131. CURCULIONIDAE Latreille 1802

by Robert S. Anderson

Family common name: The weevils or snout beetles

Weevils are one of the most diverse groups of organisms. Over 60,000 species have been described world wide and their diversity in North America is challenged among beetles perhaps only by Staphylinidae. Weevils are associated with virtually all kinds of plants and plant parts. Most feed on living plants but some are saprophagous. Weevils are immediately recognizable by their elongate rostrum (or snout), with mouthparts situated at the apex, geniculate antennae and compact antennal club. Some weevils in the subfamilies Entiminae, Cossoninae and Scolytinae have the rostrum reduced in form and not markedly produced anteriorly. Traditional considerations of the weevils do not include Scolytinae and Platypodinae but increasing evidence suggests these beetles are derived from within Curculionidae.

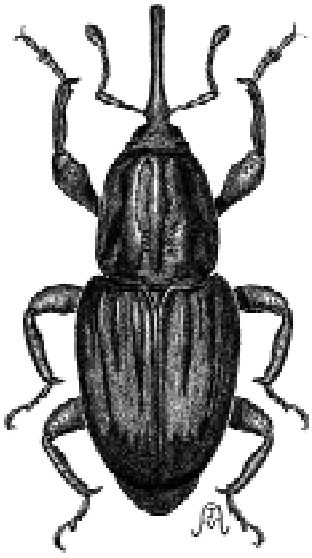

FIGURE 1.131. *Sphenophorus pertinax* (Olivier)

Description (based on Lawrence 1982): Shape very variable, broadly oval to elongate, slightly flattened to markedly convex, most covered with recumbent or appressed vestiture of scales, some with metallic sheen or forming contrasting patterns, some subglabrous or with erect or suberect hairs only; length from 1-40 mm (most 2-20 mm); color variable, typically black or dark brown, more rarely of other colors.

Eyes present, may be reduced or absent. Rostrum varying from very short and indistinct to very long and narrow; most sexually dimorphic with female rostrum longer, finer and with position of antennal insertion more basal. Antennae geniculate (very few exceptions where scape is very short and position of antennal insertion on rostrum is basal); club of three articles (sometimes with one), compact, in some the apical articles recessed in glabrous basal article; funicle of 5-7 articles, slender; point of antennal insertion on rostrum is various, mostly between midlength and apex, mostly lateral but in some, dorsal. Mandibles of some bearing a scar at apex or deciduous process. Maxillae in some concealed by expanded mentum, a few with distinct galea and lacinia. Labial palpi of one or two articles, rarely absent; in some weevils palpi inserted in cavities on the ventral surface of the prementum. Proventriculus of some lacking sclerotized plates. Front coxae contiguous or separated, middle and hind coxae variable. Tarsi of 5 articles but article 4 very small and hidden between lobes of article 3 (exception, Raymondionyminae with only 4 articles); tarsal claws of some connate and simple or with a basal process or tooth. Abdomen with first two ventrites connate, very rarely free. Pygydium formed by tergite VII or VIII, in most concealed beneath apex of elytra, exposed and/or sulcate in some. Cap piece of tegmen may be reduced and may or may not be bilobed, occasionally absent; aedeagus with a trough-like ventral plate and membranous dorsally; in some aedeagus with separate pedon and tectum.

Larvae (based on Lawrence 1982) subcylindrical, slightly curved; lightly sclerotized and grublike; usually with very fine hairs. Head hypognathous and free, rarely retracted into prothorax. Frontal arms "v-shaped" and not reaching mandibular articulations, endocarina usually present. Stemmata absent in most. Antennae of 1 or 2 articles and apical article sometimes a conical sensorium. Frontoclypeal suture present. Labrum free, usually with 4 pairs of setae. Maxillae with galea and lacinia fused to form mala, maxillary palpi usually of 2 articles. Labial palpi of 1 or rarely, and indistinctly, of 2 articles. Abdominal tergites usually with 3 or 4 transverse plicae. Thoracic spiracles found on the prothorax or between prothorax and mesothorax. Legs absent.

Habits and habitats. The habits and habitats of Scolytinae, long treated as a separate family, are summarized under that subfamily heading.

Weevils can be found associated with just about any kind of plant in any terrestrial or freshwater habitat. Most species are strictly phytophagous as adults and larvae and usually have a narrow range of suitable host plants. Most species are associated with angiosperms but a few are associated with gymnosperms, mainly the various conifers in the Pinaceae. Adult and larval feeding habits vary extensively but can loosely be classified into two groups: one in which both adults and larvae are polyphagous

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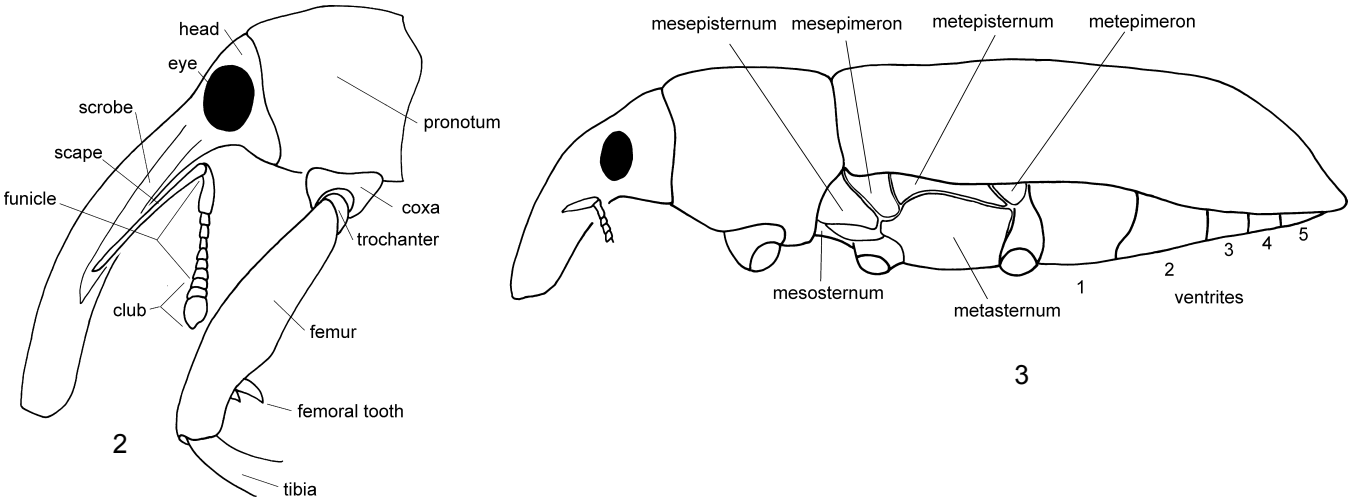


FIGURES 2.131-3.131. 2. Lateral view of a generalized curculionid head; schematic; 3. Lateral habitus of a generalized curculionid; schematic (both after Kissinger 1964)

(Entiminae), and one in which adults and larvae have a more restricted range of host plants (other subfamilies). Among the polyphagous species, the larvae feed externally in the soil on roots whereas the adults feed generally on foliage. Species with more restricted ranges of hosts usually feed little as adults (often visiting flowers) or feed on foliage or reproductive structures, and their larvae feed internally in the stems, roots, leaves or reproductive structures of a few congeric or confamilial plant taxa. Some weevil larvae in the Hyperinae and Ceutorhynchinae feed externally on foliage and reproductive structures. Pupation usually takes place in the host plant or in the soil but species of *Hypera* and *Cionus* construct a loosely woven cocoon that is attached to the host plant.

Adults of some weevil species (Raymondionyminae and Molytinae) have reduced eyes or are eyeless and live in the soil or leaf litter. Some weevil species in the Conoderinae, Cossoninae, Cryptorhynchinae and Molytinae feed in dead plant material, usually wood. Some species appear to live in association with ants, although this appears an obligate relationship only for *Liometophilus* (Cryptorhynchinae). Some species of Entiminae are parthenogenetic. Most Entiminae as well as some Cryptorhynchinae and Molytinae are flightless.

Curculionidae are a very important group economically. Some species are serious pests of ornamental, agricultural and forestry plants and have well-known common names (e.g., boll weevil, white pine weevil, strawberry root weevil, black vine weevil, etc.). Recently, species have become increasingly used in the biological control of introduced pest plants (e.g., *Neochetina*, *Hylobius*, *Cyphocleonus*, *Eustenopus*, etc.) particularly in western North American grasslands and southeastern aquatic habitats (O'Brien 1995). An excellent review of the biology of Anthonomini is by Burke (1976).

Some subfamilies as Erirhininae, Bagoinae, Cyclominae and Ceutorhynchinae have a number of genera and species associated with freshwater macrophytes. Many of these species are very good swimmers (Morris 1995) and adults spend most of their time in or near water. Most of these taxa are best found at night when adults come up onto the plants to feed. A few weevils are found in intertidal situations (e.g., many Cossoninae, *Emphyastes*, and *Thalasselephas*) where they develop in driftwood or seaweed. There are many weevils in arid habitats such as deserts (Entiminae) and grasslands (Baridinae and Ceutorhynchinae), likely because of their associations with the plants that dominate those habitats. A great number of weevils that have immigrated to North America from Europe are likely associated with imported ornamental plants or amongst ballast brought by ships at the turn of the 19th century.

Various groups of weevils are also common as Quaternary fossils in northern North America and are important in reconstructing the late Cenozoic history of northern habitats (Matthews 1982).

Obviously a more complete summary of the natural history of Curculionidae is beyond the scope of these few notes.

Status of the classification. The classification of the weevils was regarded by Crowson in 1955 as the last great problem to be clarified within the Coleoptera. While there have been many advances in the classification, much still remains to be resolved. The classification used herein largely is that of Alonso-Zarazaga and Lyal (1999) with a few changes in placement and ranking of certain taxa. A total of 18 subfamilies are recognized. Lawrence and Newton (1995), the classification at the family level adopted for this book, recognize only 6 subfamilies within Curculionidae, demoting many subfamilies to tribes within their Curculioninae. They also refer to the Entiminae as Brachycerinae although the constitution remains basically the same. They recognize Dryophthorinae as a separate family but not Raymondionyminae and Erirhininae, all three of which are recognized as families in the classifications of Thompson (1992) and Alonso-Zarazaga and Lyal (1999). These authors consider these as having family level status because they do not share the same derived male genitalic structure as the Curculionidae *sensu stricto*. Herein all are considered subfamilies within Curculionidae. The classification

of Kuschel (1995) is very similar to that of Lawrence and Newton (1995) but includes Ithyceridae within the subfamily Brachycerinae of Curculionidae.

Catalogs are available for some groups of Curculionidae in North America (*e.g.*, Howden 1993; O'Brien 1986, 1989, 1996, 1997) and an annotated checklist (and supplements) with full synonyms, information about keys, and distributions has been published (O'Brien and Wibmer 1982, 1984; Wibmer and O'Brien 1989). A review of the state of knowledge about immatures is by Burke and Anderson (1976). Excellent (but outdated) regional works to the species level are those of Hatch (1971) for the Pacific Northwest and Downie and Arnett (1996) for northeastern North America. Blatchley and Leng (1916) remains an old standard. Many of the keys used herein are modified from Kissinger (1964).

Distribution. Curculionids are found just about everywhere in North America. Diversity is greatest in the southern United States but no recent regional counts are available. The last tabulation for the Nearctic Region as a whole was in 1978 by O'Brien and Wibmer who counted 239 genera and 2388 species. Bousquet (1991) recorded almost 700 species in Canada and Alaska. Anderson (1993a) counted 249 species in 115 genera in extreme southern Florida alone. Many recent additions to the fauna are the result of deliberate introductions for biological control purposes but also, a number of taxa recently added to the North American fauna are from extreme southern Florida or Texas and are recent discoveries. The species *Isochnus arcticus* (Korotyaev 1976) is found as far north as Ellesmere Island at almost 82 degrees north latitude.

Some weevil species are routinely intercepted at ports of entry of foreign materials (especially agricultural products) into the United States and Canada. Some of these taxa have traditionally or occasionally been considered as part of the North American fauna and included in keys and faunal lists. At present, there is no evidence to suggest they are established in North America and they are not included in the key. These genera are: *Diocalandra* Faust 1894; *Dynatopechus* Marshall 1931; *Sternochetus* Pierce 1917; *Liophloeus* Germar 1817; *Euophryum* Broun 1909.

Terminology. In general, standard terms for beetle anatomy are used in the keys and text (see Figs. 2, 3). Generally known and readily visible characters are used where possible but in some instances specialized characters requiring high magnification or dissections are required. Simply put, some weevil groups are difficult to identify. Measurements of body length are taken from the anterior margin of the eyes to the apex of the elytra; the snout is not included. On the elytra, intervals are numbered with the sutural interval being interval 1. Tarsal articles are numbered from 1 through 5, with 5 being the terminal or apical article bearing the claws; article 4 is very small and recessed between the lobes of article 3. I use the term ventrite to apply to the visible abdominal sternites and they are numbered from 1 through 5, the latter being terminal.

In older literature the terms 'uncus' and 'mucro' are used to describe the structure of the apical tooth on the hind tibia. Following Thompson (1992), I have chosen not to use these terms as comparative study shows them to refer to the same structure, the different names being used for different degrees of development and positioning of the apical tooth. Associated with this is the use of the term 'apical comb of setae' which I use to apply to the row of setae that may be across the apex of the hind tibia or in some weevils is displaced by a change in position of the apical tooth to be oriented longitudinally to the main axis of the tibia. We do use 'corbel' and related terms in the keys to Entiminae, contrary to the recommendations of Thompson (1992). See Thompson (1992) for details.

Classification of the Nearctic Subfamilies and Tribes

Curculionidae Latreille 1802
- I. Dryophthorinae
  - 1. Dryophthorini
  - 2. Orthognathini
  - 3. Rhynchophorini
- II. Erirhininae
  - 4. Erirhinini
- III. Raymondionyminae
  - 5. Raymondionymini
- IV. Curculioninae
  - 6. Curculionini
  - 7. Acalyptini
  - 8. Anthonomini
  - 9. Cionini
  - 10. Derelomini
  - 11. Ellescini
  - 12. Mecinini
  - 13. Otidocephalini
  - 14. Rhamphini
  - 15. Smicronychini
  - 16. Storeini
  - 17. Tychiini
- V. Bagoinae
- VI. Baridinae
  - 18. Baridini
  - 19. Madarini
  - 20. Madopterini
  - 21. Nertinini
- VII. Ceutorhynchinae
  - 22. Ceutorhynchini
  - 23. Cnemogonini
  - 24. Hypurini
  - 25. Mononychini
  - 26. Phytobiini
  - 27. Scleropterini
- VIII. Conoderinae
  - 28. Lechriopini
  - 29. Zygopini
  - 30. Tachygonini
- IX. Cossoninae
  - 31. Cossonini
  - 32. Acamptini
  - 33. Dryotribini

34. Onycholipini
35. Pentarthrini
36. Proecini
37. Rhyncolini

X. Cryptorhynchinae
38. Cryptorhynchini
39. Gasterocercini

XI. Cyclominae
40. Rhythirrinini

XII. Entiminae
41. Agraphini
42. Alophini
43. Anypotactini
44. Brachyderini
45. Cneorhinini
46. Cyphicerini
47. Eudiagogini
48. Eustylini
49. Geonemini
50. Hormorini
51. Naupactini
52. Omiini
53. Ophryastini
54. Otiorhynchini
55. Peritelini
56. Phyllobiini
57. Polydrusini
58. Sciaphilini
59. Sitonini
60. Tanymecini
61. Thecesternini
62. Trachyphloeini
63. Tropiphorini

XIII. Hyperinae
64. Hyperini

XIV. Lixinae
65. Lixini
66. Cleonini
67. Rhinocyllini

XV. Mesoptiliinae
68. Laemosaccini
69. Magdalidini

XVI. Molytinae
70. Molytini
71. Trachodini
72. Anchonini
73. Camarotini
74. Cholini
75. Cleogonini
76. Conotrachelini
77. Cycloterini
78. Erodiscini
79. Hylobiini
80. Lepyrini
81. Lymantini
82. Petalochilini
83. Piazorhinini
84. Pissodini
85. Sternechini
86. Thalasselephantini
87. Trypetidini

XVII. Scolytinae
88. Hylesinini
89. Scolytini

XVIII. Platypodinae
90. Platypodini

Key to the Nearctic subfamilies of Curculionidae

1. Pregular sutures present; pregular sclerite distinct, located between median gular suture and labial articulation; head with rostrum virtually absent; at least one pair of tibiae with denticles or stout socketed setae along the dorsal (outer) margin 2

— Pregular sutures absent; pregular sclerite not evident; head with rostrum variable from very long and cylindrical to short and broad, or (rarely) nearly absent; tibiae lacking denticles or stout socketed setae along the dorsal (outer) margin 3

2(1). Tarsus with article 1 as long as articles 2-5 combined; head as wide as pronotum; pronotum usually with lateral constriction near middle; antennal club without sutures; lateral denticles on front tibia not socketed .... XVIII. Platypodinae (p. 805)

— Tarsus with article 1 not longer than articles 2 or 3; head narrower than pronotum, often concealed by pronotum when viewed dorsally; pronotum not constricted laterally; antennal club with sutures; lateral denticles on front tibia socketed or (rarely) not ..... XVII. Scolytinae (p. 792)

3(1). Tarsus of 4 subequal articles (Fig. 12); eyes absent (Fig. 11); body size small (<5mm); body color generally pale orange-red or pale brown; tibia at inner apical angle with small tooth much shorter than a tarsal claw..... ..... III. Raymondionyminae (p. 732)

— Tarsus of 5 articles, but with article 4 very small and difficult to see between lobes of article 3 (Fig. 88); eyes absent or present, well-developed, or reduced in size and represented by only from 1 to a few facets (Fig. 51); body size various; body color various; tibia at apex various but if eyes are lacking or almost so, tibia with large tooth arising from outer apical angle 4

4(3).[1] Tarsus with claws widely separated by dermal lobes extended between them from both dorsal and ventral surfaces at apex of article 5; mouthparts with prementum withdrawn into oral cavity, palpi mostly or entirely concealed; antenna inserted near base of rostrum, with scape long, projected some distance beyond the hind margin of the eye and not fitting into antennal scrobe (Fig. 5) (exceptions; *Dryophthorus* [Fig. 4], *Orthognathus* [Fig. 7], *Yuccaborus* [Fig. 6] have a more distal insertion of the antennae, possess a scrobe and

the scape does not pass, or only slightly passes, beyond hind margin of eye); antenna with club of two basic parts, with basal glabrous and glossy portion, and apical uniformly pilose portion (Figs. 4-7); funicle with 4, 5 or 6 articles; body surface lacking broad flat scales; pygydium formed of tergite 7 in male ..... I. Dryophthorinae (p. 728)

— Tarsus with claws single, connate at base or separate, but with dorsal and ventral surfaces at apex of article 5 not extended between bases of tarsal claws; mouthparts with prementum visible, not withdrawn, palpi mostly visible; antenna inserted variously along length of rostrum, usually some distance from base, with scape short or long, and fitting into antennal scrobe, but at most only slightly projected beyond the hind margin of the eye (Figs. 8, 13, 27, 70); antenna with club various, but mostly with three articles, each pilose to some extent, basal article not or rarely glossy, subequal in length to other articles or rarely variously longer than other 2 articles combined, sutures evident between all articles; funicle with 5, 6 or 7 articles; body surface mostly with some broad flat scales or fine hair-like scales; pygydium formed of tergite 8 in male 5

5(4). Male with aedeagus with tectum and pedon separate (dissection necessary), tegmen as long as or longer than aedeagus (including the apodemes); species associated with freshwater aquatic habitats, many with dense varnish-like coating over scales or with dense hydrofuge scales ..... II. Erirhininae (p. 730)

— Male with aedeagus with tectum and pedon fused (dissection necessary), tegmen shorter than aedeagus (including the apodemes); species associated with various habitats, most with scales present, various in density, but lacking varnish-like coating (exception; *Bagous* recognized by presence of prosternal channel) or with scales lacking entirely 6

6(5).[2] Legs with well-developed, usually large hook-like tooth at apex of front, middle and hind tibiae: tooth arising from one of, a) outer apical angle (Fig. 57), b) from middle of apical margin (Fig. 93), or c) at inner apical angle, but if at inner apical angle, tooth on hind tibia is more or less as long as or longer than tarsal claw (Fig. 89) and outer curved face of tooth is continuous with apex of outer tibial margin or is connected to it by a distinct, continuous sharp carina which traverses the apical face of the tibia; apical comb of setae present or absent, if present, oriented either transversely, obliquely or subparallel to the length of the tibia 7

— Legs with apex of front, middle and hind tibiae with tooth, if present, small to moderately large (usually larger on front or middle tibiae), usually smaller than tarsal claw, arising from inner apical angle and with outer curved face distinctly separated from, and not continuous with, outer tibial margin or with carina traversing the apical face of the tibia; apical comb of setae oriented transversely to length of tibia 18

7(6). Mesepimeron strongly ascended, truncated by elytral humeri and visible (or nearly so) in dorsal view between pronotum and elytra (Figs. 23-26); tarsus with 1 (rarely) or 2 claws ..... VI. Baridinae (most) (p. 740)

— Mesepimeron not ascended, not visible in dorsal view between pronotum and elytra (exception; *Laemosaccus* [Fig. 92] recognized by short, straight rostrum, basal margin of elytra extended over base of pronotum, exposed pygydium, and small, acute tooth on the inner margin of the front femur); tarsus with 2 claws 8

8(7). Rostrum in repose received into ventral channel which may be limited to prosternum or extended beyond into meso- or metasternum (Figs. 21, 59) 9

— Rostrum in repose not received into ventral channel, but may rest between front, middle and/or hind coxae 14

9(8). Eyes large, elongate-oval, subcontiguous (or nearly so) dorsally, frons very narrow (Fig. 45); eyes situated towards top front of head, in lateral view with lower margin of eye clearly situated above level of dorsum of base of rostrum (Fig. 46) ..... VIII. Conoderinae (p. 754)

— Eyes small to moderate in size, more or less rounded, more widely separated dorsally, frons broad; eyes situated towards sides of head, in lateral view with lower margin of eye situated near or below level of dorsum of base of rostrum 10

10(9). Rostrum very short, not much longer than wide, broad and flat dorsally, subquadrate in form (Fig. 82); dorsal vestiture of pronotum and elytra in part bifid (*Bangasternus*) ..... XIV. Lixinae (part) (p. 783)

— Rostrum moderately long, many times longer than wide, elongate and narrow; dorsal vestiture, if present, simple 11

11(10). Ventral channel extended beyond prosternum into meso- or metasternum (Fig. 59) ..... X. Cryptorhynchinae (p. 761)

— Ventral channel limited to prosternum (Fig. 21); even though rostrum in repose may overlie meso-, metasternum and some abdominal ventrites) 12

12(11). Hind tibia with outer face at apex lacking apical comb of setae lateral to base of apical tooth (as in Fig. 57); body with distinct and dense suberect or erect broad scales, body of some specimens

[1] In small specimens it may be difficult to see the states of the tarsal claws and the mouthparts. There are only two genera of small-sized Dryophthorinae included here. *Dryophthorus* (Fig. 4) can be recognized by an antennal funicle of 4 articles in combination with the antennal club character, whereas *Sitophilus* may be recognized by the form of the apex of the hind tibia which has a small preapical tooth on the inner margin in addition to the larger hook-like tooth at the inner apical angle (the tibiae appearing "pincer-like"), in combination with the antennal club.

