinaloa and Sonora). Pollen: Oligolectic on uncultivated mesophytic *Cucurbita, viz., Lundelliana* and *Sororia* groups, as well as most, if not all, domestic *Cucurbita* grown within its range.
Peponapis michelbacherorum Hurd and Linsley, 1964. Hilgardia 35: 437, fig. 14. ♂, ♀.

utahensis (Cockerell). Ariz., N. Mex., Tex., ?Utah; Mexico to Costa Rica. Pollen: Oligolectic on uncultivated, mesophytic *Cucurbita, viz., Lundelliana* and *Sororia* groups, as well as most, if not all, domestic *Cucurbita* grown within its range. The species was described from a specimen collected prior to the admission of Arizona and New Mexico into the Union and there is a possibility that it had been collected even before Utah gained statehood. Thus the northernmost contemporary record of the species from Tempe, Arizona may be as far north as the species occurs.
Xenoglossa utahensis Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 182. ♀.

Genus PEPONAPIS Subgenus PEPONAPIS Robertson

Peponapis Robertson, 1902. Canad. Ent. 34: 324.
Type-species: *Macrocera pruinosa* Say. Orig. desig.

Pruinosa Species Group

limitaris (Cockerell). South. Tex.; Mexico to Panama. Pollen: Oligolectic on uncultivated, mesophytic *Cucurbita* including *C. fraterna* and *C. martinezii*, as well as most, if not all, domestic *Cucurbita*.
Xenoglossa pruinosa limitaris Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 18: 73. ♂.
Tetralonia tenuifasciata Friese, 1916. Stettin. Ent. Ztg. 77: 295, 332. ♀, ♂. Preocc.
Tetralonia tenuimarginata Friese, 1921. Stettin. Ent. Ztg. 82: 75, 78. N. name.

pruinosa (Say). Maine to Ga., west to Idaho and Calif.; Mexico (Central Plateau and west coast, south to Oaxaca). Pollen: Oligolectic on uncultivated xerophytic *Cucurbita* including *C. foetidissima* and *C. galleotti* as well as most, if not all, domestic *Cucurbita*. The geographic range of the species has been significantly expanded following the development and widespread cultivation of domestic *Cucurbita*. The species has been introduced into Hawaii (Oahu and Hawaii), but it is not known whether it has become established. Attempts have also been made to introduce this species into New Zealand, but so far these have been unsuccessful.
Macrocera pruinosa Say, 1837. Boston Jour. Nat. Hist. 1: 405. ♂, ♀.
Xenoglossa spriuna Howard, 1901. Insect Book, Pl. Viii, fig. 2. ♂. *Lapsus calami.*
Xenoglossa angelica Cockerell, 1902. Ent. News 13: 103. ♂, ♀.
Xenoglossa (Peponapis) howardi Cockerell, 1918. Ann. and Mag. Nat. Hist. (9) 2: 420. ♂, ♀.
Xenoglossa pruinosa var. *lutzi* Cockerell, 1923. Canad. Ent. 55: 205. ♀, ♂.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 34. —Mathewson, 1968. Kansas Ent. Soc., Jour. 41: 255-261, 1 fig. (nest construction and life history). —Michelbacher, Hurd and Linsley, 1971. Bee World 52: 156-166, 4 figs. (experimental introductions). —Hurd, Linsley and Michelbacher, 1974. Smithsn. Contrib. Zool. 168: 1-17, 4 figs., 8 tables (nat. history).

Morphology: Mathewson, 1965. Kans. Ent. Soc., Jour. 28: 209-233, 25 figs. (internal).

Genus PEPONAPIS Subgenus XEROPEPONAPIS Hurd and Linsley

Peponapis subg. *Xeropeponapis* Hurd and Linsley, 1970. Calif. Univ. Pubs. Ent. 62: 28.
Type-species: *Peponapis timberlakei* Hurd and Linsley. Monotypic and orig. desig.

timberlakei Hurd and Linsley. Deserts, N. Mex. to Calif., Nev.; Mexico (Baja California and Sonora). Pollen: Oligolectic on uncultivated, xerophytic *Cucurbita* including *C. digitata* and *C. palmata* of the *Digitata* group. There is no evidence that the species collects pollen from either the xerophytic *C. foetidissima* or domestic *Cucurbita* even though some specimens including females have been collected in these flowers.
Peponapis timberlakei Hurd and Linsley, 1964. Hilgardia 35: 428, figs. 2, 12. ♂, ♀.

Genus PEPONAPIS Subgenus XENOPEPONAPIS Hurd and Linsley

Peponapis subg. *Xenopeponapis* Hurd and Linsley, 1970. Calif. Univ. Pubs. Ent. 62: 29.

Type-species: *Melissodes crassidentata* Cockerell. Monotypic and orig. desig.

crassidentata (Cockerell). Southern Tex.; Mexico to Costa Rica. Pollen: Oligolectic on uncultivated *Cucurbita* including *C. gracilior, C. kellyana, C. lundelliana, C. martinezii, C. radicans,* and *C. sororia* as well as most, if not all, domestic *Cucurbita.*
Melissodes crassidentata Cockerell, 1949. U. S. Natl. Mus., Proc. 98: 466. ♂.

Genus MELISSODES Latreille

This large genus, which although present in both North and South America as well as the West Indies, is especially well represented by numerous species in North America. Of the eight currently recognized subgenera only the subgenus *Ecplectica* does not extend into America north of Mexico.

Revision: LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1032-1194, 129 figs. (Pt. I of a gen. rev. of North and Centr. Amer. spp.). —LaBerge, 1956. Kans. Univ. Sci. Bul. 38: 533-578, 13 figs. (Pt. II of a gen. rev. treating the subgenera *Tachymelissodes, Apomelissodes, Psilomelissodes, Heliomelissodes*). —LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 283-663, 125 figs. (Pt. III (final) of a gen. rev. treating the subgenera *Callimelissodes* and *Eumelissodes*).

Taxonomy: Robertson, 1905. Amer. Ent. Soc., Trans. 31: 367-371 (Illinois species). —Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 521-522 (large species). —Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 74-92. —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1073, figs. 199-205 (larva). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 263-310, figs. 67-85, 1 table (eastern U. S. spp.). —LaBerge, 1963. Nebr. Univ. State Mus., Bul. 4: 227-242 (geogr. records, n. spp., floral information).

Genus MELISSODES Subgenus MELISSODES Latreille

Melissodes Latreille, 1829. *In* Cuvier, Regne Animal, ed. 2, v. 5, p. 354.
Type-species: *Melissodes fonscolombei* Romand. First included species, 1841.
Melissoda Drapiez, 1841. Dict. Classique Sci. Nat., v. 4, p. 241. Emend. Preocc.

bimaculata bimaculata (Lepeletier). Maine west to east. N. Dak. and Colo., south to north. Fla. and east. Tex. Parasite: *Triepeolus lunatus concolor* Robt. Pollen: Unknown, but visits flowers of *Abutilon theophrasti, Agastache nepetoides, Althaea rosea, Arctium minus, Asclepias tuberosa, A. verticillata, Asparagus, Aster novae-angliae, A. paniculata, Astragalus canadensis, Baptisia tinctoria, Bidens aristosa, Blephilia hirsuta, Brauneria purpurea, Cacalia reniformis, Campanula americana, C. rotundifolia, Cassia fasciculata, Cephalanthus occidentalis, Cicuta maculata, Cirsium lanceolatum, Convolvulus sepium, Cuphea peliolata, Cucurbita pepo, Dalea onobrychis, Desmodium bracteosum, D. canadense, D. dillenii, D. paniculatum, Dianthera americana, Dipsacus sylvestris, Echinocystis lobata, Eupatorium coelestinum, Gaura biennis, Gerardia grandiflora, Gladiolus, Gossypium herbaceum, Grindelia, Helenium autumnale, Helianthus annuus, H. divaricatus, H. grosse-serratus, H. tuberosus, Hibiscus lasiocarpus, H. militaris, Impatiens biflora, Ipomoea pandurata, I. purpurea, Jacquemontia temnifolia, Lepachys pinnata, Lespedeza procumbens, Lobelia leptostachys, L. siphillitica, Lythrum alatum, Malva rotundifolia, M. sylvestris, Medicago sativa, Melilotus alba, M. officinale, Mentha, Monarda fistulosa, M. mollis, M. punctata, Nepeta cataria, Oenothera biennis, Oxalis stricta, Petalostemon purpureum, Petunia, Physostegia virginiana, Platycodon grandiflorum, Polygonum pennsylvanicum, Prunella vulgaris, Pycnanthemum flexuosum, Ratibida, Rhus copallina, Rudbeckia triloba, Sagittaria, Scrophularia marilandica, Scutellaria lateriflora, Seymeria macrophylla, Sicyos angulatus, Silphium laciniatum, S. perfoliatum, Siscanna, Solidago, Stachys palustris, Strophostylis, Symphoricarpos occidentalis, S. orbiculata, Teucrium canadense, Trifolium pratense, Verbena hastata, V. stricta, V. urticaefolia, V. baldwini interior, Vernonia fasciculata, V. spicata, Veronica virginica, Vitex agnus-castus.*
Macrocera bimaculata Lepeletier, 1825. Encycl. Method. Ins., v. 10, p. 528. ♀.
Macrocera binotata Say, 1837. Boston Jour. Nat. Hist. 1: 404. ♀, ♂.
Macrocera nigra Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 112. ♂.

Melissodes melanosoma Cockerell, 1905. Canad. Ent. 37: 266. ♂.

Biology: Ashmead, 1894. Psyche 7: 25 (nest). —Banks, 1902. N. Y. Ent. Soc., Jour. 10: 209 (nest). —Folsom, 1922. Ent. Soc. Amer., Ann. 15: 183 (nest). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 34 (nest).

bimaculata nulla LaBerge. South. Fla. and Keys. Pollen: Unknown, but visits flowers of *Lythrum lineare*.
Melissodes (*Melissodes*) *bimaculata nulla* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1109. ♂, ♀.

blanda LaBerge. Tex., Okla. Pollen: Unknown, but visits flowers of *Borrichia frutescens*, *Gaillardia*, *Opuntia*, *Sphaeralcea*.
Melissodes (*Melissodes*) *blanda* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1084. ♂, ♀.

colliciata Cockerell. Ariz., Mexico (Chihuahua, Durango, Jalisco, Zacatecas, Puebla, Michoacan, Oaxaca). Pollen: Unknown, but visits flowers of *Asclepias*, *Baccharis glutinosa*, *Gutierrezia*.
Melissodes colliciata Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 257. ♂.
Melissodes (*Melissodes*) *elusa* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1061. ♂, ♀.

Taxonomy: LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 655 (synonymy). —LaBerge, 1963. Nebr. Univ. State Mus., Bul. 4: 234-235 (geogr. records).

communis alopex Cockerell. South. Calif. to B. C., east to Alta. and Utah. Pollen: Unknown, but visits flowers of *Asclepias erosa*, *Cirsium*, *Clarkia amoena*, *C. elegans*, *Cryptantha intermedia*, *Datura meteloides*, *Durantia plumieri*, *Encelia californica*, *Eriodictyon trichocalyx*, *Eriogonum fasciculatum polifolium*, *Gilia capitata*, *Grindelia camporum*, *Hugelia virgata*, *Lotus scoparius*, *Malvastrum fasciculatum*, *Medicago sativa*, *Melilotus*, *Mesembryanthemum crystallinum*, *Monardella lanceolata*, *Opuntia littoralis*, *Penstemon*, *Phacelia ramosissima*, *Salvia apiana*, *S. carnosa*, *S. clevelandii*, *Scabiosa*, *Sphaeralcea fasciculata*, *Stachys apargioides*, *Stephanomeria exigua*, *Trifolium involucrata*.
Melissodes alopex Cockerell, 1928. Psyche 35: 233. ♂.

communis communis Cresson. Southeastern Ariz., north through eastern Colo. and Wyo. to N. Dak. and east through Ill. and Ind. in the north and through Tex. in the south to the Atlantic. Pollen: Polylectic, appears to prefer pollen from flowers of Leguminosae and Labiatae, but visits a wide variety of flowers including *Abutilon theophrasti*, *Althaea rosea*, *Amorpha*, *Asclepias syriaca*, *A. tuberosa*, *Baptisia*, *Befaria racemosa*, *Blephilia hirsuta*, *Brazoria truncata*, *Campanula*, *Cassia fasciculata*, *Chrysopsis*, *angustifolia*, *Cirsium discolor*, *C. lanceolatum*, *Cleome serrulata*, *Convolvulus*, *Croton*, *Cucurbita*, *Cyrilla parviflora*, *Dalea multiflora*, *Dianthera americana*, *Echium vulgare*, *Gossypium herbaceum*, *Grindelia*, *Helenium tenuifolium*, *Helianthus annuus*, *H. lenticularis*, *Heliotropium*, *Hyrta*, *Ipomoea*, *Lactuca*, *Lythrum alatum*, *L. lineare*, *Malva sylvestris*, *Medicago sativa*, *Melilotus alba*, *Mentha*, *Monarda citriodora*, *M. fistulosa*, *M. pectinata*, *M. punctata*, *Nepeta cataria*, *Oenothera elliptica*, *O. laciniata*, *Opuntia*, *Passiflora incarnata*, *Petalostemon occidentale*, *P. purpureum*, *P. violaceum*, *Phaseolus*, *Platycodon grandiflorium*, *Prionopsis*, *Proboscidea louisianica*, *Pycnanthemum flexuosum*, *Ratibida columnifera*, *Rudbeckia*, *Rhus glabra*, *Salvia*, *Sidalcea reticulata*, *Solanum elaeagnifolium*, *Solidago serotina*, *Teucrium canadense*, *Thelesperma megapotamicum*, *Verbena stricta*, *Vernonia baldwini interior*, *V. glauca*.
Melissodes communis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 204. ♀, ♂.
Melissodes hortivagans Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 180. ♂, ♀.
Melissodes Martini Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 526. ♀.
Melissodes variabilis Robertson, 1905. Amer. Ent. Soc., Trans. 31: 368. ♀, ♂.
Melissodes xanthopteralis Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 362. ♂.
Melissodes manni Cockerell, 1924. Amer. Mus. Novitates 113: 1. ♂.
Melissodes hortivagans melanotica Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 231. ♀.

comptoides Robertson. N. J. to Fla., west to S. Dak., Colo., Ariz. Pollen: Polylectic, appears to prefer pollen of *Euphorbia marginata*, *Medicago sativa* and *Melilotus alba*, but visits other flowers including *Amphiachyris dracunculoides*, *Asclepias incarnatus*, *Aster*,

Blephilia hirsuta, Campanula americana, Cassia fasciculata, Cleome serrulata, Cicuta maculata, Cirsium lanceolatum, Diodea teres, Gossypium herbaceum, Helenium tenuifolium, Helianthus annuus, H. petiolaris, Lepachys pinnata, Lespedeza virginica, Ludwigia alternifolia, Lycopus americanus, Lythrum alatum, L. lineare, L. salicaria, Monarda citriodora, M. fistulosa, M. punctata, Petalostemon purpureum, Prunella vulgaris, Pycnanthemum flexuosum, P. pilosum, P. virginianum, Ratibida, Solidago serotina, Symphoricarpos, Taxaracum officinale, Teucrium canadense, Verbena hastata, V. stricta, Vernonia fasciculata, V. longifolia, V. noveboracensis.

Melissodes comptoides Robertson, 1898. Acad. Sci. St. Louis, Trans. 8: 52. ♀, ♂.

Melissodes martini hitei Cockerell, 1908. Ann. and Mag. Nat. Hist. (8) 2: 331. ♀.

gilensis gilensis Cockerell. Ariz., N. Mex., Colo. Pollen: Polylectic, visits flowers of *Arabis, Asclepias tuberosa, Cercidium torreyanum, Cirsium, Lippia lycioddea, Lotus brightii, Lupinus, Malva, Melilotus alba, M. officinalis, Monarda menthaefolia, M. stricta, Nolina, Robinia neomexicana.* Another subspecies, *Melissodes gilensis crenata* LaBerge, occurs in Mexico.

Melissodes gilensis Cockerell, 1896. Entomologist 29: 306. ♀, ♂.

Melissodes epicharina Cockerell, 1905. Psyche 12: 99. ♀.

maesta LaBerge. Tex.; Mexico (Coahuila, San Luis Potosi and Zacatecas). Pollen: Unknown, but visits flowers of *Helenium, Monarda citriodora, Phacelia.*

Melissodes (*Melissodes*) *maesta* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1095. ♂, ♀.

paroselae Cockerell. South. Calif. to southwest. Tex.; Mexico (Baja Calif., Sonora, Chihuahua, Nayarit). Pollen: Polylectic, visits flowers of *Acacia greggii, Argemone, Asclepias subulata, Aster canescens, Cucurbita, Cleome luteum, Dalea albiflora, Dasylirion wheeleri, Eriogonum trichopes, Franseria eriocentra, Gaillardia, Gossypium herbaceum, Haplopappus heterophylla, Helianthus annuus, Heterotheca subaxillaris, Kallstroemia grandiflora, Larrea tridentata, Leucophyllum frutescens, Lippia, Lygodesmia juncea, Medicago sativa, Opuntia, Parosela scoparia, Pectis papposa, Petalostemon, Prosopis glandulosa, Psilostrophe cooperi, Pyrrhopappus multicaulis, Rhus, Salix, Senecio longilobus, Thurberia thespesioides, Verbesina encelioides, V. exauriculata, Wedelia incarnata, Wislizenia palmeri, W. refracta, Zinnia grandiflora.*

Melissodes parosetae Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 528. ♂.

Melissodes paroselae Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 16: 477. Justified emendation of *parosetae.*

Melissodes Helenae Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 365. ♀.

Melissodes communis gratior Cockerell, 1923. Calif. Acad. Sci., Proc. 12: 85. ♀.

Biology: Mathewson and Daly, 1955. Kans. Ent. Soc., Jour. 28: 120. —Linsley, 1962, Ent. Soc. Amer., Ann. 55: 161, fig. 8. —Butler, Todd, McGregor and Werner, 1962. Ariz. Univ. Agr. Expt. Sta. Tech. Bul. 139: 1-11. —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 41 (floral relationships with *Larrea*).

tepaneca Cresson. Kans., Ill. and N. C. south through Tex. and Mexico to Panama. Pollen: Polylectic, visits flowers of *Abutilon avicennes, A. theophrasti, Agastache breviflora, Asclepias syriaca, A. tuberosa, Aster tanacetifolium, Baccharis, Borrichia frutescens, Brazoria truncata, Callirhoe involucrata, Cephalanthus occidentalis, Cercidium texanum, Coreopsis palmata, Cornuta grandifloria, Cuphea balsamona, Dalea grisea, Davilla knuthii, Donnellsmithia hintonii, Eryngium leavenworthii, Eysenhardtia polystacha, Gaillardia suavis, Gossypium herbaceum, Grindelia, Helenium microcephalum, Hibiscus tiliaceus, Ipomoea longifolia, I. murucoides, I. triloba, Lactuca pulchella, Lindheimeria texana, Lippia, Lythrum alatum, L. lanceolatum, Marrubium vulgare, Medicago, Monarda punctata, Opuntia lindheimeri, Parkinsonia, Petalostemon multiflorium, P. purpureum, P. violaceum, Phacelia, Phlox, Prosopis, Ratibida columnifera pulcherrima, Rubus, Rudbeckia, Salvia, Sida acuta, Sphaeralcea, Sisyrinchium campestre, Teucrium canadense, Verbesina encelioides, Verbena officinalis, V. stricta, Vernonia aschenborniana.*

Melissodes tepaneca Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 210. ♀ in part (♂ misdet.).

Melissodes petalostemonis Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 53. ♀.

Melissodes galvestonensis Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 181. ♀, ♂.

Melissodes bruesi Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 110. ♀.
Melissodes loena Cockerell, 1909. Entomologist 42: 148. ♂.
Melissodes masuca Cockerell, 1909. Entomologist 42: 148. ♂.
Melissodes tepaneca aschenborniana Cockerell, 1912. Ann. and Mag. Nat. Hist. (8) 10: 28. ♂.
Melissodes aurescens Cockerell, 1949. U. S. Natl. Mus., Proc. 98: 462. ♀.

tepida tepida Cresson. North. Utah to Calif. (Sierra Nevada Mts.), north to south. Idaho and northwest. Oreg. Pollen: Presumably polylectic, visits flowers of *Asclepias, Astragalus bolanderi, Glycyrrhiza lepidota, Helianthus annuus, Medicago sativa, Melilotus, Mentha, Trifolium pratense.*
Melissodes tepida Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 210. ♀.

tepida timberlakei Cockerell. South. Calif. northeast to Sierra Mts., north to southern Oreg. west of Sierras. Parasite: *Triepeolus lineatulus* Ckll. and Sandh., *T. timberlakei* Ckll. Pollen: Polylectic, visits the flowers of many species of plants for pollen and or nectar evidently preferring the pollen of Leguminosae, Labiatae, Euphorbiaceae, but also visits *Althaea rosea, Artemisia, Asclepias eriocarpa, Aster, Bellis, Brassica adpressa, B. geniculata, B. incana, Centaurea cyanus, Centromadia pungens, Chrysanthemum, Clarkia amoena, Cleomella, Coreopsis lanceolata, Croton californicus, Cryptantha intermedia, Cucurbita, Daucus carota, Durantia plumieri, Eremocarpus setigerus, Eriastrum virgatum, Eriogonum fasciculatum, E. gracile, E. involucratum, Eschscholzia californica, Geranium, Gilia capitata, Gossypium, Gutierrezia californica, G. sarothrae, Helianthus annuus, H. bolanderi, H. petiolaris, Heliotropium curassavicum, Hemizonia pungens, Hugelia virgata, Ipomoea, Lippia filiformis, L. lanceolata, Lotus americanus, L. scoparius, Madia, Marrubium vulgare, Medicago sativa, Melilotus alba, M. indica, Mesembryanthemum crystallinum, Papaver heterophyllum, Phacelia ramosissima, Phaseolus, Phyla lanceolata, P. nodiflora rosea, Plantago bigelovii, Pluchea borealis, P. camphorata, P. sericea, Raphanus, Rosa, Salsola kali, Scabiosa, Senecio douglasii, Sicyos, Sida hederacea, Stachys ajugoides, S. bullata, Stephanomeria exigua, S. virgata, Trichostema lanceolatum, Trifolium involucratum, T. repens, Wislizenia refracta.*
Melissodes timberlakei Cockerell, 1926. Ann. and Mag. Nat. Hist. (9) 18: 624. ♀.

Biology: Linsley, 1946. Econ. Ent., Jour. 39: 20-23, 25 (nesting habits).

tepida yumensis LaBerge. Southeast. Calif., south. Nev., southwest. Utah, Ariz.; Mexico (Baja Calif.). Pollen: Polylectic, visiting flowers of *Aster spinosa, Cercidium torreyanum, Chilopsis linearis, Citrullus, Cynodon dactylon, Gossypium, Lippia brevipes, Medicago sativa, Melilotus alba, Phyla nodiflora, Pluchea, Salix, Sida hederacea, Sphaeralcea orcutti, Tamarix gallica.*
Melissodes (Melissodes) tepida yumensis LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1128. ♂, ♀.

Biology: Butler, Todd, McGregor and Werner, 1962. Ariz. Univ. Agr. Expt. Sta. Tech. Bul. 139: 1-11 (floral relationships).

tessellata LaBerge. South. coastal Calif.; Mexico (Baja Calif., Jalisco). Pollen: Polylectic, visits a wide variety of flowers for pollen and or nectar including *Acacia greggii, Asclepias erosa, Baccharis glutinosa, Bebbia juncea, Brassica geniculata, Centaurea melitensis, Chrysanthemum segetum, Chrysothamnus veganus, Clarkia amoena, C. elegans, Corethrogyne bernardina, C. filaginifolia, Croton californicus, Cucurbita foetidissima, Durantia plumieri, Encelia farinosa, Eriogonum fasciculatum, Gutierrezia bernardina, G. californica, G. sarothrae, Haplopappus palmeri, H. vernonioides, Helianthus annuus, Hemizonia fasciculatum, H. paniculata, Hugelia virgata, Lippia filiformis, Lotus scoparius, Malvastrum fasciculatum, Marrubium vulgare, Medicago sativa, Melilotus alba, Monardella villosa, Opuntia parryi, Parkinsonia aculeata, Pluchea camphorata, Polygonum lapathifolium, Salvia apiana, Senecio douglasii, Stephanomeria virgata, Trichostema lanceolatum, Wislizenia refracta.*
Melissodes (Melissodes) tessellata LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1157, figs. 101-103. ♂, ♀.

thelypodii thelypodii Cockerell. West Tex. to southeast. Calif.; Mexico (Chihuahua, Coahuila, Durango). Pollen: Polylectic, takes pollen from a wide variety of plants including *Carthamnus, Gossypium, Kallstroemia grandiflora*, but also visits the flowers of *Asclepias, Astragalus cottonii, Baccharis glutinosa, Chamaesaracha coronopus, Cirsium, Convolvulus, Gaillardia, Helianthus annuus, Hoffmanseggia jamesii, Ipomoea mexicana, Larrea tridentata, Lippia cuneifolia, Lygodesmia juncea, Medicago sativa, Melilotus, Solanum elaeagnifolium, Sphaeralcea, Thelypodium linearifolium, Thurberia thespesioides, Wedeliella incarnata*. Another subspecies, *Melissodes thelypodii stulta* LaBerge, occurs in Mexico (Colima, Durango, Jalisco, Michoacan, Oaxaca and San Luis Potosi), Guatemala and Honduras.

Melissodes thelypodii Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 527. ♀.
Melissodes kallstroemiae Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 16: 216. ♂.
Melissodes kallstroemiae var. *phenacoides* Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 16: 217. ♂.
Melissodes thurberiae Cockerell, 1914. Ent. Soc. Wash., Proc. 16: 31. ♀.

Biology: Butler, Todd, McGregor and Werner, 1962. Ariz. Univ. Agr. Expt. Sta. Tech. Bul. 139: 1-11. —Cazier and Linsley, 1974. Amer. Mus. Novitates 2546: 14 (floral relationships).

Genus MELISSODES Subgenus APOMELISSODES LaBerge

Melissodes subg. *Apomelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1175.
Type-species: *Melissodes fimbriata* Cresson. Orig. desig.

apicata Lovell and Cockerell. Maine to Fla. Pollen: Oligolectic, obtains both pollen and nectar from flowers of *Pontederia*, but visits other flowers for nectar including *Cirsium, Hydrocotyle umbellata, Melilotus alba, Oenothera speciosa, Stachys floridana, Trifolium hybridum*.
Melissodes apicata Lovell and Cockerell, 1906. Psyche 13: 111. ♀.

Taxonomy: LaBerge, 1963. Nebr. Univ. State Mus., Bul. 4: 233-234 (geogr. and floral records).

baileyi Cockerell. Tex. Pollen: Unknown, but visits flowers of *Callirhoe* and *Gaillardia*.
Melissodes Baileyi Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 361. ♀.

Taxonomy: LaBerge, 1963. Nebr. Univ. State Mus., Bul. 4: 231-233. ♂ (geogr. and floral records).

fimbriata Cresson. Va. to Ga., west to Tex., Kans. Pollen: Oligolectic, obtains both pollen and nectar from flowers of *Oenothera*, but visits other flowers for nectar including *Helianthus petiolaris, Kneiffia*.
Melissodes fimbriata Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 203. ♀, ♂.

mitchelli LaBerge. N. C., Ga., Fla. Pollen: Apparently oligolectic, visits flowers of *Opuntia*.
Melissodes (*Apomelissodes*) *mitchelli* LaBerge, 1956. Kans. Univ. Sci. Bul 38: 556, fig. 7. ♂, ♀.

Genus MELISSODES Subgenus HELIOMELISSODES LaBerge

Melissodes subg. *Heliomelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1172.
Type-species: *Melissodes desponsa* Smith. Orig. desig.

desponsa Smith. N. S. to N. C., Ala., west to N. Dak. and Okla. Pollen: Oligolectic, obtains pollen from flowers of *Cirsium*, but visits other flowers for nectar including *Aster novaeangliae, Brauneria purpurea, Carduus crispus, Cassia, Centaurea jacea, Coreops aristosa, Helianthus annuus, H. grosse-serratus, Inula helenium, Monarda fistulosa, Pontederia cordata, Pycnanthemum, Rudbeckia laciniata, Silphium, perfoliatum, Solidago canadensis, S. puberula, Verbena stricta*.
Melissodes desponsa Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 310. ♀.
Melissodes daponsa(!) Bridwell, 1899. Kans. Acad. Sci., Trans. 16: 211.
Melissodes nigripes Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 311. ♀ (♂ misdet.).
Melissodes cnici Robertson, 1901. Canad. Ent. 33: 230. ♀, ♂.

rivalis Cresson. B. C. and Calif. east to Man., Minn., south to Ariz., N. Mex. and Tex. Parasite: *Nemognatha dichroa* LeC.? Pollen: Apparently oligolectic, obtains pollen from composites of the tribe Cynareae, especially the genus *Cirsium*, but visits other flowers presumably for nectar including *Apocynum, Asclepias, Carduus caulescens, Centaurea americana, Helianthus annuus, Penstemon cyananthus, Rudbeckia, Solidago, Teucrium, Trifolium repens, T. pratense, Verbena.*
Melissodes rivalis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 277. ♂.
Melissodes desponsiformis Cockerell, 1905. *In* Viereck, Canad. Ent. 37: 320. ♀.
Melissodes mysops Cockerell, 1905. Entomologist 38: 146. ♂, ♀.
Melissodes hexacantha Cockerell, 1905. Psyche 12: 100. ♂.
Melissodes nigrosignata Cockerell, 1905. Psyche 12: 101. ♀.
Melissodes habilis Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 229. ♂.

Biology: Scullen, 1928. Pan-Pacific Ent. 4: 176 (as *mysops*, nesting habits). —LaBerge, 1956. Kans. Univ. Sci. Bul. 38: 571-572 (additional information on nesting habits based on notes supplied by H. A. Scullen).

Genus MELISSODES Subgenus TACHYMELISSODES LaBerge

Melissodes subg. *Tachymelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1170.
Type-species: *Melissodes dagosa* Cockerell. Orig. desig.

dagosa Cockerell. Idaho and Wash. to Calif. and Colo. Pollen: Unknown, but visits flowers of *Asclepias, Cirsium, Medicago sativa, Melilotus alba, Norta altissima, Sphaeralcea, Thelypodium brachycarpa.*
Melissodes dagosa Cockerell, 1909. Canad. Ent. 41: 128. ♂.
Melissodes calloleuca Cockerell, 1924. Pan-Pacific Ent. 1: 55. ♀.

opuntiella Cockerell. Utah, Calif., Ariz., Tex.; Mexico (Coahuila Mexico and Zacatecas). Pollen: Polylectic, obtains pollen from such flowers as *Cirsium, Lindheimera texana, Sphaeralcea pedatifolia, Verbesina encelioides*, but visits other flowers including *Cercidium texanum, Erigeron compositus, Helenium microcephalum, Helianthus annuus, Opuntia lindheimeri, Parkinsonia, Prosopis, Tetradymia canescens.*
Melissodes opuntiella Cockerell, 1911. Canad. Ent. 43: 131. ♂, ♀.
Melissodes albocincta Cockerell, 1919. Ann. and Mag. Nat. Hist. (9) 2: 119. ♀.

sphaeralceae Cockerell. Ariz., N. Mex., Tex.; Mexico (Aguascalientes, Distrito Federal, Mexico, San Luis Potosi, Zacatecas). Pollen: Unknown, but visits flowers of *Melilotus alba, Monarda, Sphaeralcea angustifolia, S. fendleri.*
Melissodes sphaeralceae Cockerell, 1896. Entomologist 29: 304. ♂.

Genus MELISSODES Subgenus EUMELISSODES LaBerge

Melissodes subg. *Eumelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1177.
Type-species: *Melissodes agilis* Cresson. Orig. desig.

agilis Cresson. South. Canada, U. S., except Fla.; Mexico (Chihuahua, Coahuila, Durango). Pollen: Apparently an oligolege of *Helianthus* including *H. annuus, H. atrorubens, H. bolanderi, H. ciliaris, H. coronarius, H. divaricatus, H. grosse-serratus, H. laetiflorus, H. lenticularis, H. maximillianus, H. mollis, H. petiolaris, H. pumilis, H. radulus, H. rigidus, H. salicifolius, H. scaberrimus, H. subrhomboideus, H. tuberosus*, but visits a wide variety of flowers: *Abutilon theophrasti, Althaea rosea, Aplopappus spinulosus, Arctium, Argemone platyceras, Bidens aristosa, B. laevis, Blephilia hirsuta, Brassica juncea, Brauneria pallida, Carduus crispus, Carya pecan, Cassia chamaecrista, C. fasciculata, Centromadia pungens, Chrysopsis hispidus, Chrysothamnus, Cirsium altissimum, C. discolor, C. lanceolatum C. undulatum, Clematis, Cleome lutea, C. serrulata, Convolvulus, Coreopsis lanceolata, C. palmata, C. tripteris, Cosmos, Datura meteloides, Enceliopsis, Engelmannia pinnatifida, Ericameria palmeri, Eschscholzia californica, Eupatorium purpureum, Eustoma artemifolium, Gaillardia cristata, Gilia, Grindelia squarrosa, Gutierrezia sarothrae, Haplopappus palmeri, Helenium autumnale, H. laciniatum, Heliopsis, Heliotropium, Hemizonia pungens, Hibiscus, Ipomoea, Lactuca pulchella, Lepachys pinnata, Liatris pycnostachya, Medicago sativa, Melilotus alba, Mentha canadensis, Monarda fistulosa, Penstemon, Pepo, Petalostemon*

occidentale, P. purpureum, Phacelia, Physostegia parviflora, Platycodon grandiflorum, Pluchea camphorata, Prionopsis, Pycnanthemum flexuosum, P. pilosum, Pyrrhopappus multicaulis, Rudbeckia hirta, R. laciniata, R. triloba, Schrankia uncinata, Senecio, Silphium integrifolium, S. laciniatum, S. perfoliatum, S. speciosum, Sium cicutaefolium, Solidago canadensis, S. serotina, S. trinervata, Teucrium canadense, Verbena hastata, V. stricta, Verbesina encelioides, V. exauriculata, V. occidentalis, Vernonia baldwini interior, V. baldwini occidentalis, V. fasciculata, Veronica, Vitex agnus-castus, Wislizenia refracta.

Melissodes agilis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 204. ♂.

Melissodes aurigenia Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 212. ♀, ♂.

Biology: Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 34 (nest site, burrow). —Custer, 1928. Canad. Ent. 60: 28-31, 2 figs. (possibly this species using same burrow entrance as *Svastra obliqua* Say).

appressa LaBerge. Calif. Pollen: Oligolege of autumnal flowering Compositae, especially *Gutierrezia, Haplopappus, Heterotheca,* but visits other flowers including *Alyssum maritinum, Aster exilis, Centromadia pungens, Croton californicus, Grindelia californica, G. camporum, Helianthus annuus, Heliotropium curassavicum, H. oculatum, Hemizonia pungens, Lessingia glandulifera, Melilotus alba, Phacelia crenulata, Pluchea camphorata, Senecio, Solidago confinis, S. occidentalis.*

Melissodes (*Eumelissodes*) *appressa* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 616. ♀, ♂.

bicolorata LaBerge. Northern Calif., Nev., Utah. Pollen: Unknown, but visits flowers of *Chrysothamnus, Haplopappus arborescens, Melilotus, Penstemon palmeri.*

Melissodes (*Eumelissodes*) *bicolorata* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 441. ♀, ♂.

bidentis Cockerell. N. Dak. and Minn., east to N. Y., south to Tex. Pollen: Apparently an oligolege of Compositae, visits flowers of *Bidens, Echinacea pallida, Gossypium herbaceum, Helianthus annuus, H. maximillianus, H. tuberosus, Physostegia parviflora, Rudbeckia laciniata, Sonchus terrestris.*

Melissodes bidentis Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 362. ♀.

bimatris LaBerge. B. C. to Calif., east to Colo. and N. Mex. Pollen: Probably oligolectic, obtaining pollen principally from flowers of *Chrysothamnus* including *C. nauseosus, C. n. consimilis, C. n. gnaphalodes, C. n. hololeucus, C. n. mohavensis, C. n. occidentalis, C. n. speciosus, C. paniculatus, C. parryi, C. viridulus, C. viscidiflorus viscidiflorus,* and *Haplopappus acradenius, H. arborescens H. palmeri,* but also visits flowers of *Artemisia, Aster, Bigelovia, Centromadia pungens, Chaematoris, Eriogonum, Grindelia camporum, Gutierrezia californica, G. lucida, G. sarothrae, Helianthus, Rhamnus californica, Senecio.*

Melissodes (*Eumelissodes*) *bimatris* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 431. ♀, ♂.

boltoniae Robertson. Pa. to Minn. south to Fla. and Tex. Pollen: Oligolege of Compositae, visiting flowers of *Abutilon avicennae, Amphiachyris dracunculoides, Aster ericoides villosus, A. multiflorus, A. novaecangliae, A. praeatus, Bidens involucrata, Boltonia asteroides, Cassia, Chrysopsis, Cirsium, Coreopsis aristosa, Helenium altissimum, H. autumnale, H. tenuifolium, Helianthus annuus, H. grosse-serratus, H. tuberosus, Heterotheca latifolia, Lythrum, Ratibida pinnata, Rudbeckia triloba, Silphium, Solidago canadensis, S. missouriensis, Verbena stricta, Vernonia baldwini interior.* In the vicinity of Lawrence, Kansas females have been observed almost invariably collecting pollen from flowers of *Amphiachyris dracunculoides.*

Melissodes boltoniae Robertson, 1905. Amer. Ent. Soc., Trans. 31: 368. ♀.

Melissodes melandri Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 109. ♀.

brevipyga LaBerge. Ariz., Calif., Idaho. Pollen: Oligolege of Compositae, visits flowers of *Aster spinulosus, A. tephrodes, Baccharis emoryi, Chrysothamnus, Gutierrezia californica, G. sarothrae, Haplopappus acradenius, Palafoxia linearis, Pectis papposa.*

Melissodes (*Eumelissodes*) *brevipyga* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 606, figs. 111-112. ♀, ♂.

cerussata LaBerge. Calif. (Blythe, Hopkins Well and Ludlow). Pollen: Unknown, but visits flowers of *Geraea canescens* and *Hoffmanseggia* in the fall.

Melissodes (*Eumelissodes*) *cerussata* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 436. ♀.

Taxonomy: LaBerge, 1963. Nebr. Univ. State Mus., Bul. 4: 238-239. ♂.

confusa Cresson. Alta., Man. and Sask. south through Calif., Ariz. and N. Mex. to southern Mexico (Veracruz and Oaxaca). Pollen: Probably oligolectic on a wide range of Compositae, visits flowers of *Agoseris glauca, Aplopappus, Argemone platyceras, Aster canescens, Bidens triplinervia* var. *macrantha, Ceanothus, Cirsium undulatum, Cleome, Cosmos parviflorus, Erigeron uniflorus, Eryngium asperum, Gaillardia, Geranium atropurpureum, Grindelia squarrosa, Helenium bigelovii, H. hoopesii, Heliopsis scabra, Lactuca pulchella, Lotus, Medicago sativa, Monarda pectinata, Penstemon, Petalostemon purpureum, Phacelia, Polymentha, Ratibida columnaris, Rudbeckia hirta, R. laciniata, Senecio bigelovii, S. purchianus, Solidago trinervata, Teucrium occidentale, Verbena stricta, Verbesina encelioides, Vicia pulchella.*

Melissodes confusa Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 205. ♀, ♂.
Melissodes ruidosensis Cockerell, 1896. Entomologist 29: 305. ♂.
Melissodes tenuitarsis Cockerell, 1905. Psyche 12: 99. ♂.
Melissodes civica Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 258. ♀.
Melissodes atraticornis Cockerell, 1934. Amer. Mus. Novitates 697: 9. ♂.

coreopsis Robertson. Alta. east to Minn., south to Ill., Tex. and Ariz. Pollen: Oligolectic, principally *Helianthus* and related genera, but visits a wide variety of flowers for pollen and or nectar including *Amphiachyris dracunculoides, Amorpha canescens, A. fruticosa, Aster ericoides villosus, A. multiflora, A. novaeangliae, A. paniculatus, A. praeatus, Bidens involucrata, Boltonia asteroides, Chrysopsis angustifolia, Chrysothamnus graveolus, Cirsium, Clematis, Cleome serrulata, Cooperia pedunculata, Convolvulus, Coreopsis grandiflorum, C. palmata, C. tinctoria, Cosmos, Echinacea angustifolia, E. pallida, E. purpurea, Erucastrum pollichii, Eryngium leavenworthii, Eupatorium altissimum, Euphorbia, Eustoma russellianum, Gaillardia pulchella, Geranium, Gossypium herbaceum, Grindelia squarrosa, Gutierrezia sarothrae, Haplopappus, Helenium autumnale, H. laciniatum, H. latifolia, H. nudiflorum, H. tenuifolium, Heterotheca subaxillaris, Helianthus annuus, H. grosse-serratus, H. maximillianus, H. petiolaris, H. salicifolius, H. tuberosus, Heliopsis helianthoides, Marrubium vulgare, Medicago sativa, Melilotus alba, M. officinalis, Monarda citriodora, M. pectinata, M. punctata, Nepeta cataria, Opuntia lindheimeri, O. macrorhiza, Parosela, Petalostemon candidum, P. oligophyllum, P. purpureum, Prionopsis ciliata, Psoralea floribunda, Ratibida columnaris, R. pinnata, Rudbeckia amplexicaulis, R. bicolor, R. hirta, R. laciniata, R. triloba, Salsola pestifer, Silphium perfoliatum, S. speciosum, Solidago canadensis, S. rigida, S. serotina, Tetragonotheca ludoviciana, Tetraneuris linearifolia, Trifolium repens, Verbena officinalis, V. stricta, Verbesina encelioides, Vernonia.*

Melissodes coreopsis Robertson, 1905. Amer. Ent. Soc., Trans. 31: 368. ♀.
Melissodes agilis semiagilis Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 364. ♂.
Melissodes confusiformis Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 366. ♀.
Melissodes helianthophila Cockerell, 1914. Ann. and Mag. Nat. Hist. (8) 14: 361. ♂.

denticulata Smith. Que. west to N. Dak., south to Fla. and Tex. Pollen: Apparently an oligolege of *Vernonia* including *V. altissima, V. baldwini, V. b. interior, V. fasciculata, V. glauca, V. noveboracensis, V. texana,* but visits other flowers for nectar including *Amphiachyris dracunculoides, Carduus crispus, Convolvulus sepium, Eupatorium purpurea, Ipomoea pandurata, Pycnanthemum, Silphium laciniatum, Solidago juncea, Symphoricarpos, Verbena hastata, V. stricta.*

Melissodes denticulata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 311. ♂.
Melissodes senilis Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 311. ♀.
Melissodes perplexa Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 206. ♀, ♂.
Melissodes vernoniana Robertson, 1905. Amer. Ent. Soc., Trans. 31: 368. ♀, ♂.

dentiventris Smith. Southeastern Canada, Mass. west to Kans., south to Ga. and Tex. Pollen: Oligolectic, principally *Aster* including *A. anomalus, A. dumosus, A. ericoides, A. e. villosus, A. novaeangliae, A. paniculatus, A. sagitifolius, A. turbinellus,* but visits flowers of other Compositae as well as other families including *Bidens aristosa, B. polylepis, Boltonia asteroides, Coreopsis tripterus, Chrysopsis mariana, C. microcephala, Eupatorium perfoliatum, E. serotinum, Helianthus annuus, H. divaricatus, H. grosse-serratus, H. radula, Isopappus divaricatus, Lespedeza virginica,*

Lippia lanceolata, Polygonum pennsylvanicum, Solidago canadensis, S. rigida, S. ulmifolia, Verbena hastata, Vernonia, Veronica.