[2] This is often a difficult character to see clearly and to assess. Some groups (*e.g.*, many Baridinae and some Curculioninae) are equivocal and are thus considered in both halves of this couplet. In general, taxa associated with woody plants tend to develop a larger and curved apical tooth whereas those associated with herbaceous plants have a less developed tooth or apical spine, or none at all.

with crustose coating (Acamptini, *Acamptus*) ... . IX. Cossoninae (part) (p. 756)

— Hind tibia with outer face at apex with apical comb of setae lateral to base of apical tooth (Fig. 99); body vestiture various but surface not with crustose coating 13

13(12). Body lacking distinct vestiture, with smooth varnish-like coating over scales; elytra tuberculate or not; legs elongate, slender; commonly associated with aquatic habitats ... V. Bagoinae (p. 740)

— Body with vestiture of appressed scales or suberect or erect hair-like scales, lacking smooth varnish-like coating over scales, or obvious vestiture lacking; elytra tuberculate or not; legs more robust; rarely associated with aquatic habitats .... XVI. Molytinae (p. 786)

14(8). Mouthparts with labial palpi of 3 articles but short, globular, telescoping and appearing composed of 1 article, ventrally situated at apex of large prementum (Fig. 90); female with large paired symbiont sacs attached to vagina near base of gonocoxites; body size mostly medium to large (>5 mm) (exception; *Microlarinus*) .... XIV. Lixinae (p. 783)

— Mouthparts with labial palpi of 3 distinct articles but elongate, not telescoping, dorsally situated at apex of variously sized prementum; female lacking large paired symbiont sacs attached to vagina near base of gonocoxites (dissection necessary); body size mostly small to medium (<10 mm) 15

15(14). One or more of mesepisternum, mesepimeron, metepisternum and metepimeron with vestiture in form of dense plumose (pectinate) hairs (Fig. 15), rarely hairs may be sparse, fine and at most bifid only in anterior portion of metepisternum 16

— Mesepisternum, mesepimeron, metepisternum and metepimeron with vestiture, if present, simple not plumose or bifid 17

16(15). Tooth at apex of tibia, large and hook-like, larger than tarsal claw (Fig. 93); pronotum only slightly narrower than base of elytra in dorsal view (Fig. 91); elytra with basal margin at intervals 2-4 extended anteriorly overlapping base of pronotum (Fig. 91) ..... XV. Mesoptilinae (p. 786)

— Tooth at apex of tibia, small, at most subequal in length to tarsal claw; pronotum distinctly narrower than base of elytra in dorsal view (Fig. 14); elytra with basal margin at intervals 2-4 straight, not overlapping base of pronotum (Fig. 14) (Otidocephalini) .... IV. Curculioninae (part) (p. 732)

17(15). Hind tibia with outer face at apex with apical comb of setae lateral to base of apical tooth, oriented either transversely, obliquely or subparallel to the length of the tibia (Figs. 99-101) .... XVI. Molytinae (most) (p. 786)

— Hind tibia with outer face at apex lacking apical comb of setae lateral to base of apical tooth (Fig. 57) ..... IX. Cossoninae (most) (p. 756)

18(6). Mandible with prominent scar on outer apical face indicating point of attachment of deciduous process (Fig. 68), or else clothed on outer apical face with many fine scales and/or setae, mandibles generally robust and thick; rostrum short and broad, usually quadrate or subquadrate in form, often expanded laterally towards apex, not different in males and females in length or form (Figs. 70-77) ..... XII. Entiminae (most) (p. 766)

— Mandible lacking scar and therefore lacking deciduous process, either glabrous or with a few small setae on outer apical face, mandibles generally less robust, smaller and thinner; rostrum more elongate and cylindrical, usually as long as or longer than pronotum, or (rarely) shorter than pronotum, different in males and females in length and/or form or not (Figs. 13, 17, 19) 19

19(18). Rostrum in repose received into distinct ventral channel in prosternum (rarely into mesosternum) 20

— Rostrum in repose not received into ventral channel, but may rest between front, middle and/or hind coxae 23

20(19). Rostrum very broad, more or less triangular in dorsal view, fitting into large, deep emargination in front of front coxae; emargination limited posteriorly by small, triangular prosternum (Fig. 69) (Thecesternini, *Thecesternus*) .... XII. Entiminae (part) (p. 766)

— Rostrum more elongate and cylindrical in form, the prosternal channel extended behind the front coxae (rarely onto mesosternum) and the rostrum (when in repose) extended between and/or beyond front coxae 21

21(20). Antenna with funicle with 5 articles; prothorax lacking postocular lobes; claws free, simple; dorsum covered with fine, erect hair-like vestiture (Mecinini, *Cleopomiarus*) .... IV. Curculioninae (part) (p. 732)

— Antenna with funicle with 6 or 7 articles; other characters various 22

22(21). Pygydium covered by elytra; rostrum longer than pronotum, straight and slender, abruptly attenuate immediately beyond antennal insertion (Fig. 28); antenna with article 2 of funicle long, more or less one-half length of scape (Madarini, Zygobaridina, *Amercedes*) .... VI. Baridinae (part) (p. 740)

— Pygydium not covered by elytra; rostrum various in length, straight or slightly curved, more or less of uniform width throughout length, not abruptly attenuate (Fig. 34); antenna with article 2 of funicle short, much less than one-half length of scape ..... VII. Ceutorhynchinae (part) (p. 747)

23(19). Mesepimeron strongly ascended, truncated by elytral humeri and visible in dorsal view between pronotum and elytra (Figs. 31-33); pygydium not covered by elytra (Figs. 31-33) .... VII. Ceutorhynchinae (part) (p. 747)

— Mesepimeron not ascended, not visible in dorsal view between pronotum and elytra; pygydium mostly covered by elytra 24

24(23). Tarsus with claws separate, each with basal process ..... IV. Curculioninae (part) (p. 732)

— Tarsus with claws separate, simple 25

25(24). Eyes rounded, rostrum mostly very elongate, slender and cylindrical in cross section (Figs. 13, 15-19); antenna with scape not or just reaching anterior margin of eye (Figs. 13) .... IV. Curculioninae (part) (p. 732)

— Eyes more or less elongate-oval, rostrum shorter, more robust and subquadrate in cross section (Figs. 64, 81); antenna with scape just reaching or passing anterior margin of eye (Fig. 64) 26

26(25). Pronotum with anterolateral margin with distinct postocular lobe present (Fig. 64) .... XI. Cyclominae (p. 765)

— Pronotum with anterolateral margin straight, simple or postocular lobe at most very slightly developed (Fig. 81) 27

27(26). Vestiture with at least some bifid scales (limited on some specimens to thoracic sterna), if bifid scales appear absent, humeri obviously quadrate; humeri quadrate to subquadrate, rarely rounded, if humeri rounded, bifid scales are distinct on dorsum ..... XIII. Hyperinae (p. 782)

— Vestiture simple, lacking bifid scales; humeri rounded ..... XII. Entiminae (part) (p. 766)

Classification of the Nearctic Curculionidae

I. Dryophthorinae Schoenherr 1825

by Robert S. Anderson

This group of weevils is characterized by the form of the antennal club with the basal article glabrous and glossy, the presence of what Zimmerman (1993) called 'dermal lobes' extended between the tarsal claws from both dorsal and ventral surfaces of the apex of tarsal article 5, the antenna (usually) with the scape long and extended far beyond the posterior margin of the eye, and male genitalia with a distinct lateral line dividing the aedeagus into upper (tectum) and lower (pedon) parts. This primitive form of genitalia is shared with Raymondionyminae and Erirhininae and is the basis for some authors removing these three subfamilies from Curculionidae and giving them each separate family status. By removing these three groups, the hypothesis of monophyly of Curculionidae is strengthened based on their unique derived form of genitalia not shared with other Curculionoidea.

Dryophthorinae are a tropical group, and few species occur in North America. Except for the diverse genus *Sphenophorus*, of the North American genera each is represented by but one or a few species. Most dryophthorines are associated with monocots, including Poaceae, Cyperaceae, Liliaceae and Arecaceae. Some species are serious pests of bananas, bromeliads, corn, turfgrass and stored products. Larvae generally mine stems or roots, some in semiaquatic habitats. The odd genus *Dryophthorus* is associated with moist dead wood.

Key to the Nearctic Genera of Dryophthorinae

1. Antenna with funicle of 4 articles (Fig. 4); tarsus with 5 distinct articles; body usually covered with a crusty deposit; size small, less than 4.0 mm in body length ..... *Dryophthorus*

— Antenna with funicle of 6 articles (Figs. 5-7); tarsus with 5 articles but with article 4 small and difficult to see at base of article 5; body lacking surface deposit; size various 2

2(1). Pygydium covered by apex of elytra; antenna with scape not reaching anterior margin of eye (Figs. 6-7); metepimeron not visible 3

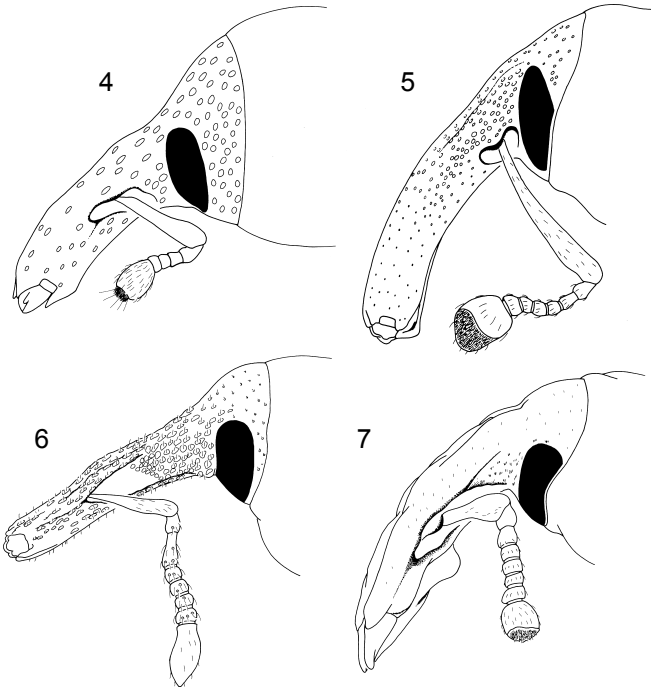
— Pygydium exposed at apex of elytra; antenna with scape projected at least past anterior margin of eye (Fig. 5); metepimeron visible (obscure in *Sitophilus*) 4

3(2). Front coxae contiguous; hind tibia expanded apically and with broad wide apical bevel; pronotum with postocular lobes; mandible large, lacking teeth on exterior face .... *Orthognathus*

— Front coxae separated by prosternum; hind tibia linear, not expanded apically and with narrow apical bevel; pronotum lacking postocular lobes; mandible small, with 3 teeth on exterior face ... . *Yuccaborus*

4(2). Size small, total body length less than 5 mm; tibiae (especially front) with distinct subapical tooth on inner margin in addition to larger apical tooth ... . *Sitophilus*

— Size moderate to large, total body length greater than 5 mm; tibia with at most a rounded subapical swelling on inner margin in addition to larger apical tooth 5



FIGURES 4.131-7.131. Dryophthorinae, lateral view of head. 4. *Dryophthorus americanus* Bedel; 5. *Sphenophorus zeae* Walsh; 6. *Yuccaborus frontalis* (LeConte); 7. *Orthognathus subparallelus* (Chevrolat).

5(4). Metepisternum very broad, length more or less 2 times width; antenna with club transverse, wider than long, lateral margins at base widely divergent, shape sub-triangular; body size very large, total body length greater than 25 mm ..... *Rhynchophorus*

— Metepisternum narrow, length 3 or more times width; antenna with club elongate, longer than wide, lateral margins at base sub-parallel to slightly divergent, shape sub-quadrate or sub-oval; body size moderate to large, total body length greater than 5 mm but less than 25 mm 6

6(5). Scutellum (exposed portion) widest at or near middle, shape rhomboidal or sub-circular; more or less as long as wide ..... *Cosmopolites*

— Scutellum (exposed portion) widest at or near base, shape triangular or sub-triangular; generally longer than wide 7

7(6). Tarsus with article 3 with ventral pilosity long, confined to apical margin as a continuous fringe, ventral surface otherwise glabrous; antenna with club obliquely truncate at apex with apical pilose part very short, appearing recessed within glabrous part, visible only as a narrow line in lateral view ..... *Scyphophorus*

— Tarsus with article 3 with ventral pilosity long or short, uniformly covering 1/3 or more of ventral surface, or with pilosity sparse and confined to anterolateral angle or lateral margins, ventral surface otherwise glabrous; antenna with apex evenly rounded or truncate, with apical pilose part long, distinctly visible as more than a narrow line in lateral view 8

8(7). Tarsus with article 5 ventrally excavated and bilamellate at middle of apex; rostrum hump-like at base, directed posteroventrally; associated with Asteraceae, Asclepiadaceae ..... *Rhodobaenus*

— Tarsus with article 5 ventrally evenly rounded at middle of apex; rostrum straight (few) or evenly rounded at base (many), directed anteroventrally; associated with monocotyledons 9

9(8). Tarsus with article 3 with ventral pilosity restricted to anterolateral areas, median area largely glabrous, article 3 narrow, subequal in width to article 2 (many) or broad, wider than article 2 (few) ..... *Sphenophorus*

— Tarsus with article 3 with ventral pilosity extensive covering nearly all of ventral surface except near base at middle, article 3 broad, wider than article 2 10

10(9). Front coxae widely separated by width of antennal club; middle coxae widely separated by width of a coxa; prementum toothed ventrally or slightly emarginate at apex; Florida; on Arecaceae, Bromeliaceae ..... *Metamasius*

— Front coxae narrowly separated by one-half width of antennal club; middle coxae narrowly separated by one-half width of a coxa; prementum broadly sulcate throughout length; Arizona, California; on Cactaceae ..... *Cactophagus*

Classification of the Nearctic Dryophthorinae

1. Dryophthorini Schoenherr 1825

Dryophthorus Germar 1824, 1 sp., *D. americanus* Bedel 1885, generally distributed in eastern North America. Adults are found under bark, in association with old rotten logs or in forest litter.

Bulbifer Dejean 1821
Dryophora Berthold 1827
Tetratemnus Wollaston 1873
Tetraspartus Pascoe 1885

2. Orthognathini Lacordaire 1866

Orthognathina Lacordaire 1866

Orthognathus Schoenherr 1838, 1 sp., *O. subparallelus* (Chevrolat 1880), Arizona. Adults have been collected at lights.

Sphenognathus Schoenherr 1840

Rhinostomina Kuschel 1995

Yuccaborus LeConte 1876, 1 sp., *Y. frontalis* (LeConte 1876), generally distributed in southwestern United States. Two subspecies are recognized. Adults and larvae are associated with *Yucca* (Liliaceae); adults come to lights.

3. Rhynchophorini Schoenherr 1833

Rhynchophorina Schoenherr 1833

Rhynchophorus Herbst 1795, 2 spp., *R. palmarum* (Linnaeus 1758) and *R. cruentatus* (Fabricius 1775). Extreme southeastern United States, Texas and California. Adults and larvae are associated with various species of palms (Arecaceae). See Wattanapongsiri (1966) to separate the species. (Volume 1, Color Fig. 14)

Cordyle Thunberg 1797

Litosomina Lacordaire 1866

Sitophilus Schoenherr 1838, 5 spp., generally distributed; adventive. Three species, *S. granarius* (Linnaeus 1758), *S. zeamais* Motschulsky 1855, and *S. oryzae* (Linnaeus 1763) are serious pests of stored grain products. See Kuschel (1961) for a partial key to species.

Sphenophorina Lacordaire 1866

Cactophagus LeConte 1876, 1 sp., *C. spinolae* (Gyllenhal 1838), Arizona and California, adults and larvae are associated with *Carnegiea gigantea* (Engelm.) and other cacti (Cactaceae) (Anderson 1948). *Cactophagus graphipterus* (Champion 1910) has been found in orchid houses in Connecticut, Washington DC, and New Jersey (Barber 1917). It is not known if this species is established there. See Vaurie (1967) to separate the species.

Eucactophagus Champion 1910
Phyllerythrurus Chevrolat 1885

Cosmopolites Chevrolat 1885, 1 sp., *C. sordidus* (Germar 1824), Florida, adventive. This species is associated with banana trees (*Musa sapientum* L.); larvae mine stem and corm (Woodruff 1969).

Metamasius Horn 1873, 3 spp., *M. hemipterus* (Linnaeus 1758) and *M. callizona* (Chevrolat 1883), adventive; *M. mosieri* Barber 1920, native; Florida. *Metamasius hemipterus* is associated with palms, sugar cane, and bananas (Woodruff and Baranowski 1985), whereas, *M. callizona* is a serious pest in *Tillandsia* (O'Brien and Thomas 1990, Frank and Thomas 2000, Larson and Frank 2000); *M. mosieri* is also associated with bromeliads (Larson *et al.* 2001). See Vaurie (1966) to separate the species.
Odontorhynchus Chevrolat 1880
Odontorrhynchus Kirby 1881
Metmasiopsis Champion 1910
Subphyllerythrurus Voss 1954

Rhodobaenus LeConte 1876, 2 spp., *R. tredecimpunctatus* (Illiger 1794) and *R. quinquepunctatus* (Say 1824), generally distributed in United States and southeastern Canada. Species are associated with various Asteraceae and Asclepiadaceae; larvae are in stems (Vaurie 1981). See Vaurie (1981) to separate the species.
Homalostylus Chevrolat 1885

Scyphophorus Schoenherr 1838, 2 spp., *S. acupunctatus* Gyllenhal 1838 and *S. yuccae* Horn 1873, generally distributed in extreme southern United States. Species are associated with *Agave* and *Yucca* (Liliaceae); larvae mine the roots and stems. See Vaurie (1971) to separate the species.

Sphenophorus Schoenherr 1838, 65 spp., generally distributed. Species are associated with various monocots including grasses (Poaceae) and sedges (Cyperaceae) (Vaurie 1951). Some species are pests of turfgrass or corn. See Vaurie (1951) to separate the species. (Volume 2, Color Fig. 30)
Sitonobia Gistel 1856
Merothricus Chevrolat 1885
Trichischius LeConte 1876
Nesorthognathus Voss 1943

Diocalandrina Zimmerman 1993

[*Diocalandra* Faust 1894, 3 spp., intercepted in quarantine; British Columbia, Washington, California and Arizona. Not established in North America.]

II. Erirhininae Schoenherr 1825

by Robert S. Anderson

This group of weevils is unfortunately very difficult to characterize based solely on external characters. Like Dryophthorinae and Raymondionyminae, they possess male genitalia that are primitive in structure with the aedeagus with separate tectum and pedon, and the tegmen as long as or longer than the aedeagus. Most species are associated with aquatic or semi-aquatic habitats and the members of the subtribe Stenopelmina possess a dense, varnish-like coating over the scales or have dense hydrofuge scales. Many species are active swimmers.

Most species mine the stems or other parts of aquatic macrophytes. Species in the genera *Cyrtobagous*, *Neochetina* and *Neohydronomus* have been introduced for biological control of aquatic weeds, mainly in Florida. *Grypus equiseti* (Fabricius 1775) is associated with primitive horsetails of the genus *Equisetum*.

Key to the Nearctic Genera of Erirhininae

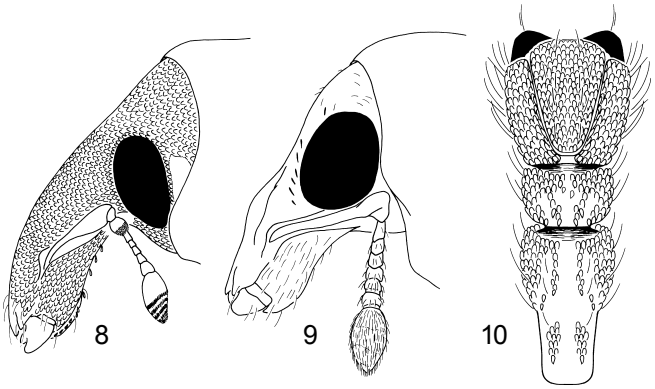
1. Antenna with funicle of 6 articles 2
— Antenna with funicle of 7 articles 11

2(1). Tarsus with single claw ..... *Brachybamus*
— Tarsus with two claws 3

3(2). Antenna with club with basal article glabrous and glossy and almost as long as rest of club (Fig. 8); tarsus with article 3 not emarginate, usually not wider than article 2 4
— Antenna with club uniformly pubescent (Fig. 9); tarsus with article 3 various 6

4(3). Pronotum with anterolateral margin straight, postocular lobe absent; tarsus with article 5 longer than four other articles combined; dorsal vestiture of only isolated appressed, rounded scales, no obvious varnish-like coating overlying scales ..... *Cyrtobagous*
— Pronotum with anterolateral margin with well-developed postocular lobe; tarsus with article 5 shorter than four other articles combined; dorsal vestiture of dense appressed scales, with varnish-like coating overlying scales 5

5(4). Rostrum short, stout, nearly straight (Fig. 8); middle tibia flattened, with outer margin evenly curved, and with both inner and outer margins with numerous long, dense, fine hairs ..... *Lissorhoptrus*
— Rostrum slender, elongate, evenly curved; middle tibia not flattened, with outer margin more or less



FIGURES 8.131-10.131. Erirhininae. 8-9. Lateral view of head. 8. *Lissorhoptrus oryzophilus* Kuschel; 9. *Stenopelmus rufinasus* Gyllenhal; 10. *Notiodes setosus* (LeConte), tarsus, dorsal view.

straight, and with both inner and outer margins with short, stout scales and at most a few scattered, fine longer hairs ..... *Neobagoidus*

6(3). Tarsus with article 3 very broad, apex of article 5 not or very slightly projected beyond lobes of article 3 (Fig. 10) 7
— Tarsus with article 3 emarginate or bilobed, apex of article 5 distinctly projected beyond lobes of article 3 by at least one-half length article 5 9

7(6). Body size less than 1.5 mm; frons about half as wide as rostrum in dorsal view at point of antennal insertion; pronotum lacking postocular lobes ..... *Tanysphyrus*
— Body size distinctly greater than 1.5 mm; frons wider than rostrum in dorsal view at point of antennal insertion; pronotum with postocular lobes present, slightly to well developed 8

8(7). Tarsus with article 5 very slightly projected beyond apices of lobes of article 3 ..... *Neochetina*
— Tarsus with article 5 not projected beyond apices of lobes of article 3 ..... *Notiodes*

9(6). Rostrum very short, subequal in length to scape (Fig. 9); pronotum with anterolateral margin straight, postocular lobe absent (Fig. 9) ..... *Stenopelmus*
— Rostrum more elongate, from 1.5 to 2.0 times length of scape; pronotum with anterolateral margin with postocular lobe present, slightly to well developed 10

10(9). Rostrum straight, robust; eyes large, narrowly separated ventrally by less than the width of rostrum; pronotum with anterolateral margin with postocular lobe slightly developed ..... *Neohydronomus*
— Rostrum evenly curved, slender; eyes moderate, separated ventrally by about the width of rostrum; pronotum with anterolateral margin with postocular lobe well developed ..... *Onychylis*

11(1). Each tibiae with small spur(s) in addition to small tooth at inner apical angle 12
— Tibiae all lacking spurs 13

12(11). Each tibia with 2 spurs ..... *Procas*
— Front tibia with 1 spur, middle and hind tibiae each with 2 spurs ..... *Notaris*

13(11). Antenna with funicle with fine pubescence; elytra with stria 10 not margined along last interval; body densely covered with broad scales ..... *Grypus*
— Antenna with funicle with distinct setae; elytra with stria 10 finely margined along last interval; body with fine setae or elongate-linear scales ..... *Tournotaris*

Classification of the Nearctic Erirhininae

4. Erirhinini Schoenherr 1825

Erirhinina Schoenherr 1825

Grypus Germar 1917, 3 spp., generally distributed in Canada and northern United States, south in West to Colorado. At least one species, *G. equiseti* (Fabricius 1775), is associated with *Equisetum* (Equisetaceae) in wetlands. See Cawthra (1957) to separate the species.

Aplopus Dejean 1821
Grypidius Schoenherr 1826

Notaris Germar 1817, 2 spp., *N. puncticollis* (LeConte 1876) and *N. aethiops* (Fabricius 1792), generally distributed in Canada and northern United States. *Notaris aethiops* is associated with *Sparganium ramosum* Curt. (Sparganiaceae) in Europe and *Typha* (Typhaceae) in wetlands in North America (Anderson 1997). See Buchanan (1927) to separate the species.

Pilumnus Dejean 1821
Erirhinus Schoenherr 1825
Erycus Tournier 1874

Procas Stephens 1831, 1 sp., *P. lecontei* Bedel 1879, Michigan, Ontario, Quebec and Yukon Territory.

Apachiscelus Desbrochers 1875
Notodermus Desbrochers 1875
Pseudypera Voss 1936

Tournotaris Alonso-Zarazaga and Lyal 1999, 2 spp., generally distributed in Canada, Alaska, and northern United States south into Nevada and California. At least one species, *T. bimaculata* (Fabricius 1787), is associated with *Typha* (Typhaceae) in wetlands (Anderson 1997). See Buchanan (1927) to separate some of the species.

Stenopelmina LeConte 1876

Brachybamus Germar 1835, 1 sp., *B. electus* Germar 1835, generally distributed in eastern North America. Adults have been associated with *Eleocharis* (Cyperaceae) in wetlands.

Cyrtobagous Hustache 1929, 1 sp., *C. salviniae* Calder and Sands 1985, Florida. This species has been introduced for biological control of *Salvinia molesta* Mitchell (Salviniaceae) (O'Brien 1995).

Lissorhoptrus LeConte 1876, 6 spp., generally distributed. Species are associated with wetlands; *L. oryzophilus* Kuschel 1952 is a pest of cultivated rice; larvae feed externally on roots (Anderson 1993a). See Kuschel (1952) to separate the species.

Lissocordylus Kuschel 1952

Neobagoidus O'Brien 1990, 1 sp., *N. carlsoni* O'Brien 1990, Florida. This species is associated with *Lachnanthes caroliniana* (Lamarck) Dandy (Haemodoraceae) in wetlands (O'Brien 1990).

Neochetina Hustache 1926, 2 spp., *N. bruchi* Hustache 1926 and *N. eichhorniae* Warner 1970, Florida, Louisiana and Texas. These species have been introduced for control of *Eichhornia crassipes* (Mart.) Solms. (water hyacinth; Pontederiaceae) (O'Brien 1995). See O'Brien (1976) or DeLoach (1975) to separate the species.

Neohydronomus Hustache 1926, 1 sp., *N. affinis* Hustache, Florida. This species has been introduced for control of *Pistia stratiotes* L. (water lettuce; Araceae) (O'Brien 1995).

Notiodes Schoenherr 1838, 12 spp., generally distributed. Associated with wetlands. At least three species of *Notiodes* have been associated with Cyperaceae but *Notiodes celatus* (Burke 1961) is associated with the fern *Marsilea mucronata* A. Br. (Marsileaceae) (Burke 1971). See Tanner (1943) and Burke (1961a, 1965) to separate the species.

Notiophilus Schoenherr 1835; not Duméril 1805
Endalus Laporte 1840
Notionomus Erichson 1842

Onychylis LeConte 1876, 6 spp., generally distributed in eastern North America. Species are associated with *Pontederia cordata* L. (Pontederiaceae) and *Nuphar luteum* (L.) Sibhorn and Smith (Nymphaeaceae) in wetlands (Burke 1961b, Anderson 1993a). See Burke (1961b) to separate the species. This genus is composite and is being subdivided by Charles O'Brien and Guillermo Wibmer.

Stenopelmus Schoenherr 1835, 1 sp., *S. rufinasus* Gyllenhal 1836, generally distributed in the United States and southern Canada. This species is associated with *Azolla* (Salviniaceae) in wetland habitats (Scherf 1964).

Panscopus Schoenherr 1843; not Schoenherr 1842
Monius Schoenherr 1845
Degorsia Bedel 1902

Tanysphyrina Gistel 1856

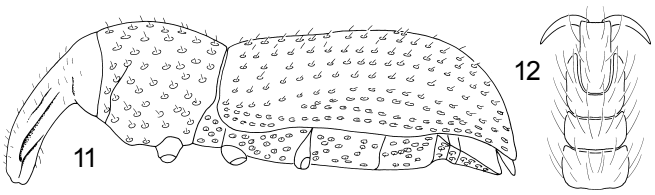
Tanysphyrus Germar 1817, 2 spp., generally distributed in the eastern United States and Canada west across the north to British Columbia and south to Utah. *Tanysphyrus lemnae* (Fabricius 1792) is a widespread Holarctic species associated with *Lemna* (duckweed; Lemnaceae) whereas *T. ater* Blatchley 1928 is associated with *Ricciocarpus natans* (L.) Corda (Bryophyta: Ricciaceae); larvae mine the leaves.

Tanysphyroides Egorov 1996 (valid subgenus)

III. Raymondionyminae Reitter 1913

by Robert S. Anderson

This is a small group of three genera of eyeless weevils found in North America only in California and adjacent Oregon. They are easily recognized by their eyeless condition (Fig. 11) but also by the tarsi, which have only 4 articles (Fig. 12). Like Dryophthorinae and Erirhininae they possess primitive male genitalia and have recently been given family status by Thompson (1992) and Alonso-Zarazaga and Lyal (1999). Adults are collected in various kinds of leaf litter. Nothing is known of larval biology.



FIGURES 11.131-12.131. Raymondionyminae, *Alaocybites californica* Gilbert, 11. Lateral habitus; 12. Tarsus, dorsal view.

KEY TO THE NEARCTIC GENERA OF RAYMONDIONYMINAE

1. Front coxae not separated by prosternum; prosternum lacking lateral ridges in front of coxae; abdomen with ventrite 4 separated from 5 by a deep suture similar to suture between ventrites 3 and 4; antenna with funicle with 7 articles ..... *Alaocybites*
— Front coxae narrowly separated by prosternum; prosternum with lateral ridge in front of each coxa slightly to well developed; abdomen with ventrite 4 separated from 5 by a shallow suture; antenna with funicle with 5 or 7 articles 2

2(1). Antenna with funicle with 5 articles; hind tibia linear or triangular in form; prosternum with ridges in front of coxae low ..... *Gilbertiola*
— Antenna with funicle with 7 articles; hind tibia markedly expanded towards apex, subtriangular in form; prosternum with ridges in front of coxae well developed ..... *Schizomicrus*

CLASSIFICATION OF THE NEARCTIC RAYMONDIONYMINAE

5. Raymondionymini Reitter 1913

Alaocybites Gilbert 1956, 2 spp., California. Adults have been collected in coniferous leaf litter. See Gilbert (1956) to separate the species.

Gilbertiola Osella 1982, 2 spp., California and Oregon. Adults have been collected in redwood leaf litter. See Gilbert (1956) to separate the species.

Gilbertia Osella 1977; not Cossman 1889; not Jordan and Eigenmann 1890; not Walsingham 1891

Schizomicrus Casey 1905, 1 sp., *S. caecus* (Casey 1892), California. Adults have been collected in leaf litter.

Schizonotus Casey 1892; not Ratzeburg 1852; not Thorell 1888; not Reuter 1892

IV. Curculioninae Latreille 1802

By Robert S. Anderson

Traditionally this subfamily has been restricted to members of the genus *Curculio* and some close relatives but it is now a large conglomerate of taxa of questionable relationships. Members have a small or no tooth on the inner angle at the apex of the hind tibia, eyes are rounded, the rostrum mostly elongate to very

elongate and cylindrical in cross section, and the antenna with the scape not or just reaching the anterior margin of the eye. They may be confused with Baridinae or Ceutorhynchinae but members of these latter two subfamilies have the mesepimeron strongly ascended, truncated by elytral humeri and visible in dorsal view between the pronotum and elytra. Sexual dimorphism in rostral form in Curculioninae is extreme in some taxa; generally, the female rostrum in longer and finer and the antennae are inserted more basally than in males. This dimorphism appears to be related to oviposition and may be a key adaptation in explaining weevil diversity (Anderson 1995).

Curculionines tend to be associated with many herbaceous as well as some woody plants. Most have larvae that develop in reproductive structures such as fruits, seeds or flower buds; some also mine stems. Many plant families serve as hosts and knowledge of the host plant can facilitate identifications. Larvae of Rhamphini are leaf miners. Most species in Cionini and Mecinini are adventive. Anthonomini are the most diverse group, especially the genus *Anthonomus*. An excellent review of the natural history of Anthonomini is by Burke (1976).

Key to the Nearctic genera of Curculioninae

1. Rostrum in repose received into distinct ventral channel in prosternum; antennae with 5 funicle articles ..... *Cleopomiarus*
— Rostrum in repose not received into ventral channel, but may rest between front, middle and hind coxae; antennae with 5-7 funicle articles 2

2(1). Tarsus with claws connate at base 3
— Tarsus with claws free at base, simple or with basal process 7

3(2). Antenna with funicle with 5 articles 4
— Antenna with funicle with 6 or 7 articles 6

4(3). Pygydium covered by elytral apices ..... *Cionus*
— Pygydium exposed beyond elytral apices 5

5(4). Body oval, length less than twice greatest width; pronotum with lateral margins markedly arcuate from base to apex ..... *Gymnetron*
— Body elongate and cylindrical, length more than twice greatest width; pronotum with lateral margins more or less subparallel in basal half ..... *Mecinus*

6(3). Tarsus with article 5 shorter than articles 1 to 3 combined ..... *Smicronyx*
— Tarsus with article 5 about as long as articles 1 to 3 combined ..... *Promecotarsus*

7(2). Tarsus with claw simple, lacking basal process or tooth 8
— Tarsus with claw with basal tooth or process[3] .. 16

8(7). Front femur with ventral margin simple, lacking tooth 9
— Front femur with ventral margin with slightly to well-developed tooth 12

9(8). Pronotum with anterolateral margin with postocular lobe present; hind femur with ventral margin with large broad tooth ..... *Pachytychius*
— Pronotum with anterolateral margin straight, postocular lobe absent; hind femur with ventral margin simple, lacking tooth 10

10(9). Pronotum with distinct lateral margin defined by low carina, apically with carina slightly produced laterally, denticulate or serrate ..... *Elaeidobius*
— Pronotum with lateral margin rounded, not defined by carina, no lateral protrusions, denticulations or serrations 11

11(10). Abdomen with suture between ventrites 2 and 3 straight laterally; rostrum longer than pronotum; antenna with funicle from article 2 to apex, long and slender, about as long as club .... *Acalyptus*
— Abdomen with suture between ventrites 2 and 3 angulate posteriorly at lateral margin; rostrum shorter than pronotum; antenna with funicle from article 2 to apex, very short and stout, shorter than length of club ..... *Phyllotrox*

12(8). Body greater than 2.3 mm in length; tarsal claws widely divergent, tooth on claw extended from underside of claw ..... *Dorytomus*
— Body less than 2.3 mm in length; tarsal claws not widely divergent, tooth on claw extended from inside face of claw 13

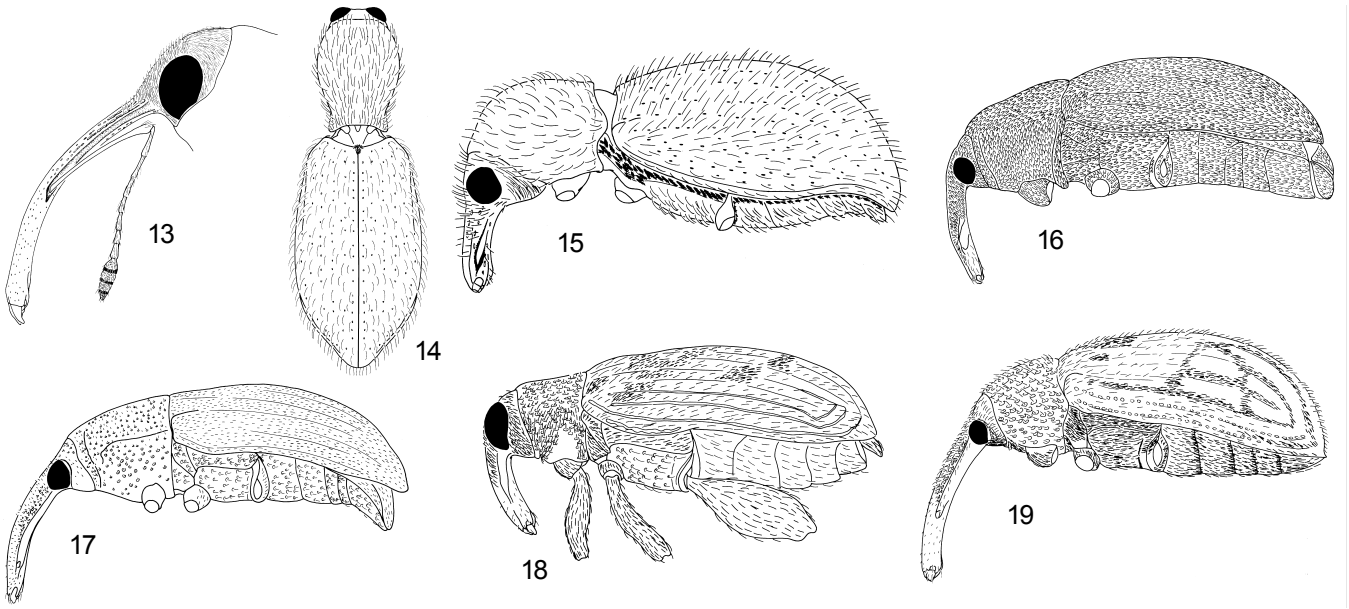
13(12). Elytra nearly glabrous except for group of white scales near middle of interval 4; scutellum with dense white scales; middle coxae separated by distance nearly equal to width of a coxa ..... *Ephelops*
— Elytra with more or less uniformly distributed scales or vestiture; middle coxae separated by distance distinctly less than width of a coxa 14

14(13). Body with sparse fine pubescence; hind tibia with apical tooth minute; body color light brown ..... *Dietzianus*
— Body with sparse to dense scales; hind tibia with apical tooth about half as long as tarsal claw; body color darker reddish brown to black 15

15(14). Rostrum with lateral groove defined to anterior margin of eye, with at most a few scattered scales adjacent to eye; body elongate-oval; scales generally of one color; apical third of elytra in lateral view markedly rounded to apex; associated with Asteraceae ..... *Epimechus*
— Rostrum with lateral groove not defined immediately anterior to eye, obliterated by dense scales adjacent to eye; body stout; scales ornate, of more than one color; apical half of elytra in lateral view sloped gradually to apex; associated with Solanaceae ..... *Brachyogmus*

16(7). Abdomen with suture between ventrites 2 and 3 markedly extended posteriorly towards lateral margins, extended to or beyond suture between ventrites 3 and 4 (Fig. 16) 17

[3] *Nanops* has a minute tooth that is difficult to see at high magnification and it may appear absent. It can be recognized by its small size (1.4-1.5 mm) and front femur lacking a ventral tooth. Species are associated with *Hypericum* (Hypericaceae).



FIGURES 13.131-19.131. Curculioninae. 13. *Curculio monticola* (Casey), head, lateral view; 14. *Myrmex arizonicus* (Schaeffer), dorsal habitus. 15-19. Lateral habitus, 15. *Myrmex arizonicus* (Schaeffer); 16. *Tychius tectus* LeConte; 17. *Notolomus bicolor* LeConte; 18. *Tachyerges ephippiatus* (Say); 19. *Anthonomus fulvus* LeConte.

— Abdomen with suture between ventrites 2 and 3 more or less straight, if extended posteriorly, not extended to suture between ventrites 3 and 4 (Fig. 19) 18

17(16). Pygydium covered by elytra; antenna with funicle with 6 or 7 articles; associated with subfamily Papilionoideae (Fabaceae) ..... *Tychius*

— Pygydium exposed beyond elytra apex (especially so in male); antenna with funicle with 5 or 6 articles; associated with subfamily Mimosoideae (Fabaceae) ..... *Sibinia*

18(16). Front coxae positioned much closer to posterior margin of prosternum than to anterior margin, distance to anterior margin greater than twice distance to posterior margin (Fig. 17) 19

— Front coxae positioned near middle of prosternum, coxae more or less equidistant from anterior and posterior margins of prosternum (Figs. 15, 18-19) 22

19(18). Eye partly covered by anterior margin of pronotum (Fig. 13); mandible prominent, slender, triangular in outline, inner face simple, not dentate; rostrum very long and slender (Fig. 13) 20

— Eye distant from anterior margin of pronotum (Fig. 17); mandible not prominent, inner face dentate; rostrum moderately long and slender (Fig. 17) 21

20(19). Antenna with club longer than wide; tarsus with claw with distinct and long basal tooth; body with more or less uniform vestiture of brown or grey appressed scales; body size 4.2-13.0 mm; associated with Fagaceae, Juglandaceae and Betulaceae ..... *Curculio*

— Antenna with club as wide as long; tarsus with claw with short and fine basal tooth; body with vestiture of scattered white appressed scales; body size 2.0-3.0 mm; associated with Salicaceae ..... *Archarius*

21(19). Rostrum longer than head and pronotum combined; elytra black with sparse, recumbent vestiture; pronotum slightly constricted toward apex; southern Rocky Mountain United States; associated with Geraniaceae ..... *Hypoleschus*

— Rostrum shorter than head and pronotum combined; elytra yellowish or light reddish brown, lacking obvious vestiture; pronotum rather markedly constricted toward apex; southeastern United States west into Texas; associated with Arecaceae .... *Notolomus*

22(18). Pronotum longer than wide, distinctly constricted at base such that width at midlength much greater than at base (Fig. 14); black, or black and red, glossy and ant-like in form 23

— Pronotum wider than long, base not distinctly constricted such that width at midlength is at most slightly greater than at base; form various 25

23(22). Head with supraocular sulcus present and angulate dorsolaterally; front femur lacking tooth on ventral margin; extreme southern Florida ..... *Micromyrmex*

— Head with supraocular sulcus lacking, no obvious sulcus or impression above eye; front femur with tooth on ventral margin, tooth may be obsolete in some specimens; widespread 24

24(23). Elytra oval, humeri rounded, flight wings absent; eyes slightly reduced in size and number of facets ..... *Oopterinus*

— Elytra elongate-oval, humeri quadrate (Fig. 14), flight wings present; eyes well-developed (Fig. 15) ... *Myrmex*

25(22). Hind tibia with apical comb of setae oblique, set at an angle to long axis of tibia; hind tibia narrowed apically; hind femur stouter than middle femur, slightly so in some specimens; jumping forms (Fig. 18) 26
— Hind tibia with apical comb of setae transverse, perpendicular to long axis of tibia; hind tibia not narrowed apically; hind femur not distinctly stouter than middle femur 28

26(25). Antenna with funicle of 7 articles; eyes subcontiguous to contiguous in anterior view; elytra with or without distinct pattern of contrasting pale vestiture ..... *Tachyerges*
— Antenna with funicle of 6 articles; eyes distinctly separated at point of closest approach by a distance greater than 0.10 X width of an eye in anterior view; elytra without distinct pattern of contrasting pale vestiture 27

27(26). Metasternum (lateral portion), mesepisternum and metepisternum with short, dense, plumose white scales which contrast markedly with the rest of body vestiture; hind femur slightly expanded, length greater than 3.10 X maximum width, ventral margin simple; body size small, 1.0-1.8 mm . ..... *Isochnus*
— Metasternum, mesepisternum and metepisternum with vestiture as on rest of body, mesepisternum and metepisternum in some speicmens with broad bifurcate (but not plumose) scales; hind femur slightly to markedly expanded, length less than 3.20 X maximum width, ventral margin with various spines and setae set in denticles; body size moderate, 1.6-2.5 mm ..... *Orchestes*

28(25). Front coxae distinctly separated by process of prosternum; middle coxae widely separated by distance nearly equal to width of a coxa; body size 1.1-1.4 mm; extreme southern Florida .... *Huaca*
— Front coxae contiguous; middle coxae separated by distance less than width of a coxa; body size greater than 1.3 mm; widespread 29

29(28). Hind tibia with distinct apical tooth, tooth large and curved, subequal in size to tarsal claw 30
— Hind tibia with at most only small, usually straight apical tooth, tooth much smaller than tarsal claw, or tibial apex simple, lacking tooth 40

30(29). Antenna with funicle with coarse, elongate, erect scales; antenna with club compact, glossy and nearly glabrous; tarsus with claws usually with a long, slender tooth extended on inside of claw well distad of base ..... *Magdalinops*
— Antenna with funicle with very fine setae; antenna with club various, usually less compact and with distinct pubescence; tarsus with claws various 31

31(30). Abdomen with sutures between ventrites angled posteriorly at lateral margins 32
— Abdomen with sutures between ventrites straight, not angled posteriorly at lateral margins 36

32(31). Front femur with large, broad, triangular tooth, tooth longer than tarsal claw ..... *Ochyromera*
— Front femur lacking tooth or with at most a short tooth, not longer than tarsal claw 33

33(32). Tarsus with claw with short, broad, blunt basal process 34
— Tarsus with claw with long, fine, acute basal tooth 35

34(33). Front femur simple, lacking tooth; rostrum shorter than pronotum ..... *Ellescus*
— Front femur with minute tooth on ventral margin; rostrum longer than pronotum ..... *Proctorus*

35(33). Rostrum with scrobe descended, antenna with scape rested below lateral rostral groove and below ventral margin of rostrum; antenna with funicle with 6 or 7 articles; associated with Rubiaceae ..... *Plocetes*
— Rostrum with scrobe not descended, rostrum without lateral grooves, antenna with scape parallel to long axis of rostrum; antenna with funicle with 7 articles; associated with Oleaceae .... *Lignyodes*

36(31). Front femur with ventral margin simple, lacking tooth; tooth on tarsal claw minute (may appear absent); body size small, 1.4-1.5 mm ..... *Nanops*
— Front femur with ventral margin with tooth; tooth on tarsal claw distinct; body size various, most greater than 1.5 mm 37

37(36). Front femur with large, broad, triangular tooth, middle and hind femora simple, lacking tooth; associated with Malvaceae ..... *Macrorhoptus*
— Front, middle and hind femora each with tooth; associated with various plants (including Malvaceae) 38

38(37). Antenna with funicle with 6 articles; antenna with club with basal article glossy, almost glabrous, remaining articles densely pubescent; dorsal margin of eye elevated above level of interocular area ..... *Anthonomopsis*
— Antenna with funicle with 7 articles; antenna with club various; eyes various 39