Melissodes dentiventris Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 312. ♂.

Melissodes autumnalis Robertson, 1905. Amer. Ent. Soc., Trans. 31: 369. ♀, ♂.

Melissodes megacerata Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 362. ♂.

elegans LaBerge. Tex., Kans. Pollen: Probably an oligolege of Compositae, visits flowers of *Aplopappus divaricatus, Aster, Boltonia asteroides, Cleome, Croton monanthrogynus, Eupatorium serotinum, Fagopyrum, Grindelia, Helenium tenuifolium, Heterotheca latifolia, H. subaxillaris, Polygonum, Prionopsis ciliata, Solidago serotina, Verbesina encelioides.*

Melissodes (*Eumelissodes*) *elegans* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 490. ♀, ♂.

exilis LaBerge. Ariz. (Tucson). Pollen: Unknown, but visits flowers of *Aster, Viguiera.*

Melissodes (*Eumelissodes*) *exilis* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 648. ♀, ♂.

expolita LaBerge. Ariz., south. Calif.; Mexico (Sonora). Pollen: Unknown, but visits flowers of *Baileya, Chrysothamnus, Encelia farinosa, Sphaeralcea emoryi.*

Melissodes (*Eumelissodes*) *expolita* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 505. ♀, ♂.

fasciatella LaBerge. Ariz. Pollen: Presumably an oligolege of fall flowering Compositae, visits flowers of *Chrysothamnus, Erigeron, Gutierrezia, Haplopappus gracilis, Heterotheca subaxillaris, Viguiera.*

Melissodes (*Eumelissodes*) *fasciatella* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 445. ♀.

fumosa LaBerge. Md. to Nebr. south to S. C., Ala., Miss. Pollen: Presumably an oligolege of Compositae and seems to prefer flowers of the genus *Solidago* including *S. canadensis, S. glaberrima, S. rupestris, S. serotina,* but also visits flowers of *Asclepias tuberosa, Aster dumosus, Boltonia asteroides, Chrysopsis microcephala, Eupatorium linearifolium, Grindelia, Helenium, Koellia.*

Melissodes (*Eumelissodes*) *fumosa* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 486, figs. 90-91. ♀, ♂.

gelida LaBerge. Mont. and N. Dak. south to N. Mex. and Tex. Pollen: Oligolege of Compositae with some preference for flowers of the genus *Helianthus* including *H. annuus, H. petiolaris,* but also visits flowers of *Argemone, Chrysopsis, Cosmos, Echinacea, Engelmannia pinnatifida, Gaillardia, Lacinaria squarrosa, Monarda pectinata, Ratibida columnaris, Sphaeralcea, Thelesperma gracile, Verbena stricta, Vernonia.*

Melissodes (*Eumelissodes*) *gelida* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 575. ♀, ♂.

grindeliae Cockerell. Minn. to Wash., south to southern Calif., Ariz., N. Mex. Pollen: Oligolege of Compositae, visits flowers of *Aster commutatus, Chrysopsis hispida, Chrysothamnus nauseosus, Cleome serrulata, Croton, Grindelia squarrosa, Haplopappus, Helianthus, Hymenoxys floribunda, H. richardsonii, Liatris punctata, Lupinus, Melilotus alba, M. officinalis, Petalostemon occidentale, Phacelia glandulosa, Polymentha, Psilostrophe guaphaloides, Ratibida columnaris, R. tagetes, Rudbeckia laciniata, Verbena stricta.*

Melissodes grindeliae Cockerell, 1898. Denison Univ. Sci. Labs., Bul. 11: 66. ♂, ♀.

humilior Cockerell. Ariz., N. Mex., west Tex.; Mexico (Chihuahua). Pollen: Presumably an oligolege of Compositae, visits flowers of *Aster crassulus, A. spinosus, A. tanacetifolius, Grindelia, Haplopappus acradenius, Helenium autumnale, Heterotheca, Lygodesmia juncea, Solidago occidentalis, Sphaeralcea emoryi, Verbesina encelioides.*

Melissodes humilior Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 447, 450. ♀.

Melissodes intermediella Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 102. ♀.

hurdi LaBerge. Calif. (Central Valley). Pollen: Presumably an oligolege of late summer and fall flowering Compositae including *Artemisia, Centromadia pungens, Grindelia camporum, Gutierrezia californica, Hemizonia pungens, Heterotheca grandiflora, Lessingia glandulifera, Solidago.*

Melissodes (*Eumelissodes*) *hurdi* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 526. ♀, ♂.

hymenoxidis Cockerell. Colo., Wyo., Utah, Mont., Calif. Pollen: Presumably an oligolege of late summer and fall flowering Compositae including *Aster foliaceus, Chrysopsis, Grindelia, Haplopappus suffruticosus, Hymenoxys lingulaefolia,* but also visits *Lupinus* and an unspecified mint.

Melissodes hymenoxidis Cockerell, 1906. Amer. Mus. Nat. Hist., Bul. 22: 443. ♀.

Taxonomy: Lanham, 1977. Kans. Ent. Soc., Jour. 50: 312 (holotype).
Melissodes fremontii Cockerell, 1907. Entomologist 40: 268. ♂.
Melissodes kelloggi Cockerell, 1919. Ent. News 30: 293. ♂.

illata Lovell and Cockerell. P. E. I. to Alta., south to N. C. in the mts. and Ill. Pollen: Oligolege of Compositae, especially *Solidago* and *Aster*, visits flowers of *Aster azureus, Cirsium arvense, Chrysanthemum leucanthemum pinnatifidum, Grindelia, Helianthus strumosus, Hieracium auriantiacum, Leontodon, Rudbeckia serotina, Solidago canadensis, S. gigantea leiophylla, S. juncea, Sonchus, Tanacetum vulgare.*
Melissodes illata Lovell and Cockerell, 1906. Psyche 13: 110. ♀, ♂.

limbus LaBerge. Ariz., N. Mex. and Tex., to central Mexico (Jalisco and Hidalgo). Pollen: Oligolege of Compositae, especially *Verbesina, Aplopappus* and *Baileya*, visits flowers of *Aplopappus gracilis, A. spinulosus, A. tenuisectus, Argemone, Aster, Baccharis, Baileya multiradiata, Chrysothamnus, Encelia farinosa, Eriogonum, Gossypium herbaceum, Grindelia, Gutierrezia, Hymenothrix wislizenii, Kallstroemia grandiflora, Marrubium vulgare, Melilotus alba, Pectis papposa, Sphaeralcea, Verbesina encelioides, V. exauriculata, Wedeliella incarnata.*
Melissodes (Eumelissodes) limbus LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 585. ♀, ♂.

lutulenta LaBerge. B. C. to Sask., south to Calif. Ariz. and Mexico (Guanajuato). Pollen: Oligolege of Compositae, especially *Chrysothamnus, Grindelia* and *Solidago*, visits *Achillea millefolia, Anthemis cotulla, Aster spinosus, Centromadia pungens, Chaemataxis, Chrysothamnus, Cleome, Grindelia squarrosa, Gutierrezia, Helianthus, Melilotus alba, Mentzelia veatchiana, Solidago occidentalis.*
Melissodes (Eumelissodes) lutulenta LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 599. ♀, ♂.

manipularis Smith. Fla. to N. C., ?Va. Pollen: Unknown, but visits flowers of *Chrysopsis, Kuhnistera, Petalostemon.* The Virginia record pertains to a collection made at the flowers of *Eupatorium* in Falls Church and has not been verified since it was published in 1907 by Cockerell.
Melissodes manipularis Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 312. ♂.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 329.

melanura (Cockerell). Calif., Nev. Pollen: Presumably an oligolege of summer and fall flowering Compositae including *Aster, Corethrogyne bernardina, Erigeron, Gutierrezia californica, G. sarothrae, Haplopappus linearifolius, Lessingia glandulifera, Solidago elongata,* but also visits flowers of *Eriogonum virgatum.*
Exomalopsis melanurus Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 59. ♀.

menuachus Cresson. B. C., Alta. and N. Dak., south to Calif., Tex., and Ill.; Mexico (Chihuahua, Zacatecas). Parasite: *Triepeolus occidentalis* Cress.? Pollen: Oligolege of Compositae, especially *Grindelia* and *Solidago*, visits flowers of *Argemone intermedia, A. platyceras, Aster laevis, A. multiflora, Cassia chamaecrista, Chrysopsis, Chrysothamnus graveolus glabrata, Cleome serrulata, Eustoma russellianum, Gaillardia, Grindelia inornata, G. squarrosa, Gutierrezia californicum, G. sarothrae, Helianthus annuus, H. petiolaris, Hymenothrix wislizenia, Medicago sativa, Melilotus alba, Petalostemon oligocephalum, Polygonum, Rudbeckia laciniata, Sidalcea neomexicana, Solidago canadensis, S. rigida, Verbena, Viguiera, Xanthocephalum gymnospermoides.*
Melissodes Menuachus Cresson, 1868. Amer. Ent. Soc., Trans. 1: 388. ♂.
Melissodes mennacus(!) Uhler, 1877. U. S. Geol. Geog. Survey, Bul. 3: 783.
Melissodes pallida Robertson, 1895. Amer. Ent. Soc., Trans. 22: 127. ♀.
Melissodes Mizeae Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 522. ♀.
Melissodes blakei Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 523. ♀.
Melissodes lavata Cockerell, 1924. Pan-Pacific Ent. 1: 56. ♀.
Melissodes octobris Cockerell, 1934. Ent. News 45: 30. ♀.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 225 (nest site).

micheneri LaBerge. Calif. (Sierra Nevada Mts. and Peninsular Mts. of south. Calif.). Pollen: Oligolege of Compositae, especially *Chrysothamnus* and *Chrysopsis*, visits flowers of *Bigelovia, Chrysopsis fastigiata, C. villosa, Chrysothamnus nauseosus, Haplopappus arborescens, H. bloomeri angustatus, Solidago.*
Melissodes (Eumelissodes) micheneri LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 642. ♀, ♂.

microsticta Cockerell. B. C. to Sask. south to southern Calif., Nev., Utah., Colo., and Tex. Pollen: Oligolege of Compositae, visits flowers of *Artemisia, Aster adscendens, A. canescens, A. delectabilis, A. foliaceus, Calyptridium umbellatum, Carduus, Cichorium intybus, Chrysopsis fastigiata, C. villosus, Chrysothamnus nauseosus, C. n. consimilis, Corethrogyne, Cryptantha intermedia, Erigeron stenophyllus, Eriogonum subscaposum, Grindelia squarrosa, Gutierrezia californica, G. sarothrae, Haplopappus, Helenium bigelovii, Helianthus, Hemizonia wheeleri, H. wrightii, Malvastrum paniculata, Penstemon, Phacelia humilis, Senecio ionophyllus, Solidago elongata, S. occidentalis, Sphaeralcea fasciculata.*

Melissodes microsticta Cockerell, 1905. *In* Viereck, Canad. Ent. 37: 321. ♂.

monoensis LaBerge. Calif. (Mono Co.). Pollen: Unknown, but visits flowers of *Chrysothamnus.*

Melissodes (Eumelissodes) monoensis LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 623. ♀, ♂.

montana Cresson. Colo. and Utah, south through Tex., N. Mex., and Ariz. to south. Mexico (Oaxaca). Pollen: Oligolege of Compositae, visits flowers of *Aplopappus gracilis, Asclepias, Aster commutatus, Croton, Erigeron, Eriogonum, Grindelia, Gutierrezia, Helianthus annuus, Heterotheca psammophila, H. subaxillaris, Polymentha, Senecio longilobus, Verbesina exauriculata,* but also is known to collect pollen from flowers of *Kallstroemia grandiflora.*

Melissodes montana Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 202. ♀, ♂.

Melissodes hirsuta Smith, 1879. Descr. n. spp. Hym. Brit. Mus., p. 116. ♂.

Eucera oajacana Dalla Torre, 1896. Cat. Hym. v. 10, p. 242. N. name for *hirsuta* Smith, a secondary homonym in *Eucera.*

Melissodes atrifera Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 256. ♂.

Melissodes atrifera sandiarum Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 257. ♂.

Biology: Cazier and Linsley, 1974. Amer. Mus. Novitates 2546: 14 (floral relationships).

moorei Cockerell. Calif. Pollen: Oligolege of Compositae, visits flowers of *Corethrogyne, Erigeron glaucus, Grindelia platyphylla, Hemizonia paniculata, Heterotheca grandiflora, Solidago.*

Melissodes moorei Cockerell, 1926. Ann. and Mag. Nat. Hist. (9) 18: 624. ♀.

nivea Robertson. N. Y. to Minn. and Kans., south to N. C., Ala., and Miss. Pollen: Oligolege of Compositae, especially *Solidago, Aster* and *Liatris,* visits flowers of *Aster ericoides, A. sagittifolius, Bidens laevis, Boltonia asterioides, Chrysopsis mariana, Gerardia, Helenium, Helianthus annuus, H. atrorubens, Lacinaria, Lepachys pinnata, Liatris graminifolia, Prionopsis ciliata, Solidago canadensis, S. lanceolata, S. rigida, S. serotina, Vernonia glauca.*

Melissodes nivea Robertson, 1895. Amer. Ent. Soc., Trans. 22: 127. ♀.

ochraea LaBerge. South. Calif., Ariz. Pollen: Presumably an oligolege of Compositae, visits flowers of *Baccharis, Chrysothamnus, Gutierrezia, Haplopappus acradenius.*

Melissodes (Eumelissodes) ochraea LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 428. ♀, ♂.

pallidisignata Cockerell. B. C. to Man., south through south. Calif. and N. Mex. to central Mexico (Aguascalientes). Pollen: Oligolege of Compositae especially *Haplopappus, Chrysothamnus, Layia, Erigeron* and *Grindelia,* visits flowers of *Aplopappus gracilis, Aster adscendens delectabilis, Centromadia pungens, Chrysopsis hispida, Chrysothamnus nauseosus, C. n. mojavensis, C. n. occidentalis, C. viscidiflorus typicus, Cirsium, Cleome serrulata, Ericameria palmeri, Grindelia camporum, G. latifolia, G. platyhylla, G. squarrosa, Gutierrezia californica, G. sarothrae, Haplopappus acradenius, H. vernonioides, Helianthus, Heliotropium, Hemizonia pungens, Heterotheca grandiflora, Lepachys, Lessingia glandulifera, Medicago sativa, Melilotus alba, Petalostemon occidentalis, Pluchea persica, Psilostrophe gnaphalodes, Senecio ionophyllus, Solidago canadensis, S. confinis, S. occidentalis, Wislizenia refracta.*

Melissodes nigrosignata pallidisignata Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 180. ♀.

Melissodes menuacha vernonensis Viereck, 1905. Canad. Ent. 37: 320. ♀, ♂.

Melissodes praelauta Cockerell, 1905. Psyche 12: 102. ♂.

Biology: Thorp and Chemsak, 1964. Pan-Pacific Ent. 40: 75-83, 2 figs. (life history).

paucipuncta LaBerge. Ariz. Pollen: Possibly oligolectic on *Opuntia*, a male has been taken at flowers of *Bebbia*.
Melissodes (*Eumelissodes*) *paucipuncta* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 650. ♀, ♂.

paulula LaBerge. Wash. to southern Calif. Pollen: Oligolege of Compositae, especially *Haplopappus*, *Gutierrezia*, and *Solidago*, visits flowers of *Baccharis emoryi*, *Croton californicus*, *Ericameria palmeri*, *Erigeron canadensis*, *Eriogonum fasciculatum*, *E. gracile*, *Gutierrezia californica*, *G. sarothrae*, *Haplopappus acradenius*, *H. arborescens*, *H. vernonioides*, *Pluchea camphorata*, *Salsola kali*, *Senecio douglasii*, *Solidago californica*, *S. elongata*, *S. occidentalis*.
Melissodes (*Eumelissodes*) *paulula* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 631. ♀, ♂.

perlusa Cockerell. Alta. and Man., south to Iowa and Ariz. Pollen: Possibly an oligolege of *Helianthus* including *H. annuus*, *H. petiolaris*, but also visits flowers of *Bigelovia*, *Brauneria pallida*, *Grindelia*, *Medicago sativa*, *Mentha canadensis*, *Petalostemon oligophyllum*, *Ratibida columnaris*.
Melissodes semiagilis perlusa Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 231. ♂.

Taxonomy: Cockerell, 1914. Canad. Ent. 46: 413. ♀.

perpolita LaBerge. Ariz., N. Mex., Colo., (?)Utah. Pollen: Unknown, but visits flowers of *Aster*, *Chaemataxis*, *Grindelia*, *Haplopappus spinulosus*.
Melissodes (*Eumelissodes*) *perpolita* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 443. ♀, ♂.

personatella Cockerell. Central and southern Calif.; Guatemala (Jicaro). Pollen: Unknown, but visits flowers of *Eriogonum gracile*, *E. subscaposum*, *Gutierrezia californica*, *G. sarothrae*, *Hagardia squamosa*, *Haplopappus palmeri*, *H. vernonioides*, *Hemizonia paniculata*, *Heterotheca grandiflora*, *Palafoxia linearis*.
Melissodes personatella Cockerell, 1901. Canad. Ent. 33: 297. ♂.

pexa LaBerge. Ariz.; Mexico (Coahuila, Chihuahua). Pollen: Unknown, but visits flowers of *Lepidium alyssoides*.
Melissodes (*Eumelissodes*) *pexa* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 621. ♀, ♂.

pilleata LaBerge. N. C. Pollen: Possibly an oligolege of Compositae, visits flowers of *Aster*, *Chrysopsis*, *Gerardia flavia*, *Haplopappus*, *Kuhnistera pinnata*, *Liatris*.
Melissodes (*Eumelissodes*) *pilleata* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 459. ♀, ♂.

pullatella LaBerge. Oreg. Pollen: Unknown, but visits flowers of *Grindelia*.
Melissodes (*Eumelissodes*) *pullatella* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 620. ♀.

relucens LaBerge. N. Mex. (Mesilla Park), Tex. (El Paso and Big Bend Natl. Pk.). Pollen: Unknown, but visits flowers of *Chrysopsis hirsutissima*, *Haplopappus heterophylla*.
Melissodes (*Eumelissodes*) *relucens* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 437. ♀, ♂.

robustior Cockerell. Wash., Oreg., Idaho, Nev., Calif. Parasite: *Nemognatha hurdi* MacSwain, *Sphaeropthalma unicolor* (Cress.). Pollen: Oligolege of Compositae, especially *Helianthus* including *H. annuus*, *H. bolanderi*, *H. gracilentus*, *H. lenticularis*, *H. petiolaris*, but also visits flowers of *Asclepias*, *Aster*, *Brassica adpressa*, *B. geniculata*, *B. incana*, *Chaenactis artemisifoliae*, *C. glabriuscula*, *Chrysothamnus*, *Cichorium*, *Cirsium lanceolatum*, *Coreopsis grandiflora*, *C. lanceolata*, *C. tinctoria*, *Corethrogyne bernardina*, *Cosmos*, *Encelia californica*, *E. farinosa*, *Gaillardia*, *Godetia bottae*, *Grindelia camporum*, *G. elata*, *Gutierrezia californica*, *G. sarothrae*, *Haplopappus vernonioides*, *Hemizonia paniculata*, *H. pungens*, *H. wrightii*, *Heterotheca grandiflora*, *Latuca serriola*, *Lythrum californicum*, *Marrubium vulgare*, *Scabiosa atropurpurea*, *Senecio douglasii*, *Solidago californica*, *S. confinis*, *Stephanomeria exigua*.
Melissodes robustior Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 16: 482. ♀, ♂.

Biology: MacSwain, 1958. Pan-Pacific Ent. 34: 40. —Chemsak and Thorp, 1962. Pan-Pacific Ent. 38: 53-55 (nest).

rustica (Say). N. S. to Sask., south to Ga., La., N. Mex. and southern Mexico (Oaxaca), but not known in Tex. and Okla. Parasite: *Triepeolus eldredi* Ckll., *T. pectoralis* (Robt.). Pollen: Oligolege of Compositae, especially *Solidago*, *Aster*, *Grindelia*, *Aplopappus*, analyzed cell provisions of nests in Wyo. showed that females obtained pollen exclusively from *Eriophyllum integrifolium;* visits flowers of *Abutilon theophrasti*, *Amphiachyris dracunuloides*, *Aplopappus gracilis*, *Asclepias*, *Aster anomalus*, *A. commutatus*, *A.*

crenulis, A. dumosus, A. ericoides, A. e. villosus, A. exiguus, A. grandiflorus, A. laevis, A. lateriflorus, A. multiflorus, A. novaeangliae, A. paniculatus, A. praeustus, A. sagittifolius, A. salicifolius, A. turbinellus, Baccharis, Bidens aristosa, B. laevis, B. asteroides, Centaurea juncea, Chrysopsis, C. mariana, Cirsium arvense, C. lanceolatum, Cleome lutea, C. serrulata, Coreopsis tripteris, Cosmos, Epilobium perfoliatum, Gaillardia, Grindelia squarrosa, Helenium autumnale, H. tenuifolium, Helianthus atrorubens, H. divaricatus, H. grosse-serratus, H. maximillianus, H. petiolaris, H. radula, H. tuberosus, Heliopsis helianthoides, Hieracium scabrum, Lycopus americanus, Marrubium vulgare, Melilotus alba, M. officinalis, Mentha, Physostegia parviflora, Polymentha, Ratibida columnaris, R. pinnata, Rudbeckia laciniata, R. subtomentosa, R. triloba, Silphium perfoliatum, Solidago altissima, S. canadensis, S. graminifolia, S. juncea, S. nemoralis, S. rigida, S. rugosa, S. serotina, Spiraea alba, Verbena hastata, V. stricta, Verbesina virginica, Vernonia fasciculata, V. glauca.

Macrocera rustica Say, 1837. Boston Jour. Nat. Hist. 1: 406. ♂, ♀.

Melissodes assimilis Smith, 1879. Descr. n. spp. Hym. Brit. Mus., p. 114. ♀.

Melissodes ambigua Smith, 1879. Descr. n. spp. Hym. Brit. Mus., p. 116. ♀.

Melissodes festinata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym. v. 2, p. 300. ♀, ♂.

Melissodes simillima Robertson, 1897. Acad. Sci. St. Louis, Trans. 7: 355. ♀, ♂.

Melissodes asteris Robertson, 1914. Ent. News 25: 373. ♀.

Taxonomy: Clement, 1973. Kans. Ent. Soc., Jour. 46: 521, figs. 3-6 (larva).

Biology: Clement, 1973. Kans. Ent. Soc., Jour. 46: 516-525, 6 figs., 1 table (nest architecture, pollen stores, parasite).

saponellus Cockerell. Wash., Oreg., Calif., Utah, Colo. Pollen: Unknown, but visits flowers of *Bahia oblongifolia, Chaenactis stevioides, Encelia actoni, Sphaeralcea, Trifolium.*

Melissodes saponellus Cockerell, 1908. Canad. Ent. 40: 234. ♀.

Biology: LaBerge, 1963. Nebr. Univ. State Mus., Bul. 4: 241 (interspecific copulation).

semilupina Cockerell. B. C. south to Calif., east to Colo. and N. Mex. Pollen: Oligolege of Compositae, especially *Chrysothamnus* and *Haplopappus*, visits flowers of *Chrysothamnus nauseosus, C. n. consimilis, C. viscidiflorus typicus, Cleome, Gutierrezia californica, Haplopappus vernonioides, Hemizonia paniculata, Solidago occidentalis.*

Melissodes menuacha semilupina Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 29. ♂.

Melissodes chrysothamni Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 524. ♀.

snowii Cresson. Alta., Man., Colo., N. Mex., Nebr., N. Dak. Pollen: Probably an oligolege of Compositae, especially *Helianthus* and *Solidago*, visits flowers of *Aster, Cleome serrulata, Gaillardia, Gutierrezia sarothrae, Helianthus petiolaris, H. subrhomboideus, Lacinaria punctata, Medicago sativa, Solidago missouriensis, S. nemoralis, S. rigida.*

Melissodes snowii Cresson, 1872. Acad. Nat. Sci. Phila., Proc. 24: 211. ♂.

subagilis Cockerell. Minn., Alta. and Wash. south to northern Calif., Ariz. and Tex. Pollen: Oligolege of *Grindelia* including *G. nana, G. squarrosa*, but visits other flowers including *Aplopappus gracilis, A. spinulosus, A. tenuisectus, Aster adscendens, Baccharis, Baileya multiradiata, Bigelovia wrightii, Chrysopsis hispida, Chrysothamnus viscidiflorus, Cleome serrulata, Erigeron, Gossypium herbaceum, Gutierrezia sarothrae, Haplopappus acradenius, Helianthus annuus, H. maximillianus, H. petiolaris, Heterotheca subaxillaris, Medicago sativa, Pectis papposa, Petalostemon, Prionopsis ciliata, Ratibida tagetes, Salsola pestifer, Silphium, Solidago rigida, S. serotina, Sphaeralcea, Verbena hastata, Verbesina exauriculata.*

Melissodes agilis var. *subagilis* Cockerell, 1905. Entomologist 38: 145. ♂.

Melissodes pecosella Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 179. ♀.

Tetraloniella excurrens melanaspis Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 228. ♀.

Xenoglossodes albertensis Cockerell, 1937. Canad. Ent. 69: 87. ♀.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 225 (nest).

subillata LaBerge. Que. to Sask., south to N. C. and Ill. Pollen: Oligolege of Compositae, visits flowers of *Aster azureus, Chrysanthemum leucanthemum, Cichorium intybus, Cirsium arvense, Coreopsis grandiflora, C. lanceolata, Echinacea pallida, Epilobium angustifolium, Eupatorium maculatum, Gaillardia aristata, Helianthus maximillianus, H. petiolaris, Hieracium auriantiacum, Latuca pulchella, Petalostemon oligophyllum, Platycodon grandiflorium, Psoralea lanceolata, Ratibida columnaris, Rudbeckia hirta, R. laciniata, Solidago graminifolium, Sonchus arvensis glabrescens, Teucrium occidentalis, Vernonia fasciculata.*

Melissodes (Eumelissodes) subillata LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 568, figs. 99-101. ♀, ♂.

submenuacha Cockerell. Colo., Ariz., N. Mex., western Tex. Pollen: Probably an oligolege of Compositae, visits flowers of *Aplopappus gracilis, Bidens, Cleome serrulata, Haplopappus heterophylla, Helianthus annuus, H. petiolaris, Hymenothrix wislizeni, Medicago sativa, Verbesina encelioides, V. oreophila.*

Melissodes menuacha var. *submenuacha* Cockerell, 1897. Entomologist 30: 137. ♂.

Melissodes Hewetti Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 527. ♀.

Taxonomy: LaBerge, 1963. Nebr. Univ. State Mus., Bul. 4: 241-242 (geogr. and floral records).

tincta LaBerge. Minn. and Mich. south to Tex. and Fla. Pollen: Oligolege of Compositae, seems to prefer *Chrysopsis* and *Aster*, visits flowers of *Aster longicaulus, Chrysopsis microcephala, Helianthus maximillianus, Verbesina encelioides.*

Melissodes (Eumelissodes) tincta LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 493. ♀, ♂.

trinodis Robertson. Southeast. Canada, Kans. and N. Dak. east to Maine and Ga. Parasite: *Triepeolus helianthi* (Robt.). Pollen: Oligolege of Compositae, especially *Helianthus* including *H. annuus, H. a. coronarius, H. atrorubens, H. divaricatus, H. grosse-serratus, H. maximillianus, H. mollis, H. salicifolius, H. tuberosus,* but also visits flowers of *Arctium, Asclepias incarnata, Aster anomalus, A. praeatus, Bidens aristosa, B. laevis, Blephilia hirsuta, Cardnus crispus, Cassia chamaecrista, Cirsium lanceolata, Coreopsis palmata, C. tripteris, Dichophyllum marginatum, Grindelia, Helenium altissimum, H. autumnale, Heliopsis helianthoides, Lepachys pinnata, Liatris, Monarda fistulosa, Pepo, Petalostemon purpureum, Ratibida columnaris, Rudbeckia hirta, R. laciniata, R. submentosa, R. triloba, Solidago canadensis, S. rupestris, S. ulmifolia, Symphoricarpos, Teucrium canadense, Verbena hastata, V. stricta, Vernonia glauca, V. baldwini interior, Veronica.*

Melissodes trinodis Robertson, 1901. Canad. Ent. 33: 231. ♀, ♂.

Biology: Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 164 (nest).

tristis Cockerell. Nebr. to Calif., south through Tex. and Ariz. to southern Mexico (Puebla). Pollen: Most polylectic of all the species of the subgenus *Eumelissodes*, seems to prefer flowers of the Leguminosae, Compositae and Malvaceae, visits flowers of *Acacia, Actinea acaulis, A. richardsonii, Allionia incarnata, Arabis, Argemone, Asclepias galloides, A. verticillata, Aster canescens, A. spinosa, A. tanacetifolium, Astrgalus, Baccharis, Bahia, Baileya multiradiata, Berberis trifoliata, B. wilcoxii, Canotia holocantha, Ceanothus fendleri, C. greggii, Celtis pallida, Cercidium texanum, Cevalia sinuata, Chilopsis linearis, C. saligna, Chrysopsis hispida, Chrysothamnus, Cirsium ochrocentrum, C. undulatum, Cleome luteum, C. serrulata, Convolvulus, Croton luteovirens, Dalea lasianthera, Dasylirion wheeleri, Encelia, Engelmannia pinnatifida, Erigeron canadensis, Eriogonum trichopes, Euphorbia albomarginata, Eysenhardtia polystacha, E. spinosa, Gaillardia pinnatifida, G. pulchella, G. suavis, Gaura, Gilia calcarea, Gossypium herbaceum, Grindelia, Gutierrezia californica, Haplopappus gracilis, H. laricifolius, Helenium autumnale, H. hoopesii, H. laciniatum, Helianthus annuus, H. ciliaris, H. petiolaris, Hoffmanseggia densiflora, H. jamesii, Hymenothrix wislizenii, Iris mios, Kallstroemia grandiflora, Larrea tridentata, Lepidium, Lesquerella ovalifolia, Lippia cuneifolia, L. ligustrina, Lotus, Lupinus, Lygodesmia juncea, Malvastrum cockerelli, Marrubium vulgare, Medicago sativa, Melilotus alba, M. officinalis, Mentzelia multiflora, Mertensia franciscana, Mimosa borealis, Monarda citriodora, M. pectinata, Mortonia scabrella, Nepeta cataria, Nolina microcarpa,*

Opuntia basilaris, O. lindheimeri, O. macrorhiza, Parkinsonia, Pectis papposa, Penstemon superba, Petalostemon candidum, P. flavescens, P. occidentatum, Phacelia glandulosa, P. popei, Philadelphus microphyllus, Polemonium, Prionopsis, Prosopis juliflora, Psoralea tenuiflora, Pyracantha, Ratibida columnaris, R. tagetes, Rhus, Rosa, Salix, Salsola kali, S. pestifer, Salvia lemmoni, Sapindus drummondii, S. sapinarius, Senecio longilobus, S. werneriaefolius, Solanum elaeagnifolium, Solidago annua, S. stenolobus, Sphaeralcea angustifolia, S. coccinea, S. emoryi, S. laxa, S. lobata, S. marginata, Stephanomeria, Tamarix gallica, Thurberia thespesioides, Verbena stricta, Verbesina encelioides, Vernonia, Vicia, Wislizenia refracta, Zexmenia podocephala, Zinnia grandiflora.

Melissodes tristis Cockerell, 1894. Ent. News 5: 234. ♂.

Melissodes pallidicincta Cockerell, 1896. Entomologist 29: 306. ♀.

Melissodes tristis var. *malvina* Cockerell, 1902. Entomologist 35: 177. ♂.

Melissodes semitristis Cockerell, 1905. Psyche 12: 102. ♂.

Melissodes pallidicincta erythrina Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 231. ♂.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 161, fig. 8 (sleep). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 41-42, fig. 17 (intrafloral relationships with *Larrea*).

utahensis LaBerge. Utah and Nev., south to south. Calif. and Ariz., Nebr. Pollen: Unknown, but visits flowers of *Chrysothamnus* including *C. nauseosus, Chaemataxis, Eriogonum heermannii, Gutierrezia californica.*

Melissodes (*Eumelissodes*) *utahensis* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 602, figs. 109-110. ♀, ♂.

velutina (Cockerell). South. and cent. Calif. Pollen: Polylege, especially of Polemoniaceae and Compositae, visits flowers of *Acanthopappus sphaerocephalus, Aster abatus, Chorizanthe staticoides, Cirsium, Coreopsis lanceolata, Cryptantha intermedia, Encelia actoni, Eremocarpus setigerus, Eriogonum fasciculatum, Gutierrezia californica, G. sarothrae, G. stricta, Helianthus gracilentus, Heliotropium curassavicum* var. *oculatum, Hugelia ambigua, H. virgata, Lotus scoparius, Marrubium vulgare, Mirabilis laevis, Monarda lanceolata, Prosopis, Salvia columbariae, Trichostema lanatum.*

Exomalopsis velutinus Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 58. ♀.

verbesinarum Cockerell. Wash. to southern Calif., east to Nev. and Tex.; Mexico (Chihuahua to Jalisco). Pollen: Oligolege of Compositae, visits flowers of *Actinea, Argemone platyceras, Aster canescens, A. tanacetifolius, Baileya multiradiata, Bigelovia, Cevallia sinuata, Chaenactis, Chrysothamnus, Croton californicus, Encelia californica, Erigeron, Eysenhardtia polystachya, Geraea canescens, Grindelia, Gutierrezia lucida, Haplopappus acradenius, Lygodesmia juncea, Pectis papposa, Psilostrophe cooperi, Sphaeralcea, Tamarix, Verbesina encelioides.*

Melissodes pecosella verbesinarum Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 180. ♀.

vernalis LaBerge. Wash. and Nev. to southern Calif. and Ariz.; Mexico (Baja California, Sonora, and Hidalgo). Pollen: Oligolege of Compositae, especially *Encelia* and *Geraea*, visits flowers of *Aster abatus, A. agnatus, Baileya multiradiata, Bebbia juncea, Chilopsis linearis, Encelia farinosa, Geraea canescens, Hyptis emoryi, Melilotus, Prosopis, Psilostrophe cooperi, Sphaeralcea ambigua, Viguiera deltoides.*

Melissodes (*Eumelissodes*) *vernalis* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 608, figs. 113-114. ♀, ♂.

vernoniae Robertson. Ind., and N. Dak., west to Idaho, south to N. Mex. and Tex. Pollen: Polylectic, collects pollen of *Vernonia*, also probably uses pollen from *Helianthus* and possibly *Ipomoea*, visits flowers of *Bidens, Gaillardia pulchella, Grindelia, Helianthus tuberosus, Heliopsis helianthoides, Ipomoea pandurata, Lacinaria, Lactuca pulchella, Liatris, Monarda fistulosa, Polygonum, Rudbeckia hirta, Silphium laciniatum, S. speciosum, Verbena stricta, Vernonia altissima, V. fasciculata, V. baldwini interior, V. longifolia, V. texana.*

Melissodes vernoniae Robertson, 1902. Canad. Ent. 34: 323. ♀, ♂.

Melissodes cŏnfusiformis incondita Cockerell, 1925. Ann. and Mag. Nat. Hist. (9) 16: 230. ♀.

wheeleri Cockerell. Mich. and N. Dak., south to La., Tex. and Ariz. Pollen: Oligolege of Compositae, especially *Gaillardia, Helianthus* and *Rudbeckia*, visits flowers of *Anthemis cotula, Asclepias tuberosa, Cleome serrulata, Coreopsis, Echinacea, Engelmannia bipinnatifida, Gaillardia pulchella, Grindelia squarrosa, Helianthus annuus, H. debilis, H. petiolaris, Opuntia, Petalostemon purpureum, Ratibida columnaris, Rudbeckia bicolor, R. grandiflora, R. hirta, Silphium asperimum, Sphaeralcea.*

Melissodes wheeleri Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 111. ♀.

Taxonomy: Cockerell, 1906. Ann. and Mag. Nat. Hist. (7) 17: 367. ♂.

Genus MELISSODES Subgenus PSILOMELISSODES LaBerge

Melissodes subg. *Psilomelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37: 1173. Type-species: *Melissodes intorta* Cresson. Monotypic and orig. desig.

intorta Cresson. Kans., Tex. Pollen: Probably dependent upon the pollen of the Malvaceous genus *Callirhoe* including *C. digitata, C. involucrata, C. leiocarpa*, but also visits flowers of *Asclepias latifolia, Gaillardia, Rorippa sinuata.*

Melissodes intorta Cresson, 1872. Amer. Ent. Soc., Trans. 4: 278. ♂.
Melissodes wickhami Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 112. ♀.

Taxonomy: LaBerge, 1963. Nebr. Univ. State Mus., Bul. 4: 234 (geogr. and floral records).

Genus MELISSODES Subgenus CALLIMELISSODES LaBerge

Melissodes subg. *Callimelissodes* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 294. Type-species: *Melissodes lupina* Cresson. Orig. desig.

ablusa Cockerell. Calif. (Millbrae, Bolinas).

Melissodes metenua ablusa Cockerell, 1926. Pan-Pacific Ent. 3: 85. ♀.

clarkiae LaBerge. Oreg., Calif. Pollen: Probably oligolectic on *Clarkia* including *C. amoena, C. biloba, C. cylindrica, C. dudleyana, C. gracilis albicaulis, C. speciosa, C. unguiculata, C. williamsonii.*

Melissodes (*Callimelissodes*) *clarkiae* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 315, figs. 50-53. ♀, ♂.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 29-31 (floral relationships).

coloradensis Cresson. N. C., Ohio, Ind., Ill., Wis., Mo., Nebr., Kans., Wyo., Colo., N. Mex., Ariz., Utah, north. Calif. Pollen: Oligolege of Compositae, with *Helianthus* including *H. annuus, H. atrorubens, H. divaricatus, H. grosse-serratus, H. mollis, H. petiolaris, H. scaberrimus* and *H. tuberosus* as the primary source of pollen, but also visits flowers of *Cirsium discolor, C. lanceolatum, Coreopsis tripteris, Heliopsis helianthoides, H. laevis, Liatris pycnostachya, Lythrum alatum, Rudbeckia laciniata, Silphium integrifolium, S. laciniatum, S. perfoliatum, S. terebinthinaceum, Solanum, Solidago serotina, Verbena hastata, V. stricta, Vernonia baldwini interior, V. fasciculatum.*

Melissodes coloradensis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 200. ♀, ♂.

composita Tucker. Mont. south to Ariz., N. Mex. Ecology: Nests in ground individually, but many individuals use a communal entrance. Parasite: *Triepeolus helianthi* Robt.? Pollen: Unknown, but visits flowers of *Grindelia squarrosa, Haplopappus gracilis, Thurberia thespesioides.*

Melissodes lupina composita Tucker, 1909. Kans. Acad. Sci., Trans. 22: 281. ♂.

Biology: Hurd and Linsley, 1959. Ent. News 70: 141-146 (nest).

glenwoodensis Cockerell. N. Dak. south to N. Mex., west to Wash. and southern Calif. Pollen: Oligolege of Compositae, especially *Chrysothamnus* including *C. nauseosus consimilis, C. n. mojavensis, C. n. speciosus, C. viscidiflorus typicus*, but visits other flowers including *Cirsium, Grindelia squarrosa, Haplopappus vernonioides, Helianthus petiolaris, Solidago trinervata.*

Melissodes glenwoodensis Cockerell, 1905. Ann. and Mag. Nat. Hist. (7) 15: 522. ♀.

Taxonomy: Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 107.

lupina Cresson. Mont. to Wash., south to Colo., Utah, Nev., Calif.; Mexico (Baja Calif.). Pollen: Oligolege of Compositae, but visits a wide variety of flowers including *Achillea, Adenostegia, Adenostoma fasciculatum, Arctium, Asclepias, Aster chilensis, A. exilis, Bigelovia, Brassica, Calochortus nuttalli, Calycadenia, Castanopsis, Centaurea solstitialis, Chaenactis artemisiaefolia, C. glabriuscula, Chrysopsis villosus, Chrysothamnus nauseosus speciosus, C. viscidiflorus typicus, Cirsium, Clarkia amoena, C. bottae, Cleome serrulata, Cordylanthus, Coreopsis lanceolatum, C. tinctoris, Corethrogyne bernardense, C. filaginifolia, Cosmos, Croton californicus, Cryptantha intermedia, Cucurbita, Encelia, Epilobium, Eremocarpus setigerus, Erigeron foliosus, Eriodictyon angustifolium, Eriogonum fasciculatum, E. gracile, E. latifolium, Eriophyllum confertiflorum, Grindelia camporum, G. elata, G. squarrosa, Gutierrezia californica, G. sarothrae, Haplopappus arborescens, H. bloomeri angustatus, H. palmeri, Hemizonia fasciculata, H. fitchi, H. heermannii, H. lobbii, H. luzulaefolia, H. paniculata, H. pungens, H. wrightii, Heterotheca grandiflora, Holodiscus discolor, Iris hartwegi, Lessingia, Ligustrum, Limnanthes, Lotus, Lythrum californica, Madia, Malacothrix, Marrubium vulgare, Medicago sativa, Melilotus alba, M. indica, Monardella, Nemophila, Perezia microcephala, Phacelia heterophylla, P. humilis, Phalacroseris bolanderi, Pimpinella, Polygonum auberti, Raphanus, Rhamnus californica, Salvia carduacea, Senecio, Solidago californica, S. elongata, S. occidentalis, Stephanomeria exigua, S. virgata, Trichostema laxum, Trifolium repens, Verbena, Vicia.*

Melissodes lupina Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 210. ♂.