39(38). Elytra with surface even, not tuberculate; pygydium exposed beyond apices of elytra; scales of elytra evenly distributed, without contrasting pattern; body stout ..... *Chelonychus*
— Elytra with serrate tubercle at base of interval 3; pygydium covered by elytra; elytra with broad, conspicuous band of white scales across elytra near base; body more elongate ..... *Smicraulax*

40(29). Rostrum with lateral groove short, apex of groove not extended to anterior margin of eye (short by distance at least equal to diameter of eye); associated with Viscaceae (mistletoe) ... *Cionomimus*
— Rostrum with lateral groove long, apex of groove extended to anterior margin of eye (if short, by much less than diameter of eye); associated with various plants 41

41(40). Antenna with funicle of 5 articles; antenna with club with basal article glossy, almost glabrous; front coxae of some slightly separated; middle coxae widely separated; femora simple, lacking tooth

on ventral margin; body size 1.3-1.5 mm .... *Neomastix*

— Antenna with funicle of 6 or 7 articles; antenna with club various; front coxae various; middle coxae various; femora with tooth or simple, lacking tooth on ventral margin; body size greater than 1.3 mm, most greater than 1.5 mm 42

42(41). Rostrum with lateral groove descended, directed slightly to well below middle of eye; elytra with base of interval 3 elevated; antenna with funicle of 6 articles ..... *Pseudanthonomus*

— Rostrum with lateral groove not descended, directed to middle of eye; elytra with base of interval 3 various, flat to elevated; antenna with funicle of 6 or 7 articles 43

43(42). Rostrum with dense scales throughout almost entire length, scales obscuring underlying cuticle; head constricted behind eyes, hind margin of eye markedly produced; associated with *Bernardia* (Euphorbiaceae); Texas .... *Narberdia*

— Rostrum with scales if present, not dense and limited to basal half of length, scales not obscuring underlying cuticle; head not constricted behind eyes, eye produced but hind margin flat against cuticle; associated with various plants; widely distributed 44

44(43). Front femur markedly expanded, width about twice that of middle or hind femur, with large biserrate tooth on ventral margin; head subconical; associated with *Serjania* (Sapindaceae); southern Texas ..... *Cionopsis*

— Front femur at most slightly expanded, width less than twice that of middle or hind femur, tooth on ventral margin various; head subconical or not, if subconical, then front femur not expanded; associated with various plants; widely distributed 45

45(44). Ventrite 5 of male very short at middle, deeply and broadly emarginate; pronotum with low median carina in basal third to one-half; rostrum short, subequal in length to pronotum or slightly longer, and straight; abdomen with ventrites flat .... *Coccotorus*

— Ventrite 5 of male longer at middle, at most slightly and shallowly emarginate; pronotum lacking median carina; rostrum moderate to long, slightly to distinctly longer than pronotum, and slightly to markedly curved; abdomen with ventrites convex 46

46(45). Front tibia moderately curved, with apical half of inner margin expanded and carinate; elytra with interval 2 descended lateral to scutellum, interval 3 with prominent swelling at base; mesosternum markedly declivious; body size 4.0 - 5.8 mm; southern Florida ..... *Atractomerus*

— Front tibia only slightly curved, with apical half of inner margin simple; elytra with interval 2 flat lateral to scutellum, interval 3 with slight to prominent swelling at base; mesosternum at most slightly declivious; body size various, most less than 4.0 mm; widely distributed ..... *Anthonomus*

Classification of the Nearctic Curculioninae

6. Curculionini Latreille 1802
Curculionina Latreille 1802

Archarius Gistel 1856, 1 sp., *A. salicivorus* (Paykull 1792), Quebec; adventive. This species is associated with galls on *Salix* (Salicaceae). Recently confirmed as established in Quebec by Sylvain Côté (pers. comm.).

Archarias Villa and Villa 1833; not Dejean 1821
Balanobius Jekel 1861
Longifistulia Hong and Wang 1987
Toptaria Kwon and Lee 1990 (valid subgenus)

Curculio Linnaeus 1758, 27 spp., generally distributed. Species are associated with various Fagaceae, Juglandaceae and Betulaceae. See Gibson (1969) to separate the species.

Balaninus Germar 1817
Pelecinus Wiedemann 1823; not Latreille 1800
Tropibalaninus Heller 1927 (valid subgenus)
Carponinophilus Voss 1962 (valid subgenus)

7. Acalyptini Thomson 1859

Acalyptus Schoenherr 1833, 1 sp., *A. carpini* (Herbst 1795), generally distributed in Alaska, Canada and northern United States. This species is associated with *Salix* (Salicaceae) (Anderson 1997).

Orsophagus Roelofs 1874

8. Anthonomini Thomson 1859

Anthonomopsis Dietz 1891, 1 sp., *A. mixta* (LeConte 1876), generally distributed in eastern and central United States and Canada. This species is associated with *Prunus* (Rosaceae) (Ahmad and Burke 1972).

Anthonomus Germar 1817, 110 spp., generally distributed. Species are associated with various families of plants including Asteraceae, Caprifoliaceae, Cistaceae, Cupressaceae, Euphorbiaceae, Fabaceae, Juglandaceae, Krameriaceae, Malpighiaceae, Malvaceae, Myrtaceae, Rosaceae, Rutaceae, Salicaceae, Solanaceae, and Vitaceae; larvae mostly develop in reproductive structures or in galls (Burke 1976). See Dietz (1891), Hatch (1971), Blatchley and Leng (1916) to separate some of the species. The genus presently is being revised in the New World by Wayne Clark and Horace Burke; some of their papers include North American species (Clark 1987a, b, 1988, 1990, 1991a, b; Clark and Burke 1985, 1986, 1996).

Pallene Dejean 1821
Furcipus Desbrochers 1868 (valid subgenus)
Toplithus Gozis 1882
Anthomorphus Weise 1883 (valid subgenus)
Furcipes Bedel 1884
Toplethus Bedel 1884
Anthonomochaeta Dietz 1891 (valid subgenus)
Anthonomocyllus Dietz 1891 (valid subgenus)

Anthonomorphus Dietz 1891 (valid subgenus)
Cnemocyllus Dietz 1891 (valid subgenus)
Paranthonomus Dietz 1891
Tachypterus Dietz 1891; not Guérin-Méneville 1838
Trichobaropsis Dietz 1891
Listrorrhynchus Champion 1903
Tachypterellus Fall and Cockerell 1907 (valid subgenus)
Anthonomidius Reitter 1915 (valid subgenus)
Sexarthrus Blatchley 1916
Pterochalybs Ter-Minasian 1936 (valid subgenus)
Persexarthrus Voss 1944 (valid subgenus)
Parafurcipes Voss 1956 (valid subgenus)
Exanthonomus Voss 1960
Neobradybatus Hoffmann 1963

Atractomerus Duponchel and Chevrolat 1842, 1 sp., *A. punctipennis* (Gyllenhal 1836), southern Florida. This species is associated with *Eugenia* (Myrtaceae) (Anderson 1993a).
Leptarthrus Dietz 1891; not Stephens 1829
Cissoanthonomus Hustache 1939
Arthleptrus Burke 1982

Brachyogmus Linell 1897, 1 sp., *B. ornatus* Linell 1897, southwestern United States. This species is associated with *Lycium* (Solanaceae) (Burke 1968).

Chelonychus Dietz 1891, 2 spp., generally distributed in Western United States and Canada. See Clark and Burke (in press b) to separate the species.

Cionomimus Marshall 1939, 2 spp., southwestern and western United States. Species are associated with *Phoradendron* (mistletoe; Viscaceae) (Burke 1981). See Burke (1981) or Anderson (1994) to separate the species.
Cionistes Dietz 1891; not Wright 1861

Cionopsis Champion 1903, 2 spp., southern Texas. Species are associated with *Serjania* (Sapindaceae); larvae in fruits (Anderson and Burke 1990). See Burke (1982) to separate the species.

Coccotorus LeConte 1876, 4 spp., generally distributed in eastern and central United States and Canada. Species are associated with *Prunus* (Rosaceae) (Brown 1966a). See Brown (1966a) to separate the species.

Dietzianus Sleeper 1953, 2 spp., generally distributed in eastern United States. See Blatchley and Leng (1916) to separate the species.
Xanthus Dietz 1891; not Gistl 1834; not Agassiz 1843

Ephelops Dietz 1891, 1 sp., *E. triguttatus* Dietz 1891, southern Florida. This species may be associated with *Piscidia* (Fabaceae) (Anderson 1993a).

Epimechus Dietz 1891, 11 spp., generally distributed in western United States. Species are associated with various Asteraceae. See Clark and Burke (in press a) to separate the species.

Huaca Clark 1993, 2 spp., southern Florida. *Huaca apian* Clark 1993 has been associated with *Zanthoxylum flavum* Vahl. (Rutaceae) (as Anthonomini new genus 1, new species 1; Anderson 1993a). See Clark (1993a) to separate the species.

Magdalinops Dietz 1891, 4 spp., generally distributed in western United States and Canada. Species are associated with Asteraceae. See Clark and Burke (in press b) to separate the species.

Nanops Dietz 1891, 1 sp., *N. schwarzii* Dietz 1891, southeastern United States. This species is associated with *Hypericum* (Hypericaceae).

Narberdia Burke 1976, 1 sp., *N. aridulus* Burke 1976, Texas. This species is associated with *Bernardia myricaefolia* (Scheele) Wats. (Euphorbiaceae); larvae in fruits (Burke and Rector 1976).

Neomastix Dietz 1891, 1 sp., *N. solidaginis* Dietz 1891, southeastern United States. Adults have been associated with various plants (Clark 1993b).

Pseudanthonomus Dietz 1891, 7 spp., generally distributed in eastern and central United States and Canada extending as far west as Arizona and Colorado, and as far north as Yukon Territory. Species are associated with various Rosaceae, Ericaceae, Betulaceae, Saxifragaceae, Hamamelidaceae and Krameraceae; larvae in flower buds and fruits (Clark 1987c). See Clark (1987c) to separate the species.

Smicraulax Pierce 1908, 2 spp., Arizona and Texas. Species are associated with *Phoradendron* (mistletoe; Viscaceae); larvae mine stems. See Burke (1975) to separate the species.

9. Cionini Schoenherr 1825

Cionus Clairville 1798, 1 sp., *C. scrophulariae* (Linnaeus 1758), New York; adventive. This species is associated with *Scrophularia* and *Verbascum* (Scrophulariaceae); larvae feed externally on the leaves and pupate in round translucent cocoons among flowers and seed-capsules. Recently confirmed as established by Hoebeke (pers. comm.).

10. Derelomini Lacordaire 1866

Elaeidobius Kuschel 1952, 1 sp., *E. subvittatus* (Faust 1898), Florida; adventive. This species is associated with the male flowers of *Elaeis guineensis* Jacquin (African oil palm; Arecaceae) (O'Brien and Woodruff 1986).

Hypoleschus Fall 1907, 1 sp., *H. atratus* Fall 1907, New Mexico and Colorado. This species is associated with *Geranium* sp. (cranesbill; Geraniaceae) (C.W. O'Brien, pers. comm.).

Notolomus LeConte 1876, 2 spp., southeastern United States west to southern Texas. Species are associated with flowers of *Serenoa repens* (Bartr.) Small and *Sabal palmetto* (Walt.) Lodd (saw pal-

metto and cabbage palm; Arecaceae); larvae develop in male flowers (Anderson 1993a). See Blatchley and Leng (1916) to separate the species.

Phyllotrox Schoenherr 1843, 7 spp., generally distributed in the United States. *Phyllotrox canyonacerensis* Warner 1976 is associated with fruits of *Acer grandidentatum* Nutt. (maple; Aceraceae) (Warner 1976). The genus needs revision.

Euclyptus Dietz 1891

11. Ellescini Thomson 1859

Ellescina Thomson 1859

Ellescus Dejean 1821, 4 spp., generally distributed. Species are associated with *Salix* and *Populus* (willow, poplar and aspen; Salicaceae); larvae mine the central axis of female catkins (Scherf 1964). The genus needs revision.

Sarapus Villa and Villa 1833; not Fischer von Waldheim 1821
Elleschus Schoenherr 1838
Alyca LeConte 1876
Anisarctus Desbrochers 1907

Proctorus LeConte 1876, 2 spp., generally distributed in northern United States, Canada and Alaska. Associated with *Salix* (willow; Salicaceae). See LeConte and Horn (1876) to separate the species.

Encalus LeConte 1876

Dorytomina Bedel 1886

Dorytomus Germar 1817, 21 spp., generally distributed. Species are associated with *Salix* and *Populus* (willow, poplar and aspen; Salicaceae); larvae feed in catkins and one develops in sawfly galls in the stems of *Salix*. See O'Brien (1970a) to separate the species but note subsequent synonymy as summarized in O'Brien and Wibmer (1982).

Solenorhinus Motschulsky 1860
Doratotomus Gistel 1886
Eteophilus Bedel 1886
Alycodes Dietz 1891
Euolamus Reitter 1916 (valid subgenus)
Olamus Reitter 1916 (valid subgenus)
Praeolamus Zumpt 1932
Paradorytomus Zumpt 1932
Chaetodorytomus Iablokov-Khnzorian 1970 (valid subgenus)

12. Mecinini Gistel 1856

Cleopomiarus Pierce 1919, 1 sp., *C. hispidulus* (LeConte 1876), generally distributed in eastern United States. This species is associated with *Lobelia* (Campanulaceae); larvae in seed capsules (Anderson 1973).

Miaromimus Solari 1947
Hemimiarus Franz 1947
Gymnetron Schoenherr 1825, 4 spp., generally distributed; adventive. Species are associated with *Verbascum thapsis* Linnaeus, *Linaria vulgaris* Miller (both Scrophulariaceae) and *Plantago lanceolata* Linnaeus (Plantaginaceae); larvae in seed capsules (Anderson 1973). See Buchanan (1937) to separate three of the four species; Sleeper (1954a) presents notes on the fourth. Downie and Arnett (1996) provide a brief key to the four species.

Gymnetrum Agassiz 1846
Carpolinus Gistel 1848
Aprinus Desbrochers 1893
Eutemnoscelus Desbrochers 1893 (valid subgenus)

Mecinus Germar 1821, 2 spp., *M. pyraster* (Herbst 1795) and *M. janthinus* (Germar 1817), eastern and western United States and Canada (disjunct); adventive. *Mecinus pyraster* is associated with *Plantago lanceolata* Linnaeus (Plantaginaceae); larvae are in seed capsules (Anderson 1973). *Mecinus janthinus* has been introduced into Montana, Wyoming, Washington, British Columbia, Alberta and Nova Scotia (Harris *et al.* 2001; DeClerk-Floate and Harris in press) for the biological control of *Linaria vulgaris* Miller (yellow toad-flax) and *L. dalmatica* (L.) Miller (Dalmation toad-flax) (Scrophularaceae). There is no key to separate the two species in North America.

Hexaphyllus Dejean 1821
Macipus Fischer de Waldheim 1829
Mecinopsis Escalera 1914

13. Otidocephalini Lacordaire 1863

Micromyrmex Sleeper 1953, 2 spp., *M. cavirostris* (Casey 1892) and *M. poeyi* (Chevrolat 1832), southern Florida. See Blatchley and Leng (1916; as *Otidocephalus*) to separate the species.

Myrmex Sturm 1826, 31 spp., generally distributed in the United States and southeastern Canada; most species in southwestern United States. Species are associated mainly with various Asteraceae, also Fagaceae, Ulmaceae, Arecaceae, Smilacaceae, Viscaceae and Sapotaceae (Anderson 1993b). Larvae mostly mine stems. The genus needs revision. See Horn (1873) and Schaeffer (1907) to separate most of the species.

Otidocephalus Chevrolat 1832
Cycotida Pascoe 1872

Oopterinus Casey 1892, 2 spp., eastern United States. Larvae of *O. perforatus* develop in cynipid galls on the roots of *Quercus*. See O'Brien (1985) to separate the species.

14. Rhamphini Rafinesque 1815

Rhamphina Rafinesque 1815

Isochnus Thomson 1859, 5 spp., generally distributed in North America, including far northern Canada and Alaska; not in southeastern United States. Species are associated with *Salix* and *Populus*

(willow, poplar and aspen; Salicaceae); larvae mine leaves (Anderson 1989a). See Anderson (1989a) to separate the species.

Orchestes Illiger 1798, 5 spp., generally distributed. Species are associated with Betulaceae, Rosaceae and Ulmaceae; larvae mine leaves (Anderson 1989a). See Anderson (1989a) to separate the species.

Salius Schrank 1798 (valid subgenus)
Alyctus Thomson 1859
Threcticus Thomson 1859
Euthoron Thomson 1859
Nomizo Morimoto 1984 (valid subgenus)

Tachyerges Schoenherr 1825, 3 spp., generally distributed. Species are associated with *Salix* and *Populus* (willow, poplar and aspen; Salicaceae); larvae mine leaves (Anderson 1989a). See Anderson (1989a) to separate the species.

15. Smicronychini Seidlitz 1891

Promecotarsus Casey 1892, 3 spp., generally distributed in western United States and Canada. See Casey (1892) to separate the species.

Smicronyx Schoenherr 1843, 70 spp., generally distributed. Species are associated with various plants, mostly Asteraceae and Convolvulaceae (*Cuscuta*; dodder); larvae are in seeds or may cause galls (Anderson 1962). See Anderson (1962) to separate the species.

Micronyx Schoenherr 1835; not Boisduval 1835
Desmoris LeConte 1876 (valid subgenus)
Pachyphanes Dietz 1894 (valid subgenus)
Pseudromicronyx Dietz 1894 (valid subgenus)
Synertha Dietz 1894
Chalybodontus Desbrochers 1897 (valid subgenus)
Oligocaricis Lea 1926

16. Storeini Lacordaire 1863

Pachytychius Jekel 1861, 1 sp., *P. haematocephalus* (Gyllenhal 1836), New York; adventive. This species is associated in Europe with *Lotus corniculatus* L. (Fabaceae) (Hoffmann 1958).

Styphlotychius Jekel 1861
Barytychius Jekel 1861
Scyphotychius Desbrochers 1875
Rabdotorhinus Desbrochers 1894
Fogatianus Caldara 1978

17. Tychiini Thomson 1859

Tychiina Thomson 1859

Sibinia Germar 1817, 22 spp., generally distributed in western United States. Species are associated with various Fabaceae (subfamily Mimosoideae); larvae in reproductive structures (Clark 1978). See Clark (1978) to separate the species.

Sibynes Schoenherr 1825
Campipterus Motschulsky 1845
Campopterus Agassiz 1846
Sibynia Agassiz 1846
Aocnus Schoenherr 1859
Sibynia Wollaston 1865; not Agassiz 1846
Paragoges LeConte 1876
Dichotychius Bedel 1885 (valid subgenus)
Mecynopyga Pierce 1908
Microtychius Casey 1910 (valid subgenus)
Teratonychus Bondar 1949
Itychus Kissinger 1962

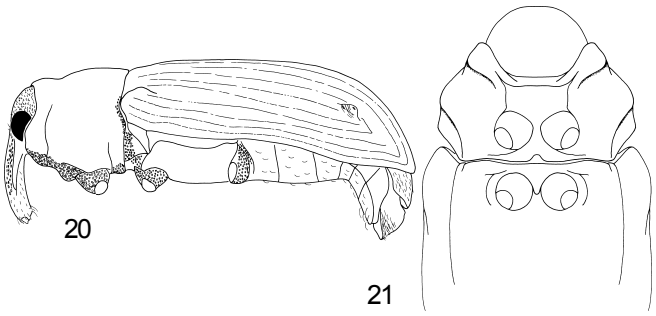
Tychius Germar 1817, 16 spp., generally distributed; four species adventive (Anderson and Howden 1994). Species are associated with various native and adventive Fabaceae (subfamily Papilionoideae); larvae in reproductive structures (Clark 1971; Clark and Burke 1977). See Clark (1971, 1977) and Anderson and Howden (1994) to separate the species.

Miccotrogus Schoenherr 1825
Apeltarius Desbrochers 1873 (valid subgenus)
Ectatotychius Tournier 1874
Hypactus Marseul 1888
Henonia Pic 1897
Xenotychius Reitter 1897
Pseudolignyodes Pic 1899
Paratychius Casey 1910
Aoromius Desbrochers 1907
Lepidotychius Penecke 1922
Elleschidius Penecke 1938
Heliotychius Franz 1943
Neotychius Hustache 1945
Mongolotychius Korotyaev 1990

Lignyodina Bedel 1884

Lignyodes Dejean 1835, 17 spp., generally distributed. Species are associated with Oleaceae; larvae are in reproductive structures (Clark 1980a, 1980b, 1981). Subgenus *Lignyodes* are associated with *Fraxinus* (ash), subgenus *Chionanthobius* with *Chionanthus*, *Forestiera* and *Osmanthus*, and subgenus *Neotylopterus* with *Forestiera*. See Clark (1980a, 1980b, 1981) to separate the species.

Lignyodes Schoenherr 1835; not Dejean 1835
Stenorhynchus Villa and Villa 1835; not Lamarck 1818; not Hemprich 1820; not Berthold 1827
Rhaestes Gistel 1856
Thysanocnemis LeConte 1876
Tylopterus LeConte 1876; not Capiomont 1868
Chionanthobius Pierce 1912 (valid subgenus)
Lignyodius Dieckmann 1970
Neotylopterus Clark, Whitehead and Warner 1977 (valid subgenus)



FIGURES 20.131-21.131. Bagoinae, *Bagous americanus* LeConte, 20. Lateral habitus; 21. Thoracic sterna, ventral view.

Plocetes LeConte 1876, 4 spp., generally distributed in southeastern United States west to southern Texas (two species are restricted to extreme southern Florida; one to extreme southern Texas). *Plocetes ulmi* LeConte 1876 is widespread in the southeastern United States and is associated with *Cephalanthus occidentalis* L. Species are all associated with Rubiaceae; larvae likely in reproductive structures (Clark 1982; Anderson 1991). See Clark (1982) and Anderson (1991) to separate the species.

Dietzia Champion 1903

Hamaba Casey 1910

Rosella Whitehead 1977

Ochyromerina Voss 1935

Ochyromera Pascoe 1874, 1 sp., *O. ligustri* Warner 1961, southeastern United States; adventive. This species is associated with *Ligustrum* (adventive; privet; Oleaceae) (Warner 1961).

Exochyromera Voss 1937

Incertae sedis (Curculioninae)

Macrorhoptus LeConte 1876, 6 spp., generally distributed in central and western United States and Canada. Species are associated with *Sphaeralcea*, *Sidalcea* and *Callirhoe* (Malvaceae); larvae are in reproductive structures (Burke 1973). The genus needs revision. See Sleeper (1957a) to separate the species.

Paraceratopus Brèthes 1910

V. Bagoinae Thomson 1859

by Robert S. Anderson

Only the genera *Bagous* and *Pnigodes* constitute Bagoinae in North America and the status of the latter as distinct is questionable. Most are found in aquatic or semi-aquatic habitats where larvae are associated with a variety of plant families. Members are easily recognized by the median prosternal channel (Fig. 21), the smooth varnish-like coating over the scales, the mostly tuberculate elytra, and the elongate and slender legs. They are very similar in appearance to the Stenopelmina (Erirhininae) but the members of that subtribe do not possess a sternal channel for reception of the rostrum and have different male genitalia.

Key to the Nearctic genera of Bagoinae

1. Pronotum slightly constricted behind apex (Fig. 20) ..... *Bagous*
— Pronotum markedly constricted behind apex ..... *Pnigodes*

Classification of the Nearctic Bagoinae

Bagous Germar 1817, 33 spp., generally distributed. Species are associated with various wetland plants such as *Limnobium spongia* (Bosc) Steud. (Hydrocharitaceae), *Brasenia schreberi* Gmel. and *Nymphaea* (Nymphaeaceae), *Eleocharis* and *Carex* (Cyperaceae), and *Potamogeton* (Potamogetonaceae) (O'Brien and Marshall 1979). *Bagous pictus* Blatchley 1920 is associated with *Sesuvium portulacastrum* (L.) L. (Aizoaceae). See Tanner (1943) to separate the species. The genus *Pnigodes* is questionably distinct from *Bagous*. The genus is being revised by Charles O'Brien.

Macropelmus Dejean 1821
Hydronomus Schoenherr 1825
Cyprus Schoenherr 1825
Lyprus Schoenherr 1826
Dicranthus Motschulsky 1845
Ephimeropus Hochhuth 1847
Elmidomorphus Cussac 1851
Bagoas Gistel 1856
Anactodes Brisout 1863
Helminthimorphus Bedel 1884
Bagoimorphus Desbrochers 1884
Parabagous Schilsky 1907
Abagous Sharp 1916
Parabagous Sharp 1916; not Schilsky 1907
Probagous Sharp 1916
Heterobagous Solari 1930
Himeniphades Kôno 1934
Memptorrhynchus Iablokov-Khnzorian 1960
Fontenelleus Hoffmann 1962

Pnigodes LeConte 1876, 1 sp., *P. setosus* LeConte 1876, generally distributed in central and southwestern United States. This genus is questionably distinct from *Bagous*.

VI. Baridinae Schoenherr 1836

by Robert S. Anderson

Among all weevils, those in the Baridinae are in need of the most study. The group as a whole is difficult to characterize and generic concepts and definitions need much refinement. There are many genera and some are of questionable validity. Some genera (*e.g.*, *Baris*, *Pseudobaris*, *Onychobaris*, *Sibariops*, etc.) have numerous included species but these have not been studied since their original descriptions and many of them are still known only from type

series and localities. Thomas Lincoln Casey was the last person to seriously study this subfamily and is responsible for most of the generic and species concepts and names in use today. His types are all located at the Smithsonian Institution in Washington D.C. and a critical study of this collection is central to resolving the state of taxonomy in this subfamily.

Most baridines are glossy and black, with few (usually white) or no scales on the body, and are most readily recognized by an ascended mesepisternum that is visible between the hind angle of the pronotum and the elytral humerus. They share this latter feature with Ceutorhynchinae but the latter have an exposed pygydium (shared with some Baridinae) and have a very small or no apical tooth on the hind tibia. This tooth is generally well-developed in Baridinae or the outer curved face of the tooth is continuous with the apex of the outer tibial margin or is connected to it by a distinct, continuous sharp carina that traverses the apical face of the tibia.

The natural history of baridines is poorly known. Some species are associated with monocots such as various grasses, sedges, and palms. Larvae mostly mine stems. Some species in the genera *Buchananius* and *Plocamus* appear to be associated with fungi on dead wood. Adults, especially of the tribe Madopterini, frequently visit flowers. Many baridines can also be found in semi-aquatic habitats.

Key to the Nearctic genera of Baridinae
(slightly modified from Kissinger 1964)

1. Tarsus with a single claw 2
— Tarsus with two claws (may be connate at base) 3

2(1). Body subcylindrical in form, elytra about twice as long as wide; middle coxae separated by a distance less than the width of a coxa .. *Barilepton*
— Body elongate-oval in form, elytra about 1.5 times as long as wide; middle coxae separated by a distance about equal to the diameter of a coxa ..... *Eisonyx*

3(1). Tarsus with claws connate at base 4
— Tarsus with claws separate at base 20

4(3). Pygydium not covered by elytra, broadly exposed, punctate, nearly vertical 5
— Pygydium more or less covered by elytra, mostly smooth, lacking obvious punctures, oblique 11

5(4). Front coxae widely separated by a distance greater than the width of a coxa 6
— Front coxae narrowly separated by a distance less than the width of a coxa 9

6(5). Prosternum unimpressed in front of coxae; antenna with club more or less subcylindrical in shape, about as wide as article 7 of funicle, basal article of club about half as long as club ..... *Orchidophilus*
— Prosternum with median sulcus or apical impression in front of coxae; antenna with club more or less oval in shape, distinctly wider than article 7 of funicle, basal article of club about a third as long as club 7

7(6). Prosternum with apical excavation but lacking sulcus immediately anterior to coxae; elytra with intervals flat; body nearly glabrous; femora not toothed ..... *Ampeloglypter*
— Prosternum with median sulcus extended from coxae to near apex; elytra with intervals various; elytra often with scattered white scales or with a patch of white scales at base of interval 3; femora with or without tooth 8

8(7). Elytra with intervals rather wide and flat on disk (Fig. 25); body color black or dark piceous; elytra often with scattered white scales or with a patch of white scales at base of interval 3; femora with or without tooth ..... *Pseudobaris*
— Elytra with intervals narrow and convex on disk (Fig. 24); body color pale reddish brown; elytra nearly glabrous; femora without tooth ... *Desmoglyptus*

9(5). Antenna with club about as long as preceding six articles of funicle ..... *Hesperobaris*
— Antenna with club shorter than preceding five articles of funicle 10

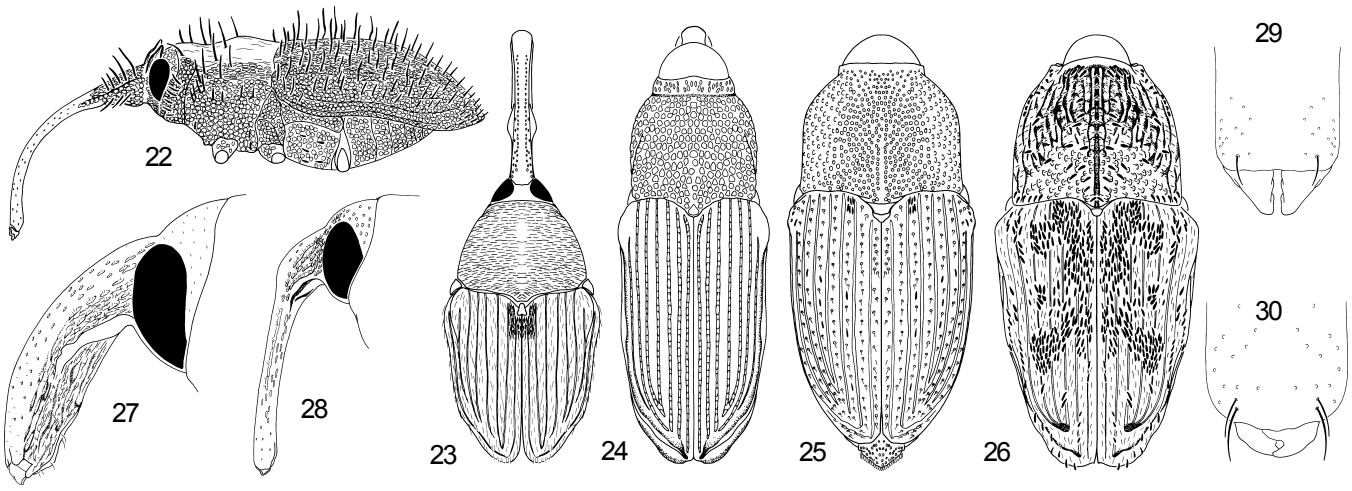
10(9). Rostrum distinctly separated from head by marked constriction at base of rostrum; body with dense scales; size greater than 3.0 mm ..... *Trichobaris*
— Rostrum at most slightly separated from head by slight constriction at base of rostrum; body nearly glabrous; size less than 2.0 mm ..... *Microbaris*

11(4). Prosternum not sulcate in front of coxae and/or coxae separated by distance greater than width of a coxa 12
— Prosternum with deep, narrow sulcus in front of coxae and/or coxae separated by distance less than diameter of a coxa 14

12(11). Rostrum short and stout, shorter than pronotum; body nearly glabrous, with sparse, minute hair-like scales, elytra blue in color, intervals nearly impunctate ..... *Zygobarinus*
— Rostrum long and slender, longer than pronotum; body with some sparse, broad scales, elytra black or piceous in color, intervals with deep, coarse punctures 13

13(12). Elytra with striae narrow, punctures wider than striae; prosternum in front of coxae with a pair of low ridges which are divergent posteriorly; southern Florida ..... *Zygobaris*
— Elytra with striae broad, punctures not as wide as striae; prosternum in front of coxae with ridges developed only near apex; southern Texas ..... *Zygobarella*

14(11). Prosternum behind coxae with deep narrow sulcus; rostrum longer than pronotum, abruptly attenuate immediately beyond antennal insertion, antennal insertion sub-basal (Fig. 28); antenna with article 2 of funicle long, more or less one-half length of scape ..... *Amercedes*
— Prosternum behind coxae lacking sulcus; rostrum various in length, of more or less subequal width throughout length, not attenuate beyond antennal insertion, antennal insertion near or in front



FIGURES 22.131-30.131. Baridinae. 22. *Plocamus echidna* (LeConte), lateral habitus. 23-26. Dorsal habitus, 23. *Geraeus patagoniensis* (Sleeper); 24. *Desmoglyptus arizonicus* Casey 1920; 25. *Pseudobaris nigrina* (Say); 26. *Glyptobaris lecontei* Champion. 27-28. Lateral view of head, 27. *Baris* sp.; 28. *Amercedes subulirostris* Casey. 29-30. Dorsal view of apex of rostrum and mandibles, 29. *Odontocorynus salebrosus* (Casey); 30. *Haplostethops* sp.

of middle of rostrum; antenna with article 2 of funicle short, much less than length of scape 15

15(14). Prosternum lacking sulcus medially in front of coxae; rostrum about as long as pronotum, slender, cylindrical, slightly curved ..... *Strongylotes*

— Prosternum with median sulcus in front of coxae; rostrum shorter than pronotum, stout, distinctly curved 16

16(15). Body nearly glabrous; prosternum in front of coxae with glabrous, median, broad sulcus with acute lateral margins; pronotum with fine, shallow punctures ..... *Stethobaris* (part)

— Body with narrow or broad scales; prosternum in front of coxae with median suclus with scales and with low, rounded lateral margins; pronotum with deep punctures 17

17(16). Mandibles prominent, not overlapped when closed; rostrum abruptly separated from head by deep constriction; hind tarsus with article 5 longer than articles 1 and 2 combined ..... *Acentrinops*

— Mandibles small, not prominent, overlapped when closed; rostrum only slightly separated from head by slight constriction; hind tarsus with article 5 subequal in length to shorter than articles 1 and 2 combined 18

18(17). Antenna with basal article of funicle elongate, slender, longer than articles 2 to 5 combined; elytra with broad scales arranged in groups; body length greater than 3.0 mm; body form subcylindrical; tarsal claws connate to near apex ..... *Barinus*

— Antenna with basal article of funicle stout, shorter than articles 2 to 4 combined; elytra with some solitary white scales; body length less than 2.5 mm; body form oval; tarsal claws connate only at base 19

19(18). Prosternum with median impression indistinctly defined laterally, wider posteriorly ..... *Catapastus*

— Prosternum with median impression distinctly defined and ridged laterally, wider anteriorly .... *Catapastinus*

20(3). Pygydium more or less completely exposed beyond elytral apex, punctate, nearly vertical 21

— Pygydium covered by elytra, mostly smooth, lacking obvious punctures, oblique 36

21(20). Hind tibia lacking tooth at apical margin or with tooth or process shorter than tarsal claw 22

— Hind tibia with tooth at apical margin about as long as tarsal claw 25

22(21). Mandible prominent, triangular, inner face smooth and straight ..... *Pseudocentrinus* (part; male)

— Mandible with distinct teeth on inner face 23

23(22). Antenna with club shorter than articles 2-7 of funicle, article 2 of funicle longer than 3; abdominal ventrite 5 distinctly longer than 3 and 4 combined ..... *Centrinogyna* (part; male)

— Antenna with club longer than articles 2-7 of funicle, articles 2 and 3 of funicle subequal in length; abdominal ventrite 5 shorter than 3 and 4 combined 24

24(23). Prosternum with shallow median sulcus in front of coxae; rostrum in lateral view distinctly separated from head by a marked transverse impression at base; scutellum quadrate ..... *Orthoris*

— Prosternum flat in front of coxae, lacking median sulcus; rostrum in lateral view at most slightly separated from head by a slight transverse impression at base; scutellum triangular .... *Rhoptobaris*

25(21). Front coxae narrowly separated by a distance much less than the width of a coxa 26

— Front coxae widely separated by a distance greater than the width of a coxa 34

26(25). Prosternum with deep, narrow median sulcus in front of coxae 27

— Prosternum flat in front of coxae or with at most a slight median longitudinal impression 28

27(26). Antenna with article 2 of funicle more than twice as long as wide, as long as articles 3 and 4 combined; body form elliptical in dorsal view ..... *Aulobaris*

— Antenna with article 2 of funicle less than twice as long as wide, shorter than articles 3 and 4 combined; body form elongate, subparallel in dorsal view ..... *Trepobaris*

28(26). Elytra with striae 1and 2 deeply linearly punctate in basal one-third, striae deeply continuously impressed in apical two-thirds only; male with rostrum with ventral surface with long dense pilosity ..... *Myctides*

— Elytra with striae 1and 2 deeply continuously impressed throughout entire length; male with rostrum with ventral surface glabrous or with a few short setae 29

29(28). Rostrum in lateral view continuous with head, not separated from head by transverse impression; eyes large, extended onto dorsal surface of head; frons about one-half as wide as rostrum at apex; body subcylindrical in form ..... *Stenobaris*

— Rostrum in lateral view distinctly separated from head by transverse impression; eyes smaller, lateral, not extended onto dorsum of head; frons about as wide as rostrum at apex; body various in form 30

30(29). Pronotum with sides covered with broad, round scales; body with white and tan colored scales intermixed ..... *Cosmobaris*

— Pronotum with sides lacking broad, round scales; body either subglabrous or with only white scales 31

31(30). Rostrum in lateral view separated from head by shallow, broad impression (Fig. 27) 32

— Rostrum in lateral view separated from head by a deep groove or dorsal constriction of the base of the rostrum 33

32(31). Elytra subglabrous, vestiture fine, minute, of uniform length and form; antenna with basal article of club less pubescent and more glossy than other articles of club; body size 2.8-6.0 mm ..... *Baris*

— Elytra fine minute hair-like vestiture as well as broad, white scales which form a spot at the base of elytral interval 3 (other spots may also be present); antenna with club uniformly pubescent; body size 1.8-3.0 mm ..... *Plesiobaris*

33(31). Pronotum broadly constricted at apex, not tubulate; vestiture of fine scales, recumbent ..... *Pycnobaris*

— Pronotum sharply constricted at apex, tubulate; vestiture of fine scales and setae intermixed, suberect ..... *Stictobaris*

34(25). Surface of pronotum distinctly rugose (Fig. 26); elytra with coarse elongate yellow scales and fine setae; prosternum produced posteriorly only slightly over mesosternum; mandible with inner face nearly smooth ..... *Glyptobaris*

— Surface of pronotum punctate; elytra glabrous or nearly so, with at most fine short, hair-like scales; prosternum produced posteriorly over mesosternum; mandible with inner face deeply notched 35

35(34). Femora with ventral margin with tooth; pronotum and elytra with fine, sparse punctures; body nearly glabrous; elytra with surface uneven ..... *Madarellus*

— Femora with ventral margin simple, lacking tooth; pronotum and elytra with deep, uniform punctures; body with fine short, suberect hair-like scales; elytra with surface more or less even ... *Onychobaris*

36(20). Body with sparse, erect, coarse setae (Fig. 22); body size small, less than 3.0 mm 37

— Body with at most fine setae or appressed scales; body size various 38

37(36). Front coxae widely separated by distance much greater than width of a coxa; prosternum flat in front of coxae; body densely covered with broad, appressed scales in addition to erect setae (Fig. 22) ..... *Plocamus*

— Front coxae narrowly separated by distance less than width of a coxa; prosternum medially shallowly, broadly impressed in front of coxae; body with at most some fine hair-like scales in addition to erect setae ..... *Buchananius*

38(36). Mandibles prominent, triangular in form when viewed dorsally, not or only slightly overlapped or crossed when closed (Fig. 29) 39

— Mandibles not prominent, less obviously triangular in form when viewed dorsally, overlapped or crossed when closed (Fig. 30) 52

39(38). Mandible with inner face smooth (Fig. 29), not dentate or emarginate, usually straight but divergent in some specimens 40

— Mandible with inner face dentate or crenulate, straight 45

40(39). Abdomen with ventrite 5 tumid medially, more than three times as long as ventrites 3 and 4 combined; prosternum deeply, narrowly sulcate in front of coxae ..... *Pseudocentrinus* (part; female)

— Abdomen with ventrite 5 flat medially, at most slightly longer than ventrites 3 and 4 combined; prosternum various 41

41(40). Antenna with distal articles of funicle obliquely truncate, club with basal article with glabrous area with blunt or dentiform process on inner face .. .. *Odontocorynus* (part; male)

— Antenna with distal articles of funicle and basal article of club simple, not modified 42

42(41). Male with prosternum flat in front of front coxae 43

— Male with prosternum deeply excavated anterior to front coxae 44

43(42)[4]. Pronotum with anterior tubulate portion with a longitudinal fold on each side; prosternum with vestiture on median line not radiating from a central point, but directed backwards (Fig. 23) ..... *Geraeus*

— Pronotum with anterior tubulate portion lacking a longitudinal fold on each side; prosternum with vestiture on median line radiating from a central point, lying either behind, on, or before the posterior line of the tubulate portion ... *Linogeraeus*

44(42). Prosternum of male with large, deep pit between prosternal spines ..... *Pachygeraeus*
— Prosternum of male flat between spines but with transverse, deep, median anterior fossa ..... *Pycnogeraeus*

45(39). Front coxae widely separated by distance equal to width of a coxa; hind tibia with large tooth at apical margin at least as long as a tarsal claw 46
— Front coxae narrowly separated by distance obviously less than width of a coxa; hind tibia lacking tooth at apical margin or tooth obviously shorter than a tarsal claw 48

46(45). Rostrum with point of antennal insertion medial; prosternum flat, lacking sulcus; body elongate oval in form ..... *Calandrinus*
— Rostrum with point of antennal insertion in basal one-half; prosternum with median sulcus in front of coxae; body broadly oval in form 47

47(46). Elytra, except at base, nearly glabrous; pronotum with basal margin distinctly produced posteriorly and emarginate immediately in front of scutellum; front tibia simple, not excavated to receive base of tarsus ..... *Pachybaris*
— Elytra with scattered broad white scales; pronotum with basal margin distinctly produced posteriorly but not emarginate immediately in front of scutellum; front tibia with outer surface at apex deeply excavated to receive base of tarsus ..... *Diorymeropsis*

48(45). Rostrum with point of antennal insertion behind midlength; prosternum of female with median longitudinal sulcus in front of coxae, in male, with two erect processes in front of which is an elongate-oval impression ..... *Centrinopus*
— Rostrum with point of antennal insertion at or in front of midlength; prosternum of male unarmed in front of coxae 49

49(48). Metasternum short, middle and hind coxae separated by less than length of abdominal ventrite 1 behind hind coxa; body broadly oval in dorsal form ..... *Microcholus*
— Metasternum longer, middle and hind coxae separated by a distance at least equal to length of abdominal ventrite 1 behind hind coxa; body elongate in dorsal form 50

50(49). Front coxae separated by more than one-half width of a coxa; mandible with outer face denticulate ..... *Centrinogyna*
— Front coxae narrowly separated by distance less than one-half width of a coxa (exception some *Nicentrus*); mandible with outer margin not denticulate 51

[4] The genus *Centrinus* with only the species *C. pistor* (Germar 1824) should key here (not seen by me). Its relationship to *Geraeus* and *Linogeraeus* needs to be reassessed (see text).

51(50). Pronotum constricted apically, markedly tubulate ..... *Centrinites*
— Pronotum not constricted or tubulate at apex ..... *Nicentrus*

52(38). Lateral profile with dorsal surface markedly, evenly convex; elytra with striae obsolete, indicated only by rows on punctures 53
— Lateral profile with dorsal surface flattened near middle, not evenly convex; elytra with striae distinct, moderately deep 54

53(52). Prosternum with median longitudinal impression in front of coxae; pronotum markedly tubulate at apex ..... *Oomorphidius*
— Prosternum flat in front of coxae; pronotum not tubulate at apex ..... *Cholinobaris*

54(52). Shortest distance between middle and hind coxae less than, or equal to, one-half length of metepisternum 55
— Shortest distance between middle and hind coxae usually greater than one-half length of metepisternum 58

55(54). Antenna with article 2 of funicle about as wide as long, stout; antennal club large, elongate, about as long as funicle; body nearly glabrous, with minute hair-like scales ..... *Stethobaris*
— Antenna with article 2 of funicle distinctly longer than wide, slender; antennal club moderately long, not as long as funicle; body with fine, but distinct, long hair-like scales 56

56(55). Pronotum constricted apically but not tubulate ... *Oligolochus*
— Pronotum tubulate at apex 57

57(56). Prosternum deeply sulcate in front of coxae; body lacking dense white scales on venter ..... *Idiostethus*
— Prosternum shallowly sulcate in front of coxae; lateral margins of thoracic sterna with dense, white, overlapped scales ..... *Haplostethops*

58(54). Prosternum of male with a pair of erect, slender processes in front of coxae or with low transverse carina 59
— Prosternum of male unarmed in front of coxae 60

59(58). Body form in dorsal view elongate-oval; prosternum of male with short, slender spines ..... *Sibariops*
— Body form in dorsal view slender, subcylindrical; prosternum of male with long, slender spines and a deep rounded fossa anterior to spines ..... *Cylindridia*

60(58). Front coxae narrowly separated by distance distinctly less than width of a coxa 61
— Front coxae widely separated by distance greater than width of a coxa 62

61(60). Elytra with fine, inconspicuous hair-like scales; pronotum strongly constricted at apex and tubulate ..... *Dirabius*
— Elytra with moderately coarse, elongate, white conspicuous scales; pronotum not constricted or tubulate at apex ..... *Trichodirabius*

62(60). Body with fine, elongate scales; antenna with funicle with very fine, long setae ..... *Apinocis*
— Body with coarse, elongate scales; antenna with coarse, elongate scales ..... *Barilepsis*

CLASSIFICATION OF THE NEARCTIC BARIDINAE

18. Baridini Schoenherr 1836

Baridina Schoenherr 1836

Aulobaris LeConte 1876, 10 spp., generally distributed in eastern United States and Canada, also California. Some species are associated with wetlands. See Casey (1892, 1920) to separate the species. The genus needs revision.

Baris Germar 1817, 92 spp., generally distributed. Species are associated with various plants, mostly Asteraceae. See Casey (1892) and Gilbert (1964) to separate some of the species. The genus needs revision; many species are of questionable validity.

Baridius Schoenherr 1825
Cyphirhinus Schoenherr 1826
Aegyptobaris Pic 1889 (valid subgenus)
Turkmenobaris Zaslavskij 1956 (valid subgenus)

Cosmobaris Casey 1920, 1 sp., *C. americana* Casey 1920, generally distributed. This species is associated with *Chenopodium* (Chenopodiaceae); larvae mine stems (Kissinger 1964).