Melissodes intermediella var. *catalinensis* Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 102. ♀.

Melissodes catatinensis vanduzeei Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 86. ♀.

lustra LaBerge. Idaho, Oreg., Nev., Calif.; Mexico (Baja Calif.). Pollen: Oligolectic, depending upon plants of Compositae for pollen, particularly *Gutierrezia, Chrysothamnus* and *Haplopappus*, visits flowers of *Aster, Baccharis pilularis, Bigelovia, Chrysothamnus nauseosus nauseosus, C. n. consimilis, C. n. speciosus, C. viridulus, C. viscidiflorus typicus, Cleome, Croton californicus, Eriogonum latifolium, Grindelia camporum, G. sarothrae, Haplopappus bloomeri angustatus, H. palmeri, H. vernonioides, Heterotheca grandiflora, Melilotus alba, Senecio douglasii.*

Melissodes (*Callimelissodes*) *lustra* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 334, fig. 59. ♀, ♂.

metenua Cockerell. Wash. to northern Calif., Idaho, Wyo., Utah. Pollen: Unknown, but visits flowers of *Cosmos, Eriogonum, Melilotus alba.*

Melissodes metenua Cockerell, 1924. Pan-Pacific Ent. 1: 56. ♀.

minuscula LaBerge. Calif. Pollen: Unknown, but visits flowers of *Cressa cretica, Heliotropium curassavicum, Melilotus.*

Melissodes (*Callimelissodes*) *minuscula* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 323. ♀, ♂.

nigracauda LaBerge. Calif. Pollen: Unknown, but visits flowers of *Erigeron, Senecio douglasii, Stephanomeria exigua.*

Melissodes (*Callimelissodes*) *nigracauda* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 327, figs. 54-57. ♀, ♂.

plumosa LaBerge. Wash. to Calif., (?)N. Dak. Pollen: Unknown, but visits flowers of *Encelia californica, Helianthus petiolaris.*

Melissodes (*Callimelissodes*) *plumosa* LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 308, figs. 42-45. ♀, ♂.

stearnsi Cockerell. Wash., Oreg., Calif. Pollen: Possibly an oligolege of Compositae, but visits a wide variety of flowers including *Althaea rosea, Asclepias eriocarpa, Aster exilis, Brassica, Centaurea solstitialis, Cirsium, Cleome, Corethrogyne bernardense, C. virgata, Cucurbita, Datura meteloides, Eremocarpus setigerus, Eriogonum setiger, Gilia virgata, Grindelia, Gutierrezia californica, G. sarothrae, Haplopappus palmeri, H. parishii, Helianthus annuus, Heliotropium curassavicum, Hemizonia fasciculata, H. pungens, Hugelia virgata, Marrubium vulgare, Medicago sativa, Melilotus, Navarretia, Phacelia, Silybum marianum, Trichostema lanceolatum.*

Melissodes stearnsi Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 101. ♀.

tribas LaBerge. Calif. (San Diego).
Melissodes (Callimelissodes) tribas LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 326. ♀.

tuckeri Cockerell. Mont., S. Dak., Nebr., Kans., Tex. Pollen: Unknown, but visits flowers of *Aster, Heterotheca subaxillaris.*
Melissodes Tuckeri Cockerell, 1909. Canad. Ent. 41: 129. ♀.

Genus MELISSODES Subgenus UNASSIGNED

scotti Cockerell. Calif. (San Clemente Isl.).
Melissodes scotti Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 430. ♀.

Unrecognized Species of the Genus Melissodes Latreille

The types of the below listed are either lost or destroyed (see LaBerge, 1961. Kans. Univ. Sci. Bul. 42: 654).

americana (Lepeletier). Carolina, Ill.
Macrocera americana Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 92. ♂.

intermedia Cresson. Tex.
Melissodes intermedia Cresson, 1872. Amer. Ent. Soc., Trans. 4: 278. ♀.

pennsylvanica (Lepeletier). Pa.
Macrocera pennsylvanica Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 97. ♂.

philadelphica (Lepeletier). Pa.
Macrocera Philadelphica Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 110. ♂.

Nomina Nuda in the Genus MELISSODES Latreille

Melissodes maura Bray, 1917. Jour. Ent. Zool. 9: 94.
Melissodes pullata Bray, 1917. Jour. Ent. Zool. 9: 94.

Genus FLORILEGUS Robertson

Revision: Urban, 1970. Bol. Parana Univ. Federal, Zool. 3 (12): 245-280, 4 figs. (included spp.).

Genus FLORILEGUS Subgenus FLORILEGUS Robertson

Florilegus Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 53.
Type-species: *Melissodes condigna* Cresson. Monotypic.

condignus (Cresson). N. J. to Fla., west to Nebr., Colo., N. Mex., south to Argentina. Pollen: Polylectic, visits a wide variety of flowers in the United States where it exhibits a preference for those of the Leguminosae and particularly *Medicago sativa.*
Melissodes condigna Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 207. ♀.
Melissodes palustris Robertson, 1892. Amer. Nat. 26: 273. ♂.
Tetralonia quadrata Bertoni and Schrottky, 1910. Zool. Jahrb., Abt. f. Syst. p. 572. ♂, ♀.
Florilegus pavoninus Cockerell, 1914. N. Y. Ent. Soc., Jour. 22: 316. ♀.
Florilegus barticanus Cockerell, 1918. Amer. Mus. Nat. Hist. Bul. 38: 690. ♂.
Tetralonia ecuadoria Friese, 1923. Arkiv. f. Zool. 15 (13): 3. ♂, ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 253-255, fig. 78 (redescription). —LaBerge and Ribble, 1966. Ent. Soc. Amer., Ann. 59: 948-949, figs. 8-11 (cocoon, larva).

Biology: LaBerge and Ribble, 1966. Ent. Soc. Amer., Ann. 59: 944-950, 11 figs., 1 table (nesting behavior, nest architecture, floral relationships).

Genus GAESISCHIA Michener, LaBerge and Moure

Revision: Urban, 1963. Bol. Parana Univ. Federal, Zool. 3 (4): 79-129, 7 figs., 1 map, 2 tables (included spp.).

Taxonomy: LaBerge, 1958. Pan-Pacific Ent. 34: 195-201, 3 figs. (diagnostic characteristics, classification).

Genus GAESISCHIA Subgenus GAESISCHIA Michener, LaBerge and Moure

Gaesischia Michener, LaBerge and Moure, 1955. Dusenia 6: 220.
Type-species: *Svastra fulgurans* Holmberg. Orig. desig.
Gaesischia Subgenus *Prodasynhalonia* LaBerge, 1958. Pan-Pacific Ent. 34: 199.
Type-species: *Gaesischia mexicana* LaBerge. Monotypic and orig. desig.

The typical subgenus occurs south of the United States.

Genus GAESISCHIA Subgenus GAESISCHIANA Michener, LaBerge and Moure

Gaesischia subg. *Gaesischiana* Michener, LaBerge and Moure, 1955. Dusenia 6: 224.
Type-species: *Gaesischia* (*Gaesischiana*) *exul* Michener, LaBerge and Moure. Orig. desig.
Gaesischia subg. *Agaesischia* Moure and Michener, 1955. Dusenia 6: 273.
Type-species: *Eucera patellicornis* Ducke. Orig. desig.

exul Michener, LaBerge and Moure. Ariz. to Colombia. Pollen: Polylectic, visits flowers of *Andira inermis, Caesalpinia eriostachys, Dalbergia retusa, Myrospermum fructescens, Parkinsonia aculeata, Piscidia carthagenensis, Pterocarpus rohrii.*
Gaesischia (*Gaesischiana*) *exul* Michener, LaBerge and Moure, 1955. Dusenia 6: 224. ♂.

Taxonomy: LaBerge, 1958. Pan-Pacific Ent. 34: 198. ♀.

Biology: Frankie and Baker, 1974. An. Inst. Nac. Univ. Auton. Mexico 45, ser. Botanica 1: 4-5, 1 fig., 1 table (group foraging). —Jones and Buchmann, 1974. Anim. Behaviour 22: 483, tables 1, 2 (u. v. floral patterns as orientation cues). —Frankie, Opler and Bawa, 1976. Jour. Ecol. 64: 1049-1057, 1 fig., 4 tables (foraging behavior).

Genus SIMANTHEDON Zavortink

Simanthedon Zavortink, 1975. Calif. Acad. Sci., Proc. 40: 232.
Type-species: *Simanthedon linsleyi* Zavortink. Monotypic and orig. desig.

linsleyi Zavortink. Southeastern Ariz. (Cochise Co.), N. Mex. (Eddy Co.); Mexico (Durango). Pollen: Polylectic, especially *Menodora scabra, Agave palmeri, Datura meteloides, Polygala racemosa*, but also visits other flowers for nectar and or pollen including *Cevallia sinuata, Conyza, Desmanthus cooleyi, Hoffmanseggia densiflora, Ipomoea hirsutula, Mentzelia pumila, Salvia reflexa, Solanum elaeagnifolium.*
Simanthedon linsleyi Zavortink, 1975. Calif. Acad. Sci., Proc. 40: 236, 2 figs. ♂, ♀.

Genus MARTINAPIS Cockerell

Genus MARTINAPIS Subgenus MARTINAPIS Cockerell

Another subgenus, *Svastropsis* Moure and Michener, is found in Argentina.

Melissodes subg. *Martinella* Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 450. Preocc.
Type-species: *Melissodes luteicornis* Cockerell. Monotypic.
Martinapis Cockerell, 1929. Entomologist 62: 19. N. name.

Revision: Zavortink and LaBerge, 1976. Wasmann Jour. Biol. 34: 119-145, 2 figs., 3 tables (included spp.).

luteicornis (Cockerell). Kans. (Dodge City), west. Tex., N. Mex. and east. Ariz. (Cochise and Graham Counties); Mexico (Chihuahua and Durango). Pollen: Polylectic, seems to prefer to visit plants in the families Leguminosae and Zygophyllaceae for pollen and nectar including *Dalea, Hoffmanseggia, Larrea*, and *Petalostemon*, although a female has been recorded collecting pollen from *Solanum elaeagnifolium;* visitation records include flowers of *Acacia, Andropus carnosus, Baileya multiradiata, Cevallia sinuata, Chilopsis linearis, Chrysothamnus, Dalea lanata, D. scoparia, D. terminalis, Datura inoxia, Fallugia paradoxa, Gaura suffulta, Hoffmanseggia glauca, Larrea tridentata, Lygodesmia juncea, Melilotus alba, Mentzelia multiflora, Petalostemon, Prosopis glandulosa* var. *torreyanum, Solidago occidentalis, Tribulus, Verbesina encelioides, Xanthisma texanum.*
Melissodes luteicornis Cockerell, 1896. Ann. and Mag. Nat. Hist. (6) 18: 293. ♂.

Taxonomy: Zavortink and LaBerge, 1976. Wasmann Jour. Biol. 34: 130-140, fig. 2 (redescription).

Biology: Linsley and Hurd, 1959. Ent. News 70: 67 (pollen source). —Linsley and Cazier, 1970. Kans. Ent. Soc., Jour. 43: table 1 (pollen source). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 41, tables 1, 3, 4, 6, 8 (floral relationship with *Larrea*, as *luteicornis*). —Zavortink and LaBerge, 1976. Wasmann Jour. Biol. 34: 140-143, tables 1-3 (floral relationships, seasonal periods of activity).

occidentalis Zavortink and LaBerge. South. Calif. (Colorado and south. Mojave Deserts), and southwest. Ariz. (Lower Colorado Valley); Mexico (Baja California and Sonora). Pollen: Polylectic, seems to prefer to visit plants in the families Compositae, Leguminosae, Solanaceae and Zygophyllaceae for pollen and nectar including *Cercidium*, *Dalea*, *Datura*, *Larrea*, *Palafoxia*, *Solanum;* floral visitation records include *Cercidium floridum*, *Dalea emoryi*, *Encelia*, *Helianthus niveus*, *Larrea tridentata*, *Palafoxia linearis*, *Wislizenia refracta*.

Martinapis occidentalis Zavortink and LaBerge, 1976. Wasmann Jour. Biol. 34: 121, figs. 1, 2. ♂, ♀.

Biology: MacSwain, 1957. Pan-Pacific Ent. 33: 70 (floral relationships, as *luteicornis*). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 41, table 12 (floral relationship with *Larrea*, as *luteicornis* in part). —Zavortink and LaBerge, 1976. Wasmann Jour. Biol. 34: 128-129 (floral relationships, daily and seasonal periods of activity).

Genus MELISSOPTILA Holmberg

Revision: Urban, 1968. Rev. Brasil. Ent. 13: 1-94, 70 figs., 3 maps (included spp.).

Taxonomy: LaBerge, 1957. Amer. Mus. Novitates 1837: 37-38 (tax. characters).

Genus MELISSOPTILA Subgenus MELISSOPTILA Holmberg

Melissoptila Holmberg, 1884. Cordoba. Acad. Nac. de Cien., Actas 5: 119.
Type-species: *Melissoptila tandilensis* Holmberg. Monotypic.
Thyreotremata Holmberg, 1887. Cordoba. Acad. Nac. de Cien., Bol. 10: 225. Nomen nudum.
Thyreothremma Holmberg, 1903. Mus. Nac. Buenos Aires, An. (3) 2: 391.
Type-species: *Melissoptila tandilensis* Holmberg. Desig. by Sandhouse, 1943. (=*Thyreothremma rhopalocera* Holmberg).

The typical subgenus does not occur in North America.

Genus MELISSOPTILA Subgenus PTILOMELISSA Moure

Ptilomelissa Moure, 1943. Rev. de Ent. 14: 482.
Type-species: *Ptilomelissa ochromelaena* Moure. Monotypic.

otomita (Cresson). Tex. (Brownsville); Mexico, Guatemala, Honduras, Costa Rica, Panama.
Melissodes otomita Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 209. ♂.
Melissodes pinguis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 216. ♀, ♂.
Melissodes pinguis var. *velutinella* Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 158. ♀.
Tetralonia joseana Friese, 1916. Stettin. Ent. Ztg. 77: 330. ♂, ♀.
Exomalopsis rufitecta Cockerell, 1949. U. S. Natl. Mus., Proc. 98: 454. ♀.
Exomalopsis rufitecta var. *palliditecta* Cockerell, 1949. U. S. Natl. Mus., Proc. 98: 454. ♀.

Taxonomy: LaBerge, 1957. Amer. Mus. Novitates 1837: 38 (synonymy, selects *otomita* instead of *pinguis* under provision of first reviser). —Urban, 1968. Rev. Brasil. Ent. 13: 67-71, figs. 29, 44, 53-65, map 1 (as *pinguis*).

Morphology: Graf, 1970. Bol. Federal Univ. Parana, Zool. 3: 281-287, 1 pl., figs. 1-3 (salivary glands).

Tribe ANTHOPHORINI

This is a large tribe of pollen-collecting bees that is found throughout much of the world. Although the Anthophorini contains several genera, most of the species belong to the Old World

genus *Amegilla* and the genus *Anthophora* which occurs on all the continents except Australia. In the New World the tribe is represented by the apparently endemic, North American *Deltoptila* and *Emphoropsis* and by *Anthophora* which, although present in both North and South America, is especially well represented by numerous species in North America. While most of the studied Anthophorini nest in the ground, at least members of the subgenus *Clisodon* make their nests in wood.

Genus ANTHOPHORA Latreille

Taxonomy: Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 64-72. —Michener, 1936. Amer. Mus. Novitates 876: 1-2 (small group only). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 323-331, figs. 90-93 (eastern U. S. spp.).

Genus ANTHOPHORA Subgenus ANTHOPHORA Latreille

Podalirius Latreille, 1802. Hist. Hat. Fourmis, p. 430. Name suppressed by Internatl. Comn. Zool. Nomencl., Op. 151, 1944.

Anthophora Latreille, 1803. Nouv. Dict. Hist. Nat., v. 18, p. 167. Proposed unnecessarily to replace *Podalirius* Latreille.
Type-species: *Apis acervorum* Linnaeus. Desig. by Internatl. Comn. Zool. Nomencl., Op. 151, 1944. (=*Apis pilipes* Fabricius).

Lasius Panzer, [1801-1802]. Faunae Ins. German., h. 86, no. 16. Name suppressed by Internatl. Comn. Zool. Nomencl., Op. 151, 1944.

Podalirius subg. *Paramegilla* Friese, 1897. Die Bienen Europas, v. 3, p. 18.
Type-species: *Apis ireos* Pallas. Desig. by Sandhouse, 1943.

Anthophoroides Cockerell and Cockerell, 1901. Ann. and Mag. Nat. Hist. (7) 7: 48.
Type-species: *Podalirius vallorum* Cockerell. Monotypic and orig. desig.

Anthemoessa Robertson, 1905. Amer. Ent. Soc., Trans. 31: 372. Preocc.
Type-species: *Anthophora abrupta* Say. Monotypic and orig. desig.

Melea Sandhouse, 1943. U. S. Natl. Mus., Proc. 92: 526. N. name.

Taxonomy: Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 51-62 (western U. S. spp.). —Michener, 1960. Queensland Nat. 16: 63 (status of *Amegilla*).

abrupta Say. N. Y. to Fla., west to Mich., south to La. and Tex. Parasite: *Hornia m. minutipennis* Riley, *Monodontomerus mandibularis* Gahan, *M. montivagus* Ashm., *Physocephala sagittaria* (Say), *Xeromelecta californica* (Cress.)., *X. interrupta* (Cress.). Pollen: Unknown, but visits a wide variety of flowers including *Aesculus, Asclepias, Azalea, Blephilia, Cirsium, Convolvulus, Cornus, Delphinium, Dianthera, Diospyros, Fransera, Gillenia, Hydrophyllum, Iris, Leonurus, Melilotus, Mertensia, Monarda, Nepeta, Oenothera, Penstemon, Polygonatum, Rosa, Rubus, Scutellaria, Stachys, Teucrium, Trifolium, Triosteum, Vicia.*

Anthophora abrupta Say, 1837. Boston Jour. Nat. Hist. 1: 409. ♂.

Anthophora sponsa Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 339. ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1080, figs. 232, 233 (larva).

Biology: Walsh, 1868. Amer. Ent. 1: 9 (as *sponsa*). —Ashmead, 1894. Psyche 7: 25. —Frison, 1922. Amer. Ent. Soc., Trans. 48: 137-156. —Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7): 35. —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 166. —Rau, 1929. Jour. Compar. Psychol. 9: 53. —Rau, 1929. Psyche 36: 156.

abruptella Cockerell. Calif. Parasite: *Sphaeropthalma unicolor* (Cress.). Pollen: Unknown, but visits flowers of *Amsinckia intermedia, Eriodictyon californicum, Phacelia distans, P. ramosissima.*

Anthophora abruptella Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 72. ♀.

affabilis Cresson. Calif., Utah, Colo., N. Mex., Tex. Pollen: Collects pollen from flowers of *Camissonia clavaeformis, Oenothera caespitosa, O. deltoides.*

Anthophora affabilis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 189. ♂, ♀.

aterrima Cockerell. Calif. Pollen: Unknown, but visits flowers of *Satureja douglasii, Thermopsis macrophyllus.*

Anthophora aterrima Cockerell, 1924. Pan-Pacific Ent. 1: 51. ♀, ♂.

bomboides bomboides Kirby. Ont. to Ga., west to Wis. and Man. Parasite: *Monodontomerus mandibularis* Gahan. Pollen: Unknown, but visits flowers of *Ceanothus, Penstemon.*
Anthophora bomboides Kirby, 1837. *In* Richardson, Faune Bor.-Amer., v. 4, p. 271. ♂.
Anthophora canadensis Cresson, 1869. Amer. Ent. Soc., Trans. 2: 292. ♂.

Taxonomy: Cockerell, 1936. Canad. Ent. 68: 276 (key to this and following subspecies of *bomboides*).

bomboides neomexicana Cockerell. S. Dak., Wyo., Idaho, Colo., N. Mex., Calif. (Mono Co.), ?Nebr., ?Tex. Parasite: *Hornia neomexicana* (Ckll.), *Monodontomerus montivagus* Ashm., *Sphaeropthalma unicolor* (Cress.), *Xeromelecta californica* (Cress.).
Anthophora bomboides var. *neomexicana* Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 408. ♂, ♀.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 224 (nest). —Hicks, 1931. Canad. Ent. 63: 175 (nest, parasite).

bomboides scutellaris Swenk. Nebr., Colo.
Anthophora scutellaris Swenk, 1909. Ent. News 20: 391. ♀.

bomboides sodalis Cresson. Wash., Oreg., east. Calif., Nev., ?Man., ?Alta.
Anthophora sodalis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 212. ♂.

bomboides solitaria Ritsema. B. C., ?Calif.
Anthophora insularis Smith, 1879 (not 1857). Descr. New Species Hym. Brit. Mus., p. 124. ♀. Preocc.
Anthophora solitaria Ritsema, 1880. Tijdschr. v. Ent. 23: xcvii. N. name.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 331.

bomboides stanfordiana Cockerell. B. C., Wash., Oreg., Calif. Parasite: *Dasymutilla aureola* (Cress.), *Hornia minutipennis occidentalis* Linsley, *Xeromelecta californica* (Cress.). Pollen: Unknown, but visits flowers of *Castilleja latifolia, Delphinium* including *D. hesperium, Dudleya, Eriodictyon californicum, Glycyrrhiza lepidota, Penstemon, Phacelia distans, P. imbricata, Raphanus sativa, Rosa californica, Stanleya pinnata.*
Anthophora stanfordiana Cockerell, 1904. Ent. News 15: 32. ♂, ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1007, 1078, figs. 7-15, 219-222, 225 (larva).

Biology: Kellogg, 1908. Amer. Ins., p. 517. —Nininger, 1920. Psyche 27: 135. —Linsley and MacSwain, 1942. Calif. Univ. Pubs. Ent. 7: 189 (habits).

bomboides willingi Cockerell. Sask.
Anthophora bomboides Willingi Cockerell, 1911. Canad. Ent. 43: 34. ♂.

californica albomarginata Timberlake. Ariz., Calif., desert. Pollen: Unknown, but visits flowers of *Aster spinosa, Chilopsis linearis, Dalea, Heliotropium curassavicum, Larrea tridentata, Phyla nodiflora, Prosopis glandulosa, Salvia columbariae.*
Anthophora californica albomarginata Timberlake, 1937. Amer. Mus. Novitates 958: 13. ♀, ♂.

californica californica Cresson. Colo., N. Mex., Ariz., Calif.; Mexico (Baja Calif.). Pollen: Unknown, but visits a wide variety of flowers including *Amsinckia douglasiana, A. intermedia, Astragalus pomonensis, Castilleja latifolia, Cercidium floridum, Dalea californica, Dudleya aloides, Eriodictyon californicum, Isomeris arborea, Lantana montevidensis, Lotus scoparius, Lupinus, Oenothera, Penstemon spectabilis, Phacelia distans, P. imbricata, Pholisma racemosa, Raphanus sativus, Rubus ursinus, Salvia columbariae, S. mellifera, Scrophularia californica, S. laciniata, Senecio douglasii, Solanum xantii.*
Anthophora californica Cresson, 1869. Amer. Ent. Soc., Trans. 2: 290. ♂.
Anthophora 5-fasciata Provancher, 1895. Nat. Canad. 22: 172. ♂.
Anthophora tarsata subtarsata Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 88. ♂, ♀.

Taxonomy: Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 154. ♂.

californica erysimi Cockerell. Calif. (San Miguel Is.). Pollen: Unknown, but visits flowers of *Erysimum insulare.*
Anthophora californica erysimi Cockerell, 1937. Pan-Pacific Ent. 13: 150. ♀.

californica texana Cresson. Colo., N. Mex., Ariz., Tex.; Mexico (Zacatecas). Pollen: Unknown, but visits flowers of *Caesalpinia falcaria, Chilopsis linearis, Larrea tridentata.*
Anthophora texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 282. ♀.

Taxonomy: Cockerell, 1905. Canad. Ent. 37: 335. ♂.

capistrata Cresson. Tex.; ?Mexico (Baja Calif.).
Anthophora capistrata Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 187. ♂.

centriformis centriformis Cresson. Nev., Calif. (Sierra Nevada Mts.).
Anthophora centriformis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 212. ♂.

centriformis vierecki Cockerell. N. Mex., Nev., Calif. Pollen: Unknown, but visits flowers of *Beloperone californica, Hyptis emoryi, Lotus scoparius, Lupinus odoratus, Nama parryi, Penstemon spectabilis, Scutellaria angustifolia.*
Anthophora centriformis vierecki Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 69. ♂.

chlorops chlorops Michener. Wash.
Anthophora chlorops Michener, 1936. Brooklyn Ent. Soc., Bul. 31: 92. ♀.

chlorops utahensis Michener. Utah.
Anthophora chlorops utahensis Michener, 1936. Amer. Mus. Novitates 876: 2. ♀.

citreostrigata Dours. North America. (No recent records; doubtless not Nearctic).
Anthophora citreo-strigata Dours, 1868. Soc. Linn. Nord France, Mem. 71: 95. ♀.

coptognatha Timberlake. Ariz., Calif. deserts. Pollen: Unknown, but visits flowers of *Dalea fremontii, Lantana, Larrea tridentata, Lycium, Prosopis, Salvia pilosa.*
Anthophora coptognatha Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 54. ♂, ♀.

crotchii Cresson. B. C., Wash., Calif. Pollen: Unknown, but visits a wide variety of flowers including *Amsinckia douglasiana, A. eastwoodae, A. intermedia, Astragalus, Brassica, Brodiaea capitata, Caulanthus heterophyllus, Delphinium parryi, Eriodictyon, Lantana montevidensis, Lupinus, Marrubium vulgare, Oenothera, Orthocarpus purpurascens, Raphanus sativus, Salvia carduacea, S. columbariae, Trichostema parishii.*
Anthophora crotchii Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 192. ♂.
Anthophora Washingtoni Cockerell, 1905. *In* Viereck, Canad. Ent. 37: 313. ♀.

Taxonomy: Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 161. ♂.

dammersi Timberlake. Calif. Pollen: Collects pollen from flowers of *Camissonia kernensis,* but also visits flowers of *Amsinckia douglasiana, A. intermedia, Beleperone californica, Chaenactis fremontii, Salazaria mexicana, Salvia carduacea.*
Anthophora dammersi Timberlake, 1937. Amer. Mus. Novitates 958: 15. ♂, ♀.

edwardsii edwardsii Cresson. Wash. to Calif., Nev. and Utah. Parasite: *Anthrax* sp. near *fur* O. S., *Dasymutilla aureola* (Cress.), *Melecta separata callura* (Ckll.), *Meloe fransiscana* Van Dyke, *Mythicomyia* sp. near *pusilla* Melander, *Nemognatha scutellaris* LeC., *Sphaeropthalma unicolor* (Cress.), *Tricrania stansburyi* Hald., *Xeromelecta californica* (Cress.). Pollen: Collects pollen from *Amsinckia* and *Astragalus,* but visits these and a wide variety of other flowers for nectar including *Brassica, Brodiaea, Cryptantha, Erodium, Eriogonum, Lantana, Layia, Lupinus, Mentzelia, Orthocarpus, Phacelia, Plagiobothrys, Prunus, Raphanus, Ribes, Salix, Salvia, Solanum.* Predator: *Anthrenus scrophulariae* (L.). *Ptinus californicus* Pic.
Anthophora edwardsii Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 190. ♀, ♂.

Taxonomy: Michener, 1958. Kans. Univ. Sci. Bul. 35: 1082, figs. 228, 234, 235 (larva). —Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 62.

Biology: Linsley and MacSwain, 1941. South. Calif. Acad. Sci., Bul. 40: 130. —Thorp, 1969. Amer. Midland Nat. 82: 321-337, 7 figs., 1 map, 2 tables (nest, flight behavior, flower relationships, enemies).

edwardsii gohrmanae Cockerell. Colo., N. Mex., Calif.
Anthophora gohrmanae Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 454. ♂.
Anthophora gohrmanae var. *coloradensis* Michener, 1936. Brooklyn Ent. Soc., Bul. 31: 92. ♂, ♀.

Taxonomy: Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 62.

fedorica Cockerell. Tex.
Anthophora fedorica Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 70. ♂.

Taxonomy: Cockerell, 1908. Ent. Soc. Wash., Proc. 9: 71. ♀.

forbesi Cockerell. Ariz., Calif. (Death Valley), Mexico (Baja Calif.). Parasite: *Melecta separata arizonica* (Ckll.). Pollen: Unknown, but visits flowers of *Larrea tridentata*.
Anthophora forbesi Cockerell, 1907. Canad. Ent. 39: 354. ♀.

Taxonomy: Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 59. ♂.

Biology: Lutz and Cockerell, 1920. Amer. Mus. Nat. Hist., Bul. 42: 574 (parasite).

frontata Say. La.
Anthophora frontata Say, 1837. Boston Jour. Nat. Hist. 1: 409. ♂.

fulvicauda Timberlake. Calif. Pollen: Collects pollen from flowers of *Camissonia clavaeformis*, but also visits flowers of *Chilopsis linearis*, *Eriodictyon crassifolium*, *Stephanomeria exigua*.
Anthophora fulvicauda Timberlake, 1937. Amer. Mus. Novitates 958: 14. ♀, ♂.

fulvicollis Timberlake. Calif., Ariz. Pollen: Collects pollen from flowers of *Camissonia clavaeformis*.
Anthophora fulvicollis Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 59. ♂.

fumipennis Swenk. Nebr.
Anthophora fumipennis Swenk, 1909. Ent. News 20: 391. ♀.

fuscipennis Smith. North America. (No recent records).
Anthophora fuscipennis Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 338. ♀.

lesquerellae (Cockerell). N. Mex. Pollen: Unknown, but visits flowers of *Lesquerella fendleri*, *Lycium*, *Ungnadia speciosa*.
Podalirius lesquerellae Cockerell, 1896. Canad. Ent. 28: 197. ♀, ♂.

Taxonomy: Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 399. ♂.

linsleyi Timberlake. South. Calif., arid regions. Parasite: *Anthrax nidicola* Cole, *Hornia bohartí* Linsley, *Hylemya cilicrura* Rond., *Lytta chloris* Fall, *L. occipitalis* Horn, *L. purpurascens* Fall, *Monodontomerus montivagus* Ashm., *Myopa rubida* (Bigot), *Nemognatha scutellaris* LeC., *Sphaeropthalma unicolor* (Cress.)., *Triepeolus mojavensis* Linsley, *Xeromelecta californica* (Cress.). Pollen: Primarily associated with flowers of *Salvia carduacea*, but also visits flowers of *Amsinckia intermedia*, *Dalea saundersii*, *D. schottii*, *Larrea tridentata*, *Lupinus odoratus*, *Monardella exilis*, *Phacelia distans*, *Salazaria*. Predator: *Ptinus californicus* Pic, *Trogoderma ajax* Casey, *T. simplex* Jayne.
Anthophora linsleyi Timberlake, 1941. Pan-Pacific Ent. 17: 34. ♂, ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1082, figs. 227, 236, 237 (larva).

Biology: Linsley and MacSwain, 1942. Amer. Midland Nat. 27: 402-417 (parasites, predators, scavengers). —Ferguson, 1962. Calif. Univ. Pubs. Ent. 27: 76 (parasites). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 43 (nest, floral relationships).

marginata Smith. N. Mex., Ariz.; Mexico.
Anthophora marginata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 339. ♀.

Taxonomy: Cockerell, 1905. Amer. Ent. Soc., Trans. 31: 331. ♀, ♂.

montana Cresson. Colo., Tex., N. Mex., Ariz. Parasite: *Sphaeropthalma unicolor* (Cress.). Pollen: Unknown, but visits flowers of *Cleome serrulata*, *Delphinium*, *Lycium vulgare*, *Mentzelia pumila*, *Salvia lanceolata*.
Anthophora montana Cresson, 1869. Amer. Ent. Soc., Trans. 2: 290. ♀.

Biology: Linsley, 1962. Ent. Soc. Amer., Ann. 55: 161, fig. 9.

nebracensis Swenk. Nebr. Pollen: Unknown, but visits flowers of *Monarda fistulosa*.
Anthophora nebracensis Swenk, 1909. Ent. News 20: 390. ♀.

neglecta Timberlake and Cockerell. Calif. Pollen: Collects pollen from flowers of *Camissonia clavaeformis*, but also visits flowers of *Abronia villosa*, *Amsinckia douglasiana*, *A. intermedia*, *A. tessellata*, *Acamptopappus sphaerocephalus*, *Arctostaphylos*, *Astragalus*

pomonensis, Delphinium, Ephedra, Isomeris arborea, Lantana montevidensis, Lotus rigidus, Lupinus bicolor, Melilotus alba, Phacelia distans, Ranunculus, Rhus ovata, Salix, Salvia columbariae, S. pilosa, Sisymbrium irio, Trichostema lanatum.

Anthophora neglecta Timberlake and Cockerell, 1936. *In* Cockerell, Amer. Mus. Novitates 831: 4. ♂, ♀.

nigrita Dours. "Indiana." No recent records; probably not North American.

Anthophora nigrita Dours, 1869. Soc. Linn. Nord France, Mem. 2: 137. ♂.

Podilirius nigratus(!) Dalla Torre, 1896. Cat. Hym., v. 10, p. 278.

Taxonomy: Moure, 1960. Studia Ent. 3: 118-119 (status of *A. nigrita* (Fabr.) and *A. nigrita* Dours).

occidentalis Cresson. B. C., Mont., S. Dak., Oreg., Wyo., Kans., Colo., Utah, N. Mex., Ariz. Parasite: *Anthrax fur* (O. S.), *Chrysura smaragdicolor* (Walk.), *Dasymutilla dugesii* (Ckll. and Casad), *D. fulvohirta* (Cress.), *Hornia m. minutipennis* Riley, *H. neomexicana* (Ckll.), *Monodontomerus montivagus* Ashm., *Nemognatha lurida* Cress., *N. piezata* Fabr., *Sphaeropthalma unicolor* (Cress.), *Triepeolus* sp., *Xeromelecta californica* (Cress.). Pollen: Unknown, but visits flowers of *Carduus, Cleome serrulata, Convolvulus sepium.*

Anthophora occidentalis Cresson, 1869. Amer. Ent. Soc., Trans. 2: 292. ♀, ♂.

Biology: Johnson, 1903. Ent. News 14: 290. —Hungerford and Williams, 1912. Ent. News 23: 259. —Long, 1925. Carnegie Inst. Wash., Yearbook 24: 340. —Mickel, 1928. Ent. News 39: 69. —Porter, 1951. Iowa State Coll. Jour. Sci. 26: 23-30, 19 figs. —Hobbs, Nummi and Virostek, 1961. Canad. Ent. 93: 142-148 (nests, nesting site, nest associates).

pacifica infernalis (Dalla Torre). Utah, Nev., south. Calif. Parasite: *Melecta pacifica fulvida* Cress. Pollen: Unknown, but visits flowers of *Amsinckia intermedia, Arctostaphylos glandulosa, A. glauca, Buddleia, Lantana montevidensis, Lupinus bicolor, Pedicularis densiflora, Rhus laurina, Ribes indecorum, R. nevadensis, R. speciosum, Solanum douglasii.*

Anthophora carbonaria Cresson, 1879. Amer. Ent. Soc., Trans. 7: 210. ♀. Preocc.

Podalirius infernalis Dalla Torre, 1896. Cat. Hym., v. 10, p. 273. N. name.

Anthophora corvicolor Cockerell, 1905. Ent. News 16: 81. ♀.

pacifica pacifica Cresson. B. C., Wash., Oreg., north. Calif., Nev. Pollen: Unknown, but visits flowers of *Arctostaphylos glauca, Cercocarpus ledifolius, Cynoglossum grandis, Eriodictyon californicum, Erodium botrys, Lantana montevidensis, Lasthenia chrysostoma, Lotus glaber, Lupinus bicolor, L. densiflorus, Pedicularis densiflora, Ribes indecorum, R. malvaceum, Salix lasiolepis.*

Anthophora pacifica Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 190. ♂.

Anthophora ignava Cresson, 1879. Amer. Ent. Soc., Trans. 7: 210. ♀.

pernicis Timberlake. Ariz., Nev. Pollen: Unknown, but visits flowers of *Ribes cereum.*

Anthophora pernicis Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 58. ♂.

platti Timberlake. South. Calif. Pollen: Unknown, but visits flowers of *Lantana montividensis, Salix, Salvia mellifera.*

Anthophora platti Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 60. ♂, ♀.

porterae Cockerell. Wyo., Colo., N. Mex., Calif. (desert). Pollen: Polylectic, visits flowers of *Astragalus* including *A. crotalariae, A. fremontii, Lupinus, Oenothera deltoides, Ribes.*

Anthophora porterae Cockerell, 1900. Ann. and Mag. Nat. Hist. (7) 5: 407. ♂, ♀.

Anthophora porterae var. *semiflava* Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 183. ♂.

Anthophora porterae var. *watsoni* Cockerell 1911. Amer. Ent. Soc., Trans. 37: 238. ♂.

Anthophora porterae mut. *Thalassiana* Cockerell, 1920. Nature 105: 518. ♂.

raui Rohwer. Mo., Colo. to N. Y.

Anthophora raui Rohwer, 1923. Ent. Soc. Wash., Proc. 25: 100. ♀.

Biology: Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 179. —Rau, 1929. Psyche 36: 555.

smithii Cresson. S. Dak., Kans., Colo., Tex., N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Carduus, Cleome serrulata, Cnicus, Grindelia subalpina, Petalostemon oligophyllus, Salvia pitcheri, Verbena macdougali.*

Anthophora smithii Cresson, 1869. Amer. Ent. Soc., Trans. 2: 289. ♂, ♀.

Podalirius cardui Cockerell, 1897. Amer. Ent. Soc., Trans. 24: 155. ♂.

Biology: Banks, 1902. N. Y. Ent. Soc., Jour. 10: 212. —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 161-162, fig. 9.

subignava Cockerell. Colo.
Anthophora subignava Cockerell, 1929. N. Y. Ent. Soc., Jour. 37: 443. ♀.

urbana catalinae Cockerell. Calif. (Santa Catalina Isl.).
Anthophora catalinae Cockerell, 1901. Canad. Ent. 33: 297. ♀.

urbana clementina Cockerell. Calif. (San Clemente Isl.).
Anthophora catalinae clementina Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 430. ♀, ♂.

urbana nicolai Cockerell. Calif. (San Nicolas Isl.).
Anthophora nicolai Cockerell, 1939. Calif. Acad. Sci., Proc. (4) 23: 429. ♀, ♂.

urbana urbana Cresson. Idaho, Wash., Colo., Utah, N. Mex., Ariz., Calif.; Mexico (Baja California and Sonora). Parasite: *Meloe niger* Kirby, *Xeromelecta californica* (Cress.), *Zodion obliquefasciatum* (Macq.)? Pollen: Highly polylectic, taking pollen and or nectar from a great variety of annuals and perennials including *Allium, Amsinckia intermedia, Amorpha californica, Arctostaphylos drupacea, A. glandulosa, A. glauca, A. nevadensis, Artemisia tridentata, Asclepias eriocarpa, A. sublata, Aster canescens, Astragalus parishii, Baileya, Bebbia juncea, Brassica campestris, B. geniculata, Brodiaea crocea, B. laxa, B. lutea, Cakile edentula, Calycadenia multiglandulosa, Camissonia, Centaurea solstitialis, Cercidium floridum, Chaenactis artemisiaefolia, C. glabriuscula, Chaemabatia foliolosa, Chamaenarion angustifolium, Chilopsis linearis, Chrysopsis fastigiata, C. villosa, Chrysothamnus nauseosus, Cirsium californicum, Clarkia biloba, C. cylindrica, C. rhomboidea, C. unguiculata, Clematis lasiantha, Cleomella obtusifolia, Convolvulus arvense, C. occidentalis, Cordylanthus nevinii, Corethrogyne, Cryptantha intermedia, Dalea californica, D. emoryi, D. saundersii, Durantia plumieri, Epilobium, Eriastrum densiflora, E. sapphirinum, E. virgatum, Erigeron divergens, E. stenophyllus, Eriodictyon californicum, E. parryi, E. trichocalyx, Eriogonum confertiflorum, E. fasciculatum, E. nodosum, E. nudum, E. subscaposum, Eryngium aristatulum, Geraea canescens, Gilia capitata, G. tricolor, Gormania obtusata, Grindelia camporum, Gutierrezia californica, G. lucida, G. sarothrae, Haplopappus acradenius, H. linearifolius, H. palmeri, H. squarrosus, H. vernonioides, Helianthus annuus, H. gracilentus, Heliotropium curassavicum, Hemizonia paniculata, H. pungens, H. wheeleri, Hoffmanseggia, Horkelia bernardina, Hyptis emoryi, Iris, Lantana montividensis, Larrea tridentata, Lathyrus splendens, Lepidospartum squamatum, Lessingia germanorum, Lonicera japonica, Lotus argophyllus, L. davidsonii, L. hamatus, L. leucophaeus, L. purshianus, L. scoparius, Lupinus lobbii, L. superbus, Lythrum californicum, Malacothamnus densiflorus, Marrubium vulgare, Medicago sativa, Melilotus alba, Mentzelia multiflora, Mimulus guttatus, Mirabilis laevis, Monardella lanceolata, M. linoides, M. odoratissima, M. stricta, M. villosa, Navarretia, Oenothera, Palafoxia linearis, Penstemon antirrhinoides, P. grinnellii, P. heterophyllus, P. heterodoxus, P. palmeri, P. spectabilis, Pentachaeta aurea, Phacelia cicutaria, P. ciliata, P. distans, P. frigida, P. imbricata, P. ramosissima, Phyllodoce breweri, Potentilla glandulosa, Prosopis glandulosa, Ranunculus californicus, Raphanus sativus, Rhus laurina, Rosa californica, Salazaria mexicana, Salvia apiana, S. carduacea, S. carnosa, S. clevelandii, S. mellifera, S. pachyphylla, S. pilosa, Scrophularia californica, Senecio douglasii, S. integerrimus, Sisymbrium, Solanum douglasii, Solidago californica, S. multiradiata, S. occidentalis, Stachys bullata, S. californica, Stephanomeria exigua, S. pauciflora, S. virgata, Streptanthus tortuosus, Trichostema lanceolatum, T. laxum, T. parishii, Verbena californica, Vicia americana, Wislizenia refracta, Zauschneria californica.* Predator: *Trogoderma incisulum* LeC., *T. sternale* Jayne.
Anthophora urbana Cresson, 1878. Acad. Nat. Sci., Phila., Proc. 30: 188. ♀, ♂.
Podalirius alamosanus Cockerell, 1896. Canad. Ent. 28: 195. ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1080, figs. 223, 224, 226 (larva).