Desmoglyptus Casey 1892, 2 spp., Maryland, Pennsylvania, Virginia, District of Columbia, and Arizona. Species are associated with *Vitis* (grape; Vitaceae) (Kissinger 1964). See Casey (1920) to separate the species.

Hesperobaris Casey 1892, 2 spp., Missouri, Kansas and Texas. See Casey (1892) to separate the species.

Microbaris Casey 1892, 1 sp., *M. galvestonica* Casey 1892, Texas.

Orthoris LeConte 1876, 7 spp., generally distributed in the western United States and Canada. Species are associated with *Mentzelia* (Loasaceae); larvae are in pods, stems and roots (Pierce 1907). See Casey (1892, 1920) to separate the species. The genus needs revision.

Plesiobaris Casey 1892, 6 spp., generally distributed in eastern United States. Species are associated with *Hypericum* (Hypericaceae) in wetlands. See Casey (1892, 1920) to separate the species.

Pseudobaris LeConte 1876, 31 spp., generally distributed in eastern United States and Canada, west to California, Colorado and Utah. At least one species is associated with *Lycopus* (Labiatae) (Kissinger 1963). See Casey (1892) to separate the species. The genus needs revision; many species are of questionable validity.

Pseudobaridia Casey 1920 (valid subgenus)

Pycnobaris Casey 1892, 4 spp., Kansas, Colorado, Texas and California. See Casey (1892, 1920) to separate the species.

Rhoptobaris LeConte 1876, 1 sp., *R. canescens* LeConte 1876, Kansas, Colorado, Texas and Oregon.

Stenobaris Linell 1897, 1 sp., *S. avicenniae* Linell 1897, Florida. This species is associated with *Avicennia germinans* (L.) L. (black mangrove; Avicenniaceae) (Linell 1897).

Trepobaris Casey 1892, 1 sp., *T. elongata* Casey 1892, Arizona and Texas.

Trichobaris LeConte 1876, 9 spp., generally distributed in eastern and southern United States and southern Canada. Species are associated with various Solanaceae; larvae are in stems (Barber 1935; Cuda and Burke 1985). See Barber (1935) to separate the species.

19. Madarini Jekel 1865

Madarina Jekel 1865

Ampeloglypter LeConte 1876, 3 spp., generally distributed in eastern United States and southern Canada. Species are associated with *Vitis* (grape; Vitaceae); larvae make galls on stems (Kissinger 1964). See Blatchley and Leng (1916) to separate the species.

Glyptobaris Casey 1892, 1 sp., *G. lecontei* Champion 1909, generally distributed in the eastern United States.

Madarellus Casey 1892, 5 spp., generally distributed in the eastern United States and Canada west to Texas. Species are associated with *Vitis* (Vitaceae) (Blatchley and Leng 1916). See Casey (1892, 1920) and Blatchley and Leng (1916) to separate the species. The genus needs revision.

Willinkia Bondar 1949

Onychobaris LeConte 1876, 33 spp., generally distributed in the United States, but especially in the southwest including California. See Casey (1892, 1920) to separate some of the species. The genus needs revision; many species are of questionable validity.

Orchidophilus Buchanan 1935, 3 spp., New Jersey, District of Columbia, and California; adventive in orchid houses, likely not established in the wild. See Buchanan (1935) to separate the species.

Stictobaris Casey 1892, 4 spp., southwestern and central United States. See Sleeper (1957b) to separate the species.

Tonesiina Alonso-Zarazaga and Lyal 1999

Myctides Pascoe 1874, 1 sp., *M. imberbis* Lea 1906, Florida; adventive. This species is associated with *Syzygium jambos* Alston (Myrtaceae); larvae in seeds (Woodruff 1977; Anderson 1993a).

20. Madopterini Lacordaire 1866

Torcina Bondar 1943

Sibariops Casey 1920, 41 spp., generally distributed in eastern United States and Canada. Species are associated with sedges in wetlands. See Casey (1920) to separate the species. The genus needs revision; many species are of questionable validity.

Zygobaridina Pierce 1907

Acentrinops Casey 1920, 1 sp., *A. brevicollis* Casey 1920, New Mexico and Texas.

Amercedes Casey 1894, 1 sp., *A. subulirostris* Casey 1893, Louisiana and Texas. This species is associated with *Zanthoxylum* (Rutaceae) (Pierce 1907).

Zygobaroides Pierce 1907

Apinocis Lea 1927, 15 spp., generally distributed. Larvae of at least one species, *A. saccharinus* (Marshall 1952), have been associated with grasses (Poacaeae) (Woodruff 1972). See Buchanan (1932) to separate most of the species. The genus needs revision.

Prosaldius Ogloblin 1930

Anacentrinus Buchanan 1932

Barilepis Casey 1920, 3 spp., generally distributed in the eastern United States, Arizona and Texas. See Casey (1920) to separate the species.

Barilepton LeConte 1876, 4 spp., generally distributed in eastern and southern United States. Species are associated with wetlands. See Casey (1892) to separate the species.

Barinus Casey 1892, 14 spp., generally distributed in eastern United States, also California. Species are associated with sedges in wetlands. See Sleeper (1956a) to separate the species.

Buchananius Kissinger 1957, 2 spp., generally distributed in eastern United States. Species are associated with various dead tree limbs on the ground (Kissinger 1964). See Kissinger (1958) or Blatchley and Leng (1916) to separate the species.

Zaglyptus LeConte 1876; not Foerster 1868

Calandrinus LeConte 1876, 2 spp., New Mexico, Texas, Colorado and Alberta. See Casey (1892, 1920) to separate the species.

Catapastinus Champion 1908, 1 sp., *C. caseyi* Champion 1908, southern Texas. This species is associated with *Zanthoxylum fagara* (L.) Sarg. (Rutaceae).

Catapastus Casey 1892, 6 spp., generally distributed in the eastern United States, Florida and Texas. Species are associated with various species of *Zanthoxylum* (Rutaceae). See Casey (1892, 1920) to separate the species.

Centrinites Casey 1892, 2 spp., generally distributed in the eastern United States**.** Species are associated with *Melanthium virginicum* L. (Liliaceae) (Blatchley and Leng 1916). See Casey (1920) to separate the species.

Leptosaldius Casey 1922

Centrinogyna Casey 1892, 5 spp., generally distributed in the western United States and central Canada. See Casey (1892, 1920) to separate the species. The genus needs revision.

Centrinopus Casey 1892, 6 spp., generally distributed in the eastern United States. Adults are found on flowers of Asteraceae (Kissinger 1964). See Casey (1920) to separate the species. The genus needs revision.

Centrinus Schoenherr 1825, 1 sp., *C. pistor* (Germar 1824), Kentucky. This species is of uncertain affinity. It has not been seen by me and its relationships to *Geraeus* and *Linogeraeus* need to be reassessed. Champion (1908: 261-261) limited *Centrinus* to large South American species with the mandibles strongly denticulate along the inner margins.

Toxeres Germar 1829

Toxeres Schoenherr 1833; not Germar 1829

Telephus Gistel 1848

Cholinobaris Casey 1920, 1 sp., *C. rhomboidea* Casey 1920, North Carolina.

Cylindridia Casey 1920, 4 spp., generally distributed in the eastern United States and southern Canada, west to Texas and Colorado. Species are associated with sedges (Cyperaceae). See Casey (1920) to separate the species.

Diorymeropsis Champion 1908, 1 sp., *D. xanthoxyli* (Linell 1897), Texas. This species is associated with *Zanthoxylum* (Rutaceae).

Pseudogarnia Casey 1920

Dirabius Casey 1920, 9 spp., generally distributed in the eastern United States and southern Canada, also one species in California. One species has been associated with *Scirpus cyperinus* L. (Cyperaceae); larvae are in the stems (Blatchley and Leng 1916).

Limnobaropsis Casey 1920 (valid subgenus)

Eisonyx LeConte 1880, 3 spp., Texas, New Mexico, Kansas, Oklahoma, Missouri, Iowa and Tennessee. Species are associated with *Senecio* and *Hymenoxys* (Asteraceae); larvae are in stems, crowns and roots (Pakaluk and Carlow 1994). See Pakaluk and Carlow (1994) to separate the species.

Eumononycha Casey 1893 (valid subgenus)

Geraeus Pascoe 1889, 21 spp., generally distributed in the eastern and southwestern United States and southeastern Canada. At least some species are associated with grasses (Poaceae) (Kissinger 1964); adults frequently visit flowers. See Casey (1892, 1920) and Blatchley and Leng (1916) to separate some of the species; con-

sult O'Brien and Wibmer (1984) for a listing of species included in the genus. The genus needs revision; many species are of questionable validity. Generic definitions in this part of the Baridinae need much study.

Centrinaspis Casey 1920

Haplostethops Casey 1920, 7 spp., central United States, four species known only from Missouri. Species are associated with wetlands. See Casey (1920) to separate the species. The genus needs revision; some species are of questionable validity.

Idiostethus Casey 1892, 16 spp., generally distributed in the eastern United States and southern Canada. Adults have been associated with various flowers (Blatchley and Leng 1916); larvae may be associated with orchids. See Casey (1892, 1920) to separate the species. The genus needs revision; many species are of questionable validity.

Linogeraeus Casey 1920, 15 spp., generally distributed in the southeastern and southwestern United States. Adults frequently visit flowers. See Casey (1920) to separate some of the species; consult O'Brien and Wibmer (1984) for listing of species included in the genus. The genus needs revision; many species are of questionable validity.

Stereogeraeus Casey 1920
Conocentrinus Casey 1920
Glyptogeraeus Casey 1920
Brachygeraeus Casey 1920
Centrinaspidia Casey 1920
Lepidobaris Lea 1927; not Champion 1909

Microcholus LeConte 1876, 2 spp., New Jersey, Georgia and Florida. Species are associated with wetlands. See Casey (1892) and Blatchley and Leng (1916) to separate the species.

Nicentrus Casey 1892, 20 spp., generally distributed in the eastern United States west to Texas and Arizona. Adults are frequently found on flowers in various habitats. See Casey (1892, 1920) and Blatchley and Leng (1916) to separate some of the species. The genus needs revision.

Nicentrites Casey 1922
Eunicentrus Casey 1922

Odontocorynus Schoenherr 1844, 51 spp., generally distributed in the eastern United States and southern Canada, west to Texas and Colorado. Adults are frequently found on flowers (mostly Asteraceae) in various habitats. See Casey (1920) and Blatchley and Leng (1916) to separate some of the species. The genus needs revision; many species are of questionable validity.

Oligolochus Casey 1892, 7 spp., generally distributed in the eastern United States, Arizona and California. See Buchanan (1932) to separate the species.

Anacentrus Casey 1920

Oomorphidius Casey 1892, 2 spp., southeastern and central United States. See Casey (1892) to separate the species.

Pachybaris LeConte 1876, 1 sp., *P. porosa* LeConte 1876, Florida and Louisiana. Adults have been associated with flowers of *Serenoa repens* (Bartr.) Small and *Sabal palmetto* (Walt.) Lodd (saw palmetto and cabbage palm; Arecaceae) (Anderson 1993a).

Pachygeraeus Casey 1920, 3 spp., generally distributed in the central United States. See Casey (1920) to separate the species.

Plocamus LeConte 1876, 2 spp., generally distributed in the eastern United States and southern Canada. Adults have been associated with hickory, beech and maple (Blatchley and Leng 1916). See Blatchley and Leng (1916) to separate the species.

Euchaetes LeConte 1876; not Harris 1841; not Philippi 1843; not Sclater 1858
Eunyssobia Casey 1892
Epeuchaetes Lyman 1902

Pseudocentrinus Champion 1908, 1 sp., *P. ochraceus* (Boheman 1844), Texas.

Pycnogeraeus Casey 1920, 3 spp., Pennsylvania, Florida, Texas, New Mexico and Arizona. See Casey (1892) to separate the species.

Stethobaris LeConte 1876, 11 spp., generally distributed in the eastern United States and southern Canada, west to Texas and Arizona. A number of the species are associated with orchids (Brown 1966a; Hull Sieg and O'Brien 1993; Howden 1995). See Casey (1892) to separate some of the species. The genus needs revision.

Diorymerellus Champion 1908

Trichodirabius Casey 1920, 2 spp., Florida, Louisiana and Texas. See Casey (1920) to separate the species.

Zygobarella Casey 1920, 1 sp., *Z. xanthoxyli* (Pierce 1907), Texas. This species is associated with *Zanthoxylum* (Rutaceae); larvae develop in fruits (Pierce 1907).

Zygobarinus Pierce 1907, 1 sp., *Z. coelestinus* (Linell 1897), Florida.

Zygobaris LeConte 1876, 1 sp., *Z. nitens* LeConte 1876, Florida. Adults have been collected on *Zanthoxylum flavum* Vahl. (Rutaceae) (Anderson 1993a).

21. Nertinini Voss 1954

Strongylotes Schoenherr 1836, 1 sp., *S. parallelus* Champion 1907, Texas and Arizona.

VII. Ceutorhynchinae Gistel 1856

by Boris A. Korotyaev and Robert S. Anderson

Ceutorhynchinae are a relatively well-known group of small weevils found in both terrestrial and freshwater aquatic habitats

throughout North America. They are readily recognized by the ascended mesepimeron (as in Baridinae), an exposed pygydium, and presence of a small or no tooth at the apex of the hind tibia. Many possess a prosternal channel for the reception of the rostrum and have pronotal postocular lobes that cover the eyes when the rostrum is in repose, but some do not. Adults of some species have expanded hind femora and are good jumpers.

Species of Ceutorhynchinae are associated with a variety of plant families. In terrestrial habitats the Cruciferae are a common host, whereas in aquatic habitats the most common host would appear to be Polygonaceae or semi-aquatic Cruciferae. Larvae of terrestrial species usually mine the stems or crowns of the plants but some aquatic taxa in the Phytobiini such as *Phytobius* have larvae that live and feed externally on plant reproductive structures. Some species in the genus *Ceutorhynchus* are adventive and serious pests of cultivated Cruciferae (especially rapeseed or canola) in western North America. Species in the genera *Phrydiuchus*, *Microplontus*, *Mogulones* and *Trichosirocalus* have been deliberately introduced for the biological control of pest weeds.

KEY TO THE NEARCTIC GENERA OF CEUTORHYNCHINAE

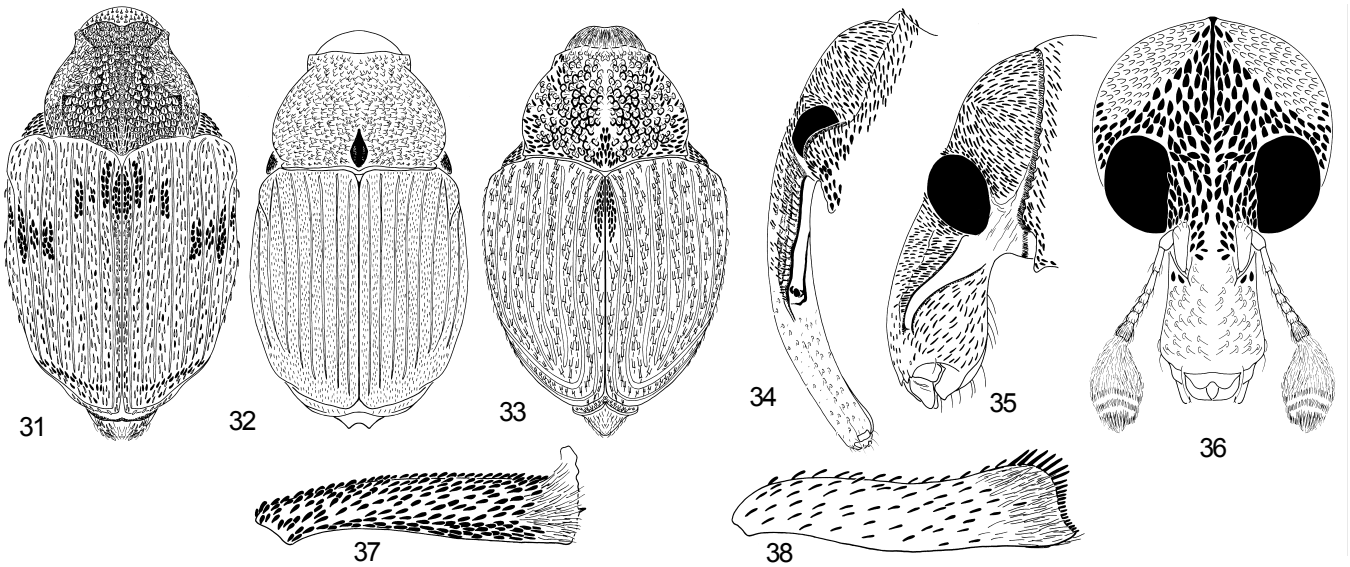
1. Tarsus with single claw; body size 3.6-5.5 mm; associated with *Iris versicolor* L. (Iridaceae) .... *Mononychus*
— Tarsus with 2 claws; body size 1.5-5.0 mm (most less than 3.5 mm); associated with various plants, not Iridaceae 2

2(1). Rostrum shorter than pronotum, thick, not more than 3 times as long as wide, weakly and unevenly curved; femora with tooth on ventral margin; hind femur rather strongly widened, 1.5-2.0 times as wide as middle femur; associated with *Portulaca oleracea* L. (Portulaceae) ..... *Hypurus*
— Rostrum much longer than pronotum, more than 3 times as long as wide; if short and thick, then femora simple, unarmed, and hind femur weakly widened, less than 1.3 times as wide as middle one; associated with various plants, not Portulaceae 3

3(2). Rostrum no more than 3 times as long as wide (Fig. 35), wider than front femur; femora unarmed; anterior margin of pronotum not raised, often with 2 more or less acute denticles or with emargination limited by angular prominences 4
— Rostrum more than 3 times as long as wide (Fig. 34); if less than 3 times, then femora dentate, anterior margin of pronotum strongly raised and size over 3.5 mm (*Phrydiuchus*), or metasternum between middle coxae depressed 12

4(3). Antenna with funicle of 7 articles; tarsal claws dentate; anterior margin of pronotum simple, without sharp denticles; prosternum anterior to front coxae long, with high keels; distance between front coxae usually not less than one-half width of rostrum ..... *Rhinoncus*
— Antenna with funicle of 6 articles; tarsal claws dentate or simple; anterior margin of pronotum often with 2 sharp denticles; prosternum anterior to front coxae sometimes short, with low, sometimes obsolete keels; distance between front coxae less than one-half width of rostrum 5

5(4). Tarsal claw with well-developed tooth at base; prosternum in front of coxae deeply excavated with its anterior margin deeply angularly emarginate, the emargination extending behind the level of anterior margins of coxal cavities; inner, usually also posterior margins of eyes sharply raised 6
— Tarsal claw simple, if dentate (in *Neophytobius*), then front coxae separated at most by width of antennal club and apical margin of pronotum narrowly



FIGURES 31.131-38.131. Ceutorhynchinae. 31-33. Dorsal habitus, 31. *Allosirocalus* sp.; 32. *Glocianus punctiger* (Gyllenhal); 33. *Homorosoma sulcipennis* (LeConte). 34-35. Lateral view of head, 34. *Ceutorhynchus rapae* Gyllenhal; 35. *Rhinoncus pericarpius* (Linnaeus). 36. *Perigasteromimus tetracanthus* (Champion), head and rostrum, dorsal view. 37-38. Front tibia, 37. *Acanthoscelis acephalus* (Say); 38. *Glocianus punctiger* (Gyllenhal).

excised; prosternum in front of coxae very weakly depressed and shallowly arcuately emarginate, the emargination not reaching the level of anterior margin of coxal cavities; inner margins of eyes slightly, if at all, raised 8

6(5). Rostrum about 3 times as long as wide, scarcely widened apically; antennal scrobe well developed, the dorsal margin reaching eye; elytra with alternate intervals moderately to rather strongly convex, more strongly so on apical prominences ..... *Dietzella*

— Rostrum usually not more than twice as long as wide, strongly widened apically; antennal scrobe foveiform or very weakly developed, vanishing at most halfway to eye; elytra with alternate intervals not conspicuously convex 7

7(6). Rostrum less than twice as long as wide; antennae inserted on dorsal surface of rostrum, scape very short, shorter than two basal articles of funicle combined (Fig. 36); Florida ... *Perigasteromimus*

— Rostrum twice or more as long as wide, antennae inserted laterally; scape longer than two basal articles of funicle combined; widespread .... *Perigaster*

8(5). Body with very dense vestiture of short, recumbent or subrecumbent matte hydrophobous scales; narrow metallic-glossy scales may be present only on apical part of rostrum; tarsi narrow, 3rd article often scarcely wider than article 2; if (in *Parenthis*) 1.5 times as wide as the latter, then anterior margin of pronotum without denticles and inconspicuously emarginate medially; tarsal claw simple 9

— Body with sparse covering of scales composed partly (at least on rostrum) or mostly from metallic-glossy narrow scales; tarsi wider, 3rd article 1.5 to (mostly) 2.0 times as wide as article 2; tarsal claw simple or dentate 11

9(8). Body size larger, 2.6-3.0 mm long; tarsus very long and narrow, 3rd tarsal article slightly wider than article 2; dorsal and lateral surface of tarsal articles lacking long swimming hairs; pronotum with acute lateral tubercles; its rounded apical margin with shallow median emargination limited by acute angulations; elytra with interval 5 keel-shaped and finely muricate in basal one-third .... *Phytobius*

— Body size smaller, 2.2-2.7 mm long; 3rd tarsal article 1.6-1.7 times as wide as article 2; if scarcely wider, then tarsus dorsally with a few long and very fine swimming hairs; pronotum with obsolete obtuse lateral tubercles and apical margin lacking any trace of median emargination or acute angulations; elytra with interval 5 not carinate in basal part 10

10(9). Tarsus with article 3 less than 1.4 times as wide and about one-half as long as article 2; dorsal and lateral surface of tarsal articles covered with long very fine semi-erect swimming hairs; middle coxae separated by about one-half their width ..... *Euhrychiopsis*

— Tarsus with 3rd article 1.6-1.7 times as wide and almost as long as article 2; tarsi lacking long swimming hairs; middle coxae separated by about their width ..... *Parenthis*

11(8). Tarsus with claws dentate; apical margin of pronotum at middle produced anteriorly and not raised, with shallow emargination narrower than base of rostrum, margin lateral to emargination finely serrate; elytra with alternate intervals rather strongly convex, with rows of large sharp granules ..... *Neophytobius*

— Tarsus with claws simple; apical margin of pronotum in the middle not produced anteriorly, with straight part limited by 2 sharp tubercles, distance between them not less than width of rostrum, margin lateral to tubercles smooth, not serrate; elytra with alternate intervals not conspicuously convex ..... *Pelenomus*

12(3). Prosternum anterior to front coxae short, without traces of keels; distance between front coxae equal to width of antennal funicle; antenna with funicle with 6 articles ..... *Amalus*

— Prosternum anterior to front coxae longer, with more or less developed keels; front coxae usually widely separated by distance greater than width of antennal funicle; antenna with funicle with 7 articles, if of 6 articles, then claws simple, or femora dentate, or rostrum wider than front femur 13