Biology: Davidson, 1897. South. Calif. Acad. Sci., Proc. 1: 4 (as *montana*). —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 161, fig. 9 (sleep). —Mayer and Johansen, 1976. Pan-Pacific Ent. 52: 120-125 (nest site, nest architecture, adult activity, development of life stages, parasites, predators, associates).

ursina californiensis Michener. Calif.
Anthophora simillima var. *californiensis* Michener, 1935. Pan-Pacific Ent. 11: 182. ♂, ♀.

ursina simillima Cresson. Wash., Wyo., Colo., N. Mex., Ariz., Calif. Pollen: Unknown, but visits flowers of *Astragalus*.
Anthophora simillima Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 189. ♂.
Anthophora euops Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 451. ♂.

Taxonomy: Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 478. ♂, ♀.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 225.

ursina ursina Cresson. Wis. and Ill, east to New England, south to Ga., ?N. Mex. Parasite: *Melecta pacifica atlantica* Linsley? Pollen: Unknown, but visits flowers of *Aesculus, Asclepias, Astragalus, Azalea, Cercis, Collinsia, Delphinium, Dicentra, Dodecatheon, Geranium, Lithospermum, Lonicera, Mertensia, Monarda, Pedicularis, Penstemon, Phlox, Physalis, Polygonatum, Polymonium, Ribes, Scutellaria, Trifolium, Vaccinium, Vicia, Viola*.
Anthophora ursina Cresson, 1869. Amer. Ent. Soc., Trans. 2: 291. ♂.
Anthophora pyralitarsis Dours, 1869. Soc. Linn. Nord France, Mem. 2: 160. ♂.

Taxonomy: Robertson, 1905. Amer. Ent. Soc., Trans. 31: 372. ♀, ♂. —Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 57.

vallorum (Cockerell). N. Mex.; Mexico. Parasite: *Hornia neomexicana* (Ckll.). Pollen: Unknown, but visits flowers of *Chilopsis, Ipomoea, Proboscidea, Solanum elaeagnifolium*.
Podalirius vallorum Cockerell, 1896. Canad. Ent. 28: 195. ♂, ♀.

vannigera Timberlake. Calif., Ariz. Pollen: Unknown, but visits flowers of *Isomeris arborea, Lycium fremontii, L. torreyi, Phacelia distans, Salvia pilosa*.
Anthophora vannigera Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 56. ♂.

walshii Cresson. Mass., Wis., Ill., Iowa, Nebr., Mo., Kans., Colo., Tex., ?Ariz. Pollen: Unknown, but visits flowers of *Abutilon, Baptisia, Blephilia, Cassia, Chamaecrista, Cirsium, Helianthus, Lespedeza, Lobelia, Petalostemon, Ruellia, Teucrium*.
Anthophora walshii Cresson, 1869. Amer. Ent. Soc., Trans. 2: 290. ♂, ♀.

Genus ANTHOPHORA Subgenus CLISODON Patton

Clisodon Patton, 1879. U. S. Geol. and Geog. Survey, Bul. 5: 479.
Type-species: *Anthophora furcata terminalis* Cresson. Monotypic and orig. desig. (=*Anthophora terminalis* Cresson).

Anthophora furcata furcata (Panzer) and other subspecies not listed here are Palearctic.

Taxonomy: Cockerell, 1936. Canad. Ent. 68: 276 (key). —Timberlake, 1951. N. Y. Ent. Soc., Jour. 59: 51 (status).

furcata neofurcata (Sladen). B. C.
Clisodon neofurcata Sladen, 1919. Canad. Ent. 51: 125. ♂, ♀.

furcata pernigra Cresson. Nev., Calif.
Anthophora pernigra Cresson, 1879. Amer. Ent. Soc., Trans. 7: 210. ♀.

furcata sperryi (Cockerell). Ariz.
Clisodon terminalis sperryi Cockerell, 1937. South. Calif. Acad. Sci., Bul. 36: 107. ♂.

furcata syringae (Cockerell). Wash., Calif. Pollen: Unknown, but visits flowers of *Castilleia, Solidago, Syringa*.
Podalirius syringae Cockerell, 1898. Acad. Nat. Sci. Phila., Proc. 50: 54. ♂.

Taxonomy: Cockerell, 1924. Pan-Pacific Ent. 1: 50. —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1082, figs. 229-231 (larva).

furcata terminalis Cresson. Alta. and ?B. C. to Que., south to Colo., Utah, N. Mex., Ariz., Ill. and N. C. Pollen: Unknown, but visits flowers of *Allium, Blephilia, Linum lewisii, Medicago, Mertensia, Monarda, Penstemon, Polemonium, Pontederia cordata, Prunella, Rosa, Salvia, Scutellaria, Stachys palustris*.
Anthophora terminalis Cresson, 1869. Amer. Ent. Soc., Trans. 2: 292. ♀, ♂.
Ceratina bidentata Provancher, 1882. Nat. Canad. 13: 234. ♂.

Anthophora nudata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 336. ♂.
Anthophora subglobulosa Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., v. 2, p. 297. ♂.
Anthophora nubiterrae Viereck, 1903. Amer. Ent. Soc., Trans. 29: 45. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 328-330, figs. 91, 92, table 10 (redescription, synonymy).

Biology: Cockerell, 1903. Birds and Nature, v. 14, p. 127. —Medler, 1964. Canad. Ent. 96: 1332-1336, 4 figs.

Genus ANTHOPHORA Subgenus MICRANTHOPHORA Cockerell

Anthophora subg. *Micranthophora* Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 66. Type-species: *Anthophora curta* Provancher. Orig. desig.

abroniae Timberlake. Ariz., Calif.; Mexico. Pollen: Unknown, but visits flowers of *Abronia* including *A. villosa, Chaenactis fremontii, C. glabriuscula, Geraea canescens, Heliotropium curassavicum.*
Anthophora abroniae Timberlake, 1937. Amer. Mus. Novitates 958: 6. ♂, ♀.

albata Cresson. Kans., Colo.
Anthophora albata Cresson, 1876. Davenport Acad. Sci., Proc. 1: 211. ♀.

arthuri Cockerell. Colo. Parasite: *Zacosmia maculata* (Cress.).
Anthophora arthuri Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 72. ♀.

cockerelli Timberlake. Calif., deserts. Pollen: Unknown, but visits flowers of *Cleomella obtusifolia, Dalea, Heliotropium curassavicum, Wislizenia refracta.*
Anthophora cockerelli Timberlake, 1937. Amer. Mus. Novitates 958: 4. ♂, ♀.

columbariae Timberlake and Cockerell. Calif. Pollen: Unknown, but visits flowers of *Chaenactis fremontii, C. glabriuscula, Cryptantha intermedia, Lotus scoparius, Lupinus nanus, Phacelia minor, Salvia carduacea, S. columbariae, Salvia mellifera, Sphaeralcea ambigua, Trifolium variegatum.*
Anthophora (Micranthophora) columbariae Timberlake and Cockerell, 1937. *In* Cockerell, Amer. Mus. Novitates 948: 9. ♂, ♀.

curta curta Provancher. Calif.; Mexico (Baja California). Parasite: *Zacosmia maculata* (Cress.). Pollen: Polylectic, visits a wide variety of flowers including *Abronia villosa, Acacia greggii, Baileya pleniradiata, Bebbia juncea, Calycadenia tenella, Centaurea melitensis, C. solstitialis, Chaenactis artemisaefolia, C. fremontii, C. glabriuscula, C. tenuifolia, Chrysopsis villosa, Chrysothamnus nauseosus, Chrysanthemum coronaria, Cnicus, Convolvulus arvense, Coreopsis lanceolata, Corethrogyne bernardina, Croton californicus, Cryptantha intermedia, C. lepida, Curcurbita foetidissima, Encelia actoni, E. californica, E. farinosa, Eriodictyon trichocalyx, Eriogonum fasciculatum, Eriophyllum multicaule, Grindelia camporum, G. elata, Gutierrezia californica, G. lucida, G. sarothrae, Haplopappus palmeri, Helianthus annuus, H. gracilentus, Heliotropium curassavicum, Hemizonia fasciculata, H. paniculata, H. pungens, H. wrightii, Heterotheca grandiflora, Jaumea carnosa, Layia platyglossa, Lotus scoparius, Melilotus alba, Palafoxia linearis, Pentachaeta aurea, Peucephyllum schottii, Phacelia distans, Phyla nodiflora rosea, Raphanus sativus, Salvia columbariae, Senecio californica, S. douglasii, Stephanomeria exigua, S. virgata, Trichostema lanceolatum, T. parishii, Viguiera laciniata, V. multiflora.*
Anthophora curta Provancher, 1895. Nat. Canad. 22: 173. ♀.
Anthophora curta var. *ensenadensis* Cockerell, 1941. San Diego Soc. Nat. Hist., Trans. 9: 349. ♂.

Taxonomy: Cockerell, 1907. Ent. News 18: 396. ♂.

curta melanops Cockerell. Colo., Tex., N. Mex., Ariz.; Mexico. Parasite: *Zacosmia maculata* (Cress.). Pollen: Unknown, but visits flowers of *Cleome, Dithyraea wislizeni, Pectis papposa, Wedelia incarnata.*
Anthophora curta var. *melanops* Cockerell, 1926. Pan-Pacific Ent. 3: 84. ♂.

Biology: Hicks, 1934. Colo. Univ., Studies 21: 265 (nest, parasite).

erythrothorax Michener. Calif.
Anthophora erythrothorax Michener, 1936. Brooklyn Ent. Soc., Bul. 31: 93. ♀.

estebana Cockerell. South. Calif. deserts; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Bebbia juncea, Chaenactis fremontii, Dalea, Encelia farinosa, Hyptis emoryi, Peucephyllum schottii.*
Anthophora estebana Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 81. ♂.

exigua Cresson. N. Mex., Nev., Calif. Pollen: Unknown, but visits flowers of *Chaenactis fremontii, Chrysothamnus nauseosus speciosus, C. viscidiflorus, Haplopappus linearifolius, H. monactis, Lessingia, Penstemon, Senecio douglasii.*
Anthophora exigua Cresson, 1879. Amer. Ent. Soc., Trans. 7: 211. ♀, ♂.

flavocincta Huard. Calif. Pollen: Unknown, but visits flowers of *Artemisia, Cressa cretica, Heliotropium curassavicum, Hemizonia paniculata.*
Anthophora nigrocincta Provancher, 1895. Nat. Canad. 22: 172. ♂. Preocc.
Anthophora flavocincta Huard, 1897. Nat. Canad. 24: 25. N. name.
Anthophora anstrutheri Cockerell, 1906. Amer. Ent. Soc., Trans. 32: 71. ♀.

flexipes Cresson. Utah, Colo., Nev., Calif. Parasite: *Anthrax limatulus* Marst., *Zacosmia maculata* (Cress.), *Zonitis* (*Neozonitis*) *hesperis* Selander. Pollen: Polylectic, stores pollen from a wide variety of flowers.
Anthophora flexipes Cresson, 1879. Amer. Ent. Soc., Trans. 7: 211. ♀, ♂.

Biology: Torchio and Youssef, 1968. Kans. Ent. Soc., Jour. 41: 289-302, 21 figs. (life history).

hololeuca Cockerell. Ariz., South. Calif.; Mexico (Baja California and Sonora). Pollen: Polylege, most commonly taken at flowers of *Dalea, Acacia* and *Cercidium*, but visits other flowers including *Abronia, Acamptopappus, Bebbia, Croton, Cryptantha, Heliotropium, Koeberlinia, Larrea, Oenothera, Palafoxia, Stephanomeria.*
Anthophora hololeuca Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 82. ♀, ♂.

maculifrons Cresson. N. Mex., Nev., Calif.; Mexico (Baja California). Pollen: Unknown, but visits flowers of *Chrysothamnus* including *C. nauseosus, C. viscidiflorus, Helianthus annuus.*
Anthophora maculifrons Cresson, 1879. Amer. Ent. Soc., Trans. 7: 210. ♀, ♂.

mortuaria Timberlake. Calif. Pollen: Unknown, but visits flowers of *Heliotropium curassavicum, Pluchea sericea.*
Anthophora mortuaria Timberlake, 1937. Amer. Mus. Novitates 958: 10. ♂, ♀.

nigritula Cockerell. Calif.
Anthophora nigritula Cockerell, 1924. Pan-Pacific Ent. 1: 52. ♀.

Taxonomy: Michener, 1936. Brooklyn Ent. Soc., Bul. 31: 93. ♂.

pachyodonta Cockerell. Nev., South. Calif.; Mexico (Baja California), deserts. Pollen: Unknown, but visits flowers of *Bebbia juncea, Encelia farinosa, Heliotropium curassavicum, Sphaeralcea emoryi, S. orcutti.*
Anthophora pachyodonta Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 80. ♂.

peritomae Cockerell. Wyo., Utah, Colo., N. Mex. Parasite: *Anthrax limatulus artemisia* Marst., *Zacosmia maculata* (Cress.). Pollen: Stores pollen from flowers of *Grindelia squarrosa*, but visits other flowers including *Chrysopsis, Chrysothamnus, Helianthus annuus, Solidago canadensis.*
Anthophora curta var. *peritomae* Cockerell, 1905. Ent. News 16: 272. ♂.
Anthophora peritomae var. *interspersa* Cockerell, 1907. Ent. News 18: 397. ♂.
Anthophora peritomae var. *tinctula* Cockerell, 1907. Ent. News 18: 397. ♀.

Taxonomy: Cockerell, 1907. Ent. News 18: 396. ♂, ♀.

Biology: Torchio, 1971. Los Angeles Co. Mus., Contrib., Sci. 206: 1-14, 13 figs. (life history).

petrophila Cockerell. N. Mex., Calif. Pollen: Unknown, but visits flowers of *Acamptopappus sphaerocephalus, Amsinckia intermedia, A. tessellata, Aster canescens, Astragalus, Baileya pleniradiata, Bebbia juncea, Chaenactis brachypappa, C. carphoclinia, C. glabriuscula, Chrysothamnus nauseosus, Dalea saundersii, Erigeron foliosus, Eriophyllum confertiflorum, Geraea canescens, Gutierrezia lucida, Haplopappus acradenius, H. cooperi, H. linearifolius, H. monactis, Lessingia tenuis, Lotus davidsonii,*

L. scoparius, Monardella exilis, Salvia pilosa, Stephanomeria exigua, S. pauciflora S. virgata.
Anthophora curta petrophila Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 15. ♀.

Taxonomy: Cockerell, 1907. Ent. News 18: 395. ♂.

phenax (Cockerell). Tex. to South. Calif., Mexico. Pollen: Unknown, but visits flowers of *Lycium* including *L. torreyi.*
Podalirius phenax Cockerell, 1898. Canad. Ent. 30: 146. ♂.

rhodothorax Michener. Calif. Pollen: Unknown, but visits flowers of *Chrysopsis villosa, Erigeron, Lessingia glandulifera, Monardella stricta.*
Anthophora rhodothorax Michener, 1936. Brooklyn Ent. Soc., Bul. 31: 94. ♀, ♂.
Anthophora emarginata Timberlake, 1937. Amer. Mus. Novitates 958: 11. ♂, ♀.

salazariae Timberlake. Calif., deserts. Pollen: Unknown, but visits flowers of *Baileya, Bebbia juncea, Chaenactis carphoclinia, C. fremontii, Dalea saundersii, Erodium cicutarium, Haplopappus cooperi, Larrea tridentata, Lotus scoparius, Oenothera clavaeformis, O. desertorum, Phacelia distans, Palafoxia linearis, Salazaria mexicana, Salvia columbariae, Senecio longilobus.*
Anthophora salazariae Timberlake, 1937. Amer. Mus. Novitates 958: 7. ♀, ♂.

Genus EMPHOROPSIS Ashmead

Emphoropsis Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 60.
Type-species: *Habropoda floridana* Smith. Desig. by Cockerell and Cockerell, 1901.
Meliturgopsis Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 62.
Type-species: *Emphoropsis murina* Cockerell. First included species, Cockerell, 1909. (=*Emphoropsis murihirta murina* Cockerell).
Psithyrus subg. *Laboriopsithyrus* Frison, 1927. Amer. Ent. Soc., Trans. 53: 69.
Type-species: *Bombus laboriosus* Fabricius. Orig. desig.

Taxonomy: Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 99-100.

birkmanni Cockerell. Tex.
Emphoropsis Birkmanni Cockerell, 1905. Canad. Ent. 37: 265. ♀.

Taxonomy: Cockerell, 1934. Amer. Mus. Novitates 732: 2. ♀, ♂.

Biology: Cockerell, 1934. Amer. Mus. Novitates 732: 2 (nest).

cineraria (Smith). B. C., Wash., Calif. Parasite: *Melecta thoracica* (Sm.), *M. pacifica* Cress. Pollen: Unknown, but visits flowers of *Arctostaphylos mariposa, A. patula, Ribes.*
Anthophora cineraria Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 124. ♀, ♂.

Taxonomy: Cockerell, 1904. Canad. Ent. 36: 302.

Biology: Torchio and Youssef, 1968. Kans. Ent. Soc., Jour. 41: 300 (parasite).

citula Cockerell. Colo.
Emphoropsis citulus Cockerell, 1929. N. Y. Ent. Soc., Jour. 37: 442. ♂.

cressoni (Dalla Torre). Wyo., Colo. ?B. C. Pollen: Unknown, but visits flowers of *Delphinium, Ribes longiflorum.*
Anthophora mucida Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 191. ♀. Preocc.
Podalirius cressoni Dalla Torre, 1896. Cat. Hym., v. 10, p. 264. N. name.
Emphoropsis mucida var. *johnsoni* Cockerell, 1905. Entomologist 38: 59. ♀, ♂.
Emphoropsis mucida var. *ventralis* Michener, 1936. Amer. Mus. Novitates 876: 3. ♀.

Taxonomy: Cockerell, 1907. Colo. Univ., Studies 4: 256. ♂. —Michener, 1936. Amer. Mus. Novitates 876: 3. ♀, ♂.

dammersi Timberlake. Calif. Pollen: Unknown, but visits flowers of *Arctostaphylos* including *A. glauca, A. pungens.*
Emphoropsis dammersi Timberlake, 1937. Amer. Mus. Novitates 958: 2. ♀, ♂.

depressa (Fowler). Calif. Pollen: Unknown, but visits flowers of *Amsinckia intermedia, Arbutus menziesii, Arctostaphylos glauca, Berberis californica, Brassica, Ceanothus*

soredatus, Eriodictyon californicum, Lupinus albifrons, Phacelia, Ribes indecorum, Salvia columbariae, S. mellifera, S. sonomensis, Vicia.
Habropoda depressa Fowler, 1899. Canad. Ent. 31: 283. ♀, ♂.

Biology: Fowler, 1899. Canad. Ent. 31: 283 (nest, adult habits).

excellens Timberlake. Calif. (Kern Co.). Pollen: Unknown, but visits flowers of *Chrysothamnus.*
Emphoropsis excellens Timberlake, 1962. Ent. News 73: 36. ♀, ♂.

interspersa Cockerell. Calif. Pollen: Unknown, but visits flowers of *Amsinckia douglasiana, A. intermedia, Astragalus, Salvia mellifera.*
Emphoropsis interspersa Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 99. ♂.

Taxonomy: Cockerell, 1924. Pan-Pacific Ent. 1: 50.

laboriosa fedorensis Cockerell. Tex.
Emphoropsis floridana var. *fedorensis* Cockerell, 1905. Canad. Ent. 37: 265. ♂, ♀.

laboriosa laboriosa (Fabricius). Ill. to New England, south to Miss. and Fla. Pollen: Unknown, but visits flowers of *Cercis, Cirsium, Dicentra, Gelsemium sempervirens, Lupinus, Malus, Melilotus, Prunus, Vaccinium, Vicia.*
Bombus laboriosus Fabricius, 1804. Systema Piezatorum, p. 352.
Anthophora floridana Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 339. ♀, ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 332-333, fig. 95 (redescription, synonymy).

Biology: Ornduff, 1970. Arnold Arboretum, Jour. 51: 1-17 (floral visitation).

miserabilis (Cresson). Wash., Oreg. Calif.; Mexico (Baja Calif.). Pollen: Stores pollen of *Abronia, Convolvulus, Lupinus,* but visits flowers of *Arctostaphylos, Cirsium, Erysimum, Lantana, Lotus, Lupinus, Phacelia, Raphanus* for nectar.
Anthophora miserabilis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 191. ♂.

Taxonomy: Torchio and Stephen, 1961. Ent. Soc. Amer., Ann. 54: 683-687, 7 figs. (larva and pupa).

Biology: Stephen and Torchio, 1961. Ent. Soc. Amer., Ann. 54: 687-692, 2 figs. (nest, life history).

morrisoni (Cresson). Colo.
Anthophora morrisoni Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30: 192. ♂.

murihirta Cockerell. B. C., Calif.
Emphoropsis murihirta Cockerell, 1905. Ent. News 16: 81. ♂.

murina Cockerell. Calif.
Emphoropsis murihirta murina Cockerell, 1909. U. S. Natl. Mus., Proc. 36: 414. ♂.

Taxonomy: Cockerell, 1924. Pan-Pacific Ent. 1: 49. ♂, ♀.

pallida Timberlake. South. Calif., Ariz., Utah, deserts. Parasite: *Lytta magister* Horn, *Zonitis* (*Neozonitis*) n. sp. Pollen: Apparently an oligolege of *Larrea tridentata,* but visits flowers of other plants including Compositae, *Lupinus, Camissonia, Phacelia Crenulata* for nectar and sometimes for pollen.
Emphoropisis pallida Timberlake, 1937. Amer. Mus. Novitates 958: 1. ♀, ♂.

Biology: Bohart, Torchio, Maeta and Rust, 1972. Kans. Ent. Soc., Jour. 45: 381-392, 14 figs. (life history). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 44 (pollen relationships).

pascoensis (Cockerell). Wash.
Habropoda floridana var. *pascoensis* Cockerell, 1898. Acad. Nat. Sci. Phila., Proc. 50: 54. ♀.

rugosissima Cockerell. Calif., Nev.; Mexico (Baja California). Pollen: Collects pollen from flowers of *Camissonia clavaeformis, C. kernensis,* but also visits flowers of *Abronia maritima, Amsinckia intermedia, Lupinus bicolor, L. nanus, Lotus scoparius, Phacelia distans, Salvia mellifera, Stanleya pinnata.*
Emphoropsis rugosissima Cockerell, 1905. Biol. Soc. Wash., Proc. 18: 182. ♀.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 46 (floral relationships).

salviae Michener. Calif. Pollen: Unknown, but visits flowers of *Salvia*.
Emphoropsis salviae Michener, 1936. Brooklyn Ent. Soc., Bul. 31: 95. ♂.

salviarum (Cockerell). N. Mex., Ariz. Pollen: Unknown, but visits flowers of *Salvia*.
Habropoda salviarum Cockerell, 1898. N. Mex. Agr. Expt. Sta., Bul. 24: 42. ♂, ♀.

semifulva Cockerell. Calif.
Emphoropsis semifulva Cockerell, 1905. South. Calif. Acad. Sci., Bul. 4: 99. ♂.

tristissima Cockerell. Calif. Pollen: Unknown, but visits flowers of *Amsinckia intermedia, Arctostaphylos patula, Collinsia bicolor, Lupinus bicolor, L. nanus, Phacelia distans, Salvia sonomensis.*
Emphoropsis infernalis tristissima Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 161. ♀.

vierecki Cockerell. Colo., N. Mex.
Emphoropsis vierecki Cockerell, 1909. U. S. Natl. Mus., Proc. 36: 414. ♀.

Tribe MELECTINI

All the members of this tribe are cleptoparasites in the nests of other anthophorid bees. The Melectini occur on all the continents except Australia.

Revision: Linsley, 1939. Ent. Soc. Amer., Ann. 32: 429-468, 9 figs. (Nearctic spp.). —Hurd and Linsley, 1951. Calif. Ins. Survey, Bul. 1: 119-140, 1 pl., 5 maps (U. S. spp.). —Lieftinck, 1972. Tijdschr. Ent. 115: 253-324, 57 figs., 2 pls., 2 maps, 1 table (generic revision of smaller genera of Old World melectines, distribution and host relationships, comments on N. Amer. genera).

Taxonomy: Hurd, 1953. Kans. Ent. Soc., Jour. 26: 35-37, 1 map (generic distribution in Americas). —Rozen, 1969. Amer. Mus. Novitates 2382: 1-24, 56 figs. (larva).

Genus MELECTA Latreille

Genus MELECTA Subgenus MELECTA Latreille

Melecta Latreille, 1802. Hist. Nat. Fourmis, p. 427.
Type-species: *Apis albifrons* Forster. Desig. by Latreille, 1810 (=*Apis punctata* Fabricius), see Day and Fitton, 1977. Biol. Jour. Linn. Soc. 9: 40.
Symmorpha Klug, 1807. Mag. f. Insektenk. 6: 198, 227.
Type-species: *Apis albifrons* Forster. Monotypic (=*Apis punctata* Fabricius).
Bombomelecta Patton, 1879. U. S. Geol. and Geog. Survey, Bul., p. 370.
Type-species: *Melecta thoracica* Cresson. Monotypic.

bohartorum Linsley. Calif., Nev.
Melecta (*Melecta*) *bohartorum* Linsley, 1939. Ent. Soc. Amer., Ann. 32: 442. ♀.

pacifica atlantica Linsley. Kans. and Nebr., to N. J., south to Ga. and Ala. Host: *Anthophora ursina ursina* Cress.?
Melecta (*Melecta*) *atlantica* Linsley, 1943. N. Y. Ent. Soc., Jour. 51: 225. ♀.

Taxonomy: Michener, 1948. Ent. Soc. Wash., Proc. 50: 17. ♀, ♂. —Michener, 1954. Kans. Ent. Soc., Jour. 27: 66. —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 492-493, fig. 117 (redescription).

pacifica fulvida Cresson. Wash., Oreg. northeast. Calif., Idaho, Wyo., Colo., Utah, Nev., Ariz., N. Mex., Tex. Host: *Anthophora pacifica infernalis* (Dalla Torre), *Emphoropsis cineraria* Smith.
Melecta fulvida Cresson, 1878. Amer. Ent. Soc., Trans. 7: 204. ♀.
Bombomelecta semifulva Cockerell, 1921. Ann. and Mag. Nat. Hist. (9) 7: 212. ♂.

Taxonomy: Michener, 1948. Ent. Soc. Wash., Proc. 50: 17. ♂. —Hurd and Linsley, 1951. Calif. Ins. Survey, Bul. 1: 128, map 4.

Biology: Torchio and Youssef, 1968. Kans. Ent. Soc., Jour. 41: 30 (induced parasitization; as *M. pacifica*).

pacifica pacifica Cresson. Calif.
Melecta pacifica Cresson, 1878. Amer. Ent. Soc., Trans. 7: 91. ♂.

Taxonomy: Hurd and Linsley, 1951. Calif. Ins. Survey, Bul. 1: 127, map 4.

separata alfredi (Cockerell). N. Mex.
Bombomelecta alfredi Cockerell, 1895. Psyche 7 (sup.): 11. ♂.

separata arizonica (Cockerell). Ariz. Host: *Anthophora forbesii* Ckll.
Bombomelecta arizonica Cockerell, 1902. Canad. Ent. 34: 267. ♀.

Biology: Lutz and Cockerell, 1920. Amer. Mus. Nat. Hist., Bul. 42: 574 (host).

separata callura (Cockerell). B. C., to Calif., Idaho, Utah, Colo., Ariz., N. Mex. Host: *Anthophora edwardsii* Cress. Parasite: *Sphaeropthalma unicolor* (Cress.).
Bombomelecta callura Cockerell, 1926. Pan-Pacific Ent. 3: 58. ♂.

Taxonomy: Rozen, 1969. Amer. Mus. Novitates 2382: 8-10, figs. 2-8 (larva).

Biology: Thorp, 1969. Amer. Midland Nat. 82: 330-331 (host). —Thorp, 1969. Amer. Midland Nat. 82: 338-345, 7 figs. (behavior, ecology).

separata johnsoni (Cockerell). Colo.
Bombomelecta johnsoni Cockerell, 1905. Ent. News 16: 270. ♂.

separata mojavensis Linsley. Calif. (Mojave Desert).
Melecta (*Melecta*) *separata mojavensis* Linsley, 1939. Ent. Soc. Amer., Ann. 32: 446. ♀, ♂.

separata separata Cresson. Calif., Oreg., Wash., Idaho.
Melecta separata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 204. ♀.

thoracica Cresson. Wash., Oreg., Calif. (Sierra Nevada Mts.), Nev., Utah, Colo., Wyo., Nebr., S. Dak., Kans. Host: *Emphoropsis cineraria* (Sm.).
Melecta thoracica Cresson, 1875. Rpt. Geog. Geol. Expl. and Survey west of 100th Meridian, v. 5, p. 726.
Melecta (*Melecta*) *sierrae* Linsley, 1939. Ent. Soc. Amer., Ann. 32: 437. ♀, ♂.

Taxonomy: Linsley, 1945. Ent. News 56: 151, fig. 1. ♀. —Hurd and Linsley, 1951. Calif. Ins. Survey, Bul. 1: 126, map. 2.

Biology: Linsley, 1943. Pan-Pacific Ent. 19: 160 (habits, as *M. sierrae*).

Genus MELECTA Subgenus MELECTOMIMUS Linsley

Melecta subg. *Melectomimus* Linsley, 1939. Ent. Soc. Amer., Ann. 32: 448.
Type-species: *Melecta edwardsii* Cresson. Monotypic and orig. desig.

edwardsii Cresson. Calif., Nev.; Mexico (Baja California). Host: ?*Emphoropsis* sp.
Melecta edwardsii Cresson, 1878. Amer. Ent. Soc., Trans. 7: 92. ♂.
Bombomelecta zygos Viereck, 1903. Amer. Ent. Soc., Trans. 29: 179. ♀.

Genus XEROMELECTA Linsley

Another subgenus, *Nesomelecta*, is found in the West Indies.

Genus XEROMELECTA Subgenus XEROMELECTA Linsley

Melecta subg. *Xeromelecta* Linsley, 1939. Ent. Soc. Amer., Ann. 32: 450.
Type-species: *Bombomelecta larreae* Cockerell. Monotypic and orig. desig.

larreae (Cockerell). N. Mex. to Nev., south. Calif.
Bombomelecta larreae Cockerell, 1900. Canad. Ent. 32: 361. ♀.
Bombomelecta azygos Viereck, 1903. Amer. Ent. Soc., Trans. 29: 181. ♂.

Genus XEROMELECTA Subgenus MELECTOMORPHA Linsley

Melecta subg. *Melectomorpha* Linsley, 1939. Ent. Soc. Amer., Ann. 32: 451.
Type-species: *Melecta californica* Cresson. Orig. desig.

californica (Cresson). B. C. to Calif. east to Ill., Mo., Okla., Tex.; Mexico (Baja California, Puebla and Zacatecas). Host: *Anthophora abrupta* Say, *A. bomboides neomexicana* Ckll.,

A. bomboides stanfordiana Ckll., *A. edwardsii* Cress., *A. linsleyi* Timb., *A. occidentalis* Cress., *A. urbana* Cress. Parasite: *Sphaeropthalma anthophora* (Ashm.), *S. unicolor* (Cress.).

Melecta californica Cresson, 1878. Amer. Ent. Soc., Trans. 7: 91. ♂, ♀.
Melecta miranda Fox, 1893. Ent. News 4: 143. ♀.
Pseudomelecta pasadenensis Cockerell, 1910. Ann. and Mag. Nat. Hist. (8) 5: 27. ♀.
Melecta sladeni Viereck, 1924. Canad. Ent. 56: 15. ♀.

Taxonomy: Hurd and Linsley, 1951. Calif. Ins. Survey, Bul. 1: 128, map 5. —Hurd, 1953. Kans. Ent. Soc., Jour. 26: 35-36 (Mexican distrib.). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1083, figs. 238-242 (larva). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 494-496, fig. 119 (redescript.). —Rozen, 1969. Amer. Mus. Novitates 2382: 10.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 224 (as *californica miranda*). —Mickel, 1928. Ent. News 39: 73 (as *californica miranda*). —Linsley and MacSwain, 1942. Amer. Midland Nat. 27: 408, f. 10. —Hobbs, Nummi and Virostek, 1961. Canad. Ent. 93: 146. —Linsley, 1962. Ent. Soc. Amer., Ann. 55: 162-163, fig. 8.

interrupta (Cresson). Minn., Wis., and Ill., south to Tex., west to Wyo., Colo. and Ariz.; Mexico (Chihuahua, Durango and Zacatecas). Host: *Anthophora abrupta* Say.
Melecta interrupta Cresson, 1872. Amer. Ent. Soc., Trans. 4: 275. ♀, ♂.
Melecta interrupta var. *fallugiae* Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 23. ♀.
Melecta interrupta var. *rociadensis* Cockerell, 1904. Ann. and Mag. Nat. Hist. (7) 14: 23. ♂.

Taxonomy: Hurd and Linsley, 1951. Calif. Ins. Survey, Bul. 1: 133, map 5. —Hurd, 1953. Kans. Ent. Soc., Jour. 26: 36 (Mexican distrib.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 496-497, fig. 119 (redescription).

Genus BRACHYMELECTA Linsley

Brachymelecta Linsley, 1939. Ent. Soc. Amer., Ann. 32: 458.
Type-species: *Melecta? mucida* Cresson. Monotypic and orig. desig.

mucida (Cresson). Nev.
Melecta? mucida Cresson, 1878. Amer. Ent. Soc., Trans. 7: 205. ♂.

Genus ZACOSMIA Ashmead

Zacosmia Ashmead, 1898. Psyche 8: 282.
Type-species: *Melecta maculata* Cresson. Monotypic and orig. desig.
Micromelecta Baker, 1906. Invertebrata Pacifica, v. 1, p. 143.
Type-species: *Melecta maculata* Cresson. Monotypic and orig. desig.

maculata desertorum Cockerell. North. Mexico to south. Calif., Ariz., Tex.
Zacosmia maculata desertorum Cockerell, 1916. Canad. Ent. 48: 391. ♂.

maculata maculata (Cresson). Alta. and Wash. to Calif., Idaho, Utah, Colo. and Wyo. Host: *Anthophora* (*Micranthophora*) *arthuri* Ckll., *A.* (*M.*) *curta melanops* Ckll., *A.* (*M.*) *flexipes* Cress., *A.* (*M.*) *peritomae* Ckll. Parasite: *Anthrax limatulus larrea* Marston.
Melecta maculata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 204. ♀, ♂.
Melecta (*Pseudomelecta?*) *suffusa* Viereck, 1924. Canad. Ent. 56: 15. ♀. N. syn.

Taxonomy: Hurd and Linsley, 1951. Calif. Ins. Survey, Bul. 1: 122. —Hurd, 1953. Kans. Ent. Soc., Jour. 26: 37, fig. (Mexican distrib.). —Rozen, 1969. Amer. Mus. Novitates 2382: 14-15, figs. 24-30 (larva).

Biology: Hicks, 1934. Colo. Univ., Studies 21 (4): 265-267. —Torchio and Youssef, 1968. Kans. Ent. Soc., Jour. 41: 289-302, 21 figs. (ecology, immature stages). —Torchio, 1971. Los Angeles Co. Mus., Contrib. Sci. 206: 1-10, 13 figs., 1 table (ecology).

Tribe CENTRIDINI

This is a New World group of pollen-collecting bees which are especially abundant in the tropics although some species are present in the warm temparate regions of both continents. The tribe contains two genera, *Centris* and *Epicharis*, but only the genus *Centris* occurs in America north of Mexico.

Taxonomy: Rozen, 1965. Amer. Mus. Novitates 2233: 13-26, figs. 35-72 (larvae).

Genus CENTRIS Fabricius

Taxonomy: Timberlake, 1940. Pan-Pacific Ent. 16: 138-141 (Calif. spp.). —Michener, 1951. Kans. Ent. Soc., Jour. 24: 1-11 (subgenera). —Snelling, 1956. Pan-Pacific Ent. 32: 1-8 (Calif. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 333-338, figs. 96, 97 (eastern U. S. spp.). —Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 112: 1-33 (nomencl. and tax. of some N. Amer. spp.). —Snelling, 1974. Los Angeles Co. Mus., Contrib. Sci. 259: 1-41, 44 figs. (distr. and tax. of some N. Amer. spp.).

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 44-46 (intrafloral ecol. of *Larrea* visiting spp.). —Alcock, Jones and Buchmann, 1976. Kans. Ent. Soc., Jour. 49: 469-474, 5 figs., 1 table (nesting behavior).

Genus CENTRIS Subgenus XEROCENTRIS Snelling

Centris subg. *Xerocentris* Snelling, 1974. Los Angeles Co. Mus., Contrib. Sci. 259: 3.
Type-species: *Centris californica* Timberlake. Orig. desig.

Taxonomy: Snelling, 1974. Los Angeles Co. Mus., Contrib. Sci. 259: 3-5 (key to N. Amer. spp.).

californica Timberlake. Calif., Ariz.; Mexico (Baja California). Pollen: Apparently oligolectic on *Wislizenia refracta*, but also visits flowers of *Cleomella obtusifolia*.
Centris californica Timberlake, 1940. Pan-Pacific Ent. 16: 139. ♀.

hoffmanseggiae Cockerell. N. Mex., Ariz., south Calif. and Santa Lucia Mts. in coastal central Calif. Pollen: Polylectic, visits flowers of *Astragalus, Cercidium, Dicentra chrysantha, Larrea tridentata, Lotus scoparius, Lupinus densiflorus, Medicago sativa, Melilotus, Penstemon antirrhinoides, Prosopis glandulosa*.
Centris hoffmanseggiae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 395. ♂ (♀ misdet.).
Centris hoffmanseggiae davidsoni Cockerell, 1904. South. Calif. Acad. Sci., Bul. 3: 160. ♂.

Taxonomy: Cockerell, 1900. Canad. Ent. 32: 363. ♂, ♀.

pallida Fox. Ariz., south Calif. deserts and Santa Catalina Island; Mexico (Baja California and Sonora). Pollen: Polylectic, chiefly *Acacia greggii, Cercidium torreyanum, Dalea emoryi, D. spinosa, Larrea tridentata, Olneya tesota, Prosopis pubescens*, but also visits other flowers including *Asclepias erosa, Aster spinosa, Cirsium, Parkinsonia aculeata*.
Centris pallida Fox, 1899. Acad. Nat. Sci. Phila., Proc. 51: 66. ♀.
Centris pallida callognatha Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 78. ♀.
Centris trichosoma Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 78. ♂.

Biology: Alcock, Jones and Buchmann, 1976. Jour. Zool., London 179: 189-199, 3 pls., 2 figs., 2 tables (nest site, adult behavior including emergence, mating). —Alcock, Jones and Buchmann, 1976. Kans. Ent. Soc., Jour. 49: 472-474, figs. 4, 5, table 1 (nest architecture, nesting behavior). —Alcock, 1976. Psyche 83: 121-131, 2 figs., 1 table (social organization of male populations).

rhodomelas Timberlake. Calif. Pollen: Unknown, but visits flowers of *Psoralea macrostachya*.
Centris rhodomelas Timberlake, 1940. Pan-Pacific Ent. 16: 139. ♀, ♂.

tiburonensis Cockerell. Ariz., south. Calif.; Mexico (Baja California). Pollen: Polylectic, chiefly *Dalea* including *D. emoryi, D. schottii, D. spinosa*, but visits other flowers for nectar and or pollen including *Acacia greggii, Asclepias, Cercidium torreyanum, Koeberlinia spinosa, Olneya tesota*.
Centris tiburonensis Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 78. ♀.

Genus CENTRIS Subgenus PARACENTRIS Cameron

Paracentris Cameron, 1903. Amer. Ent. Soc., Trans. 29: 235.
Type-species: *Paracentris fulvohirta* Cameron. Monotypic.
Centris subg. *Penthemisia* Moure, 1950. Dusenia 1: 390.
Type-species: *Hemisia Chilensis* Spinola. Orig. desig.
Centris subg. *Trichocentris* Snelling, 1956. Pan-Pacific Ent. 32: 4.

Type-species: *Centris rhodoleuca* Cockerell. Orig. desig.

Taxonomy: Snelling, 1974. Los Angeles Co. Mus., Contrib. Sci. 259: 5-20, figs. (key to N. Amer. spp.).

angustifrons Snelling. Ariz. (Huachuca Mts.).
Centris (*Paracentris*) *angustifrons* Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 112: 13. ♀.

aterrima Smith. South. Ariz.; Mexico.
Centris aterrima Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 378. ♂.

atripes Mocsary. Tex., N. Mex., Ariz., Calif. (Brawley); Mexico to Costa Rica. Pollen: Polylectic, visits flowers of *Dalea, Hyptis, Kallstroemia grandiflora, Koeberlinia spinosa, Larrea tridentata, Solanum elaeagnifolium.*
Centris atripes Mocsary, 1899. Termes. Fuzetek 22: 254. ♂.
Centris atriventris Fox, 1899. Acad. Nat. Sci. Phila., Proc. 51: 68. ♀, ♂. Preocc.
Centris foxi Friese, 1900. K. K. Naturhist. Hofmus., Ann. 15: 350. N. name.

caesalpiniae Cockerell. Tex., N. Mex., Ariz.; Mexico (Chihuahua). Pollen: Polylectic, visits flowers of *Acacia, Asclepias brachystephana, Baccharis, Cevallia sinuata, Eriogonum, Hoffmanseggia densiflora, H. falcaria, Robinia, Solanum elaeagnifolium, S. rostratum,, Verbesina encelioides.*
Centris caesalpiniae Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 394. ♀, ♂.
Centris morsei Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 355. ♂.
Centris marginata Fox, 1899. Acad. Nat. Sci. Phila., Proc. 51: 67. ♂.

cockerelli cockerelli Fox. Tex., N. Mex.; Mexico (Chihuahua, Nuevo Leon, Tamaulipas); intergrades with following subspecies in western N. Mex., Chihuahua, eastern Ariz. and Sonora. Pollen: Presumably polylectic, visits flowers of *Dalea formosa, Hoffmanseggia, Prosopis glandulosa* var. *torreyanum.*
Centris Cockerelli Fox, 1899. Acad. Nat. Sci. Phila., Proc. 51: 68. ♀.

cockerelli resoluta Cockerell. Ariz., Nev., south. Calif.; Mexico (Baja California and Sonora). Pollen: Polylectic, chiefly *Cercidium torreyanum, Dalea, Krameria, Larrea tridentata, Prosopis,* but visits other flowers for nectar and possibly pollen.
Centris cockerelli resoluta Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 76. ♀, ♂.

Biology: Alcock, Jones and Buchmann, 1976. Kans. Ent. Soc., Jour. 49: 471-472, fig. 3, table 1 (nest architecture, nesting behavior).

lanosa Cresson. Kans., Tex., and western Fla.
Centris lanosa Cresson, 1872. Amer. Ent. Soc., Trans. 4: 284. ♂.
Centris subhyalina Fox, 1899. Acad. Nat. Sci. Phila., Proc. 51: 69. ♀.
Centris birkmannii Friese, 1900. Termes. Fuzetek 23: 44. ♂, ♀.

mexicana Smith. Ariz., N. Mex., Tex.; Mexico (Chihuahua, D. F., Durango, Michoacan, Nuevo Leon, and Sonora). Pollen: Unknown, but visits flowers of *Cevallia sinuata, Hoffmanseggia densiflora, Melilotus alba, Menodora scabra.*
Centris mexicana Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 378. "♀" = ♂.

rhodopus Cockerell. Tex., N. Mex., Ariz., south. Calif.; Mexico (Baja California, Chihuahua, and Sonora). Pollen: Polylectic, visits flowers of a wide variety of plants including *Acacia greggii, Asclepias, Bebbia juncea, Centaurea, Cercidium torreyanum, Cevallia sinuata, Chilopsis linearis, Croton californicus, Dalea schottii, D. spinosa, Eriogonum inflatum, Eriodictyon, Eriophyllum, Hoffmanseggia densiflora, H. falcaria, Larrea tridentata, Lupinus, Palafoxia linearis, Prosopis glandulosa, Solanum elaeagnifolium, S. rostratum, Solidago confinis, Tamarix, Wislizenia refracta.*
Centris caesalpiniae var. *rhodopus* Cockerell, 1897. Ann. and Mag. Nat. Hist. (6) 19: 394. ♀, ♂.
Centris rhodopus var. *pulchrior* Cockerell, 1900. Canad. Ent. 32: 363. ♂.
Centris rhodoleuca Cockerell, 1923. Calif. Acad. Sci., Proc. (4) 12: 75. ♂.

Biology: Alcock, Jones and Buchmann, 1976. Kans. Ent. Soc., Jour. 49: 469-471, figs. 1, 2, table 1 (nest architecture, nesting behavior).

zacateca Snelling. Ariz., N. Mex.; Mexico (Chihuahua, Durango, Jalisco and Zacatecas). Pollen: Unknown, but visits flowers of *Baccharis*, *Hoffmanseggia densiflora*, *Melilotus alba*, *Penstemon tenuifolius*.
Centris (*Paracentris*) *zacateca* Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 112: 11. ♀, ♂.

Genus CENTRIS Subgenus ACRITOCENTRIS Snelling

Centris subg. *Acritocentris* Snelling, 1974. Los Angeles Co. Mus., Contrib. Sci. 259: 36.
Type-species: *Centris* (*Melanocentris*) *ruthannae* Snelling. Orig. desig.

ruthannae Snelling. Ariz. Pollen: Unknown, but visits flowers of *Kallstroemia grandiflora*.
Centris (*Melanocentris*) *ruthannae* Snelling, 1966. Los Angeles Co. Mus., Contrib. Sci. 112: 28, fig. 1d and i. ♂, ♀.

Genus CENTRIS Subgenus CENTRIS Fabricius

Centris Fabricius, 1804. Systema Piezatorum, p. 354. Name placed on Official List of Generic Names in Zool. by Internatl. Comn. Zool. Nomencl., Op. 567, 1959.
Type-species: *Apis haemorrhoidalis* Fabricius. Desig. by Internatl. Comn. Zool. Nomencl., Op. 567, 1959.
Hemisia Klug, 1807. Mag. Insektenk. 6: 227.
Type-species: *Apis haemorrhoidalis* Fabricius. Desig. by Cockerell, 1906.

decolorata Lepeletier. Tex. (Cameron Co.); Mexico.
Centris decolorata Lepeletier, 1841. Hist. Nat. Ins., Hym. v. 2, p. 160. ♂.

eiseni Fox. Ariz.; Mexico (Baja California, Morelos, Puebla, Sinaloa, and Sonora).
Centris eiseni Fox, 1894. Calif. Acad. Sci., Proc. 4: 22. ♀.

flavofasciata Friese. Ariz. (Nogales); Mexico (Guerrero, Morelos and Sonora), south to Panama.
Centris flavifrons var. *flavofasciata* Friese, 1899. Termesz. Fuzetek 23: 46. ♂.

versicolor (Fabricius). South. Fla.; widespread in American tropics. Pollen: Polylectic, visits flowers of *Borrichia*, *Byrsonima*, *Carymbola*, *Erigenia*, *Ocimum*, *Securidaca* and *Thrysallis* in the United States.
Apis versicolor Fabricius, 1775. Systema Ent., p. 386.
Centris versicolor vincentana Cockerell, 1938. Entomologist 71: 282. ♀.

Taxonomy: Moure, 1960. Studia Ent. 3: 123-125 (synonymy).

Genus CENTRIS Subgenus HEMISIELLA Moure

Hemisiella Moure, 1945. Rev. de Ent. 16: 407.
Type-species: *Apis lanipes* Fabricius. Orig. desig.

confinis Perez. Ariz. (Patagonia and Tumacacori); Mexico (Chiapas, Guanajuato, Morelos, Puebla). Pollen: Presumably polylectic, is known to collect pollen from flowers of *Parkinsonia aculeata*, but also visits these and other flowers for nectar including *Eysenhardtia polystacha*, *Jacaranda*.
Centris confinis Perez, 1905. Mus. Hist. Nat. Paris, Bul. 11: 40. ♀.

transversa Perez. Ariz. (Superior); Mexico (Puebla and Tehuacan). Pollen: Unknown, but Arizona specimen was taken at flowers of tamarisk.
Centris transversa Perez, 1905. Mus. Hist. Nat. Paris, Bul. 11: 39. ♀, ♂.

Genus CENTRIS Subgenus UNASSIGNED

limbata Friese. Tex.
Centris limbata Friese, 1900. Termes. Fuzetek 23: 44. ♀.

Tribe CTENIOSCHELINI

This is a chiefly Neotropical group of parasitic bees and only the genera *Ericrocis* and *Mesoplia* extend northward into the United States.

Taxonomy: Rozen, 1969. Amer. Mus. Novitates 2382: 1-24, 56 figs. (larva).

Genus ERICROCIS Cresson

Ericrocis Cresson, 1887. Amer. Ent. Soc., Trans. Sup. Vol., pp. 131, 134.
Type-species: *Crocisa? lata* Cresson. Monotypic.

Revision: Linsley, 1939. Ent. Soc. Amer., Ann. 32: 463-468.

arizonensis Baker. South. Calif., Ariz.; Mexico. Host: *Anthophora* spp., *Centris* spp.
Ericrocis arizonensis Baker, 1906. Invertebrata Pacifica, v. 1, p. 143. ♂.
Ericrocis melectoides Baker, 1906. Invertebrata Pacifica, v. 1, p. 144. ♀ (♂ misdet.).

lata (Cresson). Fla. to south. Calif.
Crocisa? lata Cresson, 1878. Amer. Ent. Soc., Trans. 7: 91. ♂.

Genus MESOPLIA Lepeletier

Mesoplia Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 457.
Type-species: *Mesocheira azurea* Lepeletier and Serville. Monotypic.
Melissa Smith, 1854. Cat. Hym. Brit. Mus. 2: 279.
Type-species: *Mesocheira azurea* Lepeletier and Serville. Desig. by Sandhouse, 1943.

dugesi (Cockerell). South. Ariz.; Mexico.
Mesonychium dugesi Cockerell, 1917. Ann. and Mag. Nat. Hist. (8) 19: 477. ♂.

Subfamily XYLOCOPINAE

Although these bees are found throughout much of the world they are especially well represented by numerous species in the tropics. Most of the species are pollen-collecting bees and, unlike most other non-parasitic anthophorids, they usually make their nests in wood of various sorts. The subfamily contains two tribes, the Ceratinini (small carpenter bees) and the Xylocopini (large carpenter bees) both of which are present in America north of Mexico.

Tribe CERATININI

This is a large group of mostly small, almost hairless bees which, except for parasitic species, make their nests in hollow, pithy or rotten stems and sometimes in vines. While there are about a dozen genera of these bees present in the Old World including the cleptoparasitic *Eucondylops*, *Inquilina* and *Nasutapis*, only the nearly worldwide genus *Ceratina* and the endemic Chilean genus *Manuelia* are present in the New World.

Pithitis smaragdula (Fabr.) was intentionally introduced into the United States from Ludhiana, India on April 10, 1969 at Davis, California as a potentially important pollinator of economically useful plants, especially legumes and cucurbits (Daly, Bohart and Thorp, 1971. Ent. Soc. Amer., Ann. 64: 1145-1150). The introduction apparently was unsuccessful since no recoveries of this species have been reported.

Genus CERATINA Latreille

Revision: Daly, 1973. Calif. Univ. Pubs. Ent. 74: 1-113, 31 figs. 2 pls., 3 tables (U. S. spp.).

Taxonomy: Smith, 1907. Amer. Ent. Soc., Trans. 33: 115-124 (N. Amer. spp.). —Sandhouse, 1935. Ent. Soc. Wash., Proc. 37: 93-95 (east. U. S. species). —Michener, 1936. Amer. Mus. Novitates 844: 1-13 (west. U. S. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 500-507, figs. 121-125. —Hirashima, 1971. Faculty Agr., Kyushu Univ., Jour. 16: 349-375, 20 figs. (subgeneric classification).

Biology: Malyshev, 1912. Trav. Soc. Imper. Nat. St. Petersbourg, Compt. Rend. Seances 43: 252-5, 276-7 (natural enemies). —Daly, 1967. Ent. Soc. Amer., Ann. 60: 1273-1282, 7 figs., 1 table (natural enemies).

Genus CERATINA Subgenus CERATINA Latreille

Clavicera Latreille, 1802. Hist. Nat. Fourmis, p. 433. Name suppressed by Internatl. Comn. Zool. Nomencl., Op. 1001, 1973.
Ceratina Latreille, 1802. Hist. Nat. Crust. Ins., v. 3, p. 380. Name placed on Official List of Generic Names in Zool. by Internatl. Comn. Zool. Nomencl., Op. 1001, 1973.

Type-species: *Apis cucurbitina* Rossi. Monotypic. (=*Hylaeus albilabris* Fabricius).

Neoceratina Perkins, 1912. Ann. and Mag. Nat. Hist. (8) 9: 117.
Type-species: *Neoceratina australensis* Perkins. Monotypic.

Ceratinula Moure, 1941. Arq. Mus. Paranaense 1: 78.
Type-species: *Ceratina lucidula* Smith. Orig. desig.

Taxonomy: Michener, 1965. Amer. Mus. Nat. Hist., Bul. 130: 220-221 (synonymy).

arizonensis Cockerell. Tex. to Calif.; Mexico; inadvertently and successfully introduced into the Hawaiian Islands (Oahu). Pollen: Polylectic, visits a wide variety of flowers including *Antirrhinum nutallianum, Asclepias, Baccharis sarothroides, Baeria chrysostoma, Brassica, Calochortus venustus, Ceanothus crassifolius, Chaenactis, Chorizanthe parryi, Cirsium, Clarkia, Cleomella obtusifolia, Condalia, Cressa, Croton californicus, Cryptantha flaccida, C. intermedia, C. muricata, Encelia farinosa, Ericameria parishii, Eriogonum fasciculatum, E. f.* var. *foliolosum, E. gracile, Eriophyllum confertiflorum, E. lanosum, Euphorbia albomarginata, E. palmeri, E. pediculifera, Larrea tridentata, Lotus glaber, Lycium fremontii, Malacothrix californica, Mesembryanthemum, Nolina microcarpa, Phacelia distans, P. douglasii, Prosopis juliflora, Rhus, Salix lasiolepis, Salvia mellifera, Senecio californicus, Solanum elaeagnifolium, Sphaeralcea laxa, Tamarix gallica.*

Ceratina arizonensis Cockerell, 1898. Canad. Ent. 30: 238. ♂.

Ceratina arizonensis vanduzeei Cockerell, 1924. Calif. Acad. Sci. (4) 12: 543. ♀.

cockerelli Smith. S. C., Ga. and Fla., west to Tex. Pollen: Apparently polylectic, visits a wide variety of flowers including *Agastache breviflora, Bidens, Callirhoe involucrata, Citrullus vulgaris, Erigeron quercifolius, Euphorbia, Gaillardia, Heterotheca, Lippia, Lupinus, Marilaunidium origanifolium, Melilotus alba, Monarda citriodora, Phacelia patuliflora, Polygala, Rubus, Sabatia campestris, Sida heterophylla, Stachys floridana.*

Ceratina lunata Smith, 1907. Amer. Ent. Soc., Trans. 33: 119. ♂, ♀. Preocc.

Ceratina cockerelli Smith, 1907. Canad. Ent. 39: 260. N. name.

Genus CERATINA Subgenus ZADONTOMERUS Ashmead

Zadontomerus Ashmead, 1899. Amer. Ent. Soc., Trans. 26: 69.
Type-species: *Ceratina tejonensis* Cresson. Monotypic and orig. desig.

Zaodontomerus Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 406. Emend.

Species Group Dupla

calcarata Robertson. Que. to Ga., west to Man., south to Tex. Ecology: Nests in borings in sumac pith. Parasite: *Aprostocetus americanus* Ashm., *Axima zabriskiei* Howard, *Coelopencyrtus hylaei* Burks, *Grotea anguina* Cress., *Omalus iridescens* (Nort.)?, *Parasierola* sp., *Rhydinofoenus tarsatorius* (Say). Pollen: Polylectic, visits a wide variety of flowers including *Aesculus glabra sargentii, Alliaria officinalis, Amelanchier canadensis arborea, Amorpha fruticosa, Amphiachyris dracunculoides, Antennaria, Apocynum, Arabis, Aruncus, Aster azureus, A. laevis, A. macrophyllus, A. paniculatus, A. saggitifolius, Barbarea vulgaris, Bicuculla cucullaria, Blephilia, Brassica, Cacalia, Callirhoe digitata, Caltha palustris, Camassia, Capsella bursa-pastoris, Cardamine, Ceanothus ovatus, Celastrus scandens, Cercis, Chionanthus virginicus, Chrysanthemum leucanthemum, Chrysopsis, Cirsium, Claytonia caroliniana virginica, Collinsia, Convolvulus sepium, Crataegus, Cypripedium, Dentaria diphylla, Deutzia gracilis, Dirca, Echium vulgare, Ellisia, Erigenia, Erigeron canadensis, E. philadelphicus, E. pulchellus, E. ramosus, Erythronium, Eulophus, Eupatorium ageratoides, Euphorbia marginata, Forsythia, Fragaria virginiana, Geranium maculatum, Geum, Gillenia Grossularia, Haplopappus, Helenium, Helianthus, Hepatica, Heterotheca, Hydrangea paniculata, Ilex, Inula helenium, Isopyrum, Kolkwitzia amabilis, Lepargyrea canadensis, Lepidium, Lonicera siberica, L. tatarica, Maculara pomifera, Malus, Malva rotundifolia, Melilotus alba, M. officinalis, Osmorrhiza, Oxalis europaea, Polemonium, Potentilla recta, Prunus americana, P. gracilis, P. persica, P. serotina, P. tomentosa, Pulsatilla hirsutissima, Pyracantha, Pyrus ioensis, Ranunculus, Rhus aromatica, R. canadensis, R. glabra, Ribes*

missouriense, Robinia pseudacacia, Rubus, Rudbeckia, Salix discolor, S. nigra, Salvia, Sambucus, Sanguinaria, Scilla campanulata, Senecio aureus, Smillacina, Solidago canadensis, S. rigida, S. ruprestis, Spiraea vanhouttei, Taenidia, Taraxacum officinale, T. taraxacum, Tussilago farfara, Vaccinium, Verbena, Viburnum molle, Viola papilionacea, Waldsteinia, Zanthoxylum, Zizia aurea.

Ceratina calcarata Robertson, 1900. Acad. Sci. St. Louis, Trans. 10: 54. ♂.

Biology: Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 184. —Rau, 1928. Ent. Soc. Amer., Ann. 21: 380 (nest, parasite). —Krombein, 1960. Ent. News 71: 68 (nest, parasite).

dupla Say. Que. to Fla., west to Man., south to Tex., La. and Miss. Parasite: *Aprostocetus americanus* Ashm., *Axima zabriskiei* Howard, *Diomorus zabriskiei* Cress., *Grotea anguina* Cress., *Habritys latrus* Wallace, *Hoplocryptus gracilis* (Prov.), *Merisus* sp. Pollen: Polylectic, visits a wide variety of flowers including *Aesculus glabra sargentii, Amelanchier canadensis, Ammannia, Amorpha, Anemonella, Antennaria plantaginifolia, Anthemis cotula, Arctium, Arabis, Aruncus, Asclepias, Aster paniculatus Barbarea vulgaris, Benzoin aestivale, Bidens mitis, B. pilosa, Blephilia, Brassica, Brauneria, Cacalia, Camassia, Capsella bursa-pastoris, Cardamine, Ceanothus, Cephalanthus occidentalis, Cerastrium, Chrysanthemum leucanthemum, Chrysopsis, Circaea, Cirsium, Claytonia caroliniana, Collinsia, Convolvulus, Coreopsis, Cornus, Crataegus punctata, Cryptotaenia, Cypripedium, Daucus carota, Delphinium, Dentaria diphylla, D. laciniata, Dianthera, Diospyros, Dirca, Ellisia, Emilia coccinae, Erigenia, Erigeron annuus, E. canadensis, E. philadelphicus, E. quercifolius, Eryngium, Erythronium, Eupatorium, Flaveria linearis, Fragaria virginiana, Galactia, Geranium maculatum, Gerardia, Gillenia, Hedeoma, Helenium, Helianthus, Heliopsis, Heracleum, Houstonia, Hydrangea paniculata, Hydrophyllum, Hypoxis, Isopyrum, Krigia, Lactuca, Leonurus, Lepidium, Liatris, Lithospermum, Lobelia, Lycopus, Lythrum, Malus, Marrubium, Medicago lupulina, Melilotus alba, M. officinalis, Monarda, Nelumbo, Nepeta, Oenothera, Opuntia, Oxalis, Pastinaca, Penstemon, Petalostemon, Phacelia covillei, Phyrma, Poinciana, Polemonium, Polygonatum, Polygonium, Potentilla recta, Prunus americana, P. serotina, Prunella, Psoralea, Ptelea, Pulsatilla, Pycnanthemum, Ranunculus, Rhannus, Rhus, Rosa, Rubus, Rudbeckia, Sabatia, Sagittaria, Salix discolor, S. sericea, Salvia lyrata, S. pratensis, Sambucus, Scrophularia, Scutellaria, Senecio plattensis, Sida, Silphium, Sinapis, Smilax, Solidago, Specularia, Spiraea, Stachys floridana, Stellaria, Stokesia laevis, Taraxacum dens-leonis, T. officinale, Teucrium, Tradescantia, Trifolium, Triosteum, Tussilago farfara, Vaccinium corymbosum, Verbena, Verbesina, Vernonia, Veronica, Viburnum, Viola rafinesquii, Waldsteinia, Zizia aurea.* Predator: *Atomosia puella* (Wied.).

Ceratina dupla Say, 1837. Boston Jour. Nat. Hist. 1: 397. ♀ (♂ misdet.).

Halictus Ontariensis Provancher, 1882. Nat. Canad. 13: 203. ♂.

Ceratina dupla var. *halophila* Cockerell, 1911. Canad. Ent. 43: 390. ♀.

Ceratina dupla floridana Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 505. ♂, ♀.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1063, figs. 173-179 (larva).

Biology: Angus, 1869. Amer. Nat. 2: 49. —Ashmead, 1894. Psyche 7: 25. —Comstock and Comstock, 1895. Manual for Study of Insects, p. 669. —Packard, 1897. N. Y. Ent. Soc., Jour. 5: 112. —Graenicher, 1905. Ent. News 16: 43. —Graenicher, 1905. Wis. Nat. Hist. Soc., Bul. 3: 158. —Hicks, 1926. Colo. Univ., Studies 15: 250.

strenua Smith. N. Y. to Ga., west to Wis., Mo., Kans., Okla. and Tex. Parasite: *Axima zabriskiei* Howard, *Grotea anguina* Cress. Pollen: Polylectic, visits a wide variety of flowers including *Amorpha fruticosa, Arctium minus, Asclepias tuberosa, Aster, Brauneria purpurea, Callirhoe digitata, Ceanothus ovatus, Cercis canadensis, Chrysanthemum, Chrysopsis, Claytonia virginica, Coreopsis grandiflora, Crataegus, Daucus carota, Erigeron philadelphicus, Euphorbia, Fragaria virginiana, Geranium maculatum, Helenium, Helianthus, Heterotheca, Hydrangea arborescens, Kolkwitzia amabilis, Leucanthemum, Marrubium vulgare, Melilotus albus, M. officinalis, Oenothera, Oxalis, Phacelia, Potentilla pumila, P. canadensis, Prunus, Psoralea floribunda, Ptelea trifoliata, Pyracantha, Rhus aromatica, R. canadensis, R. glabra,*

Robinia pseudoacacia, Rubus nigrobaccus, Salix nigra, Senecio, Silphium laciniatum, Solidago, Taraxacum dens-leonis, Vaccinium, Verbena urticifolia, Vernonia baldwinii, Viola sororia, Vitex agnus-castus, Waldsteinia, Zizia aurea.

Ceratina strenua Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 97. ♂.

Ceratina metallica Smith, 1907. Amer. Ent. Soc., Trans. 33: 121. ♂.

Biology: Krombein, 1960. Ent. News 71: 68 (nest). —Gordh and Barrows, 1976. Kans. Ent. Soc., Jour. 49: 344-345, 1 fig. (phoresitized female, as *metallica*).

texana Daly. Tex. Pollen: Presumably polylectic, visits flowers of *Agastache breviflora, Callirhoe involucrata, Lippia, Monarda citriodora, Opuntia, Phacelia patuliflora, Rubus.*

Ceratina texana Daly, 1973. Calif. Univ. Pubs. Ent. 74: 100, figs. 9c, 13l, 26, 28i. ♀, ♂.

Species Group Nanula

apacheorum Daly. N. Mex., Ariz., Calif. and Nev. Pollen: Apparently polylectic, visits a wide variety of flowers including *Acacia greggii, Aster, Baccharis glutinosa, B. sarothroides, Baileya multiradiata, Cassia leptocarpa, Cercidium floridum, Chaenactis stevioides, Chilopsis linearis, Condalia lycioides, Croton, Cryptantha intermedia, Encelia farinosa, Eriodictyon crassifolium, Gutierrezia lucida, Haplopappus cooperi, Heliotropium curassavicum, Heterotheca, Larrea tridentata, Medicago sativa, Melilotus, Mimosa biunciflora, Opuntia, Penstemon centranthifolius, P. parryi, Prosopis juliflora, Rhamnus crocea, Salix, Senecio monoensis, Sphaeralcea emoryi, S. laxa, S. pedata, Tamarix gallica, Verbesina, Wislizenia refracta.*

Ceratina apacheorum Daly, 1973. Calif. Univ. Pubs. Ent. 74: 36, figs. 13i, 25, 28d, 30b. ♀, ♂.

Biology: Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 46 (floral ecology).

hurdi Daly. Calif. (Jamesburg and Pinnacles Natl. Mon.).

Ceratina hurdi Daly, 1973. Calif. Univ. Pubs. Ent. 74: 53, figs. 13d, 28c, 30a, 31c, 31i. ♀, ♂.

nanula Cockerell. B. C. to Calif., Idaho, Mont., south to Ariz. and N. Mex.; Mexico (northern). Parasite: *Aprostocetus americanus* Ashm., *Coelopencyrtus hyleoleter* Burks?, *Eurytoma apiculae* Bugbee, *Grotea californica* Cress. Pollen: Polylectic, visits a wide variety of flowers including *Achillea borealis arenicola, Allium acuminatum, Aphyllon multiflorum, Aragallus lambertii, Arctostaphylos, Argemone platyceras, Asclepias fascicularis, A. tuberosa, Aster adscendens, Astragalus goniatus, Baccharis glutinosa, B. pilularis, B. sarothroides, Berberis, Besseya plantagenea, Brassica, Calochortus lutea, C. paludicola, Camissonia clavaeformis, Ceanothus, Centarium davyi, Centaurea melitensis, Chrysopsis, Chrysothamnus nauseosus speciosus, C. viscidiflorus, C. v. typicus, Chorizanthe cuspidata, C. staticoides, Cirsium arvense, C. vulgare, Clarkia amoena huntiana, C. biloba, C. rubicunda, Cleome lutea, C. serrulata, Collinsia heterophylla, Convolvulus occidentalis, Corethrogyne virgata, Cowania stansburyana, Cryptantha intermedia, Dalea greggii, Descuraina sophia, Diplaucus auriantiacus, Encelia californica, E. farinosa, Epilobium, Erigeron argentatus, E. divergens, E. foliosus, E. inornatus, E. miser, E. stenophyllus, E. strigosus, Eriodictyon californicus, Eriogonum fasciculatum, E. heermannii, E. nudum, E. vimineum, Eriophyllum confertiflorum, Eschscholzia californica, Euphorbia albomarginata, Gilia altissima, G. exilis, Gnaphalium californicum, Grindelia camporum, G. latifolia, Helenium puberulum, Helianthella californica, Helianthus petiolaris, Heliotropium curassavicum, Hesperochiron californicus, Heterotheca grandiflora, Hieracium albiflorum, Hulsea callicarpha, Iris, Kerria japonica, Lasthenia chrysostoma, Lepechinia calycina, Linanthus aureus, Lomatium dissectum, Lotus nevadensis, L. scoparius, L. strigosus* var. *hirtellus, Lupinus arboreus, Malacothrix saxatilis, Melilotus alba, M. officinalis, Mentzelia laevicaulis, Mimulus guttatus, Monardella villosa, Montia perfoliata, Navarretia heterodoxa, Nemophila integrifolia, Oenothera ovata, Opuntia basalaris, Penstemon centranthifolius, P. floridus, P. grinnellii, Phacelia congesta, P. distans, P. fremontii, P. minor, P. ramosissima, Physaria, Plantago lanceolata, Plectritis ciliosa, Prunus subcordata, Ranunculus californicus, Rhamnus crocea, Salix, Salvia mellifera, Sapindus saponaria, Scrophularia californica, Senecio longilobus, Solidago,*

Sphaeralcea ambigua, Stephanomeria cichoriacea, S. virgata, Thelypodium linearifolium, Trichostema, Trifolium microcephalum, Verbena lasiostachys, V. prostrata, Viola nuttallii, Wedelia incarnata, Wyethia.

Ceratina nanula Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 352. ♂.

Ceratina nanula rigdenae Michener, 1936. Amer. Mus. Novitates 844: 3. ♀, ♂.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 251 (nest).

shinnersi Daly. Tex. Pollen: Apparently polylectic, visits flowers of *Amblyolepis setigera, Amphiachyris, Argemone intermedia, A. mexicana, Aster exilis, Astragalus, Callirhoe involucrata, Cercis canadensis, Chamaesaracha conioides, Chrysanthemum maximum, Chrysopsis pilosa, Citrullis vulgaris, Coreopsis, Croptilon divaricatum* var. *divaricatum, Cucumis melo, Erigeron strigosus, Eupatorium serotinum, Helianthus annuus, Heterotheca subaxillaris, Leucophyllum frutescens, Marilaunidium organifolium, Marrubium vulgare, Melilotus alba, Mentha spicata, Monarda, Neomphila phacelioides, Opuntia Macrorhiza, Phacelia, Phyla incisa, Prosopis glandulosa, Pyrrhopappus geiseri, Rubus trivialis, Salix, Scutellaria, Sophora affinis, Sphaeralcea angustifolia, Tamarix gallica, Tetragonotheca ludoviciana, Tetraneurus linearifolia, T. scaposa, Verbesina encelioides, Vicia ludoviciana, Vitex agnus-castus.*

Ceratina shinnersi Daly, 1973. Calif. Univ. Pubs. Ent. 74: 90, figs. 13f, 21, 22m-N, 28b. ♀, ♂.

Species Group Pacifica

pacifica Smith. B. C. to Calif., Idaho and Wyo., south to Ariz. Parasite: *Aprostocetus americanus* Ashm.?, *Rhydinofoenus kaweahensis* Bradley. Pollen: Apparently polylectic, visits flowers of *Agave nevadensis, Arctostaphylos, Asclepias, Aster andersonii, Balsamorhiza sagittaria, Calochortus luteus, C. macrocarpus, C. nuttallii, Ceanothus fendleri, Centaurea melitensis, Chaenactis, Chrysothamnus, Cirsium arvense, C. vulgare, Convolvulus occidentalis, Clematis linguisticifolia, Cleome lutea, Corethrogyne, Cryptantha intermedia, C. lepida, C. racemosa, Encelia farinosa, Erigeron Eriodictyon trichocalyx* var. *lanatum, Eriogonum heermannii, Grindelia camporum, G. squarrosa, Haplopappus linearifolius, Helianthus annuus, H. petiolaris, Lomatium dissectum, Malacothrix tenuifolia, Navarretia heterodoxa, Medicago sativa, Mentzelia, Opuntia basilaris, Penstemon leonardi, Phacelia linearis, P. tanacetifolia, Rubus leucodermis, Senecio, Sisymbrium altissimum, Solidago petradoria, Sphaeralcea ambiguua, S. angustifolia, Stanleya pinnata, Stephanomeria virgata, Trifolium, Verbena lasiostachys, Viguiera nevadensis, Wyethia glabra.*

Ceratina pacifica Smith, 1907. Amer. Ent. Soc., Trans. 33: 123. ♀.

Ceratina subpunctigena Michener, 1936. Amer. Mus. Novitates 844: 6. ♀, ♂.

Ceratina utahensis Michener, 1936. Amer. Mus. Novitates 844: 7. ♀.

punctigena Cockerell. Calif. Parasite: *Aprostocetus americanus* Ashm.?, *Coelopencyrtus hyleoleter* Burks, *Eurytoma apiculae* Bugbee, *Grotea californica* Cress. Pollen: Apparently polylectic, visits flowers of *Agoseris glauca, Aplopappus parishii, Arctostaphylos patula, Asclepias erosa, Calendula, Calochortus, Ceanothus, Chaenactis, Cirsium californicum, Clarkia dudleyana, Convolvulus occidentalis, Coreopsis lanceolata, Corethrogyne virgata, Croton californicus, Cryptantha intermedia, Cucurbita, Encelia farinosa, Eriodictyon trichocalyx* var. *lanatum, Eriophyllum tridactylum, Gilia, Hazardia squarrosa, Helianthus gracilentus, H. occidentalis, Hulsea callicarpha, Malacothrix saxatilis, M. s. tenuifolia, Penstemon incertus, P. spectabilis, Phacelia, Rhus trilobata, Salvia mellifera, Scrophularia californica, Senecio douglasii, Sphaeralcea, Stenotopsis linearifolius, Stephanomeria virgata.* Predator: *Oxyopes scalaris* Hentz.

Ceratina neomexicana punctigena Cockerell, 1916. Pomona Jour. Ent. Zool. 8: 62. ♀.

Taxonomy: Michener, 1936. Amer. Mus. Novitates 844: 5. ♀, ♂.

Biology: Linsley, MacSwain and Raven, 1963. Calif. Univ. Pubs. Ent. 33: 47 (floral relationships). —Bugbee, 1966. Pan-Pacific Ent. 42: 211 (natural enemies).

Species Group Tejonensis

micheneri Daly. Calif., Oreg. Pollen: Apparently polylectic, visits flowers of *Brassica campestris, Clarkia amoena, Convolvulus occidentalis, Corethrogyne, Cryptantha intermedia, Encelia californica, Grindelia robusta, Helianthus, Hypochoeris radicata, Potentilla, Rosmarinus officinalis, Salvia stachyoidea, Vaccinium ovatum.*
Ceratina micheneri Daly, 1973. Calif. Univ. Pubs. Ent. 74: 59, figs. 6a, 8a, 9g, 11a, 11i, 12h, 20a, 29f. ♀, ♂.

tejonensis Cresson. Calif., Oreg. Parasite: *Grotea californica* Cress. Pollen: Apparently polylectic, visits flowers of *Amsinckia, Arctostaphylos drupacea, Barbarea orthoceras, Brassica, Brodiaea coronaria, B. grandiflora, B. laxa, Ceanothus crassifolius, Cirsium, Clarkia rhomboidea, Convolvulus occidentalis, Cucurbita, Diplacus aurantiacus, Epigonia, Eriodictyon, Helianthus gracilentus, Lepechinia calycina, Oenothera hookeri, Paeonia brownii, Penstemon grinnellii, Phacelia distans, Prunus amygdalus, Rubus ursinus, Salix, Salvia mellifera, Scrophularia californica.*
Ceratina tejonensis Cresson, 1864. Ent. Soc. Phila., Proc. 2: 390. ♂.
Ceratina gigantea Smith, 1907. Amer. Ent. Soc., Trans. 33: 123. ♀.

Species Group Unassigned

acantha Provancher. B. C. to Calif., Idaho, Nev. and Utah; Mexico (Baja California). Parasite: *Aprostocetus americanus* Ashm., *Coelopencyrtus hyleoleter* Burks, *Grotea californica* Cress. Pollen: Polylectic, visits a great variety of flowers including *Achillea millefolium, Ageratum, Allium dichamydium, Anaphalis, Anthemis cotula, Anthriscus scandicina, Aralia californica, Arctostaphylos, Asclepias mexicana, Aster yosemitanus, Astragalus bolanderi, Baccharis douglasii, B. pilularis, Barbaraea orthoceras, Bidens, Brassica adpressa, B. alba, B. campestris, B. geniculata, B. nigra, Brodiaea, Calochortus albus, C. luteus, Canna, Carduus tenuifolius, Ceanothus crassifolius, C. parvifolius, C. soredatus, Centaurea melitensis, C. solstitialis, Centaurium davyi, Chaenactis glabriuscula, Chaemabatia foliolosa, Chrysanthemum maximum, Chrysothamnus, Cicuta douglasii, Cirsium arvense, C. lanceolatum, C. vulgare, Clarkia amoena huntiana, C. rhomboidea, C. rubicunda, Claytonia, Clematis, Collinsia heterophylla, Convolvulus arvensis, C. occidentalis, Coreopsis maritima, Corethrogyne virgata, Cosmos, Cotoneaster, Cotula, Crepis vesicaria taraxacifolia, C. virens, Croton californicus, Cryptantha flaccida, C. intermedia, Daucus carota, Deinandra fasciculata, Diplacus auriantiacus, D. longiflorus, Dudleya, Echium giganteum, Encelia californica, Epilobium, Erigeron stenophyllus, Eriogonum fasciculatum, E. latifolium nudum, E. vimineum, Eriodictyon californicum, Eriophyllum confertiflorum, E. lanatum, E. multicaule, E. staechadifolium, Eryngium aristatulum, Eschscholzia californicum, Foeniculum vulgare, Fragaria californica, Gaillardia, Galium, Geranium dissectum, G. molle, Gilia achilleaefolia, G. capitata, G. multicaulis, Glycyrrhiza lepidota, Gnaphalium californicum, Grindelia camporum, G. robusta latifolia, Haplopappus palmeri, Helenium bigelovii, H. puberulum, Helianthus gracilentus, Heliotropium curassavicum, Hemizonia fasciculata, Heracleum lanatum, Heteromeles arbutifolia, Heterotheca grandiflora, Holodiscus discolor, Hypericum, Hypochoeris radiata, Lactuca, Lasthenia chrysostoma, L. gracilis, Layia platyglossa, Lepechinia calycina, Lepidium, Linanthus parviflorus, Lomatium dissectum, Lonicera hispidula, Lotus corniculatus, L. glaber, L. scoparius Madia, Malacothamnus arcuatus, Malacothrix saxatilis, Malvastrum fasciculatum, M. thurberi, Marrubium vulgare, Melilotus alba, Mentha spicata, Mesembryanthemum crystallinum, Micrampelis, Monardella lanceolata, M. villosa, Montia perfoliata, Myosotis laxa, Nasturtium, Navarretia heterodoxa Nemophila exilis, N. heterophylla, Oenothera cheiranthifolia, Onkerria japonica, Opuntia, Paeonia brownii, Penstemon spectabilis, Perideridia gairdneri, Phacelia distans, Physocarpus capitatus, Plagiobothrys nothofulvus, Polygonum auberti, Potentilla, Prunella vulgaris, Prunus ilicifolia, P. subcordata, Radicula nasturtium-aquaticum, Ranunculus californicus, Rhamnus californica, Ribes, Rosa, Rubus parviflorus, R. ursinus, Salix argophylla, S. lasiolepis, Salvia leucophylla, S. mellifera, Sambucus mexicana, Satureja douglasii, Scrophularia californica, Sedum, Senecio platylobus, Sidalcea malvaeflora, Silybum marianum,*

Sisymbrium altissimum, Sisyrinchium, Solidago, Sonchus arvensis, Sphacele calycina, Spiraea sorbifolia, Stachys bullata, Stellaria media, Stephanomeria virgata, Syringa, Taraxacum vulgare, Trifolium involucratum, T. microcephalum, Venegasia carpesioides, Verbena lasiostachys, V. prostrata, Vicia villosa, Vitis, Wyethia amplexicaulis glabra. Predator: *Cymatodera ovipennis* Say.

Ceratina acantha Provancher, 1895. Nat. Canad. 22: 190. ♀.

Ceratina submaritima Cockerell, 1897. Acad. Nat. Sci. Phila., Proc. 49: 352. ♂, ♀.

Ceratina submaritima ehrhorni Cockerell, 1903. Ann. and Mag. Nat. Hist. (7) 12: 453. ♂.

Biology: MacSwain, 1945. Pan-Pacific Ent. 21: 97 (natural enemies). —Daly, 1966. Ent. Soc. Amer., Ann. 59: 1138 (nest).

diodonta Smith. Tex. Pollen: Unknown, but visits flowers of *Agastache breviflora, Lippia, Monarda citriodora.*

Ceratina diodonta Smith, 1907. Amer. Ent. Soc., Trans. 33: 121. ♂, ♀.

melanoptera Cockerell. Ariz., N. Mex., Tex. (El Paso); Mexico (Sonora). Pollen: Unknown, but visits flowers of *Argemone, Cassia leptocarpa, Dalea greggii, Encelia farinosa, Eriogonum, Haplopappus gracilis, Proboscidea parviflora, Salix taxifolia, Wedelia incarnata.*

Ceratina melanoptera Cockerell, 1924. Calif. Acad. Sci., Proc. (4) 12: 543. ♂, ♀.

neomexicana Cockerell. Idaho south to Calif., Nev., Ariz., N. Mex. and Tex. Pollen: Polylectic, visits a wide variety of flowers including *Agave, Amorpha fruticosa, Anemone intermedia, Aquilegia, Artemisia, Aster, Astragalus goniatus, Berberis trifoliata, Carduus Ceanothus, Chaenactis glabriuscula, Chrysopsis, Chrysothamnus nauseosus, Erigeron canus, E. inornatus, Gilia calcarea, Grindelia perennis, Haplopappus bloomeri angustatus, Helianthus petiolaris, Iris, Ligustrum vulgare, Malva cockerelli, Melilotus officinalis, Monarda, Nothocalais cuspidata, Oenothera, Opuntia erinacea, Penstemon gracilis, Phacelia, Physaria, Platycodon grandiflorum, Potentilla, Prunus, Pulsatilla hirsutissima, Rubus, Salix bebbiana, Senecio longilobus, Silphium, Solidago, Taraxacum officinale, Tetraneuris, Viola nuttallii.*

Ceratina neomexicana Cockerell, 1901. Ent. News 12: 43. ♀.

Taxonomy: Cockerell, 1906. Canad. Ent. 38: 165. ♂.

Biology: Hicks, 1926. Colo. Univ., Studies 15: 251 (nest).

sequoiae Michener. Wash., Idaho, Oreg. and Calif. Parasite: *Aprostocetus americanus* Ashm. Pollen: Oligolectic, obtains pollen from flowers of the genus *Clarkia* including *C. biloba, C. b. australis, C. cylindrica, C. dudleyana, C. gracilis albicaulis, C. purpurea, C. rhomboidea, C. unguiculata, C. williamsonii, C. xantiana, C. viminea,* but also visits other flowers for nectar such as *Amsinckia, Asclepias mexicana, Cryptantha, Epilobium, Eriogonum, Gilia tricolor, Hesperochiron, Layia platyglossa, Lepechina calycina, Lessingia leptoclada, Lotus glaber, Madia, Mimulus, Nemophila, Oenothera, Penstemon, Phacelia, Ranunculus, Salvia, Sambucus, Scrophularia californica, Senecio, Stachys ajugoides, Trichostema laxum, Verbena lasiostachys.* Predator: *Apiomerus crassipes* (Fabr.).

Ceratina sequoiae Michener, 1936. Amer. Mus. Novitates 844: 1. ♀.