13(12). Rostrum usually wider than width of front femur; if about as wide, then at least mesosternum distinctly depressed (flat in *Phrydiuchus*, recognized by large body size of 4.0-5.0 mm); antenna with scape with elongate lamelliform translucent projection and/or 1-3 setae at apex 14

— Rostrum narrower than width of front femur; mesosternum mostly flat (only in *Nedyus* deeply depressed); antenna with scape lacking apical projections or setae 27

14(13). Body globose, elytra slightly longer than wide, with completely rounded shoulders and 7th stria almost reaching basal margin of elytron; meso- and metasterna very short, not more than half length of respective coxae ..... *Acallodes*

— Body less convex and rounded, elytra usually rounded-triangular or with staightened sides; meso- and metasterna longer than one-half of respective coxae 15

15(14). Meso- and metasterna flat; body size large, 4.0-5.0 mm; associated with *Salvia* (Labiatae) .... *Phrydiuchus*

— Meso- and often metasternum more or less deeply depressed for reception of rostrum; body size smaller, less than 3.5 mm; associated with various plants, not Labiatae 16

16(15). Mesosternum more or less deeply depressed but depression not limited by keels at sides; if rostral sulcus extends onto metasternum, its sides gently sloping; femora with ventral tooth 17

— Mesosternum with depression limited by keels at sides, often extended onto metasternum and walls very steep or abrupt; femora simple, lacking ventral tooth 19

17(16). Antenna with funicle of 7 articles; meso- and metasterna very shallowly depressed; elytra rounded-triangular, with moderately large sharp granules densely arranged along intervals and provided with short scale-like subrecumbent seta apically (Fig. 33); elytral disc lacking scale pattern other than short postscutellar spot on sutural interval (Fig. 33); body size larger, 2.1-3.2 mm ..... *Homorosoma*

— Antenna with funicle of 6 articles; meso- and metasterna moderately deeply depressed; elytra either with straightened sides in basal one-half and vague transverse band of white scales immediately behind middle, or with very large acute granules on intervals and entire body with very long erect hairs; body size smaller, 1.9-2.4 mm 18

18(17). Elytra with sides in basal one-half parallel or weakly rounded; body lacking erect hairy pubescence; elytral intervals with small rounded granules; associated with Salicaceae ..... *Rutidosoma*

— Elytra with sides rounded evenly from base; body with long and fine, erect pubescence; elytral intervals with rows of sparsely arranged, very large, acute piliferous granules; associated with *Heuchera richardsoni* (Saxifragiaceae) ..... *Asperosoma*

19(16). Rostrum dilated or, rarely, parallel-sided in female (in *Auleutes donaldi* Colonnelli) in apical part; rostral sulcus ending between middle coxae on metasternum, very deep, its walls abrupt; antenna with club with dense, short, very fine erect pubescence (may be absent on large basal segment); associated with Rubiaceae (*A. whiteheadi* Colonnelli, *A. tachygonoides* Dietz, *A. subfasciatus* Dietz) ..... *Auleutes* (part)

— Rostrum somewhat tapered apically, not conspicuously dilated in apical part; rostral sulcus usually becoming less deep posteriorly; antenna with club lacking dense short, erect pubescence; associated with Vitaceae and Onagraceae 20

20(19). Pronotum and elytra with basal margins straight, noticeably raised at junction and crenulate; pronotum usually with a pair of discal prominences, lateral tubercles acute, well developed, located close to pronotal base; rostral sulcus extended onto metasternum (which is sometimes strongly convex longitudinally), often 1st ventrite is also deeply depressed medially; rostrum moderately to strongly curved; associated with Vitaceae 21

— Pronotum and elytra with basal margins neither raised nor crenulate; pronotum lacking discal prominences (but present in *Pelenosomus*, then rostral sulcus limited to mesosternum, very shallow, margined by fine low keels); rostral sulcus often limited to mesosternum, not extended onto 1st abdominal ventrite; metasternum not strongly convex longitudinally; rostrum moderately curved to straight; associated with Onagraceae 22

21(20). Outer margin of middle and hind (in *C. inaequalis* LeConte, also of front) tibiae emarginate, with well-developed tarsal grooves; pronotum with obtuse rounded or elongate prominences, not forming acute divergent ridges; elytra sparsely clothed with narrow, lanceolate scales arranged in narrow broken transverse bands; body size 2.3-3.6 mm ..... *Craponius*

— Outer margin of middle and hind tibiae sometimes more or less distinctly grooved but not conspicuously emarginate; pronotum with 2 acute ridge-shaped discal prominences divergent anteriorly; elytra with moderately dense vestiture partly formed by lanceolate to oval scales; body size 2.1-2.3 mm ..... *Orchestomerus*

22(20). Outer margin of front and middle tibiae very deeply emarginate and compressed, almost blade-shaped, lacking tarsal grooves, emarginations limited by large acute dentiform prominences ..... *Cnemogonus*

— Outer margin of all tibiae straight or inconspicuously emarginate, sometimes with more or less developed tarsal grooves 23

23(22). Front tibia with outer margin with acute dentiform prominence apically (Fig. 37); body size large, 2.6-3.7 mm ..... *Acanthoscelidius*

— Front tibia with outer apical angle not produced into acute prominence (Fig. 38); if weakly produced (in *Auleutes isolatus* Sleeper) or with 2 spines larger than other setae in apical comb (in *Auleutes asper* LeConte), then dorsal surface with moderately dense vestiture of white scales and more or less distinct scutellar spot, elytral intervals with one row of sharp granules each; body size usually smaller, 2.1-3.5 mm 24

24(23). Pronotum with a pair of rather high discal prominences and sharp lateral tubercles; elytra with dense semi-erect vestiture of varied brown to black very broadly lanceolate scales; long scutellar spot on 1st interval black, velvety ..... *Pelenosomus*

— Pronotum without discal prominences; elytra with recumbent, usually sparse to moderately dense pubescence formed mostly by white or metallic-glossy narrow scales 25

25(24). Dorsal surface with sparse or moderately dense vestiture of white scales, lacking metallic-glossy scales, elytra with more or less distinct scutellar spot; rostral sulcus extended onto metasternum, on mesosternum sulcus deep, with abrupt walls; elytra with intervals often with sharp granules (antennal funicle then may be 6-segmented) (*A. epilobii* Paykull and several species from Canada and the U.S. except extreme southwestern and southeastern coastal regions) ..... *Auleutes* (part)

— Dorsal surface either with a mixture of narrow dark scales with metallic sheen or with narrow broken bands of narrow white scales (then body chestnut-brown), scutellar spot poorly defined; rostral sulcus not extended onto metasternum, on mesosternum sulcus shallow, its sides gentle, or the sulcus limited by keels projected behind middle coxae; elytra with intervals lacking conspicuous granules 26

26(25). Depression on mesosternum shallow, broad, its margins very finely keel-shaped raised; suture between meso- and metasterna not raised; body

black, legs often brown; elytra with more or less distinct scutellar spot and transverse bands, with moderately dense dark, narrow, metallic-glossy scales between bands; rostrum at least weakly curved (*A. nebulosus* LeConte) .... *Auleutes* (part)

— Depression on mesosternum margined by high lamelliform keels projecting behind middle coxae; body dark chestnut-brown; elytra with narrow broken bands of narrow white scales, lacking metallic glossy scales in between; rostrum nearly straight (*A. inspersus* Champion) ..... *Auleutes* (part)

27(13). Body narrow, strongly elongate, elytra 1.5-1.6 times as long as wide; legs long, slender; tarsus with claws simple ..... *Poophagus*

— Body less elongate-narrow, elytra less than 1.5 times as long as wide; legs various, but not long and slender; tarsus with claws various 28

28(27). Mesosternum shallowly, metasternum deeply depressed between coxae for reception of rostrum, the depression slightly extending beyond margins of middle coxae; associated with *Urtica dioica* L. (Urticaceae) ..... *Nedyus*

— Meso- and metasterna lacking sulcus for reception of rostrum, not at all depressed medially; associated with plants other than Urticaceae 29

29(28). Antenna with funicle of 6 articles; body size large, 3.5-4.5 mm long, reddish brown with darker underside and rostrum; dorsal surface glossy, with erect or semi-erect long parallel-sided white and brown scales; basal margins of pronotum and elytra raised at junction and coarsely crenulate ..... *Trichosirocalus*

— Antennal funicle mostly of 7 articles; if of 6 articles, then body size smaller (less than 3.5 mm), basal margins of pronotum and elytra not raised at junction and not crenulate, body lacking coarse erect vestiture, not glossy chestnut-brown 30

30(29). Tarsus with claw simple 31

— Tarsus with claw dentate 33

31(30). Antenna with funicle of 7 articles; femora with large tooth, all tibiae in male with large apical tooth, female tibiae simple; associated with Asteraceae, mostly *Cirsium* and *Carduus* ..... *Hadroplontus*

— Antenna with funicle of 6 articles; femora with slightly defined tooth or angular prominence; front tibia of male simple; associated with Liliaceae, Scrophulariaceae, Fumariaceae or Papaveraceae 32

32(31). All tibiae in both sexes simple; base of pronotum distinctly bisinuate; elytra with pattern consisting of scutellar spot with lateral arms stretching obliquely back from sutural strip and separated by dark 5th interval from oblique bands on 6-9th intervals running anteriorly to sides behind humeral prominences and not touching them (Fig. 31), sometimes pale pattern reduced to inconspicuous macula in basal third of 6th interval on dull dark brown background; associated with Liliaceae and Scrophulariaceae .... *Allosirocalus*

— Middle and hind tibiae in male with small apical tooth; base of pronotum straight; elytra with pattern consisting only of scutellar spot on sutural interval; if this is more or less distinctly T-shaped and oblique bands on 6-8(9)th intervals also present, then bands touch humeral prominence; associated with Fumariaceae and Papaveraceae ..... *Sirocalodes*

33(30). Elytra with pale pattern, consisting of scutellar spot with lateral branches oblique or perpendicular to the suture, and lateral bands on 6-8th intervals, running to sides of elytra behind humeral prominences 34

— Elytra without lateral bands, scutellar spot, if distinct, limited to sutural interval 35

34(33). Scutellar spot with oblique extensions from its transverse part, directed to lateral bands and either connected with them or separated by dark area; lateral bands running to humeral prominences or somewhat behind them; femora with tooth simple, medium-sized; body size small 2.2-2.8 mm; associated with *Matricaria perforata* Mérat and *Chrysanthemum leucanthemum* L. (Asteraceae) ..... *Microplontus*

— Elytra with wide white cruciform scutellar spot and transverse, more or less oblique bands in middle of 6-9th intervals almost always separated from the scutellar spot by at least one dark interval; femora with tooth on front and middle femora with truncate apical (facing apex of femur) slope; body size large, 3.7-4.6 mm; associated with *Cynoglossum officinale* L. (Boraginaceae) ..... *Mogulones*

35(33). Base of pronotum straight or slightly angularly produced posteriorly in the middle, not distinctly bisinuate; apical margin of pygidium, at least in male, deeply excised in the middle; associated with *Taraxacum* (Asteraceae) or (possibly) Liliaceae 36

— Base of pronotum more or less distinctly bisinuate; apical margin of pygidium entire; if sulcate and with combs of yellow hairs on sides of excision, then male hind tibia with usual small pointed apical tooth, female middle tibia with small fine apical tooth; associated with Cruciferae 37

36(35). Pronotum wide, with strongly rounded sides; anterior margin strongly bent; disc convex, without median sulcus, but with deep prescutellar fovea (Fig. 32); lateral tubercles fold-shaped; punctation dense, uniform and rather fine; elytra with short scutellar spot of dense white or yellowish scales on 1st interval, without oval white scales on base of other intervals and small pale spot at the end of basal third of 6th interval (Fig. 32); associated with *Taraxacum officinale* Weber (Asteraceae); southeastern Canada and northeastern United States ..... *Glocianus*

— Pronotum wide at base, but with more or less concave sides and sharp, but not fold-shaped lateral tubercles; elytra with small, sometimes indistinct spot at the end of basal third of 6th interval; associated (possibly) with Liliaceae; Yukon Territory ..... *Prisistus*

37(35). Antenna with funicle of 6 articles; anterior margin of pronotum not raised, sides without any trace of tubercles, in basal one-half weakly rounded; base distinctly bisinuate, disk without medial sul-

cus or shortly and narrowly sulcate only at base, strongly convex, densely and finely punctate, intervals between punctures with matte reticulate microsculpture; body and legs black; associated with *Nasturtium officinale* R. Br. (Cruciferae) ..... *Amalorrhynchus*

— Antenna with funicle of 6 or 7 articles; if 6-segmented, then anterior margin of pronotum noticeably raised, sides usually with small but distinct tubercles, moderately rounded in basal one-half, disk with median sulcus, glossy, more or less coarsely punctate; elytral striae rather wide, legs often pale; associated with various Cruciferae. 38

38(37). Mesosternum not depressed; scales not concealing integument completely, not imbricate (except in *C. opertus* Brown) ..... *Ceutorhynchus*

— Mesosternum between middle coxae moderately deeply depressed, sides of the depression gentle; scales brownish-grey and imbricate, concealing integument completely; semi-erect coarse setae or narrow scales also present ..... *Rileyonymus*

Classification of the Nearctic Ceutorhynchinae

22. Ceutorhynchini Gistel 1856

Allosirocalus Colonnelli 1983, 5 spp., generally distributed in the central and western United States and southern Canada. Species may be associated with *Allium* (wild onion; Liliaceae) in Texas and *Mimulus* and *Pedicularis* (Scrophulariaceae) in the western United States. See Hatch (1971) to separate some of the species.

Amalorrhynchus Reitter 1913, 1 sp., *A. melanarius* (Stephens 1831), Quebec, Connecticut, Massachusetts and West Virginia; adventive. This species is associated with *Nasturtium officinale* R. Br. (watercress; Cruciferae).

Amalus Schoenherr 1825, 1 sp., *A. scortillum* (Herbst 1795), generally distributed in the northern United States and Canada; adventive. This species is associated with *Polygonum* (Polygonaceae); larvae feed in the crown (Hoffmann 1954).

Leptocaryurgus Gistel 1856

Ceutorhynchus Germar 1824, 68 spp., generally distributed; some adventive and of pest status. Species are associated with Cruciferae; larvae often mine in collars of roots or stems (Anderson 1993b). See Dietz (1896), Blatchley and Leng (1916) and Hatch (1971) to separate some of the species. An unpublished 1963 Ph.D. thesis by Rudolph Scheibner from Michigan State University allows for the identification of most species. The genus needs revision. *Calosirus* Thompson is given distinct generic status by Wibmer and O'Brien (1989) and Alonso-Zarazaga and Lyal (1999); 8 species could be placed provisionally in this taxon in North America.

Falciger Dejean 1821
Ceuthorhynchus Schoenherr 1837
Ceuthorhynchidius Jacquelin du Val 1855
Calosirus Thompson 1859
Ceuthorrhynchus Gemminger and Harold 1871
Ceuthorrhynchidius Gemminger and Harold 1871
Sirocalus Heyden 1906
Dionorenus Reitter 1913
Marklissus Reitter 1916
Heterosirocalus Wagner 1944
Neosirocalus Wagner 1944
Persirocalus Wagner 1944
Ceuthamiocolus Colonnelli 1983
Nipporhynchus Korotyaev 1996, not Chandler 1934
Heorhynchus Korotyaev 1999

Glocianus Reitter 1916, 1 sp., *G. punctiger* (Sahlberg 1835), generally distributed; adventive. This species is associated with *Taraxacum officinale* Weber (Asteraceae); larvae feed on seeds in flower heads (McAvoy *et al.* 1983).

Prenesdus Reitter 1916

Hadroplontus Thomson 1859, 1 sp., *H. litura* (Fabricius 1775), Nova Scotia, Ontario, Saskatchewan, Alberta, British Columbia, South Dakota, Montana, Idaho, Oregon and Washington. Introduced for biological control of *Carduus* and *Cirsium* thistles (Asteraceae) (Peschken and Wilkinson 1981); larvae mine the stems and crown (Hoffmann 1954).

Microplontus Wagner 1944, 2 spp., *M. edentulus* (Schultze 1896), Alberta, Saskatchewan, and *M. campestris* (Gyllenhal 1837), Ontario; both exotic. *Microplontus edentulus* has been released locally at two sites for biological control of scentless chamomile, *Matricaria perforata* Mérat (Asteraceae) (A. S. McClay, pers. comm.). *Microplontus campestris* has only recently been documented as present in North America; it is associated with *Chrysanthemum leucanthemum* L. (Asteraceae).

Mogulones Reitter 1916, 1 sp., *M. cruciger* (Herbst 1784), British Columbia and Alberta. This species has been introduced for the biological control of *Cynoglossum officinale* L. (hound's-tongue; Boraginaceae) (DeClerk-Floate and Schwarzländer in press).

Boraginobius Wagner 1944

Nedyus Schoenherr 1825, 2 spp., generally distributed in the eastern United States west to Texas and Canada west to Alberta. Species are associated with *Urtica dioica* L. (nettle; Urticaceae) (Blatchley and Leng 1916). See Blatchley and Leng (1916) to separate the species.

Cidnorhinus Thomson 1859

Phrydiuchus Gozis 1885, 2 spp., *P. tau* Warner and *P. spilmani* Warner (latter may not be established), California, Oregon, Washington; adventive. Introduced for the biological control of *Salvia aethiops* L. (Mediterranean sage; Labiatae) (Warner 1969). See Warner (1969) to separate the species.

Poophagus Schoenherr 1837, 1 sp., *P. sisymbrii* (Fabricius 1776), Quebec; adventive. This species is associated with *Nasturtium* (Cruciferae); larvae mine stems and roots (Hoffmann 1954).

Poephagus Gistel 1856

Acnemiscelis Desbrochers 1896

Prisistus Reitter 1916, 1 sp., *P. olgae* Korotyaev 1988, Yukon Territory. This species may be associated with Liliaceae.

Austroceutorhynchus Korotyaev 1980 (valid subgenus)

Ranunculiphilus Dieckmann 1970 (valid subgenus)

Svetlaniolus Korotyaev 1997 (valid subgenus)

Rileyonymus Dietz 1896, 1 sp., *R. relictus* Dietz 1896, Arizona, California. This genus is questionably distinct from *Ceutorhynchus*.

Sirocalodes Voss 1958, 3 spp., *S. tescorum* (Fall 1907), *S. sericans* (LeConte 1876), and *S. siculus* (Dietz 1896), generally distributed in the western and southern United States and Manitoba. *Sirocalodes tescorum* (and *S. wickhami* (Champion 1907) from Mexico) have been associated with *Argemone* (Papaveraceae) and *S. siculus* with *Corydalis* (Fumariaceae).

Trichosirocalus Colonnelli 1979, 1 sp., *T. horridus* (Panzer 1801), Virginia. Introduced for the biological control of *Carduus* (thistles; Asteraceae); larvae mine in the crown and stem (Trumble and Kok 1979).

23. Cnemogonini Colonnelli 1979

Acanthoscelidius Hustache 1930, 13 spp., generally distributed. Species are associated with *Oenothera*, *Gaura* and perhaps other Onagraceae (Anderson 1993b). See Dietz (1896) to separate most of the species. The genus needs revision and its relationships with *Auleutes* reassessed.

Acanthoscelis Dietz 1896; not Dejean 1825

Acantharthrus Marshall 1939

Auleutes Dietz 1896, 12 spp., generally distributed. Species are associated with *Ludwigia*, *Calylophus*, *Oenothera, Gaura* and perhaps other Onagraceae (Blatchley and Leng 1916; Anderson 1993b). *Auleutes donaldi* Colonnelli 1991 has been associated with *Bouvardia glaberrima* Engelm. (Rubiaceae). See Dietz (1896) to separate most of the species. The genus needs revision and its relationships with *Acanthoscelidius* and neotropical taxa placed as *Auleutes* reassessed. The key presented here recognizes three distinct groups of *Auleutes* likely warranting separate generic status.

Cnemogonus LeConte 1876, 1 sp., *C. lecontei* Dietz 1896, generally distributed in the northern United States and Canada. This species may be associated with Onagraceae.

Craponius LeConte 1876, 1 sp., *C. inaequalis* (Say 1831), generally distributed in the eastern and central United States and southern Canada. This species is associated with *Vitis* (grapes; Vitaceae); larvae feed within fruits on seeds (Blatchley and Leng 1916).

Dietzella Champion 1907, 2 spp., *D. zimmermanni* (Gyllenhal 1837), generally distributed in the eastern United States, southern Canada and western United States, and *D. sextuberculata* (Boheman 1845), Colorado. Species are associated with *Epilobium* (Onagraceae).

Orchestomerus Dietz 1896, 3 spp., generally distributed in the eastern United States, Texas and Arizona. At least one species, *O. whiteheadi* Colonnelli 1991, is associated with *Vitis* (wild grape; Vitaceae) in Arizona.

Platymeristes Dietz 1896

Pelenosomus Dietz 1896, 1 sp., *P. cristatus* Dietz 1896, southeastern United States.

Perigaster Dietz 1896, 4 spp., generally distributed in the eastern United States, southern Canada and western United States. Species are associated with *Ludwigia* (Onagraceae) (Anderson 1993a). See Buchanan (1931) to separate the species.

Perigasteromimus Colonnelli 1999, 1 sp., *P. tetracanthus* (Champion 1907), Florida. This species is associated with *Ludwigia* spp. (Onagraceae) (C. W. O'Brien, pers. comm.).

24. Hypurini Schultze 1902

Hypurus Rey 1882, 1 sp., *H. bertrandi* (Perris 1852), California and Florida; adventive. This species is associated with *Portulaca oleracea* L. (Portulacaceae) in Europe but other Portulacaceae are suitable hosts (Zimmerman 1957; Anderson 1993a).

25. Mononychini LeConte 1876

Mononychus Germar 1824, 1 sp., *M. vulpeculus* (Fabricius 1801), generally distributed in the eastern United States and southern Canada. This species is associated with *Iris versicolor* L. (Iridaceae); larvae are in seed pods (Blatchley and Leng 1916).

26. Phytobiini Gistel 1848

[*Eubrychius* Thomson 1859, 1 sp., *E. velutus* (Beck 1817). This species has been recorded from the eastern United States west through the north to the western United States and British Columbia. It does not occur in North America; all records are misidentifications of *Euhrychiopsis lecontei* (Dietz 1896), see Tamayo *et al.* 1999.]

Euhrychiopsis Dietz 1896, 1 sp., *E. lecontei* (Dietz 1896), eastern to central United States and western Canada. This species is associated with *Potamogeton* (Potamogetonaceae) and *Myriophyllum* (Haloragaceae) (Kissinger 1964; Hatch 1971). See Tamayo *et al.* (1999) for information about this species. All records of *Eubrychius velutus* (Beck 1817) are misidentifications of *E. lecontei* (Tamayo *et al.* 1999).

Neophytobius Wagner 1936, 1 sp., *N. cavifrons* (LeConte 1876), generally distributed in the western United States and Canada. This species is associated with *Polygonum* (Polygonaceae).

Nemophytobius Voss 1952

Parenthis Dietz, 1896, 1 sp., *P. vestitus* Dietz 1896, southeastern United States. This genus is considered as a junior synonym of *Phytobius* Schoenherr by Alonso-Zarazaga and Lyal (1999).

Pelenomus Thomson 1859, 13 spp., generally distributed in the more northerly United States and Canada. Most Palearctic species are associated with *Polygonum* (Polygonaceae) (Hoffmann 1954). See Dietz (1896), Blatchley and Leng (1916) and Hatch (1971) to separate some of the species. The genus needs revision.