Biology: MacSwain, Raven and Thorp, 1973. Calif. Univ. Pubs. Ent. 70: 34-37 (floral relationships).

timberlakei Daly. Oreg., Calif. Pollen: Apparently polylectic, visits flowers of *Arctostaphylos, Asclepias mexicana, Calochortus luteus, Clarkia, Cucurbita, Eriodictyon californicum, Gilia capitata, Haplopappus arborescens, Lotus glaber, Prunus subcordata, Salvia, Senecio douglasii, Sidalcea calycosa.*

Ceratina timberlakei Daly, 1973. Calif. Univ. Pubs. Ent. 74: 102, figs. 7c, 10i, 12a, 27a, 28e, 31f, pl. 1. ♀, ♂.

Genus CERATINA Subgenus EUCERATINA Hirashima, Moure and Daly

Ceratina subg. *Euceratina* Hirashima, Moure and Daly, *In* Hirashima, 1971. Faculty Agr. Kyushu Univ., Jour. 16: 369.

Type-species: *Apis callosa* Fabricius. Orig. desig.

The majority of the species included in this subgenus occur in Asia and Europe, but a few species are present in northern Africa. The species listed below is adventive, having been inadvertently introduced into California where it is successfully established.

Taxonomy: Hirashima, Moure and Daly, *In* Hirashima, 1971. Faculty Agr. Kyushu Univ., Jour. 16: 369-371, figs. 18-20 (descr., synopsis).

dallatorreana Friese. South. Europe and N. Africa; Calif. Successfully adventive in Calif. (Central Valley). Parasite: *Aprostocetus americanus* Ashm., *Eurytoma apiculae* Bugbee, *Grotea californica* Cress. Pollen: Presumably polylectic, visits flowers of *Centaurea solstitialis*, *Convolvulus arvensis*, *Cucurbita*, *Melilotus officinalis* in Calif.
Ceratina dallatorreana Friese, 1896. Termesz. Fusetek, 19: 38, 50. ♂, ♀.

Biology: Daly, 1966. Ent. Soc. Amer., Ann. 59: 1138-1154, 17 figs., 5 tables (nest, floral records, immature stages, life history).

Tribe XYLOCOPINI

This tribe consists of generally large to very large, robust, pollen-collecting bees which occur on all the continents and many of the islands. Included are three genera, *Lestis* with two species in eastern Australia, *Proxylocopa* with 22 members centered in the more arid parts of the southwestern Palaearctic Region and *Xylocopa* with more than 600 nominal forms, the majority of which are found in the Ethiopian and Neotropical Regions.

Even though most members of this tribe (*Lestis* and *Xylocopa*) construct their nests in a wide variety of usually dead plant materials, one group of species (*Proxylocopa*), insofar as known, make their nests in the ground.

Revision: Hurd and Moure, 1963. Calif. Univ. Pubs. Ent. 29: 1-365, 244 figs., 1 frontispiece (classification, includes biological information).

Genus XYLOCOPA Latreille

Taxonomy: Ackerman, 1916. N. Y. Ent. Soc., Jour. 24: 196-232, 1 pl. (U. S. spp.). —Hurd, 1955. Calif. Ins. Surv. Bul. 4: 35-72, 4 pls., 4 maps (U. S. spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 507-511, figs. 126-127 (eastern U. S. spp.).

Biology: Malyshev, 1931. Ztschr. f. Morph. u. Okol. der Tiere (Abt. A. der Ztschr. f. wiss. Biol.). 23 (3-4): 754-809, 15 figs. (nest, life history). —Hurd, 1958. Ent. Soc. Amer., Ann. 51: 365-375, 5 figs. (nesting habits). —Hurd, 1959. Kansas Ent. Soc., Jour. 32: 53-58, 1 fig. (beefly parasitism).

Morphology: Wille, 1958. Ent. Soc. Amer., Ann. 51: 539-545 (dorsal vessel).

Genus XYLOCOPA Subgenus XYLOCOPA Latreille

Xilocopa Latreille, 1802. Hist. Nat. Fourmis, p. 432. Name suppressed by Internatl. Comn. Zool. Nomencl., Op. 743, 1965.
Xylocopa Latreille, 1802. Hist. Nat. Crust. Ins., v. 3, p. 379. Name placed on Official List of Generic Names in Zool. by Internatl. Comn. Zool. Nomencl., Op. 743, 1965.
Type-species: *Apis violacea* Linnaeus. Desig. by Westwood, 1840.

This subgenus occurs in the western Palaearctic.

Genus XYLOCOPA Subgenus SCHOENHERRIA Lepeletier

Xylocopa subg. *Schoenherria* Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 207.
Type-species: *Xylocopa micans* Lepeletier. Desig. by Sandhouse, 1943.

loripes Smith. Southeast. Ariz.; Mexico south to Honduras. Pollen: Unknown, but visits flowers of *Bouganvillea*, *Crotalaria*.
Xylocopa loripes Smith, 1874. Ent. Soc. London, Trans., p. 298. ♂.
Xylocopa formosa Smith, 1874. Ent. Soc. London, Trans., p. 299. ♀.

micans Lepeletier. Southeast. Va. to Fla., west along Gulf Coast states to Texas; Mexico (Tamaulipas). Ecology: Nests in sound, dead privet. Pollen: Polylectic, visits flowers of *Aesculus*, *Azalea*, *Bidens leucantha*, *Calopogon pulchellus*, *Carduus spinosissimus*,

Cephalanthus, Cercidium, Chaemaecrista brachiata, Cicuta, Crotalaria pumila, Dalbergia ecastophyllum, Galactia, Glycine, Gossypium, Hibiscus, Ilex, Ligustrum, Lythrum alatum, L. lineare, Medicago, Melilotus, Parkinsonia, Passiflora incarnata, Phaseolus, Philibertella clausa, Prosopis, Prunus, Rhus, Richardia, Sabal palmetto, Senecio, Serenoa serrulata, Solanum bahamense, S. wendlandii, Solidago, Stachys, Suriana, Verbena brasiliensis, Vernonia.

?Apis nasuta Christ, 1791. Naturg. Klassif., Nomencl. Ins. Bienen-,Wespen-, Ameisengeschl., v. 8, p. 130.

Xylocopa micans Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 208. ♂.

Xylocopa vidua Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 210. ♀.

Xylocopa purpurea Cresson, 1872. Amer. Ent. Soc., Trans. 4: 284. ♀.

Biology: Hurd, 1958. Ent. Soc. Amer., Ann. 51: 373, fig. 4 (nest).

Morphology: Maidl, 1912. Zool.-bot. Gesell., Verh. 62: 19-26, figs. 1-5 (gynandromorph).

Genus XYLOCOPA Subgenus NOTOXYLOCOPA Hurd

Xylocopa subg. *Notoxylocopa* Hurd, 1956. Amer. Mus. Novitates 1776: 2.
Type-species: *Xylocopa tabaniformis* Smith. Orig. desig.

Revision: O'Brien and Hurd, 1965. Ent. Soc. Amer., Ann. 58: 175-196, 38 figs. (taxonomy, distr., nesting substrates).

tabaniformis androleuca Michener. West. N. Mex. to Utah, Nev., Ariz. and south. Calif.; Mexico (Baja California and Sonora). Ecology: Nests in structural Douglas fir timbers and possibly native juniper. Pollen: Apparently polylectic, visits flowers of *Asclepias, Cucurbita pepo, Larrea tridentata, Oenothera parryi, Parkinsonia aculeata, Penstemon barbatus, Stanleya pinnata.*

Xylocopa orpifex androleuca Michener, 1940. South. Calif. Acad. Sci., Bul. 39: 127. ♂, ♀.

Biology: Hurd, 1958. Ent. Soc. Amer., Ann. 51: 373 (nesting habits). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 47 (floral relationships with *Larrea tridentata*).

tabaniformis orpifex Smith. Oreg., Calif.; Mexico (Baja California). Ecology: Nests in sound, dead, native softwoods including *Alnus rhombifolia, Juniperus, Libocedrus decurrens, Populus, Pseudotsuga menziesii, Sequoia sempervirens, Sequoiadendron gigantea.* Parasite: *Anthrax delila* (Loew.), *A. tigrinus* (DeG.), *Monodontomerus montivagus* Ashm., *Nemognatha scutellaris* Say. Pollen: Polylectic, visits a wide variety of native and introduced flowers including *Althaea rosea, Antirrhinum, Arctostaphylos patula, Asclepias, Brassica, Ceanothus crassifolius, C. integerrimus, Cestrum, Chrysothamnus, Cirsium, Citrus lemon, Clarkia breweri, C. concinna, C. elegans, C. gracilis, C. g. albicaulis, C. mildrediae, C. unguiculata, Cordylanthus nevinii, Cucurbita, Delphinium, Dicentra chrysantha, Diplacus auriantiacus, D. puniceus, Eriastrum virgatum, Eriodictyon californicum, Fremontia, Fuchsia, Haplopappus parishii, Isomeris arborea, Larrea tridentata, Lathyrus odoratus, Lepidospartum squamatum, Lonicera japonica, Lotus scoparius, Lupinus densiflorus, L. grayi, Medicago sativa, Mentzelia laevicaulis, Mimulus cardinalis, Mirabilis, Monardella, Oenothera deltoides, O. hookeri, Penstemon breviflorus, P. bridgesii, P. grinnellii, P. labrosus, Phacelia davidsonii, P. distans, P. heterophylla, P. ternatus, Rhododendron occidentale, Ribes, Rubus, Salvia mellifera, Solanum umbelliferum, Solidago, Stachys albens, S. ajugoides, Thermopsis macrophyllus, Trichostema lanceolatum, Verbascum blattaria, Wistaria, Wyethia.*

Xylocopa orpifex Smith, 1874. Ent. Soc. London, Trans., p. 298. ♀, ♂.

Xylocopa orpifera(!) Dalla Torre, 1896. Cat. Hym., v. 10, p. 216. Lapsus calami.

Xylocopa orpitex(!) Malyshev, 1931. Ztsch. Morph. Okol. Tiere (A) 23: (3-4): 788. Lapsus calami.

Biology: Davidson, 1893. Ent. News 4: 151-153 (nest, life history, parasite). —Nininger, 1916. Pomona Jour. Ent. Zool. 8: 158-165 (life history, parasite). —Hurd, 1959. Kans. Ent. Soc., Jour. 32: 54-56 (beefly parasitism). —Straw, 1956. Amer. Midland Nat. 90: 47-53 (floral relationships with *Penstemon*). —Cruden, 1966. Pan-Pacific Ent. 42: 111-119, 3 figs. (territorial behavior). —Marston, 1970. Smithsn. Contrib. Zool. 43: 116 (beefly parasitism).

tabaniformis parkinsoniae Cockerell. South. Tex.; Mexico. Ecology: Nests in dead cottonwood. Pollen: Unknown, but visits flowers of *Cercidium, Citrus, Parkinsonia aculeata, Verbesina encelioides.* Other subspecies, including typical *tabaniformis*, occur from Mexico to Ecuador.

Xylocopa tabaniformis parkinsoniae Cockerell, 1917. *In* W. P. Cockerell. N. Y. Ent. Soc., Jour. 25: 192. ♀.

Genus XYLOCOPA Subgenus XYLOCOPOIDES Michener

Xylocopa subg. *Xylocopoides* Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 155. Type-species: *Apis virginica* Linnaeus. Orig. desig.

Taxonomy: Hurd, 1961. Amer. Ent. Soc., Trans. 87: 247-257, 2 pls. (synopsis). —Hurd and Moure, 1963. Calif. Univ. Pubs. Ent. 29: 140-142 (revised keys to spp. and subspp.).

californica arizonensis Cresson. Tex. to south. Calif., Nev., and Utah; Mexico. Ecology: Nests in sound, dead, native softwoods including *Agave, Dasylirion, Nolina Yucca,* but will also nest in structural redwood when used for construction within its geographic range. Parasite: *Anthrax xylocopae* Marston. Pollen: Polylectic, visits a wide variety of flowers including those of *Acacia angustissima, A. greggii, Agave nevadensis, Aloysia wrightii, Argemone platyceras, Asclepias subverticillata, Baccharis, Bigelovia, Cercocarpus, Chilopsis linearis, C. saligua, Chrysothamnus nauseosus, Cirsium, Citrus, Cleome, Cryptantha oblata, Cucurbita maxima, C. mixta, C. moschata, C. pepo, Dalea albiflora, Datura meteloides, Delphinium andesicola, Fendlera, Fouquieria splendens, Gaillardia pulchella, Gaura coccinea, Gossypium, Heterotheca subaxillaris, Hyptis emoryi, Kallstroemia grandiflora, Koeberlinia spinosa, Larrea tridentata, Lepidospartum squamatum, Lippia lycioides, Lupinus magnificus, Medicago sativa, Melilotus alba, Nama parryi, Mentzelia pumila, Parkinsonia aculeata, Penstemon, Prosopis glandulosa* var. *torreyanum, Ratibida columnaris, Rhus laurina, R. trilobata, Robinia neomexicana luxurians, Rubus, Salvia lemmoni, Senecio longilobus, S. salignus, Solanum elaeagnifolium, Solidago, Sphaeralcea, Stanleya pinnata, Thurberia, Viguiera longifolia, Wislizenia refracta, W. r.* var. *mamillata, Yucca brevifolia, Y. elata, Y. whipplei.*

Xylocopa arizonensis Cresson, 1879. Amer. Ent. Soc., Trans. 7: 212. ♀, ♂.

Biology: Hurd, 1958. Ent. Soc. Amer., Ann. 51: 369-371 (nest). —Hurd, 1959. Kans. Ent. Soc., Jour. 32: 57-58 (nest, beefly parasitism). —O'Brien and O'Brien, 1966. Pan-Pacific Ent. 42: 27-29 (nest, territoriality). —Marston, 1970. Smithsn. Contrib. Zool. 43: 118 (beefly parasitism). —Hurd and Linsley, 1975. Smithsn. Contr. Zool. 193: 47, fig. 18 (floral relationships).

californica californica Cresson. Oreg. (Cascade Mts.), Calif. (North, Coast Ranges and Sierra Nevada Mts.). Ecology: Nests in sound, dead, native softwoods including *Libocedrus decurrens, Sequoia sempervirens, Sequoiadendron gigantea.* Pollen: Polylectic, visits flowers of *Aesculus californica, Agastache urticifolia, Arctostaphylos, Aesclepias speciosa, Ceanothus integerrimus, Cercis occidentalis, Chrysothamnus, Clarkia dudleyana, C. elegans, C. unguiculata, Epigonia, Epilobium angustifolium, Eriodictyon californicum, Lupinus albifrons, Medicago sativa, Mentha pulegium, Monardella lanceolata, Penstemon breviflorus, P. grinnellii, Phacelia heterophylla, Ranunculus, Solidago occidentalis, Yucca whipplei.*

Xylocopa californica Cresson, 1864. Ent. Soc. Phila., Proc. 3: 40. ♀.

Xylocopa amblardi Perez, 1901. Act. Soc. Linn. Bordeaux 56: 115. ♂.

Xylocopa libocedri Cockerell, 1914. Insecutor Inscitiae Menstruus 2: 101. ♂, ♀.

Biology: Cruden, 1966. Pan-Pacific Ent. 42: 111-119, 3 figs. (nest, territorial and copulatory behavior).

californica diamesa Hurd. Calif. (Centr. and south. coast ranges); Mexico (Baja California). Ecology: Nests in dead floral scapes of *Yucca whipplei.* Pollen: Polylectic, visits flowers of *Arctostaphylos patula, Asclepias mexicana, Apocynum androsaemifolium, Argemone platyceras, Ceanothus, Chrysothamnus bernardinus, C. nauseosus, Cucurbita foetidissima, Dicentra chrysantha, Eriogonum fasciculatum, Fremontia*

californica, Haplopappus linearifolius, H. parishii, Isomeris arborea, Larrea tridentata, Lepidospartum, Ligustrum, Lupinus austromontanus, L. grayi, L. parishii, Penstemon palmeri, Phacelia heterophylla, Salvia, Stachys, Stanleya pinnata, Yucca whipplei.

Xylocopa californica diamesa Hurd, 1954. Pan-Pacific Ent. 30: 202. ♂, ♀.

virginica krombeini Hurd. Southern Fla. Predator: *Horstia virginica* Baker.

Xylocopa (*Xylocopoides*) *virginica krombeini* Hurd, 1961. Amer. Ent. Soc., Trans. 87: 251. ♂, ♀.

Biology: Krombein, 1967. Trap-nesting wasps and bees, pp. 347-348, pl. 20, fig. 101 (nest architecture, life history, predator).

virginica texana Cresson. South. Kans. to Tex. Pollen: Apparently polylectic, visits flowers of *Asclepias, Calyophus serrulata, Cercis canadensis, Eryngium, Passiflora incarnata, Rubus, Salvia pitcheri, Vitex.*

Xylocopa texana Cresson, 1872. Amer. Ent. Soc., Trans. 4: 283. ♂, ♀.

virginica virginica (Linnaeus). New England and adjacent Canada (Great Lakes region), south to centr. Fla., west to Nebr., Kans., Okla. and east. Tex. Ecology: Nests in dead, sound wood of many kinds of trees, including structural timbers. Parasite: *Anthrax tigrinus* (DeG.), *Villa sinuosus* (Wied.). Pollen: Polylectic, visits flowers of a wide variety of both native and introduced plants including *Abelia, Amsonia tabernaemontana, Amygdalus persica, Aquilegia vulgaris, Asclepias incarnata, A. pulchra, A. tomentosa, Azalea, Barbarea barbarea, Bidens, Brauneria, Ceanothus ovatus, Cornus, Cyrilla racemiflora, Diervilla japonica, Diospyros kaki, Eupatorium perfoliatum, Ilex, Lespedeza, Lonicera, flava, L. japonica, Lythrum alatum, Malus, Medicago sativa, Melilotus alba, Mertensia, Monarda, Opuntia, Passiflora incarnata, Pedicularis canadensis, Petalostemon, Petunia, Phlomis tuberosa, Phlox divaricata, Physostegia, Plumbago capensis, Prunus, Rhododendron nudiflorum, Rhus glabra, Robinia pseudoacacia, Rubus, Salvia azurea grandiflora, Sassafras, Solidago canadensis, Stachys, Symphytum officinale, Syringa vulgaris, Trifolium incarnatum, T. pratense, Vaccinium corymbosum, V. vacillans, Verbena, Viburnum molle, Vicia villosa, Wistaria sinensis.* Predator: Woodpeckers and orioles.

Apis Virginica Linnaeus, 1771. Mant. Plant., v. 2, p. 450.
Apis Virginica Drury, 1773. Illust. Nat. Hist. Exotic Ins., v. 1 (index), p. 2.
Apis analis Fabricius, 1775. Systema Ent., p. 384.
Centris carolina Fabricius, 1804. Systema Piezatorum, p. 357. ♂.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1062, figs. 167-172 (larva). —Hurd, 1955. Calif. Ins. Surv., Bul. 4: 50, map 1 (distribution, floral records, nesting substrates). —Moure, 1960. Studia Ent. 3: 160 (synonymy).

Biology: Angus, 1868. Amer. Nat. 1: 157 (parasite). —Walsh, 1868. Amer. Ent. 1: 9, f. 4 (habits, nest). —Packard, 1868. Amer. Nat. 1: 369-371, pl. 10, figs. 3-7 (nest, life history, parasite). —Angus, 1869. Amer. Nat. 2: 48 (parasite). —Angus, 1869. Amer. Nat. 2: 49 (hibernation). —Packard, 1869. Guide to the study of insects, pp. 132-134, pl. 4 (habits). —Campbell, 1873. Nature 8: 253 (predation by Baltimore orioles). —Packard, 1873. Our common insects, p. 21-24 (habits). —Gentry, 1875. Amer. Nat. 9: 264-266 (pollination). —Turner, 1878. Amer. Nat. 12: 627-628 (nest, predation by woodpeckers). —Mann, 1882. Psyche 3: 298 (flower piercing habits). —Murtfeldt, 1882. Psyche 3: 343 (flower piercing habits). —Pammel, 1888. Acad. Sci. St. Louis, Trans. 5: 241-277 (pollination, flower piercing habits). —Howard, 1892. Ent. Soc. Wash., Proc. 2: 331 (hibernation). —Howard, 1902. The insect book. N. Y.: Doubleday, Page and Co., p. 9 (nest). —Ashmead, 1894. Psyche 7: 23 (nesting habits). —Comstock and Comstock, 1895. Manual for Study of Insects, p. 670 (nesting habits). —Adams, 1915. Ill. State Lab. Nat. Hist., Bul. 11: 45, 47, 104, 198-199 (life history). —Burrill, 1925. Science (n. s.) 62 (1597): 134 (flower piercing habits). —Rau, 1926. Acad. Sci. St. Louis, Trans. 25: 162 (life history, parasite). —Rau, 1929. Jour. Compar. Psychol. 9: 37 (homing experimentation). —Rau, 1931. Jour. Compar. Psychol. 12: 257 (homing experimentation). —Rau, 1933. The jungle bees and wasps of Barro Colorado Island. Publ. by Phil Rau, Kirkwood, St. Louis Co., Mo., pp. 225-226, figs. (habits and instincts, life history). —Burrill, 1934. Missouri State Museum, Bul. 11: 3-4 (flower piercing habits). —Weiss and Smith, 1940. U. S. Dept. Agr. Circular 556: 16-19, fig. (flower-spot

disease transmission). —Franklin, 1951. Kans. Agr. Expt. Sta. Tech. Bul. 70: 1-64 (pollination). —Hurd, 1955. Calif. Ins. Surv., Bul. 4: 50 (nesting substrates). —Chandler, 1958. Pest Control 26: 36, 38, 40, 47, 3 figs. (economic damage). —Hurd, 1958. Ent. Soc. Amer., Ann. 51: 368, 373-374, fig. 5 (nesting substrates). —Hurd, 1959. Kans. Ent. Soc., Jour. 32: 56-57 (beefly parasitism). —Balduf, 1961. Brooklyn Ent. Soc., Bul. 56: 81-84 (nest associates). —Balduf, 1962. Ent. Soc. Amer., Ann. 55: 263-271, 3 figs. (life history). —Sabrosky, 1962. Ent. Soc. Wash., Proc. 64: 184 (mating behavior). —Dorr and Martin, 1966. Michigan Quart. Bul. 48: 445 (flower piercing habits). —Krombein, 1967. Trap-nesting wasps and bees, pp. 345-346 (nest architecture, life history). —Marston, 1970. Smithsn. Contrib. Zool. 43: 119 (beefly parasitism). —Gerling and Hermann, 1976. Entomophaga 21: 227-223, 3 figs., 3 tables (beefly parasitism).

Morphology: Milliron, 1958. Brooklyn Ent. Soc., Bul. 53: 66-68 (gynandromorph).

Genus XYLOCOPA Subgenus NEOXYLOCOPA Michener

Xylocopa subg. *Neoxylocopa* Michener, 1954. Amer. Mus. Nat. Hist., Bul. 104: 157. Type-species: *Apis brasilianorum* Linnaeus. Orig. desig.

mexicanorum Cockerell. Tex. to east. Ariz.; Mexico.
Xylocopa mexicanorum Cockerell, 1912. Ann. and Mag. Nat. Hist. (8) 9: 555. ♀.

varipuncta Patton. Ariz, Nev., Calif.; Mexico. Ecology: Nests in rotting or decaying wood. Parasite: ?*Anthrax simson habrosus* Marston. Pollen: Polylectic, visits a wide variety of flowers including *Acacia, Argemone, Asclepias, Astragalus parishii, Brassica campestris, Buddleia, Calliopsis, Ceanothus hookeri, Cercidium Torreyanum, Cucurbita foetidissima, C. maxima, C. mixta, C. moschata, C. pepo, Datura meteloides, Eschscholzia californica, Gossypium, Lantana camara, Larrea tridentata, Lathyrus odoratus, Lonicera japonica, Lupinus paynei, Lycopersicum esculentum, Medicago sativa, Oenothera hookeri, Parkinsonia aculeata, Passiflora, Penstemon antirrhinoides, Prosopis glandulosa* var. *torreyanum, Salvia, Sesbania macrocarpa, Solanum douglasii, S. elaeagnifolium, Sphaeralcea emoryi, Trichostema lanceolatum, Vitex pyramidata, Wislizenia refracta, W. r.* var. *mamillata, Wistaria. X. sonorina* Smith, described from Hawaii, has been regarded by some investigators as a senior synonym.
Xylocopa varipuncta Patton, 1879. Canad. Ent. 11: 60. ♀.

Biology: Nininger, 1916. Pomona Jour. Ent. Zool. 8: 164-165 (nest, life table data). —Hurd, 1958. Ent. Soc. Amer., Ann. 51: 369, fig. 1. —Janzen, 1964. Pan-Pacific Ent. 40: 65-66 (nest). —Marston, 1970. Smithsn. Contrib. Zool. 43: 5 (possible parasite). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 47-48 (intrafloral ecology).

Morphology: Gordh and Gulmahamad, 1975. Ent. Soc. Wash., Proc. 77: 269-273, 8 figs. (gynandromorph).

Genus XYLOCOPA Subgenus STENOXYLOCOPA Hurd and Moure

Xylocopa subg. *Stenoxylocopa* Hurd and Moure, 1960. Ent. Soc. Amer., Ann. 53: 809. Type-species: *Xylocopa artifex* Smith. Orig. desig.

Taxonomy: Hurd and Moure, 1960. Ent. Soc. Amer., Ann. 53: 809-821, 14 figs., 2 tables (synopsis and summary of biological information).

artifex Smith. Mts. of south. Ariz. to Argentina. Ecology: Nests in hollow culms, usually dead, of bamboo and related plants including *Arundo donax, Chusquea bambusoidea, Guadua, Merostachys clausseni.* Pollen: Presumably polylectic, visits in South America flowers of *Baccharis dracunculifolia, Cassia bicapsularis, C. splendida, Crotalaria paulina, Leonurus sibircus, Passiflora, Solanum atropurpureum, S. balbisii, S. paniculatum, Tecoma ipe.*
Xylocopa artifex Smith, 1874. Ent. Soc. London, Trans., p. 289. ♀.
Xylocopa erratica Smith, 1874. Ent. Soc. London, Trans., p. 293. ♂.

Taxonomy: Hurd, 1955. Calif. Ins. Surv., Bul. 4: 62-63 (synonymy, distribution).

Biology: Schrottky, 1902. Rev. Mus. Paulista 5: 468 (floral records). —Schrottky, 1904. Allgem. Ztschr. Ent. 9: 344-349 (nest). —Strand, 1912. Zool. Jahrb. Abt. Syst. 33: 267 (nest). —Bertoni, 1918. An. Cient. Paraguayos (2) 3: 219 (nest). —Moure, 1942. Papeis Avulsos Dept. Zool., Secretaria Agr. Sao Paulo 2: 301 (nest). —Hurd and Moure, 1960. Ent. Soc. Amer., Ann. 53: 819-820 (nest substrates).

Family APIDAE

Species of this family are found throughout much of the world from the high Arctic latitudes to or near the southern limits of the major land masses of the Southern Hemisphere. The family consists of two subfamilies, the Bombinae which includes the orchid bees (Euglossini) and bumblebees (Bombini) and the Apinae which contains the stingless honeybees (Meliponini) and the familiar stinging honeybees (Apini). Some of these bees are of exceptional value to man not only because of their production of honey and other products, but also because they pollinate many agricultural and other plants. Although the family contains some social parasites (e.g., *Aglae*, *Exaerete* and *Psithyrus*) and nest robbers (e.g., *Lestrimelitta*), the pollen-collecting females, unlike those of any other family of bees, transport pollen by means of specialized pollen baskets (corbiculae) located on the hind tibiae. Virtually all stages of social development are exhibited by the family. These include all of the highly eusocial bees (Apinae) which live in perennial colonies as well as the primitively eusocial bumblebees and the solitary and parasocial Euglossini.

In America north of Mexico the family is represented most conspicuously by the introduced European honeybee (*Apis mellifera* Linnaeus) and the many native species of bumblebees. The only other member of this family present in the United States is a species of the Neotropical genus *Eulaema* which was found years ago in the vicinity of Brownsville, Texas. In spite of repeated attempts to introduce various species of meliponine bees into the United States none of these introductions has been successful.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 513-546, figs. 128-134, table 18 (east. U. S. spp.). —Winston and Michener, 1977. Natl. Acad. Sci., U. S. A., Proc. 74: 1135-1137 (phylogeny).

Biology: Michener, 1974. The Social Behavior of Bees, 404 pp., Cambridge, Massachusetts, The Belknap Press of Harvard University Press.

Morphology: Lello, 1976. Kans. Ent. Soc., Jour. 49: 85-99, 22 figs., 3 tables (adnexal glands of the sting apparatus).

Subfamily BOMBINAE

This subfamily contains two tribes, the Euglossini which is found only in the Neotropical Region and the Bombini which, although chiefly Holarctic in occurrence, is represented by a number of species in both the Oriental and Neotropical Regions. Several species of this latter tribe have been successfully introduced into the Australian Region (New Zealand).

Tribe EUGLOSSINI

These bees, which are found only in the Americas (Chihuahua, Sonora, and Texas to Argentina) are centered in the tropics and are most abundant and diverse in the forested regions. The tribe consists of six genera, four of which contain pollen-collecting species (*Eufriesea*, *Euglossa*, *Eulaema*, and *Euplusia*) and two others (*Aglae* and *Exaerete*) whose species are social parasites in the nests of the pollen-collecting Euglossini. Many of the species are large and brillantly metallic while others are clothed with contrasting patterns of black and white or yellow and white pubescence reminiscent of bumblebees. The males of many, if not all, pollen-collecting species, unlike most females, are selectively attracted to the flowers of one or more species of orchids, many of which produce little or no nectar and evidently no food. The attraction of the males to these flowers is not fully understood. It is believed that lek behavior is involved and that the males seek certain substances from these flowers, as well as from other sources, and store these in the organs of their greatly enlarged hind tibiae. It has been suggested that these substances are converted into sex pheromones, possibly species-specific, which are used to attract females responsive to mating. The males of different species visit the flowers of different species of orchids and often dislodge pollinia which adhere to the head, thorax or legs. Thus

transported to other flowers of the same species, the pollinia are readily available to effect pollination. This bee-plant (bee-flower) relationship obviously has important implications relative to the evolution of orchids and these bees.

Taxonomy: Moure, 1950. Dusenia 1: 181-200 (included genera). —Moure, 1963. Rev. Biol. Tropical 11: 211-216 (tax. characters, key to included genera). —Moure, 1967. Atas Simposio Biota Amazonica 5 (Zool.): 395-415 (checklist of included genera and spp.).

Biology: Dodson and Frymire, 1961. Mo. Bot. Garden, Bul. 49: 133-152 (floral relationships). —Dodson and Frymire, 1961. Mo. Bot. Garden, Ann. 48: 137-172 (floral relationships). —Dodson, 1962. Mo. Bot. Garden, Ann. 49: 35-36 (orchid pollination). —Vogel, 1963. Osterr. Bot. Ztschr. 110: 308-337 (orchid pollination). —Bennett, 1965. Ins. Sociaux 12: 81-91 (social behavior). —Pijl and Dodson, 1966. Orchid flowers; their pollination and evolution, 214 pp. (intrafloral relationships). —Vogel, 1966. Osterr. Bot. Ztschr. 113: 302-361 (orchid pollination). —Dodson, 1966. Kans. Ent. Soc., Jour. 39: 607-629 (ethology). —Dressler, 1967. Atas Simposio Biota Amazonica 5 (Zool.): 171-180 (pollination syndrome). —Zucchi and Camargo, 1969. Fac. Sci. Hokkaido Univ., ser. 6, Zool. 17: 271-380, 2 pls., 21 figs., 9 tables (review of biology). —Dodson, 1970. Biochemical Coevolution, Oreg. State Univ. Press, pp. 83-107 (role of chemical attractants in orchid pollination). —Janzen, 1971. Science 171: 203-205 (long distance pollination). —Evoy and Jones, 1971. Anim. Behavior 19: 579-584 (motor patterns evoked in males by floral fragrances). —Bennett, 1972. N. Y. Ent. Soc., Jour. 80: 137-145 (attraction and collection by use of baited McPhail fruitfly traps). —Williams and Dodson, 1972. Evolution 26: 84-95, 4 figs., 5 tables (selective attraction of males to orchid floral fragrances). —Michener, 1974. The Social Behavior of Bees, Chapter 21: 257-260 (natural history of orchid bees). —Dodson, 1975. *In* Gilbert and Raven, Coevolution of plants and animals, pp. 91-99, 2 figs. (coevolution with orchids).

Morphology: Lanham, 1951. Pan-Pacific Ent. 27: 181-182 (jugal brush). —Cruz-Landim, Stort, Costa Cruz and Kitajima, 1965. Rev. Brasil. Biol. 25: 323-342 (tibial organs of males). —Hills, Williams and Dodson, 1968. Amer. Orchid Soc., Bul. 37: 967-971 (identification of odor compounds in orchid fragrances). —Dodson, Dressler, Hills, Adams and Williams, 1969. Science 164: 1243-1249 (chemical substances in orchid fragrances attractive to males).

Genus EULAEMA Lepeletier

Taxonomy: Moure, 1950. Dusenia 1: 181-200 (key to related genera, key to included spp., synonymy and tax., bibliography of included spp.). —Moure, 1960. Studia Ent. 3: 145-147 (Fabrician Types). —Moure, 1967. Atas Simposio Biota Amazonica 5 (Zool): 410-413, fig. 1 (checklist of included spp.).

Genus EULAEMA Subgenus EULAEMA Lepeletier

Eulaema Lepeletier, 1841. Hist. Nat. Ins., Hym., v. 2, p. 11. Name placed on Official List of Generic Names in Zool. by Internatl. Comn. Zool. Nomencl., Op. 567, 1959.
Type-species: *Apis dimidiata* Fabricius. Desig. by Taschenberg, 1883, as validated by Internatl. Comn. Zool. Nomencl., Op. 567, 1959.
Eulaenis(!) Spinola, 1851. *In* Gay, Hist. Fiscia Polit. Chile, Zool., v. 6, p. 167.
Eulema Dalla Torre, 1896. Cat. Hym., v. 10, p. 309. Emend.

This subgenus does not occur in America north of Mexico.

Genus EULAEMA Subgenus APEULAEMA Moure

Eulaema subg. *Apeulaema* Moure, 1950. Dusenia 1: 184.
Type-species: *Centris cingulata* Fabricius. Orig. desig. (=*Eulaema fasciata* Lepeletier).

polychroma (Mocsary). Tex. (Brownsville); Mexico (Sonora) south to Ecuador and Peru.
Euglossa polychroma Mocsary, 1899. Termes. Fuzetek 22: 170. ♂.

Taxonomy: Moure, 1967. Atas Simposio Biota Amazonica 5 (Zool.): 400, 412 (tax. status, geogr. range).

Tribe BOMBINI

The Bombini includes common, large or medium-sized, social bees which are conspicuously marked with yellow and black, and sometimes, in addition, with red, or white hair. While most of the species are pollen-collecting bees, the species of the genus *Psithyrus* live as social parasites in the nests of the genus *Bombus*. Species of this tribe are found in North and South America, Eurasia including Japan and Taiwan, the Philippine Islands, Indonesia east to Java and a few species are successfully adventive in New Zealand.

Revision: Franklin, 1912. Amer. Ent. Soc., Trans. 38: 177-486 (New World spp., first part). —Franklin, 1913. Amer. Ent. Soc., Trans. 39: 73-200, 22 pls. (New World spp., concluding part). —Milliron, 1970. Ent. Soc. Canada, Mem. 65: i-lii (bibliography of New World spp.). —Milliron, 1971. Ent. Soc. Canada, Mem. 82: 1-80, pls. I-XI, 14 figs., 6 maps (Part I: contains information on development of color, distribution, external morphology, hybridization, life histories, phylogeny and classification; treats west. hemisphere spp. of genus *Bombus* and genus *Megabombus* subg. *Bombias*). —Milliron, 1972. Ent. Soc. Canada, Mem. 89: 81-237, pls. XII-XV, maps 7-35 (Part II: treats west. hemisphere spp. of genus *Megabombus* subg. *Megabombus*). —Milliron, 1973. Ent. Soc. Canada, Mem. 91: 239-333, pls. XVI-XX, maps 36-56 (Part III: treats west. hemisphere spp. of genus *Pyrobombus* subg. *Cullumanobombus*).

Taxonomy: Frison, 1919. Ill. Acad. Sci., Trans. 12: 157-165 (Illinois spp.). —Jackson, 1920. Ent. Soc. Wash., Proc. 22: 162-168 (District of Columbia and vicinity). —Lutz and Cockerell, 1920. Amer. Mus. Nat. Hist., Bul. 42: 502-544 (catalog of N. Amer. spp). —Fattig, 1923. Fla. Ent. 7: 25 (Florida spp.). —Neave, 1926. Ent. News 37: 252-254 (Alberta spp.). —Frison, 1927. Amer. Ent. Soc., Trans. 53: 51-78, 2 pls. (systematic relationships of spp. in Amer. north of Mexico). —Scullen, 1927. Pan-Pacific Ent. 4: 69-76, 121-128 (Oregon spp.). —Neave, 1933. Canad. Jour. Res. 8: 62-72 (Manitoba spp.). —Milliron, 1939. Mich. Acad. Sci. Arts and Letters, Papers 24 (2): 168-182 (Michigan spp.). —Chandler, 1950. Indiana Acad. Sci., Proc. 60: 167-177 (Indiana spp.). —Franklin, 1954. Amer. Ent. Soc., Trans. 80: 43-51 (evolution, distribution). —Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 1-163, 31 figs., 18 maps (revision of western N. Amer. spp.). —Milliron, 1961. Kans. Ent. Soc., Jour. 34: 49-61. (generic reclassification). —LaBerge and Webb, 1962. Nebr. Agr. Expt. Sta. Res. Bul. 205: 1-38 (Nebraska spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 513-544, figs. 128-134, table 18 (east. U. S. spp.). —Medler and Carney, 1963. Wis. Agr. Expt. Sta. Res. Bul. 240: 1-47 (Wisconsin spp.). —Pisani, Sakagami, Crestana, Aily and Lorenzetti, 1968. Acad. Sci. Brasil. Cienc. Letras, An. 40: 373-389 (morphometrics). —Faester and Hammer, 1970. Ent. Meddel. 38: 257-302 (cent. and north. European spp.). —Stephen and Koontz, 1973. Melanderia 13: 1-12, 52 figs. (larvae). —Plowright and Stephen, 1973. Canad. Ent. 105: 733-743 (numerical taxonomic analysis of evolutionary relationships). —Stephen and Cheldelin, 1973. Biochem. Systematics 1: 69-76 (phenetic groups based on α-glycerophosphate dehydrogenase).

Biology: Putnam, 1864. Essex Inst. Salem, Proc. 4: 98-105 (habits). —Packard, 1864. Essex Inst. Salem 4: 107-140, pl. 3 (life histories of New England spp., parasites). —Sladen, 1912. The humble-bee, its life history and how to domesticate it, xiii and 283 pp., London, Macmillan. —Frison, 1926. Ent. Soc. Amer., Ann. 19: 203-234, pl. XVII (natural enemies of Ill. spp.). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 181-192 (hibernation). —Free and Butler, 1959. Bumblebees, xiv and 208 pp., London, Collins. —Plath, 1934. Bumblebees and their ways, 201 pp., New York, Macmillan. —Macfarlane, 1973. Ent. Soc. Ont., Ann. 104: 27-30 (predators). —Michener, 1974. The social behavior of the bees, chapter 28: 314-328, figs., Cambridge, Massachusetts, The Belknap Press of Harvard University Press (natural history). —Pouvreau, 1974. Apidologie 5: 39-81 (enemies of adults). —Alford, 1975. Bumblebees, 352 pp., London, Davis-Poynter Ltd. (life histories of British spp.).

Morphology: Barendrecht, 1931. Acta Zool. 12: 153-204, 23 figs. (corpora pedunculata). —Palm, 1949. Opusc. Ent. 14: 27-47, 8 figs. (pharyngeal gland).

Genus BOMBUS Latreille

The genus *Bombus* comprises medium to large-sized, nest-building, social species, each of which normally has a worker caste and a primary reproductive caste of males and females. The females, or queens, and the workers have pollen-collecting baskets on the hindlegs. These bees usually live in colonies in or on the ground, often in the deserted nests of rodents. Most of the species in America north of Mexico depend upon a comparatively wide variety of flowers for nectar and pollen. The classification and arrangement of the subgenera in this catalog is that of Richards (1968. Brit. Mus. Nat. Hist. Ent., Bul. 22: 209-276, 39 text-figs.).

Revision: Franklin, 1912. Amer. Ent. Soc., Trans. 38: 177-486 (New World spp., first part). —Franklin, 1913. Amer. Ent. Soc., Trans. 39: 73-200, 22 pls. (New World spp., concluding part). —Milliron, 1970. Ent. Soc. Canada, Mem. 65: i-lii (bibliography of New World spp.). —Milliron, 1971. Ent. Soc. Canada, Mem. 82: 1-80, pls. I-XI, 14 figs., 6 maps (Part I: contains information on development of color, distribution, external morphology, hybridization, life histories, phylogeny and classification; treats west. hemisphere spp. of genus *Bombus* and genus *Megabombus* subg. *Bombias*). —Milliron, 1972. Ent. Soc. Canada, Mem. 89: 81-237, pls. XII-XV, maps 7-35 (Part II: treats west. hemisphere spp. of genus *Megabombus* subg. *Megabombus*). —Milliron, 1973. Ent. Soc. Canada, Mem. 91: 239-333, pls. XVI-XX, maps 36-56 (Part III: treats west. hemisphere spp. of genus *Pyrobombus* subg. *Cullumanobombus*). —Loken, 1973. Norsk Ent. Tidsskr. 20: 1-218, 99 figs., 26 Tables (Scandinavian spp., including certain circumpolar spp.).

Taxonomy: Lutz, 1916. Amer. Mus. Nat. Hist., Bul. 35: 501-521 (geogr. distribution). —Frison, 1919. Ill. Acad. Sci., Trans. 12: 157-165 (Illinois spp.). —Jackson, 1920. Ent. Soc. Wash., Proc. 22: 162-168 (District of Columbia and vicinity). —Lutz and Cockerell, 1920. Amer. Mus. Nat. Hist., Bul. 42: 502-539 (catalog of N. Amer. spp.). —Fattig. 1923. Fla. Ent. 7: 25 (Florida spp.). —Neave, 1926. Ent. News 37: 252-254 (Alberta spp.). —Frison, 1927. Amer. Ent. Soc., Trans. 53: 51-78, 2 pls. (systematic relationships of spp. in Amer. north of Mexico). —Scullen, 1927. Pan-Pacific Ent. 4: 69-76, 121-128 (Oregon spp.). —Plath, 1927. Biol. Bul. 52: 394-410, 6 figs., 2 tables (natural groupings based on biological characters). —Richards, 1931. Tromso Mus. Arshefter 50 (1927): 1-32, 2 pls. (spp. allied to *Bombus alpinus*). —Ritcher, 1933. Ent. Soc. Amer., Ann. 26: 53-63, 33 figs. (larvae). —Neave, 1933. Canad. Jour. Res. 8: 62-72 (Manitoba spp.). —Skorikov, 1937. Ent. Meddel. 20: 37-64 (Greenland spp. and their circumpolar relationships). —Milliron, 1939. Mich. Acad. Sci. Arts and Letters, Papers 24 (2): 168-182 (Michigan spp.). —Chandler, 1950. Indiana Acad. Sci., Proc. 60: 167-177 (Indiana spp.). —Kruseman, 1952. IXth Internatl. Congr. Ent., Trans. 1: 101-102 (subgeneric classification). —Franklin, 1954. Amer. Ent. Soc., Trans. 80: 43-51 (evolution and distribution). —Chandler, 1954. Indiana Acad. Sci., Proc. 63: 165-167 (color variation). —Franklin, 1955. Ent. News 66: 65-68 (morphometric studies of males). —Chandler, 1956. Indiana Acad. Sci., Proc. 65: 116-117 (parallel color variation). —Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 1-163, 31 figs., 18 maps (west. N. Amer. spp.). —Milliron, 1960. Brooklyn Ent. Soc., Bul. 55: 87-99 (types of west. hemisphere spp.). —Milliron, 1961. Kans. Ent. Soc., Jour. 34: 49-61 (classification). —Thorp, 1962. Pan-Pacific Ent. 38: 21-28 (distribution of some west. N. Amer. spp.). —LaBerge and Webb, 1962. Nebr. Agr. Expt. Sta. Res. Bul. 205: 1-38 (Nebraska spp.). —Medler, 1962. Ent. Soc. Amer., Ann. 55: 212-218, 1 fig., 4 tables (morphometric studies of radial cell, glossa, prementum and first segment of labial palpus). —Medler, 1962. XIth Internatl. Kongr. Ent. Wien, Verh. 2 (1960): 517-521 (morphometric analyses of mouthparts). —Milliron, 1962. Canad. Ent. 94: 728-735 (synonymies of New World spp.). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 513-538, figs. 128-133, table 18 (eastern U. S. spp.). —Medler and Carney, 1963. Wis. Agr. Expt. Sta. Res. Bul. 240: 1-47 (Wisconsin spp.). —Hazeltine and Chandler, 1964. Kans. Ent. Soc., Jour. 37: 77-87, 6 pls. (queens). —Hobbs, 1964. Canad. Ent. 96: 115-116 (phylogeny based on brood-rearing behavior). —Richards, 1968. Brit. Mus. Nat. Hist., Bul. (Ent.) 22: 211-276, 39 figs. (subgeneric classification). —Thorp, 1969. Pan-Pacific Ent. 45: 87-96 (key to spp. of *flavifrons* group). —Thorp, 1970. Pan-Pacific Ent. 46: 177-180 (notes on Ariz. records of *Bombus balteatus, B. franklini, B. sylvicola*). —Loken, 1973. Norsk Ent., Tidsskr. 20: 1-218, 99 figs. (Scandinavian spp., including certain circumpolar spp.). —Stephen and Koontz, 1973. Melanderia 13: 1-12, 52 figs. (larvae).

Biology: Putnam, 1864. Essex Inst. Salem, Proc. 4: 98-105 (habits). —Packard, 1864. Essex Inst. Salem, Proc. 4: 107-140, pl. 3 (life histories of New England spp., parasites). —Putnam, 1865. Essex Inst. Salem, Proc. 4: 98-105 (life histories of New England spp.). —Coville, 1890. Ent. Soc. Wash., Proc. 1: 197-203 (life histories). —Sladen, 1912. The humble bee, its life history and how to domesticate it, xiii and 283 pp., London Macmillan. —Fantham and Porter, 1914. Tropical Med. Parasit., Ann. 8: 623-638 (parasitism by *Nosema bombi*). —Wheeler, 1919. Psyche 26: 145-152 (phoresy of *Antherophagus*). —Betts, 1920. Bee World 1: 171 (*Nosema*). —Frison, 1921. Amer. Nat. 55: 188-192 (*Antherophagus* in nests). —Plath, 1922. Psyche 29: 189-202 (nesting habits). —Plath, 1923. Psyche 30: 145-154 (colony trumpeter). —Plath, 1923. Biol. Bul. 45: 325-341 (queen breeding experiments). —Plath, 1923. Psyche 39: 193-202 (egg-eating habits). —Plath, 1923. Amer. Nat. 57: 571-574 (skunk predation). —Plath, 1924. Biol. Bul. 47: 65-78, 2 figs. (life histories). —Plath, 1925. Amer. Nat. 59: 441-451 (role of pollination in certain cultivated crops). —Frison, 1926. Ent. Soc. Amer., Ann. 19: 203-234, pl. XVII (natural enemies of Ill. spp.). —Frison, 1926. Econ. Ent., Jour. 19: 149-155 (artificial domiciles). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 181-192 (hibernation). —Plath, 1927. Psyche 34: 122-128, 2 figs. (nesting habits of some New England spp.). —Frison, 1927. Econ. Ent., Jour. 20: 522-526 (fertilization and hibernation of queens under controlled conditions). —Frison, 1930. Canad. Ent. 62: 49-54 (flight orientation). —Balduf, 1939. Canad. Ent. 71: 66-74 (predation by *Phymata*). —Plath, 1934. Bumblebees and their ways, 201 pp., New York, MacMillan. —Balduf, 1941. Ent. Soc. Amer., Ann. 34: 204-214 (predation by *Phymata*). —Linsley, 1944. Brooklyn Ent. Soc., Bul. 39: 48-49 (vernal flight of males). —Cumber, 1949. Roy. Ent. Soc. London, Proc. 100: 1-45, 10 figs. (life history, production of worker caste). —Cumber, 1949. New Zealand Sci. Rev. 7: 96-97 (overwintering nest). —Pedersen and Bohart, 1950. Agron. Jour. 42: 608 (use as pollinators of small seed plots). —Loken, 1954. Bergen Univ. Pub., Biol. Sta. 13: 1-6 (behavior during solar eclipse). —Brian, 1954. Bee World 35: 61-67, 81-91 (foraging behavior). —Cumber, 1954. New Zealand Jour. Sci. Tech. (B) 36: 95-107 (life cycle). —Fye and Medler, 1954. Econ. Ent., Jour. 47: 672-676 (field domiciles). —Fye and Medler, 1954. Wis. Acad. Sci. Arts and Letters 43: 75-82 (spring emergence). —Fye and Medler, 1954. Econ. Ent., Jour. 47: 847-852 (temperature studies of domiciles). —Free, 1955. Roy. ent. Soc. London, Proc. (A) 30: 19-25 (queen production). —Free 1955. Ins. Sociaux 2: 195-212 (division of labor within colonies). —Free, 1955. Brit. Jour. Anim. Behav. 3: 147-153 (behavior of egg-laying workers). —Free, 1955. Ins. Sociaux 2: 303-311 (collection of food). —Manning, 1956. Behaviour 9: 164-201 (foraging behavior). —Free, 1957. Roy. Ent. Soc. London, Proc. 32: 182-184 (social facilitation and ovary development). —Medler, 1957. Ins. Sociaux 4: 252-254 (pollination of alfalfa and red clover). —Free, 1958. Behaviour 12: 233-242 (defense of colony). —Medler, 1958. Xth Internatl. Congr. Ent., Proc. 4: 973-981 (use in pollination of agricultural crops). —Free and Butler, 1959. Bumblebees, xiv and 208 pp., London, Collins. —Hobbs, Virostek and Nummi, 1960. Canad. Ent. 92: 868-872 (artificial domiciling). —Holm, 1960. Arsskr. Kgl. Vet.-Landbhojsk, pp. 1-19 (domestication). —Hasselrot, 1960. Opusc. Ent. Suppl. 17: 1-192 (domestication). —Pringle, 1961. Nat. Hist. 70: 20-29 (flight behavior). —Montgomery, 1961. Outdoor Indiana 4: 16-22 (bombiculture). —Hobbs, 1962. Canad. Ent. 94: 538-541 (food-gathering behavior). —Medler, 1962. Canad. Ent. 94: 825-833, 1 fig., 3 tables (egg development and absorption). —Hobbs, Nummi and Virostek, 1962. Canad. Ent. 94: 1121-1132 (management for pollination). —Cumber, 1963. New Zealand Jour. Sci. 6: 66-74 (domiciling of an unusually large nest). —Hobbs, 1964. Canad. Ent. 96: 115-116 (brood-rearing behavior). —Hobbs, 1964. Canad. Ent. 96: 1465-1470 (ecology of *Alpinobombus*). —Hobbs, 1965. Canad. Ent. 97: 120-128 (ecology of *Bombias*). —Armitage, 1965. Kans. Ent. Soc., Jour. 38: 89-100, 4 figs., 4 tables (predation by *Philanthus bicinctus*). —Hobbs, 1965. Canad. Ent. 97: 1297-1302 (ecology of *Cullumanobombus*). —Knee and Medler, 1965. Canad. Ent. 97: 1149-1155 (seasonal size increase in workers). —Plowright and Jay, 1966. Jour. Apicult. Research 5: 155-165 (domestication). —Hobbs, 1966. Canad. Ent. 98: 33-39 (ecology of *Fervidobombus*). —Holm, 1966. Ann. Rev. Ent. 11: 155-182 (management of red clover and alfalfa pollinating spp. for seed production). —Milliron and Oliver, 1966. Canad. Ent. 98: 207-213, 6 figs. (nests, usurpation and life histories of Ellesmere Island spp.). —Hobbs, 1966. Canad. Ent. 98: 288-294 (ecology of *Subterraneobombus*). —Johansen, 1967. Wash. State Univ. Tech. Bul. 57: 1-12 (ecology of southwest. Wash. spp.). —Hobbs, 1967. Canad.

Ent. 99: 943-951 (management of red clover pollinating spp.). —Hobbs, 1967. Canad. Ent. 99: 1271-1292 (ecology of *Pyrobombus*). —Hobbs, 1968. Canad. Ent. 100: 156-164 (ecology of *Bombus, s. str.*). —Husband, 1968. Mich. Acad. Sci. Arts Letters, Papers, 53: 109-112 (Acarina associated with Mich. spp.). —Plowright and Jay, 1968. Ins. Sociaux 15: 171-192 (caste differentiation: determination of female size). —Alford, 1969. Jour. Anim. Ecol. 38: 149-170 (hibernation). —Eaton and Stewart, 1969. Canad. Ent. 101: 149-150 (damage of blueberry blossoms by bumblebees). —Alford, 1970. Ins. Sociaux 17: 1-10 (incipient stages of colonial development). —Free, 1970. Jour. Anim. Ecol. 39: 395-402 (flower constancy). —Free, 1971. Behaviour 40: 55-61 (stimuli eliciting mating behavior). —Kevan, 1972. Jour. Ecol. 60: 831-847, 1 fig., 4 tables (pollination of high arctic flowers). —Richards, 1973. Quaest. Ent. 9: 115-157, 29 figs. (life histories of arctic spp.). —Richards, 1974. Kans. Ent. Soc., Jour. 47: 141-142 (nest site selection, Alta. spp.). —Macior, 1974. Melanderia 15: 1-59, 10 tables (pollination ecology of spp. in front range of Colorado Rocky Mountains). —Michener, 1974. The social behavior of the bees, chapter 28: 314-328, figs., Cambridge, Massachusetts, The Belknap Press of Harvard University Press (natural history). —Heinrich, 1975. *In* Gilbert and Raven, Coevolution of animals and plants, pp. 141-158, 4 figs., 2 tables (energetics). —Macior, 1975. Amer. Jour. Bot. 62: 1009-1016, 19 figs., 7 tables (role in pollination of *Delphinium tricorne*). —Macior, 1975. Amer. Jour. Bot. 62: 1065-1072, 21 figs., 7 tables (role in pollination of *Pedicularis*). —Richards, 1976. Kans. Univ. Sci. Bul. 50: 731-773, 31 figs. (parasitid mites associated with bumblebees). —Richards and Richards, 1976. Kans. Univ. Sci. Bul. 51: 1-18, 6 figs., 6 tables (relationships of parasitid mites associated with bumblebees). —Heinrich, 1976. Amer. Sci. 64: 384-395, 14 figs. (foraging behavior and economics of sociality). —Heinrich, 1976. Ecol. Monogr. 46: 105-128 (foraging). —Oster and Heinrich, 1976. Ecol. Monogr. 46: 129-133 (foraging).

Morphology: Cockerell and M'Nary, 1902. Canad. Ent. 34: 71-72 (mouthparts). —Barendrecht, 1931. Acta Zool. 12: 153-204, 23 figs. (corpora pedunculata). —Palm, 1948. VIIIth Internatl. Congr. Ent., Proc., pp. 289-292, 2 figs. (effect of parasitic action on queens).— Palm, 1948. Opusc. Ent., Sup. 7: 3-101 (histology of ovaries). —Palm, 1949. Opusc. Ent. 14: 27-47, 8 figs. (pharyngeal gland). —Medler, 1962. Canad. Ent. 94: 825-833 (development and absorption of eggs). —Kullenberg, Bergstrom and Stallberg-Stenhagen, 1970. Acta Chem. Scandinav. 24: 1481-1482 (volatile components of cephalic marking secretion of males). —Heinrich, 1972. Jour. Comp. Physiol. 77: 65-79 (patterns of endothermy in queens, drones and workers). —Heinrich, 1974. Kans. Ent. Soc., Jour. 47: 396-404, 3 figs. (pheromone induced brooding behavior). —Heinrich, 1976. Jour. Expt. Biol. 64: 561-585, 24 figs. (heat exchange).

Genus BOMBUS Subgenus BOMBUS Latreille

Bremus Jurine, 1801. Intell. Blatt. Litt.-Ztg. Erlangen 1: 164. Name suppressed by Internatl. Comn. Zool. Nomencl., Op. 135, 1939.
Type-species: *Apis terrestris* Linnaeus. Desig. by Morice and Durrant, 1915.

Bombus Latreille, 1802. Hist. Nat. Fourmis, p. 437.
Type-species: *Apis terrestris* Linnaeus. Monotypic.

Bremus Panzer, 1804(?). Faunae Ins. German., h. 85.
Type-species: *Apis agrorum* Fabricius. Desig. by Sandhouse, 1943.

Bombus subg. *Leucobombus* Dalla Torre, 1880. Naturhistoriker, v. 2, p. 40.
Type-species: *Apis terrestris* Linnaeus. Desig. by Sandhouse, 1943.

Bombus subg. *Terrestribombus* Vogt, 1911. Gesell. Naturf. Freunde, Sitzber., p. 55.
Type-species: *Apis terrestris* Linnaeus. Desig. by Frison, 1927.

This subgenus occurs in the Holarctic Region as well as parts of southeastern and southwestern Asia.

Biology: Hobbs, 1968. Canad. Ent. 100: 156-164 (ecology of south. Alta. spp.).

affinis Cresson. Que. and Ont. south to Ga., west to S. Dak and N. Dak. Ecology: Frequently usurps colonies of *Bombus terricola* Kirby. Parasite: *Psithyrus ashtoni* (Cress.).
Bombus affinis Cresson, 1863. Ent. Soc. Phila., Proc. 2: 103. ♂, ♀.
Bombus affinis var. *novae-angliae* Bequaert, 1920. Psyche 27: 6. ♂, ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 518-519, table 18 (synonymy, redescription). —Milliron, 1971. Ent. Soc. Canada, Mem. 82: 67-72, pl. X, map 4 (redescription, geogr. and floral records).

Biology: Plath, 1922. Psyche 29: 190-192 (nest, parasite). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 188, 191 (hibernation, parasite). —Plath, 1934. Bumblebees and their ways, p. 135 (life history).

lucorum lucorum (Linnaeus). Holarctic; Alaska southward to parts of south. B. C. and Alta., east through Yukon and N. W. T. In addition to the following subspecies, other subspecies occur in Arctic Eurasia.

Apis lucorum Linnaeus, 1761. Fauna Suecica, Ed. 2, p. 425. ♂.
Apis cryptarum Fabricius, 1775. System. Ent., p. 379. ♀.
Bombus moderatus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 109. ♀.
Bombus terrestris var. *schmiedeknechti* Verhoeff, 1892. Berlin. Ent. Ztschr. 36: 205.
Terrestribombus[1]*lucorum* form *magnus* Vogt, 1911. Gesell. Naturf. Freunde, Sitzber. p. 56. ♀.
Bombus jacobsoni Skorikov, 1912. Rev. Russ. Ent. 12: 610.

Taxonomy: Milliron, 1971. Ent. Soc. Canada, Mem. 82: 45-50, pl. X, map. 1 (synonymy, redescription, geogr. and floral records). —Loken, 1973. Norsk Ent. Tidsskr. 20: 40-46, fig. 54 (synonymy, tax. characters, color variation).

lucorum patagiatus Nylander. Northeast. Siberia, Kamchatka Peninsula, east to Alaska Peninsula (Aleutian Range).

Bombus patagiatus Nylander, 1848. Notiser Sallskapet Fauna Fenn., Forhandl. 1: 234. ♀ (or possibly worker).
Bombus viduus Erichson, 1851. *In* Middendorff, Reise in den Aussersten Norden und Osten Sibiriens 2: 65.
Bombus albocinctus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 397. ♀.
Bombus florilegus Panfilov, 1956. Zool. Zhur. 35: 1334.

Taxonomy: Milliron, 1971. Ent. Soc. Canada, Mem. 82: 51 (synonymy, tax. characters, geogr. range).

terricola terricola Kirby. N. S. to Fla., west to B. C., Mont. and S. Dak. Ecology: Colonies are frequently usurped by queens of *Bombus affinis* Cress. Parasite: *Psithyrus ashtoni* (Cress.), *P. insularis* (Sm.), *P. suckleyi* (Greene).

Bombus terricola Kirby, 1837. Fauna Bor.-Amer., v. 4, p. 273. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 81-83, fig. 17 (redescription, geogr. records). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 519-520, fig. 133, table 18 (redescription, geogr. and floral records). —Milliron, 1971. Ent. Soc. Canada, Mem. 82: 52-58, pl. X, map 2 (redescription, geogr. and floral records).

Biology: Plath, 1922. Psyche 29: 192-193 (nest). —Plath, 1927. Psyche 34: 122-124 (nest, parasite). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 188, 191 (hibernation, parasite). —Plath, 1934. Bumblebees and their ways, p. 138 (life history, parasite).

Morphology: Heinrich, 1972. Jour. Comp. Physiol. 77: 49-64 (energetics of temperature regulation and foraging).

terricola occidentalis Greene. Alaska south to north. Calif., Nev., Ariz., N. Mex. and S. Dak. Parasite: *Psithyrus fernaldae* Franklin, *P. insularis* (Sm.), *P. suckleyi* (Greene). Predator: *Philanthus bicinctus* (Mickel).

Bombus occidentalis Greene, 1858. Lyc. Nat. Hist. N. Y., Ann. 7: 12. ♀, ♂.
Bombus modestus Smith, 1861. Jour. of Ent. 1: 153. ☿.
Bombus proximus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 98. ☿.
Bombus howardi Cresson, 1863. Ent. Soc. Phila., Proc. 2: 99. ♂.
Bombus perixanthus Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 389. ♂.
Bombus mckayi Ashmead, 1902. Wash. Acad. Sci., Proc. 4: 125. ♀.
Bombus proximus var. *coloradensis* Titus, 1902. Canad. Ent. 34: 38. ♀.
Bombus nigroscutatus Franklin, 1908. *In* Fletcher and Gibson, Ent. Soc. Ontario, Ann. Rpt. 39: 111. Nomen nudum.

Bombus occidentalis nigroscutatus Franklin, 1912. Amer. Ent. Soc., Trans. 38: 269, 271. ♀, ♂, ☿.
Bremus franklini Frison, 1921. Ent. News 32: 147. ♀.
Bremus terricola var. *severini* Frison, 1926. Amer. Ent. Soc., Trans. 52: 139. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 71-81, figs. 14, 15 (redescriptions, geogr. records, as *occidentalis occidentalis, o. nigroscutatus, franklini*). —Thorp, 1970. Pan-Pacific Ent. 46: 177-180 (type locality and Ariz. records of *franklini*). —Milliron, 1971. Ent. Soc. Canada, Mem. 82: 58-67, map 3 (synonymy, redescription, geogr. and floral records).

Biology: Plath, 1922. Psyche 29: 192 (nest). —Armitage, 1965. Kans. Ent. Soc., Jour. 38: 97 (predator). —Eshelman and Plowright, 1972. Canad. Ent. 104: 389-398 (nest entrance recognition). —Wellington, 1974. Science 183: 550-551 (ocellar navigation at dusk).

Genus BOMBUS Subgenus FRATERNOBOMBUS Skorikov

Alpigenobombus subg. *Fraternobombus* Skorikov, 1922. Sta. Region. Protect. Plantes, Petrograd Bul. 4: 156.
Type-species: *Apathus fraternus* Smith. Desig. by Frison, 1927.

This subgenus occurs only in North and Central America.

fraternus (Smith). N. J. to Fla., west to N. Dak., S. Dak., Nebr., Colo. and N. Mex. Predator: *Promachus hinei* Bromley.
Apathus fraternus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 385. ♂.
Bombus scutellaris Cresson, 1863. Ent. Soc. Phila., Proc. 2: 96. ♀, ♂, ☿.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 526-527, figs. 131, 132, table 18 (redescription). —Milliron, 1973. Ent. Soc. Canada, Mem. 91: 243-246, pl. XVI, map 36 (redescription, geogr. and floral records).

Biology: Thorp, 1973. Pan-Pacific Ent. 49: 89 (predator).

Genus BOMBUS Subgenus BOMBIAS Robertson

Bombias Robertson, 1903. Amer. Ent. Soc., Trans. 29: 176.
Type-species: *Bombias auricomus* Robertson. Orig. desig.
Nevadensibombus Skorikov, 1922. Sta. Region. Protect. Plantes, Petrograd Bul. 4: 149.
Type-species: *Bombus nevadensis* Cresson. Desig. by Frison, 1927.

This subgenus is present only in North America.

Biology: Hobbs, 1965. Canad. Ent. 97: 120-128 (ecology).

nevadensis auricomus (Robertson). Ont. to Fla., west to Tex., Okla., Colo., Wyo., Mont. and south. Canada (Sask., Alta. and B. C.). Parasite: *Brachicoma sarcophagina* (Twns.), *Physocephala sagittaria* (Say), *Psithyrus citrinus* (Sm.).
Bombias auricomus Robertson, 1903. Amer. Ent. Soc., Trans. 29: 176. ♀, ♂, ☿.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 520-521, table 18 (tax. status, redescription). —Milliron, 1971. Ent. Soc. Canada, Mem. 82: 77-80, map 6 (redescription, geogr. and floral records).

Biology: Frison, 1917. Ent. Soc. Amer., Ann. 10: 277-286, pls. 23, 24 (life history, parasites). —Frison, 1918. Ent. Soc. Amer., Ann. 11: 43-48, pl. 3 (life history, parasite). —Howard, 1918. Ent. News 29: 114-115 (nest). —Plath, 1927. Psyche 34: 127 (nesting habits). —Plath, 1934. Bumblebees and their ways, p. 153 (life history).

nevadensis nevadensis Cresson. Alaska south to Calif., Ariz., N. Mex. and east to Wis.; Mexico (Hidalgo). Parasite: *Physocephala marginata* (Say), *P. texana* (Will.), *Psithyrus insularis* (Sm.), *P. suckleyi* (Greene).
Bombus nevadensis Cresson, 1874. Amer. Ent. Soc., Trans. 5: 102. ♀, ♂.
Bombus improbus Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 186. ♂.
Bombus nevadensis race *cressoni* Cockerell, 1899. Ann. and Mag. Nat. Hist. (7) 4: 388. ♀.
Bombus nevadensis miguelensis Cockerell, 1937. Pan-Pacific Ent. 13: 148. ♂.
Bombus crotchii semisuffusus Cockerell, 1937. Pan-Pacific Ent. 13: 148. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 44-49, 61, fig. 10, map 5 (redescriptions, as *nevadensis nevadensis, n. miguelensis, crotchii semisuffusus*). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 521-523, figs. 129, 130, table 18 (redescription). —Milliron, 1971. Ent. Soc. Canada, Mem. 82: 73-77, pl. XI, map 5 (synonymy, redescription, geogr. and floral records).

Genus BOMBUS Subgenus SEPARATOBOMBUS Frison

Bremus subg. *Separatobombus* Frison, 1927. Amer. Ent. Soc., Trans. 53: 64.
Type-species: *Apis griseocollis* Degeer. Orig. desig. (=*Bombus separatus* Cresson).

This subgenus is endemic in North America.

griseocollis (Degeer). Que. south to Fla., west to B. C., Wash., Oreg. and north. Calif.
Apis griseocollis Degeer, 1773. Mem. Serv. Hist. Insectes, v. 3, p. 576.
(?)*virginica* Olivier, 1789. Encycl. Meth., v. 4, p. 66.
(?)*virginica* Fabricius, 1793. Ent. System., v. 2, p. 318.
(?)*virginicus* Fabricius, 1804. Systema Piezatorum, p. 346.
Bombus separatus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 165. ♀, ♂, ☿.
Bombus mormonorum Franklin, 1911. Amer. Ent. Soc., Trans. 37: 161. ♀, ♂, ☿.
Bremus separatus var. *nero* Bequaert and Plath, 1925. Mus. Compar. Zool., Bul. 67: 275. ☿.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Tech. Bul. 40: 50-54, fig. 13, map 6 (synonymy, redescription, geogr. records). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 527-529, figs. 129, 132, table 18 (synonymy, redescription, geogr. range and floral records). —Milliron, 1973. Ent. Soc. Canada, Mem. 91: 247-252, pl. XVI, fig. 37 (synonymy, redescription, geogr. and floral records).

Biology: Plath, 1927. Psyche 34: 125-127 (life history, as *separatus*). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 190 (hibernation, as *separatus*). —Plath, 1934. Bumblebees and their ways, p. 155 (life history, as *separatus*). —Eshelman and Plowright, 1972. Canad. Ent. 104: 389-398 (nest entrance recognition).

Morphology: Stephen and Koontz, 1973. Melanderia 13: 13-29, 50 figs. (developmental changes in preadult stages).

morrisoni Cresson. B. C. to Calif., east to S. Dak., Nebr., Colo. and N. Mex. Parasite: *Monodontomerus montivagus* Ashm.
Bombus morrisoni Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 183. ♀, ♂, ☿.
Bombus morrisoni var. *umbrosus* Friese, 1931. Konowia 10: 301.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 54-57, fig. 12, map 6 (redescription, geogr. records). —Milliron, 1973. Ent. Soc. Canada, Mem. 91: 252-256, pl. XVI, map 38 (synonymy, redescription, geogr. and floral records).

Biology: Bohart and Knowlton, 1952. Econ. Ent., Jour. 45: 890-891 (yearly population fluctuations).

Genus BOMBUS Subgenus CROTCHIIBOMBUS Franklin

Bombus subg. *Crotchiibombus* Franklin, 1954. Amer. Ent. Soc., Trans. 80: 51.
Type-species: *Bombus crotchii* Cresson. Orig. desig.

Endemic in western North America.

crotchii Cresson. Calif.; Mexico (Baja California).
Bombus crotchii Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 184. ♀.
Bombus nigrocinctus Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 342. ♀.
Bremus crotchii var. *nigricaudus* Frison, 1927. Calif. Acad. Sci., Proc. (4) 16: 375. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 57-61, fig. 15, map 7 (synonymy, redescription, geogr. records). —Milliron, 1973. Ent. Soc. Canada, Mem. 91: 256-258, pl. XVI, map 39 (synonymy, redescription, geogr. records).

Genus BOMBUS Subgenus CULLUMANOBOMBUS Vogt

Bombus subg. *Cullumanobombus* Vogt, 1911. Gesell. Naturf. Freunde, Sitzber. p. 57.

Type-species: *Apis cullumanus* Kirby. Desig. by Frison, 1927.

Bremus subg. *Rufocinctobombus* Frison, 1927. Amer. Ent. Soc., Trans. 53: 78, pl. xvii, fig. 9.

Type-species: *Bombus rufocinctus* Cresson. Monotypic.

Species of this subgenus are found in the Palaearctic, Nearctic and northern Neotropical Regions.

Biology: Hobbs, 1965. Canad. Ent. 97: 1293-1302 (ecology).

rufocinctus Cresson. N. S., N. B. and Que., west to B. C., south to Calif., Ariz., N. Mex., Kans., Minn., Ill., Mich., N. Y., Vt. and Maine; Mexico (Distrito Federal, Hidalgo, Mexico, Michoacan, Morelos and Sonora). Parasite: *Physocephala texana* (Will.), *Psithyrus fernaldae* Franklin, *P. insularis* (Sm.), *P. suckleyi* (Greene). Predator: *Philanthus bicinctus* (Mickel).

Bombus rufocinctus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 106. ♂, ♀.

Bombus iridis Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 390. ♀.

Bombus prunellae Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 391. ♀.

Bombus iridis var. *phaceliae* Cockerell, 1906. Canad. Ent. 38: 160. ♀.

Bombus rufocinctus var. *astragali* Cockerell, 1907. Entomologist 40: 97. ♀.

Bombus hyperboreus var. *albertensis* Cockerell, 1909. Canad. Ent. 41: 36. ♀.

Bombus (*Bombias*) *mexicensis* Franklin, 1911. Amer. Ent. Soc., Trans. 37: 163. ♀.

Bombus henshawi Franklin, 1913. Amer. Ent. Soc., Trans. 38: 446. ♀.

Bombus rufocinctus var. *castoris* Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 15: 537. ♂.

Bremus rufocinctus var. *sladeni* Frison, 1926. Amer. Ent. Soc., Trans. 52: 138. ♂. Nomen nudum.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 62-70, figs. 3, 11, table 1 (synonymy, redescription, variation in color pattern, geogr. records). —Thorp, 1962. Pan-Pacific Ent. 38: 24-25 (synonymy, geogr. records from and near the type locality of *henshawi*). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 529-530, fig. 132, table 18 (redescription). —Milliron, 1973. Ent. Soc. Canada, Mem. 91: 317-326, pl. XIX, map 34 (synonymy, redescription, geogr. and floral records).

Biology: Armitage, 1965. Kans. Ent. Soc., Jour. 38: 97 (predator).

Genus BOMBUS Subgenus PYROBOMBUS Dalla Torre

Bombus subg. *Pyrobombus* Dalla Torre, 1880. Der Naturhistoriker 2: 40.
Type-species: *Apis hypnorum* Linnaeus. Monotypic.

Bombus subg. *Pyrrhobombus* Dalla Torre, 1882. Naturw.-med. Ver. Innsbruck, Ber. 12: 28. Emendation of *Pyrobombus* Dalla Torre.

Bombus subg. *Poecilobombus* Dalla Torre, 1882. Naturw.-med. Ver. Innsbruck, Ber. 12: 23.
Type-species: *Bombus sitkensis* Nylander. Desig. by Sandhouse, 1943.

Bombus subg. *Pratobombus* Vogt, 1911. Gesell. Naturf. Freunde, Sitzber., p. 49.
Type-species: *Apis pratorum* Linnaeus. Desig. by Frison, 1927.

Bombus subg. *Hypnorubombus* Quilis Perez, 1927. Lab. Hist. Nat. Valencia, Trabhs. 16: 19. *Lapsus.*

Bombus subg. *Hypnorobombus* Quilis Perez, 1927. Lab. Hist. Nat. Valencia, Trabhs. 16: 97.
Type-species: *Apis hypnorum* Linnaeus. Monotypic. (=*Bombus hypnorum* (Linnaeus)).

Bombus subg. *Lapponicobombus* Quilis Perez, 1927. Lab. Hist. Nat. Valencia, Trabhs. 16: 19, 22, 63.
Type-species: *Apis lapponica* Fabricius. Desig. by Milliron, 1961. (=*Bombus lapponicus* (Fabricius)).

This is a large assemblage of species which occur principally in the Holarctic Region, but a few species extend into Central America and into the East Indies.

Biology: Hobbs, 1967. Canad. Ent. 99: 1271-1292 (ecology of south. Alta. spp.).

bifarius bifarius Cresson. B. C., Oreg. (Steens Mts.), Calif. (Sierra Nevada Mts.), Idaho, Utah, Colo. Predator: *Philanthus bicinctus* (Mickel).

Bombus bifarius Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 185. ♀, ♂.

Bombus vancouverensis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 187. ♂.
Bombus cooleyi Morrill, 1903. Canad. Ent. 35: 222.
Bombus edwardsii var. *kenoyeri* Cockerell, 1915. Ann. and Mag. Nat. Hist. (8) 16: 483. ♀.
Bombus bifarius var. *arctostaphyli* Cockerell, 1930. Ann. and Mag. Nat. Hist. (10) 5: 405. ♂.
Bombus edwardsii var. *fuscifrons* Swenk, 1938. Pan-Pacific Ent. 14: 30. ♀, ☿.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 139-145, figs. 5, 29, map 18 (synonymy, redescription, tax. status, variation in color pattern, geogr. records).

Biology: Armitage, 1965. Kans. Ent. Soc., Jour. 38: 97 (predator).

bifarius nearcticus Handlirsch. Alaska and Yukon, south to Calif. (Sierra Nevada Mts.) and Utah. Parasite: *Psithyrus insularis* (Sm.), *Volucella bombylans* (L.).
Bombus nearcticus Handlirsch, 1888. K. K. Naturhist. Hofmus., Ann. 3: 243. ♀, ♂, ☿.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 139-141, 145-148, figs. 5, 29, map 18 (tax. status, redescription, variation in color pattern, geogr. records).

bimaculatus Cresson. Ont. and Maine, south to Fla., west to Ill., Kans., Okla. and Miss. Parasite: *Brachicoma sarcophagina* (Twns.).
Bombus bimaculatus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 92. ♂.
Bombus ridingsii Cresson, 1878. Acad. Nat. Sci. Phila., Proc., p. 182. ♀, ☿.
Bremus bimaculatus var. *ahenus* Bequaert and Plath, 1925. Mus. Compar. Zool., Bul. 67: 275. ♀, ♂.
Bremus bimaculatus var. *arboreti* Bequaert and Plath, 1925. Mus. Compar. Zool., Bul. 67: 276. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 531-532, table 18 (redescription).

Biology: Plath, 1922. Psyche 29: 194-195 (life history). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 189 (hibernation). —Frison, 1928. Ent. Amer. (n. s.) 8: 159-223 (life history). —Plath, 1934. Bumblebees and their ways, p. 141 (life history). —Townsend, 1936. Ent. Soc. Wash., Proc. 38: 92-98 (parasites).

caliginosus (Frison). Wash., Oreg. and Calif. Ecology: Generally inhabits more coastal areas, but the known southernmost populations occur in the San Jacinto Mts. of south. Calif.; the only known nest was located in an old bird nest some 15 feet above ground.
Bremus caliginosus Frison, 1927. Calif. Acad. Sci., Proc. (4) 16: 376. ♂.
Bremus caliginosus var. *tardus* Frison, 1927. Calif. Acad. Sci., Proc. (4) 16: 380. ♂.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 100-104, fig. 20, map 13 (synonymy, redescription, geogr. records).

Biology: Pitelka, 1954. Pan-Pacific Ent. 30: 220 (nest).

centralis (Cresson). B. C. and Alta. south to Calif., Ariz. and N. Mex. Predator: *Philanthus bicinctus* (Mickel).
Bombus centralis Cresson, 1864. Ent. Soc. Phila., Proc. 3: 41. ♀.
Bombus juxtus Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 187. ♀.
Bombus monardae Cockerell and Porter, 1899. Ann. and Mag. Nat. Hist. (7) 4: 387. ♀.
Bremus centralis var. *fucatus* Frison, 1929. Amer. Ent. Soc., Trans. 55: 107. ♀.
Bremus centralis var. *stolidus* Frison, 1929. Amer. Ent. Soc., Trans. 55: 107. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 95-100, fig. 19, map 12 (synonymy, redescription, color variation of vestiture, geogr. records).

Biology: Armitage, 1965. Kans. Ent. Soc., Jour. 38: 97 (predator).

cockerelli Franklin. N. Mex., Utah.
Bombus cockerelli Franklin, 1913. Amer. Ent. Soc., Trans. 38: 356. ♀, ☿.

edwardsii Cresson. Oreg., Calif., Nev. (Douglas and Washoe Counties).
Bombus edwardsii Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 184. ♀, ☿.
Bombus fernaldi Franklin, 1911. Amer. Ent. Soc., Trans. 37: 157. ♀, ♂, ☿.
Bombus lapponicus var. *insularis* Friese, 1924. Deut. Ent. Ztschr., p. 437. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 109-113, fig. 22, map 10 (redescription, geogr. and floral records).

Biology: Linsley and Michener, 1942. Pan-Pacific Ent. 18: 29 (nest, vernal flights).

Morphology: Heinrich, 1974. Kans. Ent. Soc., Jour. 47: 396-404, 3 figs. (pheromone induced brooding behavior).

flavifrons dimidiatus Ashmead. South. B. C. to Calif.
Bombus dimidiatus Ashmead, 1902. Wash. Acad. Sci., Proc. 4: 129. ♀, ☿.
Bombus ambiguus Franklin, 1911. Amer. Ent. Soc., Trans. 37: 159. ♀, ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 85-87, 92-95, map 11 (synonymy, tax. status, redescription, geogr. records).

flavifrons flavifrons Cresson. Alaska south to Calif., Idaho and Utah. Parasite: *Psithyrus insularis* (Smith). Predator: *Philanthus bicinctus* (Mickel).
Bombus flavifrons Cresson, 1863. Ent. Soc. Phila., Proc. 2: 105. ♀, ♂, ☿.
Bombus alaskensis Ashmead, 1902. Wash. Acad. Sci., Proc. 4: 128. ♀, ☿.
Bombus flavifrons var. *veganus* Cockerell, 1903. Amer. Nat. 37: 891. ♂.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 85-92, fig. 18, map. 11 (redescription, geogr. records).

Biology: Sladen, 1915. Canad. Ent. 47: 84 (parasite). —Armitage, 1965. Kans. Ent. Soc., Jour. 38: 97 (predator).

Morphology: Milliron, 1962. Brooklyn Ent. Soc., Bul. 57: 45-46 (gynandromorph).

frigidus Smith. Alaska and N. W. T., south at high elevations to Colo.
Bombus frigidus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 399. ♀, ♂.
Bombus carriei Greene, 1860. Lyc. Nat. Hist. N. Y., Ann. 7: 170. ♀.
Bombus couperi Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 185. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 124-126, fig. 25 (synonymy, redescription, geogr. range).

frigidus var. **alboanalis** Franklin. Man., Alaska.
Bombus alboanalis Franklin, 1913. Amer. Ent. Soc., Trans. 38: 385. ♀, ☿.

huntii Greene. B. C. and Alta., south to Calif., Nev., Utah and N. Mex.
Bombus huntii Greene, 1860. Lyc. Nat. Hist. N. Y., Ann. 7: 172. ♀.
Bombus rufosuffusus Cockerell, 1905. Ent. News 16: 271. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 135-139, fig. 28, map 17 (synonymy, redescription, geogr. records).

Biology: Medler, 1959. Ent. News 70: 179-182 (nest).

impatiens Cresson. Ont. and Maine, south to Fla., west to Mich., Ill., Kans. and Miss. Parasite: *Psithyrus citrinus* (Smith). Predator: *Mallophora orcina* (Wied.).
Bombus impatiens Cresson, 1863. Ent. Soc. Phila., Proc. 2: 90. ♂.
Bombus impatiens var. *deayi* Chandler, 1956 (1955). Ind. Acad. Sci., Proc. 65: 116. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 532-533, fig. 133, table 18 (synonymy, redescription, floral records).

Biology: Plath, 1922. Psyche 29: 195-197 (life history). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 187-188, 189 (hibernation). —Frison, 1929. Brooklyn Ent. Soc., Bul. 24: 261-285 (bionomics). —Fattig, 1933. Canad. Ent. 65: 119-120 (asilid predation). —Plath, 1934. Bumblebees and their ways, p. 144 (life history). —Townsend, 1951. Ent. News 62: 115-116 (hibernation).

melanopygus Nylander. Alaska, south to north. Calif., Idaho and Colo. Predator: *Philanthus bicinctus* (Mickel).
Bombus melanopyge Nylander, 1848. Notiser Sallskapet Fauna Fenn., Forhandl. 1: 236. ♂
?Bombus menestriesii Radoszkowski, 1859. Soc. Nat. Moscou, Bul. 32: 483. ♀, ♂.
Bombus lacustris Cresson, 1863. Ent. Soc. Phila., Proc. 2: 103. ♀, ♂, ☿.
Bremus melanopygus var. *washingtonensis* Frison, 1926. Amer. Ent. Soc., Trans. 52: 138. ♀, ☿.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 132-135, fig. 27, map 16 (synonymy, redescription, geogr. records).

Biology: Armitage, 1965. Kans. Ent. Soc., Jour. 38: 97 (predator).

mixtus Cresson. Alaska, south to Calif., Idaho and Colo. Predator: *Philanthus bicinctus* (Mickel).
Bombus mixtus Cresson, 1878. Acad. Nat. Sci. Phila., Proc., p. 186. ♀, ☿.
Bremus edwardsii var. *russulus* Frison, 1927. Calif. Acad. Sci., Proc. (4) 16: 374. ☿.

Taxonomy: Stephen, 1957. Oreg. Expt. Sta. Tech. Bul. 40: 113-120, fig. 23, map 15 (synonymy, redescription, geogr. records).

perplexus Cresson. Alaska to Maine, south to Wis., Ill. and Fla., ?Alta. Parasite: ?*Psithyrus fernaldae* Franklin.
Bombus perplexus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 91. ♂.
Bombus hudsonicus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 92. ♂.
Apathus dorsalis Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 343. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 533-534, table 18 (synonymy, redescription, geogr. range, floral records).

Biology: Plath, 1927. Psyche 34: 124-125 (nest). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 189 (hibernation). —Plath, 1934. Bumblebees and Their ways, p. 146 (life history).

pleuralis Nylander. Rocky Mountain States, B. C., N. W. T., Yukon, Alaska.
Bombus pleuralis Nylander, 1848. Notiser Sallskapet Fauna Fenn., Forhandl. 1: 231. ♀, ♂.

pleuralis var. **clarus** (Frison). B. C., N. W. T., Alaska.
Bremus pleuralis var. *clarus* Frison, 1926. Amer. Ent. Soc., Trans. 52: 139. ♀, ♂, ☿.

sandersoni Franklin. Ont. to Newfoundland, south to Tenn. and N. C.
Bombus vagans sandersoni Franklin, 1913. Amer. Ent. Soc., Trans. 38: 353. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 534-535 (tax. status, redescription).

sitkensis Nylander. Alaska, south to Calif., Idaho, Mont. and Wyo.
Bombus sitkensis Nylander, 1848. Notiser Sallskapet Fauna Fenn., Forhandl. 1: 235. ♀, ♂.
Bombus oregonensis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 185. ♂.
Bombus mixtuosus Ashmead, 1902. Wash. Acad. Sci., Proc. 4: 128. ♀, ☿.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 120-124, fig. 24, map 14 (redescription, geogr. records).

sylvicola Kirby. Alaska east to Newfoundland, south on the principal cordillera of west. U. S. (Cascade, Sierra Nevada, Great Basin and Rocky Mts.) to Calif., Nev., Utah and N. Mex.
Bombus sylvicola Kirby, 1837. Fauna Bor.-Amer., v. 4, p. 272.
Bombus gelidus Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 184. ♀.
Bremus sylvicola var. *sculleni* Frison, 1929. Amer. Ent. Soc., Trans. 55: 108. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 126-130, fig. 26, map 16 (synonymy, redescription, variation, geogr. records). —Thorp, 1962. Pan-Pacific Ent. 38: 21-23 (tax. status, geogr. records, variation in colorational pattern). —Milliron, 1971. Ent. Soc. Canada, Mem. 82: 42 (tax. status). —Loken, 1973. Norsk Ent. Tidsskr. 20: 76 (tax. status).

sylvicola var. **johanseni** Sladen. N. W. T., Baffin Land.
Bombus sylvicola var. *johanseni* Sladen, 1919. Rpt. Canad. Arctic Exped. 1913-18, v. 3, p. 30g. ♀, ☿.

sylvicola var. **lutzi** (Frison). Ariz.
Bremus sylvicola var. *lutzi* Frison, 1923. Amer. Ent. Soc., Trans. 48: 309. ♀.

Taxonomy: Thorp, 1970. Pan-Pacific Ent. 46: 177, 180 (validity of Ariz. record).

ternarius Say. Yukon east to N. S., south to Ga., Mich., Kans., Mont. and B. C. Parasite: *Psithyrus insularis* (Smith).
Bombus ternarius Say, 1837. Boston Jour. Nat. Hist. 1: 414. ♂.
?*Bombus ornatus* Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 398. ♀, ♂, ☿.

Bombus ternarius var. *expallidus* Cockerell, 1916. Mich. Univ. Mus. Zool., Occas. Papers 23: 9. ♀.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 149-150, fig. 30, map 17 (redescription, variation in color of vestiture, geogr. records). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 536-537, table 18 (synonymy, redescription).

Biology: Plath, 1927. Psyche 34: 125 (life history). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 189-190 (hibernation). —Plath, 1934. Bumblebees and their ways, p. 149 (life history). —Craig, 1953. Canad. Ent. 85: 311-312 (parasite).

vagans bolsteri Franklin. Newfoundland.
Bombus bolsteri Franklin, 1913. Amer. Ent. Soc., Trans. 38: 357. ♀, ☿.

vagans vagans Smith. B. C. east to N. S., south to Ga., Tenn., S. Dak., Mont., Idaho and Wash. Parasite: *Brachicoma sarcophagina* (Twns.), *Psithyrus citrinus* (Smith), *Spherularia bombi* Dufour.
Bombus vagans Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 399. ♀.
Bombus consimilis Cresson, 1864. Ent. Soc. Phila., Proc. 3: 41. ♀.
Bremus vagans var. *coctus* Bequaert and Plath, 1925. Mus. Compar. Zool., Bul. 67: 276. ♀, ♂.
Bremus vagans var. *helenae* Frison, 1929. Amer. Ent. Soc., Trans. 55: 110. ♀, ♂.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 104-106, fig. 21, map 14 (redescription, geogr. records). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 537-538 (synonymy, redescription, floral records).

Biology: Plath, 1922. Psyche 29: 197-198 (life history). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 190 (hibernation). —Frison, 1930. Brooklyn Ent. Soc., Bul. 25: 109-122 (life history). —Plath, 1934. Bumblebees and their ways, p. 151 (life history).

Morphology: Heinrich, 1972. Science 175: 185-187, 2 figs. (temperature regulation).

vandykei (Frison). Wash. to south. Calif.
Bremus flavifrons var. *vandykei* Frison, 1927. Calif. Acad. Sci., Proc. (4) 16: 375. ☿.
Pyrobombus (*Pyrobombus*) *cascadensis* Milliron, 1970. Canad. Ent. 102: 382. ♀, ☿. N. syn.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 106-109. ☿, ♀ (tax. characters, tax. status, geogr. records). —Thorp, 1969. Pan-Pacific Ent. 45: 87-96. ♀, ☿, ♂ (tax. status, redescription, key to related spp., geogr. and floral records).

vosnesenskii Radoszkowski. B. C. south to Calif., Nev. (Washoe County); Mexico (Baja California).
Bombus vosnesenskii Radoszkowski, 1862. Soc. Nat. Moscou, Bul. 35: 589. ♀, ♂.
Bombus columbicus Dalla Torre, 1890. Wien. Ent. Ztg. 9: 139.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1089, fig. 254 (larva). —Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 151-155, fig. 31, map 13 (redescription, geogr. records).

Biology: Hicks, 1929. Pan-Pacific Ent. 5: 97-100 (nest).

Morphology: Heinrich, 1972. Nature 239: 223-225 (physiology of brood incubation). —Heinrich, 1974. Jour. Comp. Physiol. 88: 129-140 (brood incubation). —Heinrich, 1974. Kans. Ent. Soc., Jour. 47: 396-404, 3 figs. (pheromone induced brooding-behavior). —Heinrich, 1975. Jour. Comp. Physiol. 96: 155-166, 9 figs. (thermoregulation).

Genus BOMBUS Subgenus ALPINOBOMBUS Skorikov

Alpinobombus Skorikov, 1914. Rev. Russe d'Ent. 14: 122.
Type-species: *Apis alpinus* Linnaeus. Desig. by Frison, 1927.

Members of this subgenus occur in the Alps, Arctic Eurasia and America, Greenland and the principal cordillera of western North America (Rocky Mountains, Cascades, Sierra Nevada Mts. and some of the Great Basin Mts.). Some of the species are circumpolar in distribution and at least one of the species (*Bombus hyperboreus* Schonherr) apparently produces no workers when it usurps the nests of other species.

Taxonomy: Loken, 1973. Norsk Ent. Tidsskr. 20: 94-118, figs. (Scandanavian spp.).

Biology: Hobbs, 1964. Canad. Ent. 96: 1465-1470 (ecology of south. Alta spp.). —Milliron and Oliver, 1966. Canad. Ent. 98: 207-213, 6 figs. (usurpation). —Richards, 1973. Quaest. Ent. 9: 115-157, 29 figs., 10 tables (life history).

balteatus Dahlbom. Holarctic; Arctic Alaska and Canada, south on principal cordillera of west. N. Amer. to Calif. (Sierra Nevada Mts. and White Mts.) and N. Mex. (Truchas Peak), ?Ariz. (Patagonia Mts.).

Bombus balteatus Dahlbom, 1832. Bombi Scand., p. 36. ♀.
Bombus nivalis Dahlbom, 1832. Bombi Scand., p. 40. ♀.
Bombus tricolor Dahlbom, 1832. Bombi Scand., p. 41. ♀.
Bombus kirbiellus Curtis, 1834. Descr. insects brought home by Comdr. James Clark Ross second voyage, App. Nat. Hist., p. 62. ♀, ♂, ☿.
Bombus kirbyellus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 397. Emend.
Bombus putnami Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 185. ♀.
Psithyrus kodiakensis Ashmead, 1902. Wash. Acad. Sci., Proc. 4: 130. ♂.
Bombus kirbyellus var. *pyrrhopygus* Friese, 1902. *In* Romer and Schaudinn's Fauna Arctica 2: 495.
Bombus kirbyellus var. *tristis* Sparre-Schneider *In* Friese, 1902. *In* Romer and Schaudinn's Fauna Arctica 2: 495. Preocc.
Bombus atrifasciatus Morrill, 1903. Canad. Ent. 35: 224. ♀.
Bombus kirbyellus var. *lysholmi* Friese, 1905 (1904). Mus. Zool. Acad. Imp. Sci. St. Petersbourg, Ann. 9: 519.
?Bombus kirbyellus var. *friesei* Skorikov, 1908 (1907). Russ. Ent. Obozr. 7: 111.
Bombus kirbyellus var. *cinctus* Friese, 1911. Deut. Ent. Ztschr. 4: 456. Preocc.
Bombus kirbyellus var. *cinctellus* Friese, 1911. Deut. Ent. Ztschr. 4: 456.
Bombus kirbyellus var. *similis* Friese, 1911. Deut. Ent. Ztschr. 4: 684. N. name.
Alpinobombus kirbyellus appropinquans Skorikov, 1914. Russ. Ent. Obozr. 14: 123.
Alpinobombus kirbyellus var. *subcollaris* Skorikov, 1914. Russ. Ent. Obozr. 14: 123.
Alpinobombus kirbyellus var. *gmelini* Skorikov, 1914. Russ. Ent. Obozr. 14: 124.
Bombus kirbyellus var. *semijaensis* Friese, 1923. *In* Norwegian Exped. Novaya Zemlya 1921, Rpt. Sci. Results, 14: 4.
Bremus kirbyellus var. *alexanderi* Frison, 1923. Amer. Ent. Soc., Trans. 48: 308. ♀.
Bremus kirbyellus var. *arizonensis* Frison, 1923. Amer. Ent. Soc., Trans. 48: 309. ♀.

Taxonomy: Thorp, 1962. Pan-Pacific Ent. 38: 23-24 (tax. characters, geogr. records in Calif.). —Thorp, 1970. Pan-Pacific Ent. 46: 177 (validity of Ariz. records). —Milliron, 1973. Ent. Soc. Canada, Mem. 89: 85-89, 94-107, figs. 8, 9 (synonymy, redescription, geogr. records, as *balteatus, kirbyellus,* and *polaris* in part). —Loken, 1973. Norsk Ent. Tidsskr. 20: 105-114, figs. 26, 69, 70, tables VI-IX (synonymy, tax. characters, tax. status, variation in color of vestiture).

Biology: Hobbs, 1964. Canad. Ent. 96: 1465-1470, 6 figs. (life history). —Loken, 1973. Norsk Ent. Tidsskr. 20: 112-114 (life history).

hyperboreus Schonherr. Holarctic (circumpolar); Arctic Alaska and Canada (Yukon and N. W. T), Greenland. Ecology: Usurps colonies of *Bombus polaris* Curtis, *B. jonellus* (Kirby) and possibly other species either as a casual or a facultative inquiline.

?Apis arctica Quensel *in* Acerbi, 1802. Travels through Sweden, Finland and Lapland to the North Cape in the years 1798 and 1799, v. 2, p. 253, pl. 1, fig. 7.
Bombus hyperboreus Schonherr, 1809. Svenska Vetensk. Akad., Handl. 30: 57. ♀.
Bombus hyperboreus var. *natvigi* Richards, 1931 (1927). Tromso Mus. Arshefter 50, no. 6, p. 9. ♂.
Bombus hyperboreus var. *vulpinus* Friese, 1935. Skr. Svalbard Ishavet 65: 4.
Alpinibombus(!) *hyperboreus eskimo* Skorikov, 1937. Ent. Meddel. 20: 57. ♂.
Alpinibombus(!) *hyperboreus eskimo* mod. *henrikseni* Skorikov, 1937. Ent. Meddel. 20: 57. ♂.

Taxonomy: Richards, 1931 (1927). Tromso Mus. Arshefter 50, no. 6, p. 10 (tax. status). —Milliron, 1973. Ent. Soc. Canada, Mem. 89: 89-94, pl. XII, map 7 (synonymy, redescription, geogr. records). —Loken, 1973. Norsk Ent. Tidsskr. 20: 114-118, figs. 27, 71 (synonymy, nomenclature).

Biology: Milliron and Oliver, 1966. Canad. Ent. 98: 207-213, 6 figs. (nests, nesting habits, usurpation). —Richards, 1973. Quaest. Ent. 9: 115-157, 29 figs., 10 tables (nesting habits, colony development, floral relationships, nest-parasitism, adaptation to arctic environment). —Loken, 1973. Norsk. Ent. Tidsskr. 20: 117-118 (usurpation).

polaris polaris Curtis. Holarctic (circumpolar); Arctic Alaska, Canada, Greenland and parts of Arctic Eurasia. Ecology: Colonies are sometimes usurped by queens of *Bombus hyperboreus* Schonherr. Other subspecies, such as *Bombus polaris diabolicus* Friese, occur in parts of Arctic Eurasia.

Bombus arcticus Kirby, 1821. Account of animals seen by northern expedition within Arctic Circle, p. 216. ♀, ♂. Preocc.

Bombus polaris Curtis, 1834. Descr. insects brought home by Comdr. James Clark Ross second voyage, App. Nat. Hist., p. 62. ♀, ♂.

Bombus Groenlandicus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 393. ♀.

Bombus kincaidii Cockerell, 1898. Ann. and Mag. Nat. Hist. (7) 2: 324. ♀, ♂.

Alpinibombus(!) *arcticus* mod. *natvigioides* Skorikov, 1937. Ent. Meddel. 20: 56, 57. Nomen nudum.

Taxonomy: Yarrow, 1955. Ann. and Mag. Nat. Hist. (12) 8: 152 (tax. status, as *arcticus* var *polaris*). —Milliron, 1973. Ent. Soc. Canada, Mem. 89: 98-107, pl. XII, map 9 (synonymy, redescription, geogr. records, in part, includes *balteatus* in part). —Loken, 1973. Norsk Ent. Tidsskr. 20: 101-104, figs. 25, 68 (tax. status, nomenclature, synonymy, geogr. range, as *arcticus*).

Biology: Milliron and Oliver, 1966. Canad. Ent. 98: 207-213, 6 figs. (nest, nesting habits, usurpation). —Richards, 1973. Quaest. Ent. 9: 115-157, 29 figs., 10 tables (nesting habits, artificial domiciles, colony development, floral relationships, usurpation, adaptation to arctic environment). —Loken, 1973. Norsk Ent. Tidsskr. 20: 104 (nests).

strenuus Cresson. Alaska, Yukon, N. W. T., south to B. C., ?Alta.

Bombus strenuus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 102. ♀, ♂.

Bombus neoboreus Sladen, 1919. Rpt. Canad. Arctic Exped. 1913-18, v. 3, p. 28g. ♀, ♂, ☿.

Bombus (*Alpinobombus*) *hyperboreus clydensis* Yarrow, 1955. Ann. and Mag. Nat. Hist. (12) 8: 150. ♀, ♂.

Taxonomy: Milliron, 1973. Ent. Soc. Canada, Mem. 89: 108-111, pl. XII, map 10 (synonymy, redescription, geogr. records).

Genus BOMBUS Subgenus SUBTERRANEOBOMBUS Vogt

Bombus subg. *Subterraneobombus* Vogt, 1911. Gesell. Naturf. Freunde, Sitzber., p. 62. Type-species: *Apis subterraneus* Linnaeus. Desig. by Frison, 1927.

Species of this subgenus occur in Eurasia as far south as the Himalayas and also are found in western North America north of Mexico.

Biology: Hobbs, 1966. Canad. Ent. 98: 288-294 (ecology of south. Alta. spp.).

appositus Cresson. B. C. east to Sask., south to N. Mex., Ariz. and Calif. (Cascades and Sierra Nevada Mts.). Parasite: *Melittobia chalybii* Ashm., *Physocephala texana* (Will.), *Psithyrus fernaldae* Franklin, *P. insularis* (Sm.), *P. suckleyi* (Greene).

Bombus appositus Cresson, 1878. Acad. Nat. Sci. Phila., Proc. p. 183. ♀, ♂, ☿.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 22-26, fig. 6, map 1 (redescription, color variation of vestiture, geogr. records). —Milliron, 1973. Ent. Soc. Canada, Mem. 89: 113-117, pl. XII, map 11 (redescription, geogr. records).

borealis Kirby. South. Canada from N. S. to Alta. and north. U. S. from Maine to N. J., west to N. D. and S. Dak.

Bombus borealis Kirby, 1837. Fauna Bor.-Amer., v. 4, p. 272.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 522-523, fig. 130, table 18 (redescription, geogr. range). —Milliron, 1973. Ent. Soc. Canada, Mem. 89: 117-120, pl. 12, map 12 (redescription, geogr. records).

Biology: Plath, 1922. Psyche 29: 193-194 (life history). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 189 (hibernation).

Taxonomy: Plath, 1934. Bumblebees and their ways, p. 160 (life history).

Genus BOMBUS Subgenus FERVIDOBOMBUS Skorikov

Fervidobombus Skorikov, 1922. Sta. Region. Protect. Plantes, Petrograd Bul. 4: 153.
Type-species: *Apis fervida* Fabricius. Desig. by Frison, 1927.

This subgenus is found only in the New World and contains representatives in North and South America.

Biology: Hobbs, 1966. Canad. Ent. 98: 33-39 (ecology of south. Alta. spp.).

californicus Smith. B. C. and Alta., south to Calif., Ariz. and N. Mex.; Mexico (Baja California and Sonora). Parasite: *Psithyrus insularis* (Sm.), *P. suckleyi* (Greene).
Bombus californicus Smith, 1854. Cat. Hym. Brit. Mus., v. 2. p. 400. ♀.
Bombus dubius Cresson, 1863. Ent. Soc. Phila., Proc. 2: 97. ♀.
Bombus consanguineus Handlirsch, 1888. K. K. Naturhist. Hofmus., Ann. 3: 239. ♀, ♂, ☿.
Bombus neglectulus Ashmead, 1902. Wash. Acad. Sci., Proc. 4: 124. ♀, ☿.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 32-39, figs. 2, 8, map 3 (redescription, variation in color patterns, geogr. records, as *californicus californicus* and *c. consanguineus*). —Milliron, 1973. Ent. Soc. Canada, Mem. 89: 155-160, map 17 (tax. status, synonymy, redescription, geogr. records, as *fervidus californicus*).

fervidus fervidus (Fabricius). Que. and N. B. south to Ga., west to B. C., Wash., Oreg. and Calif.; Mexico (Chihuahua). Parasite: *Brachicoma sarcophagina* (Twns.), *Melittobia chalybii* Ashm., *Spherularia bombi* Dufour. Predator: *Philanthus bicinctus* (Mickel). Another subspecies, *Bombus fervidus sonomae* Howard, occurs in Mexico.
Apis fervida Fabricius, 1798. Sup. Ent. System., p. 274. ♀.
Apis alata Fabricius, 1798. Sup. Ent. System., p. 274.
Bombus elatus Fabricius, 1804. Systema Piezatorum, p. 352. Emend.
Bombus fervidus var. *dorsalis* Cresson, 1879. Amer. Ent. Soc., Trans. 7: 230. ♀.
Bombus nevadensis race *aztecus* Cockerell, 1899. Ann. and Mag. Nat. Hist. (7) 4: 389. ♀.
Bombus fervidus var. *umbraticollis* Friese, 1931. Konowia 10: 301.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 27-32, figs. 2, 7, map 2 (redescription, variation in color patterns, geogr. records). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 523-524, fig. 130, table 18 (redescription, geogr. range, floral records). —Medler, 1965. XIIth Internatl. Congr. Ent., Proc. 1964: 388-389 (size variation in worker caste). —Milliron, 1973 Ent. Soc. Canada, Mem. 89: 147-155, pl. XIII, map 16 (synonymy, tax. status, redescription, geogr. and floral records).

Biology: Fairchild and Barrett, 1906. Ent. Soc. Wash., Proc. 8: 13-14, 1 pl. (copulation). —Plath, 1922. Psyche 29: 180-187 (defense). —Plath, 1922. Psyche 29: 198-200 (life history). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 191 (hibernation). —Bequaert, 1932. Brooklyn Ent. Soc., Bul. 27: 151 (arboreal nest). —Plath, 1934. Bumblebees and their ways, p. 166 (life history, parasite). —Townsend, 1936. Ent. Soc. Wash., Proc. 38: 92-98 (parasite). —Armitage, 1965. Kans. Ent. Soc., Jour. 38: 97 (predator). —Milliron, 1967. Canad. Ent. 99: 1321-1332 (artificially induced hibernation).

pennsylvanicus pennsylvanicus (Degeer). Que. and Ont., south to Fla., west to Minn., S. Dak., Nebr., Colo. and N. Mex.; Mexico and possibly Central America. Parasite: *Brachicoma sarcophagina* (Twns.), *Physocephala sagittaria* (Say), *Psithyrus insularis* (Sm.), *P. variabilis* (Cress.), *Spherularia bombi* Dufour. Predator: *Mallophora bomboides* (Wied.).
Apis pensylvanica Degeer, 1773. Mem. Serv. Hist. des Ins., v. 3, p. 575. ♀.
Apis americanorum Fabricius, 1775. Systema Ent., p. 380.
Apis antignensis Fabricius, 1775. Systema Ent., p. 380. ♀.
?Apis nidulans Fabricius, 1798. Sup. Ent. System., p. 274. ♂.
Bombus pallidus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 92. ♀.
Bombus pennsylvanicus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 94. Emend.
Psithyrus cevalliae Cockerell, 1899. Entomologist 32: 157. ♂.
Bombus americana Howard, 1901. The insect book, pl. 1, figs. 30, 31. *Lapsus calami.*
Bombus titusi Ashmead, 1902. Ent. News 13: 50. ♂.
Bombus pennsylvanicus var. *umbratus* Friese, 1931. Konowia 10: 301.

Taxonomy: Michener, 1953. Kans. Univ. Sci. Bul. 35: 1087, figs. 248-253 (larva, as *americanorum*). —Moure, 1960. Studia Ent. 3: 151-152 (synonymy, notes on type of *antiguensis*). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 524-526, figs. 130, 131, table 18 (synonymy, redescription, geogr. range, floral records). —Milliron, 1973. Ent. Soc. Canada, Mem. 89: 190-196, pl. XIII, map 25 (synonymy, tax. status, redescription, geogr. and floral records).

Biology: Frison, 1921. Canad. Ent. 53: 100 (parasite). —Rau, 1922. Acad. Sci. St. Louis, Trans. 24: 40 (life history). —Rau, 1924. Ent. Soc. Amer., Ann. 17: 368-381 (hibernation, as *americanorum*). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 190 (hibernation, as *americanorum*). —Frison, 1930. Ent. Soc. Amer., Ann. 23: 644-665 (life history, as *americanorum*). —Rau, 1934. Acad. Sci. St. Louis, Trans. 28: 223 (life history, as *americanorum*). —Plath, 1934. Bumblebees and their ways, p. 163 (life history, as *americanorum*). —Rau, 1937. Brooklyn Ent. Soc., Bul. 32: 61 (nest-founding, as *americanorum*). —Brower, Brower and Westcott, 1960. Amer. Nat. 94: 343-355 (mimicry experimentation, as *americanorum*). —Milliron, 1967. Canad. Ent. 99: 1330-1331 (hibernation).

pennsylvanicus sonorus Say. Tex., west to Calif.; Mexico. Parasite: *Physocephala burgessi* (Will.), *P. texana* (Will.).
Bombus sonorus Say, 1837. Boston Jour. Nat. Hist. 1: 413. ♀.
Bombus sonorus flavodorsalis Franklin, 1913. Amer. Ent. Soc., Trans. 38: 409. ♀, ☿.

Taxonomy: Stephen, 1957. Oreg. Agr. Expt. Sta. Tech. Bul. 40: 40-43, fig. 9, map. 4 (synonymy, redescription, geogr. records, as *sonorus*). —Milliron, 1973. Ent. Soc. Canada, Mem. 89: 196-201, map 26 (tax. status, redescription, geogr. and floral records).

Biology: Ryckman, 1953. Pan-Pacific Ent. 29: 144 (parasite). —Hurd and Linsley, 1975. Smithsn. Contrib. Zool. 193: 48 (floral relationships).

Unplaced Taxon in Bombus

Bombus praticola Kirby, 1837. Fauna Bor.-Amer., v. 4, p. 274. This may be the correct name for *Bombus pleuralis* Nylander.

Genus PSITHYRUS Lepeletier

Psithyrus Lepeletier, 1832. Soc. Ent. France, Ann. 1: 372.
Type-species: *Apis rupestris* Fabricius. Desig. by Curtis, 1833.
Apathus Newman, 1835. Ent. Mag. 2: 404, footnote.
Type-species: *Apis rupestris* Fabricius. Autobasic with *Psithyrus;* name proposed to replace *Psithyrus,* thought to be preoccupied by *Psithyros* Hubner, 1819.
Psithyrus subg. *Ashtonipsithyrus* Frison, 1927. Amer. Ent. Soc., Trans. 53: 69.
Type-species: *Apathus ashtoni* Cresson. Orig. desig.
Psithyrus subg. *Fernaldaepsithyrus* Frison, 1927. Amer. Ent. Soc., Trans. 53: 70.
Type-species: *Psithyrus fernaldae* Franklin. Orig. desig.
Psithyrus subg. *Eopsithyrus* Popov, 1931. Eos 7: 134.
Type-species: *Psithyrus tibetanus* (Morawitz). Orig. desig.
Psithyrus subg. *Metapsithyrus* Popov, 1931. Eos 7: 135.
Type-species: *Psithyrus campestris* (Panzer). Orig. desig.
Psithyrus subg. *Allopsithyrus* Popov, 1931. Eos 7: 136.
Type-species: *Psithyrus barbatellus* (Kirby). Orig. desig.
Psithyrus subg. *Ceratopsithyrus* Pittioni, 1949. Eos 25: 271.
Type-species: *Psithyrus klapperichi* Pittioni. Orig. desig. and Monotypic.

The genus *Psithyrus* contains a few species of obligate social parasites on the members of the genus *Bombus.* They closely resemble the species of *Bombus,* but lack the worker caste, and the queens lack pollen-collecting baskets on the hind legs.

Taxonomy: Frison, 1919. Ill. State Acad. Sci., Trans. 12: 157-165 (Ill. spp.). —Frison, 1923. Amer. Ent. Soc., Trans. 48: 307-326 (synonymy, tax. characters, geogr. records). —Frison, 1926. Amer. Ent. Soc., Trans. 52: 129-145 (synonymy, tax. characters, geogr. records). —Frison, 1927. Amer. Ent. Soc., Trans. 53: 51-78, pls. XVI-XVII (systematic relationships

of spp. in America north of Mexico). —Milliron, 1961. Kans. Ent. Soc., Jour. 34: 59-60 (subgeneric synonymy). —Medler, 1962. Canad. Ent. 94: 444-447, 1 fig., 3 tables (morphometric study). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 538-544, fig. 134, table 18 (east. U. S. spp.).

Biology: Sladen, 1899. Ent. Monthly Mag. 35: 230-234 (habits, host). —Sladen, 1915. Canad. Ent. 47: 84 (habits, host). —Frison, 1921. Canad. Ent. 53: 100-101 (hosts). Plath, 1922. Biol. Bul. 43: 23-44, pl. I (life history, hosts). Frison, 1926. Ent. Soc. Amer., Ann. 19: 205-221, pl. XVII, fig. 3b (life history, hosts).
—Plath, 1927. Brooklyn Ent. Soc., 22: 121-125 (life history, enemy of *Apis mellifera*).
—Plath, 1934. Bumblebees and their ways, 201 pp., New York, Macmillan (life history, hosts).

ashtoni (Cresson). P. E. I. west to Sask., south to N. Dak., Minn., Wis., Mich., Ohio, W. Va. and Va. Host: *Bombus affinis* Sm., *B. terricola* Kby.
Apathus ashtoni Cresson, 1864. Ent. Soc. Phila., Proc. 3: 42. ♀.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 539-540, table 18 (redescription).

Biology: Plath, 1922. Psyche, 29: 191 (hibernation, hosts). —Plath, 1934. Bumblebees and their ways, p. 169 (habits, hosts).

citrinus (Smith). P. E. I. and N. B., south to Fla. and Ala., west to S. Dak. and N. Dak. Host: *Bombus impatiens* (Cr.), *B. nevadensis auricomus* (Robt.), *B. vagans* (Sm.); also occasionally attempts to invade hives of *Apis mellifera* Linn. For years *Psithyrus laboriosus* (Fabricius) was considered to be the correct name for this species; however, an examination of the type specimen (see Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 333) has demonstrated that *laboriosus* is a member of the genus *Emphoropsis* in the Anthophoridae.
Apathus citrinus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 385. ♂.
Apathus contiguus Cresson, 1863. Ent. Soc. Phila., Proc. 2: 112. ♂.

Taxonomy: Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 540-541, table 18 (redescription).

Biology: Frison, 1921. Canad. Ent. 53: 100-101 (habits, hosts, as *laboriosus*). —Bequaert and Plath, 1925. Mus. Compar. Zool., Bul. 67: 268-272 (life history, host, as *laboriosus*).
—Plath, 1927. Ent. Soc. Amer., Ann. 20: 191 (hibernation, as *laboriosus*). —Plath, 1927. Brooklyn Ent. Soc., Bul. 29: 121-125 (inquiline in hives of *Apis mellifera* Linn.). —Plath, 1934. Bumblebees and their ways, p. 175 (hosts, habits).

fernaldae Franklin. Alaska and Canada, south to N. C. and Tenn. in east. U. S. and Colo. and Calif. in west. U. S. Host: *Bombus appositus* Cress., *B. perplexus* Cress.?, *B. rufocinctus* Cress., *B. terricola occidentalis* Greene.
Psithyrus fernaldae Franklin, 1911. Amer. Ent. Soc., Trans. 37: 164. ♀.
Psithyrus tricolor Franklin, 1911. Amer. Ent. Soc., Trans. 37: 167. ♂.
Psithyrus wheeleri Bequaert and Plath, 1925. Mus. Compar. Zool., Bul. 67: 265. ♀, ♂.

Taxonomy: Frison, 1923. Amer. Ent. Soc., Trans. 48: 321 (synonymy). —Frison, 1926. Amer. Ent. Soc., Trans. 52: 145 (tax. status of *wheeleri*). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 541-542, fig. 134, table 18 (redescription).

Biology: Plath, 1927. Ent. Soc. Amer., Ann. 20: 191 (hibernation). —Plath, 1934. Bumblebees and their ways, p. 171 (habits, hosts).

Morphology: Milliron, 1961. Brooklyn Ent. Soc., Bul. 55: 109-113, 2 figs. (gynandromorph).

insularis (Smith). Canada, south to Calif., Ariz. (Oak Creek Canyon), N. Mex., Nebr. (Sioux County), N. Y. (Ithaca) and N. H. (Durham), ?Alaska (Berg Bay). Host: *Bombus appositus* Cress., *B. bifarius nearcticus* Handlirsch, *B. californicus* Sm., *B. flavifrons* Cress., *B. nevadensis nevadensis* Cress., *B. pennsylvanicus* (DeG.), *B. rufocinctus* Cress., *B. ternarius* Say, *B. terricola occidentalis* Greene, *B. t. terricola* Kby.
Bombus interruptus Greene, 1858. Lyc. Nat. Hist. N. Y., Ann. 7: 11. ♀. Preocc.
Apathus insularis Smith, 1861. Jour. of Ent. 1: 155. ♀.

Psithyrus consultus Franklin, 1913. Amer. Ent. Soc., Trans. 38: 459. ♂.
Psithyrus crawfordi Franklin, 1913. Amer. Ent. Soc., Trans. 38: 464. ♀, ♂.

Taxonomy: Frison, 1923. Amer. Ent. Soc., Trans. 48: 321-322 (synonymy). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 542-543, table 18 (redescription).

Biology: Sladen, 1915. Canad. Ent. 47: 84 (host). —Plath, 1927. Ent. Soc. Amer., Ann. 20: 191 (hibernation, host). —Plath, 1934. Bumblebees and their ways, p. 173 (life history, hosts). —Craig, 1953. Canad. Ent. 85: 311-312 (host).

suckleyi (Greene). Alaska, south to Calif., Utah and Colo. Host: *Bombus appositus* Cress., *B. californicus* Sm., *B. nevadensis nevadensis* Cress., *B. rufocinctus* Cress., *B. terricola occidentalis* Greene, *B. t. terricola* Kby.
Bombus suckleyi Greene, 1860. Lyc. Nat. Hist. N. Y., Ann. 7: 169. ♂.
Psithyrus latitarsus Morrill, 1903. Canad. Ent. 35: 224. ♀.

Taxonomy: Frison. 1926. Amer. Ent. Soc., Trans. 52: 144 (synonymy).

variabilis (Cresson). Ohio south to Fla., west to N. Dak., S. Dak., Nebr. Kan., Okla., Tex. and N. Mex.; Mexico (Orizaba). Host: *Bombus pennsylvanicus* (Deg.).
Apathus variabilis Cresson, 1872. Amer. Ent. Soc., Trans. 4: 284. ♀, ♂.
Psithyrus bicolor Franklin, 1913. Amer. Ent. Soc., Trans. 38: 460. ♀.

Taxonomy: Frison, 1923. Amer. Ent. Soc., Trans. 48: 322 (synonymy). —Mitchell, 1962. N. C. Agr. Expt. Sta. Tech. Bul. 152: 543-544, fig. 134, table 18 (redescription).

Biology: Frison, 1916. Brooklyn Ent. Soc., Bul. 11: 46-47 (habits, host). —Frison, 1921. Canad. Ent. 53: 100 (host). —Webb, 1961. North Central Branch, Ent. Soc. Amer., Proc. 16: 16 (habits).

Subfamily APINAE

The subfamily contains two tribes, the Meliponini and the Apini of which only the latter is represented in America north of Mexico by the introduced European honeybee. The members of this subfamily are all highly eusocial and live in perennial colonies.

Tribe APINI

The tribe includes only the genus *Apis* which prior to the activities of man was indigenous to Africa, Eurasia, Japan, Formosa, the Philippines and Indonesia. One of its species, the common honeybee (*Apis mellifera* Linnaeus) has been successfully introduced into the Western Hemisphere and many areas of the Old World beyond its original range (Africa, Europe, and western Asia).

Taxonomy: Maa, 1953. Treubia 21: 525-640 (classification). —Ruttner, 1968. *In* Chauvin, Traite de biologie de l'abeille, Paris, Masson et cie 1: 27-44 (review of included spp. and races).

Biology: Michener, 1974. The Social Behavior of the Bees, chapter 30: 347-366 (natural history).

Morphology: Cruz-Landim, 1974. N. Y. Ent. Soc., Jour. 71: 2-31 (evolution of wax and scent glands).

Genus APIS Linnaeus

Apis Linnaeus, 1758. Syst. Nat., Ed. 10, p. 343.
Type-species: *Apis mellifera* Linnaeus. Desig. by Latreille, 1810. (=*Apis mellifica* Linnaeus).
Apicula Rafinesque, 1814. Principles fondamentaux de somiologie, Palermo, p. 29. N. name, proposed unnecessarily to replace *Apis* Linnaeus.
Apiarus Rafinesque, 1815. Analyse Nature ou Tabl. Univers, Palermo, p. 123. N. name, proposed unnecessarily to replace *Apis* Linnaeus.
Megapis Ashmead, 1904. Ent. Soc. Wash., Proc. 6: 120.
Type-species: *Apis dorsata* Fabricius. Orig. desig.
Micrapis Ashmead, 1904. Ent. Soc. Wash., Proc. 6: 122.

Type-species: *Apis florea* Fabricius. Monotypic and orig. desig.

Sigmatapis Maa, 1953. Treubia 21: 556.

Type-species: *Apis cerana* Fabricius. Orig. desig.

mellifera Linnaeus. Worldwide. Introduced in Western Hemisphere. Represented in the Old World by numerous subspecies, several of which have been introduced into North America with the result that much interbreeding has occurred among them. The escaped bees of the woodlands are largely *A. mellifera mellifera* (German bee) while the beekeepers' bees are largely *A. mellifera ligustica* (Italian bee). *A. mellifera remipes* (Caucasian bee) is also utilized by some beekeepers. For convenience these forms are listed below in the synonymy.

Apis mellifera Linnaeus, 1758. Syst. Nat., Ed. 10, p. 576.

Apis mellifica Linnaeus, 1761. Fauna Suecica, Ed. 2, p. 421. N. name, proposed unnecessarily to replace *mellifera*.

Apis mellifica var. *Ligustica* Spinola, 1806. Insectorum Liguriae, v. 1, p. 35.

Apis mellifica var. *remipes* Gerstaecker, 1862. Geog. Verbr. d. Honigbiene, p. 61.

Taxonomy: Alpatov, 1929. Quart. Rev. Biol. 4: 1-58 (biometric studies). —Michener, 1953. Kans. Univ. Sci. Bul. 35: 1094, figs. 275-280 (larva). —Torchio and Torchio, 1975. Utah State Agr. Expt. Sta., Research Rpt. 20: 1-36, 78 figs. (larvae).

Biology: Buttel-Reepen, 1903. Die stammesgeschichtliche Entstehung des Bienenstaates, 167 pp., Leipzig, G. Thieme. —Buttel-Reepen, 1915. Leben und Wesen der Bienen, 300 pp., Braunschweig, Vieweg und Sohn. —Philip and Vansell, 1932. Calif. Agr. Expt. Sta., Circ. 62: 1-27 (pollination of deciduous fruits). —Butler, 1949. The honeybee, 436 pp., Oxford, Clarendon Press. —Percival, 1950. New Phytol. 49: 40-63 (pollen collection). —Frisch, 1950. Bees, their vision, chemical senses and language, 119 pp., Ithaca, New York, Cornell Univ. Press. —Wykes, 1952. Jour. Expt. Biol. 29: 511-519 (nectar preferences). —Frisch, 1953. Aus dem Leben der Bienen, 180 pp., Revised ed., Berlin, Springer-Verlag. —Ribbands, 1953. The Behavior and Social Life of Honeybees, 352 pp., Bee Research Assn. Ltd. (republished in 1964, by Dover Publ., Inc., New York). —Butler, 1954. The World of the Honeybee, 226 pp., London, Collins. —Frisch, 1955. The Dancing Bees, 183 pp., New York, Harcourt, Brace and Co. —Smith, 1960. Beekeeping in the tropics, 265 pp., London, Longmans. —Lindauer, 1961. Communication among social bees, 143 pp., Cambridge, Massachusetts, Harvard Univ. Press. —Singh, 1962. Beekeeping in India, 275 pp., New Delhi, India Council of Agr. Research. —Grout, 1963. The hive and the honeybee, 652 pp., Revised, Hamilton, Illinois, Dadant and Sons. —Zander, 1964. Das Leben der bienen, (Handbook der Bienenkunde, vol. 4), 6th edition, Stuttgart, K. Weiss. —Frisch, 1965. Tanzsprache und Orientierung der Bienen, 566 pp., Berlin, Springer-Verlag. (republished in 1967 in English by Belknap Press, Harvard University Press). —Ordetx and Espina, 1966. La apicultura en las tropicos, 412 pp., Mexico City, B. Trucco. —Frisch, 1967. The dance language and orientation of bees, 566 pp., Cambridge, Massachusetts, Harvard Univ. Press. —Chauvin, 1968. Traite de biologie de l'abeille, vols. I-V, Paris, Masson et Cie. —Wenner, 1971. The bee language controversy, 109 pp., Educational Programs Improvement Corporation, Boulder, Colo. —Michener, 1975. Ann. Rev. Ent. 20: 399-416 (Brazilian bee problem). —Edrich, 1977. Anim. Behaviour 25: 342-363 (interaction of light and gravity in the orientation of the waggle dance).

Morphology: Stellwaag, 1910. Ztschr. Wiss. Zool. 95: 518-550, 6 figs., 2 pls. (structure and mechanics of flight apparatus). —Frisch, 1915. Zool. Jahrb. abt. Zool. Physiol. 35: 1-182 (form and color senses). —Snodgrass, 1925. Anatomy and Physiology of the honeybee, 327 pp., New York, McGraw Hill Co. —Kuhn, 1927. Ztschr. Vergleich. Physiol. 5: 762-800 (color vision). —Trojan, 1930. Ztschr. Morph. Okol. Tiere 19: 678-685 (Dufour's gland). —Hertz, 1939. Jour. Expt. Biol. 16: 1-8 (color vision). —Snodgrass, 1942. Smithsn. Misc. Coll. 103: 1-120, 32 figs. (skeleto-muscular mechanisms). —Snodgrass, 1956. Anatomy of the honeybee, 334 pp., Ithaca, New York, Cornell Univ. Press. —Simpson, 1960. Jour. Ins. Physiol. 4: 107-121 (function of salivary glands). —Barbier and Lederer, 1960. Acad. Sci. Paris, Compt. Rend. 250: 4467-4469 (chemical structure of royal jelly). —Barbier, Lederer and Nomura, 1960. Acad. Sci. Paris, Compt. Rend. 251: 1133-1135 (synthesis of substances in royal jelly). —Barbier and Pain, 1960. Acad. Sci. Paris, Compt. Rend. 250: 3740

(mandibular gland secretions). —Daly, 1964. Calif. Univ. Pubs. Ent. 39: 1-77, 54 figs. (skeleto-muscular morphogenesis of thorax and wings). —Youseff, 1971. Smithsn. Contrib. Zool. 99: 1-54, 10 figs., 5 tables (topography of cephalic musculature and nervous system). —Cruz-Landim, 1974. Brasil. Biol., Rev. 34: 105-113, 5 figs. (cardiac musculature). —Cruz-Landim, 1975. Ciencia e Cultura 27: 278, 3 figs., 2 tables (extracellular crystals).

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