Pachyrhinus Stephens 1829; not Schoenherr 1825
Phytobius Dejean 1835; not Schoenherr 1833
Mecopeltus Dietz 1896
Paraphytobius Wagner 1936

Phytobius Schoenherr 1833, 1 sp., *P. leucogaster* (Marsham 1802), generally distributed in the eastern United States west through the north to the western United States. This species is associated with *Myriophyllum* (Haloragaceae); larvae feed externally on flowers (Buckingham and Bennett 1981).

Hydaticus Schoenherr 1825; not Leach 1817
Litodactylus Redtenbacher 1849

Rhinoncus Schoenherr 1825, 7 spp., generally distributed; three species adventive. Species are associated with *Polygonum* (Polygonaceae) (Hoebeke and Whitehead 1980). See Hoebeke and Whitehead (1980) to separate six of the species. *Rhinoncus perpendicularis* (Reiche 1797) recently has been collected in Ontario.

Cryptorhis Billberg 1820
Campylirhynchus Dejean 1821
Camplirhynchus Gistl 1834
Campylorhynchus Agassiz 1846; not Spix 1824

27. Scleropterini Schultze 1902

Acallodes LeConte 1876, 3 spp., generally distributed in the eastern United States and southern Canada. One species is associated with *Lysimachia terrestris* L. (Primulaceae) (Blatchley and Leng 1916). See Blatchley and Leng (1916) to separate the species.

Asperosoma Korotyaev 1999, 1 sp., *A. echinatum* (Fall 1917), Manitoba. This odd species is associated with *Heuchera richardsoni* R. Br. (Saxifragiaceae) (Fall 1917).

Homorosoma Frivaldszky 1894, 1 sp., *H. sulcipenne* (LeConte 1876), generally distributed. This species is associated with *Polygonum* (Polygonaceae).

Rutidosoma Stephens 1831, 1 sp., *R. decipiens* (LeConte 1876), generally distributed in the eastern and western United States, Canada and Alaska. This species is associated with *Populus* (Salicaceae) (Anderson 1997).

Rhytidosomus Schoenherr 1837
Rhytidosoma Agassiz 1846
Oligodites Gistel 1856
Rhytidosomus Gemminger and Harold 1871; not Schoenherr 1837
Scleropteridius Otto 1897 (valid subgenus)
Prorutidosoma Korotyaev 1999 (valid subgenus)
Victorinus Korotyaev 1999 (valid subgenus)

VIII. Conoderinae Schoenherr 1833

by Henry A. Hespenheide

The Conoderinae have been defined by the combination of a prosternal channel for the reception of the rostrum, large approximate eyes, and the absence of postocular lobes on the anterolateral margin of the pronotum. They are usually placed between the Cryptorhynchinae and the Ceutorhynchinae and are probably more closely related to the former. Adults are typically diurnal and very wary and active fliers. There is considerable structural diversity within the subfamily, even among the North American forms, but the group is much more diverse in the Neotropical Region.

Most conoderine larvae are borers of wood or herbaceous stems although a few feed on seeds. The genus *Tachygonus*, provisionally placed here as a highly derived subgroup, has larvae which mine leaves. A few North American species such as *Cylindrocopturus adspersus* (LeConte 1876), the sunflower stem borer, are economically significant pests.

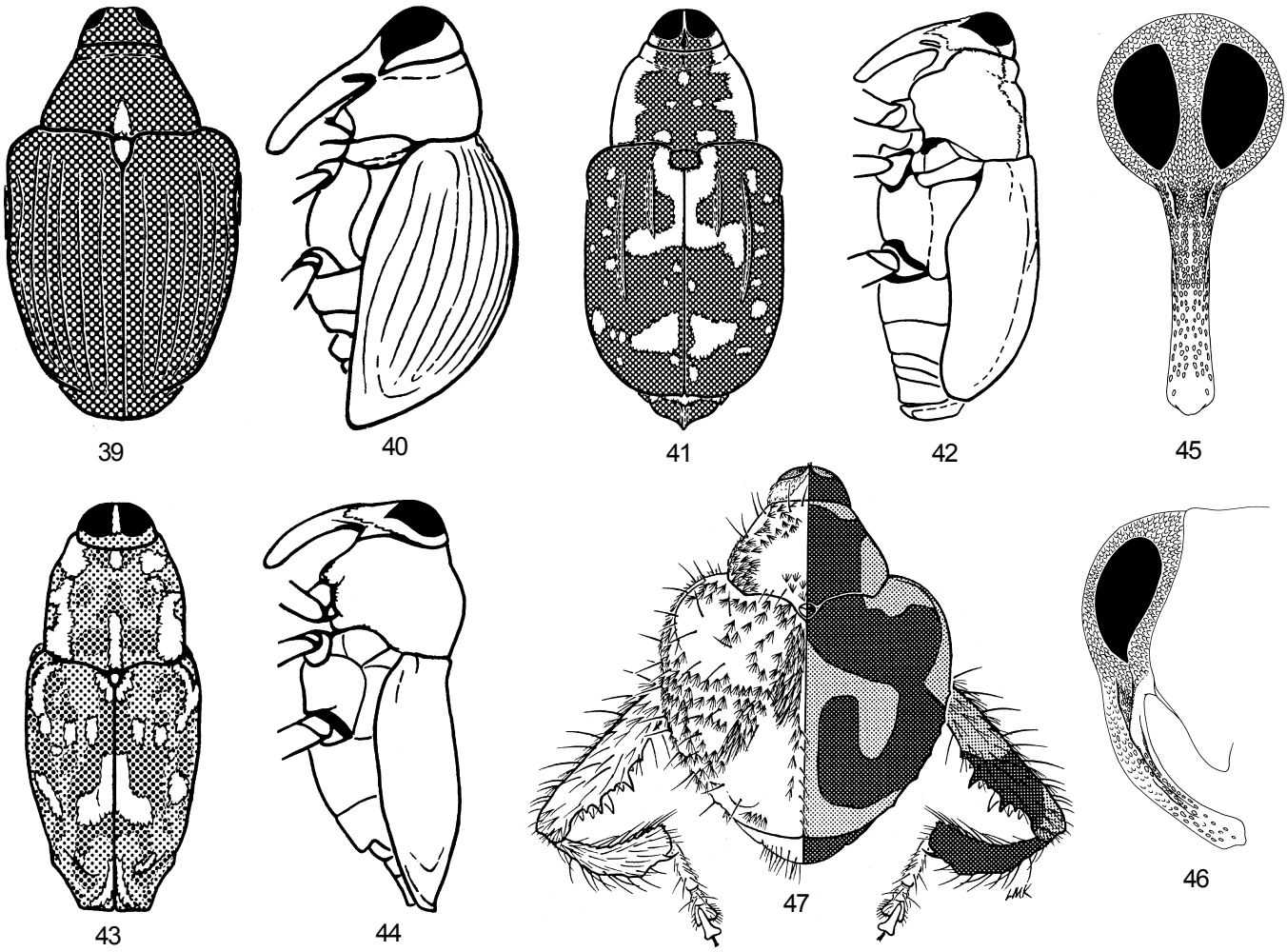
Key to the Nearctic Genera of Conoderinae

1. Antenna straight, not geniculate; hind coxae widely separated by a distance 4 or 5 times greater than width of a coxa; hind femur long (much longer than front or middle femora), spinose ventrally (Fig. 47); body form broadly ovate, flattened; with appressed scales and tufts of erect setae (Fig. 47) ..... *Tachygonus*

— Antenna geniculate; hind coxae narrowly separated by a distance less than twice width of a coxa; hind femur short (subequal in length to front or middle femora), simple or with single ventral tooth; body form elongate ovate, subtriangular in lateral form, not flattened (Figs. 39-44); vestiture various, mostly with only appressed scales or scattered setae 2

2(1). Pygydium exposed dorsally (Fig. 41); body form more or less flattened dorsally and ventrally (Fig. 42); body length greater than 6.0 mm ..... *Peltophorus*

— Pygydium covered by elytra (Figs. 39, 43); body form with ventral or dorsal surface convex (Figs. 40, 44); body length smaller than 6.0 mm 3



FIGURES 39.131-47.131. Conoderinae 39-40. *Psomus armatus* (Dietz), habitus, 39. Dorsal; 40. Lateral. 41-42. *Peltophorus polymitus seminiveus* (LeConte), habitus, 41. Dorsal; 42. Lateral. 43-44. *Cylindrocopturus adspersus* (LeConte), habitus, 43. Dorsal; 44. Lateral. 45-46. *Cylindrocopturus adspersus* (LeConte), head, 45. Anterior view; 46. Lateral view. 47. *Tachygonus lecontei* Gyllenhal (Conoderinae), dorsal habitus (left side show scale pattern, right side shows color).

3(2). Abdomen with ventrites in lateral view in same plane, horizontal; elytra in lateral view more or less continuously convex (Fig. 40) 4

— Abdomen with ventrites in lateral view ascended; elytra in lateral view flattened at base (Fig. 44) 5

4(3). Elytra with distinct setae; femora each with ventral tooth; body length greater than 3.0 mm .... *Acoptus*

— Elytra lacking distinct setae; femora simple, lacking ventral tooth; body length less than 2.0 mm .... *Psomus*

5(3). Mesosternum simple, unmodified, apex of rostrum free 6

— Mesosternum excavated, with lateral margins carinate; anterior margin of metasternum excavated to receive the tip of the rostrum or not 7

6(5). Antenna with articles 1 and 2 of funicle subequal in length; femora simple, lacking ventral tooth .... *Cylindrocopturus*

— Antenna with article 2 of funicle about twice length of article 1; femora with large ventral tooth .... *Copturus*

7(5). Femora carinate on outer face and with ventral tooth ..... *Lechriops*

— Femora not carinate on outer face, lacking ventral tooth 8

8(7). Metasternum with anterior margin excavated for reception of rostrum; body length less than 3.0 mm ..... *Eulechriops*

— Metasternum with anterior margin simple, not modified for reception of rostrum; body length greater than 3.0 mm ..... *Cylindrocopturinus*

Classification of the Nearctic Conoderinae

28. Lechriopini Lacordaire 1866

Acoptus LeConte 1876, 1 sp., *A. suturalis* LeConte 1876, generally distributed in eastern United States and southern Canada. This

species is associated with dead wood of beech trees, also with hop-hornbeam and hickory (Blatchley and Leng 1916).

Copturus Schoenherr 1825, 1 sp., *C. floridanus* (Fall 1906), Florida. This species is associated with *Swietenia mahagoni* (L.) Jacq. (Meliaceae); larvae bore under bark of living branches (Anderson 1993a).

Zurus Heller 1895; not Amyot 1846
Neozurus O'Brien and Wibmer 1982

Cylindrocopturinus Sleeper 1963, 1 sp., *C. pictus* (Schaeffer 1908), Arizona. This species is associated with *Phoradendron* (mistletoe; Viscaceae) (Anderson 1994).

Eulechriops Faust 1896, 2 spp., generally distributed in the eastern United States and Arizona. Species are associated with *Quercus* (oak; Fagaceae).

Zygomicrus Casey 1897

Lechriops Schoenherr 1825, 4 spp., generally distributed. See Blatchley and Leng (1916) to separate some of the species.

Gelus Casey 1897

Psomus Casey 1892, 1 sp., *P. armatus* (Dietz 1891), northeastern United States and southern Canada. This species is associated with *Fraxinus americanus* L. (white ash; Oleacae) (Blatchley and Leng 1916).

29. Zygopini Lacordaire 1866

Cylindrocopturus Heller 1895, 29 spp., generally distributed. Many species are associated with various Asteraceae and some with Pinaceae. See Casey (1897), Fall (1906) and Hatch (1971) to separate some of the species. The genus needs revision.

Paratimorus Heller 1895
Gyrotus Casey 1897
Copturodes Casey 1897

Peltophorus Schoenherr 1845, 3 spp., Arizona, New Mexico and Texas. Species are associated with *Agave* (Amaryllidaceae); larvae mine the stalks or in the seeds (Kissinger 1964). See Sleeper (1963) to separate the species.

Apatorhynchus Desbrochers 1891
Opalocetus Desbrochers 1910

30. Tachygonini Lacordaire 1866

Alonso-Zarazaga and Lyal (1999) place Tachygonina as a subtribe within Curculioninae; Rhamphini. This distictive genus is placed here as a tribe within Conoderinae based upon the form of the unci at the apex of the tibiae, large eyes and form of vestiture. Similarity in the pectinate form of the scales suggests a relationship with the Neotropical genera *Philinna* Champion 1906 and *Philides* Champion 1906.

Tachygonus Guérin-Méneville 1833, 5 spp., generally distributed in eastern United States and southeastern Canada, west to Texas, Arizona, New Mexico and Colorado. Species are associated with *Quercus* (Fagaceae), *Ulmus* (Ulmaceae), *Robinia* (Fabaceae), *Coursetia* (Fabaceae)) and *Berchemia* (Rhamnaceae); larvae mine leaves (Hespenheide 1992). See Hespenheide (1992) to separate the species.

Tachygonus Schoenherr 1833; not Guérin-Méneville 1833
Tachyopus Zimmermann 1840

IX. Cossoninae Schoenherr 1825

by Robert S. Anderson

Cossonine weevils are easily recognized by the large, hook-like tooth at the apex of the hind tibia and the lack of an apical comb of setae. They are usually black or brown, lack scales but have appressed or erect hairs, and are generally long, slender and dorsoventrally compressed. Most species are associated with dead plant material of some sort, usually of woody angiosperms (where they live under bark), but some are also found in dead fern fronds, palm fronds, agave leaves, yucca stalks, etc. A number of taxa are found on sandy beaches in association with driftwood. Species of *Acamptus* and at least some *Pseudopentarthrum* are found in tree holes or rotten hollowed out trees. Most of the genera in North America are represented by only one or a few species. Some species, such as those in the genus *Hexarthrum*, are difficult to separate from Scolytinae.

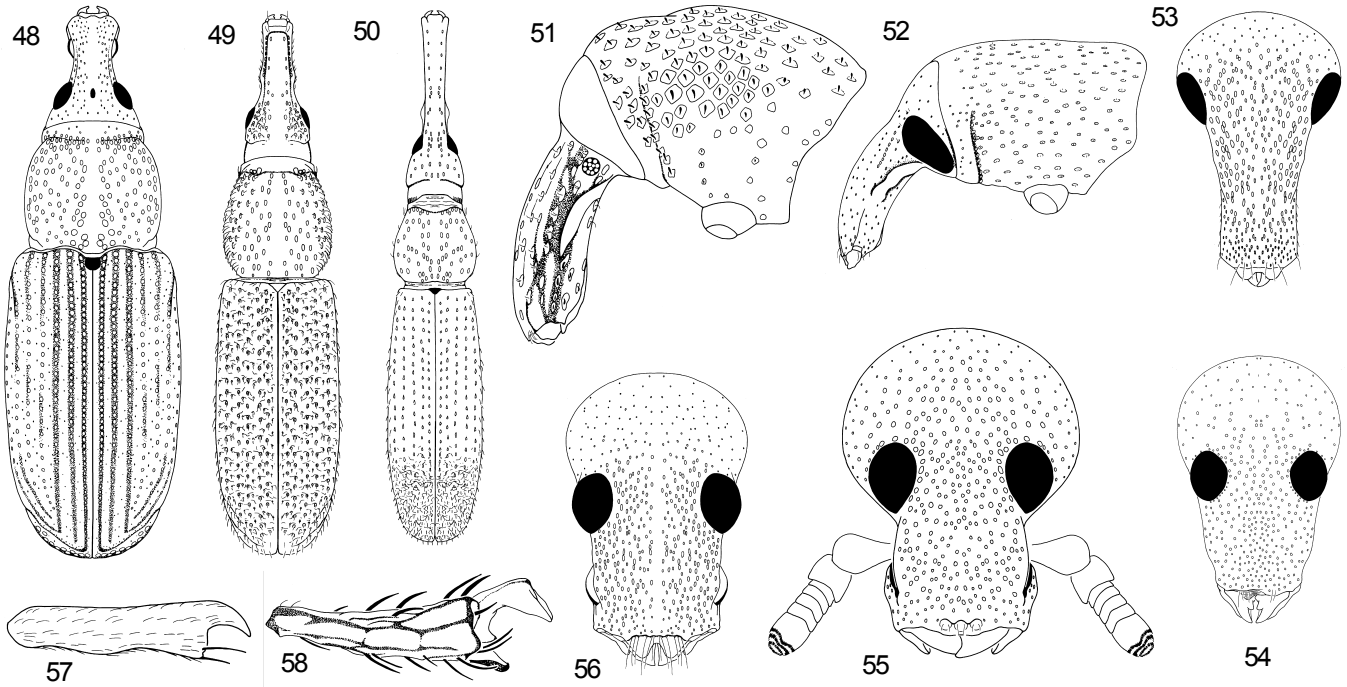
Key to the Nearctic genera of Cossoninae

1. Prosternum with distinct channel for reception of rostrum when in repose; pronotum and elytra with dense, erect or suberect, broad scales ..... *Acamptus*
— Prosternum simple, smooth, lacking channel for reception of rostrum; pronotum and elytra with vestiture various, if erect or suberect, composed of finer, hair-like scales or sparse, scattered broad scales 2

2(1). Eyes obviously located on base of rostrum, head distinctly constricted and globular behind eyes (Fig. 51); Florida 3
— Eyes located on head or at junction of head and rostrum, head not distinctly constricted dorsally behind eyes (Fig. 52); various locations 4

3(2). Eye reduced in size to less than 10 facets (Fig. 51); antenna with basal article of club subglabrous, glossy; rostrum in lateral view with ventral margin straight (Fig. 51) ..... *Paralicus*
— Eye with more than 10 facets; antenna with basal article of club setose, not glossy; rostrum in lateral view with ventral margin curved ventrally towards apex ..... *Dryotribus*

4(2). Eyes markedly reduced in size to 3 or 4 facets ..... *Amaurorhinus*
— Eye with more than 10 facets 5



FIGURES 48.131-58.131. Cossoninae. 48-50. Dorsal habitus, 48. *Cossonus piniphilus* Boheman; 49. *Macroscytalus chisosensis* (O'Brien); 50. *Stenotrupis acicula* Wollaston. 51-52. Lateral view of head, 51. *Paralicus minyops* O'Brien; 52. *Micromimus minimus* (Boheman). 53-56. Dorsal view of head, 53. *Aphanommata tenuis* (Casey); 54. *Tomolips quercicola* (Boheman); 55. *Pseudopentarthrum robustum* Casey; 56. *Rhyncolus brunneus* Mannerheim. 57-58. Hind tibia, 57. *Cossonus piniphilus* Boheman; 58. *Elassoptes marinus* Horn.

5(4). Elytra with intervals with obvious vestiture of elongate-narrow, recurved hair-like scales, alternate intervals also with row of suberect, broad, truncate scales; eyes situated low on head, in lateral view with the ventral margin of rostrum directed to middle of eye ..... *Himatium*

— Elytra with intervals with obvious vestiture absent, or with obvious vestiture of elongate, fine, hair-like setae only, no broad scales present; eyes situated higher on head, in lateral view with ventral margin of rostrum directed to lower one-half of eye or obviously below eye 6

6(5). Antenna with funicle of 5 or 6 articles 7

— Antenna with funicle of 7 articles 13

7(6). Antenna with funicle of 6 articles .... *Hexarthrum*

— Antenna with funicle of 5 articles 8

8(7). Dorsal vestiture of obvious, long, very fine hair-like setae, each at least as long as a strial puncture or longer 9

— Dorsal vestiture of at most indistinct, short, fine hair-like setae, each shorter than a strial puncture, or obvious vestiture absent 11

9(8). Body size greater than 2.0 mm, black in color; body form subcylindrical, more or less as wide as high; head not constricted behind eyes ..... *Nyssonotus*

— Body size less than 2.0 mm, pale or dark brown in color; body form markedly dorsoventrally compressed, much wider than high; head constricted behind eyes, area posterior to constriction impunctate and glossy 10

10(9). Elytra three to four times as long as pronotum (Fig. 50); pronotum about as wide as long (Fig. 50); antenna with scape extended slightly beyond hind margin of eye; Florida ..... *Stenotrupis*

— Elytra two to three times as long as pronotum (Fig. 49); pronotum longer than wide (Fig. 49); antenna with scape extended to about middle of eye; southwestern Texas ..... *Macroscytalus*

11(8). Rostrum distinctly tapered apically in dorsal view (Fig. 54); antenna with club truncate at apex .... *Tomolips*

— Rostrum more or less subparallel or slightly expanded towards apex in dorsal view (Fig. 55); antenna with club rounded at apex 12

12(11). Antenna with club not expanded, article 1 of funicle about as wide as club (Fig. 55); widespread ..... *Pseudopentarthrum*

— Antenna with club expanded, article 1 of funicle distinctly narrower than club; Quebec .... *Pentarthrum*

13(6). Dorsal vestiture of obvious, long, fine, hair-like setae, each at least as long as a strial puncture or longer 14

— Dorsal vestiture of at most indistinct, short, fine hair-like setae, each shorter than a strial puncture, or obvious vestiture absent 16

14(13). Front coxae very narrowly separated by much less than one-half width of a coxa; elytra with vestiture of long, erect, fine, hair-like setae, each much longer than a strial puncture ..... *Pselactus*

— Front coxae more widely separated by at least one-half width of a coxa or more; elytra with vestiture

of shorter hair-like or scale-like setae, each about as long as a strial puncture 15

15(14). Front coxae separated by more or less width of a coxa; elytra with vestiture of erect, stout, scale-like setae; eyes situated at junction between rostrum and head ..... *Apotrepus*

— Front coxae separated by about one-half width of a coxa; elytra with vestiture of appressed, hair-like setae; eyes situated on head adjacent to base of rostrum ..... *Carphonotus*

16(13). Hind tibia expanded somewhat laterally at apex, hook-like tooth at outer angle large and stout, tooth at inner angle, stout, spatulate, much longer than tarsal claw (Fig. 58) ..... *Elassoptes*

— Hind tibia simple, not expanded laterally at apex, hook-like tooth at outer angle various (Fig. 57), tooth at inner angle (if present) not spatulate, smaller than tarsal claw 17

17(16). Rostrum in dorsal view with apical one-half more or less abruptly dilated beyond point of antennal insertion, wider than basal one-half, ventral margin of scrobe visible in dorsal view (Fig. 48); antenna inserted beyond midlength of rostrum .... *Cossonus*

— Rostrum subequal in width throughout length (Fig. 56) or tapered towards apex (Fig. 53), scrobe not visible in dorsal view; antenna with point of insertion in basal one-half of rostrum 18

18(17). Rostrum in dorsal view at least twice as long as width of frons between eyes 19

— Rostrum in dorsal view less than twice as long as width of frons between eyes (Figs. 53, 56) ... 24

19(18). Eyes large and elongate-oval in shape, height more or less twice maximum width (Fig. 52) .... *Micromimus*

— Eyes moderate in size, round or sub-oval in shape, height much less than twice width 20

20(19). Metepisternum wide throughout length, subequal in width to width of antennal club, with 2 or 3 rows of large, distinct, deep punctures; rostrum of female with point of antennal insertion basal, rostrum long, glabrous, cylindrical and slender, rostrum of male with point of antennal insertion at basal one-third, flat and deeply punctate dorsally, more quadrate in cross-section ... *Mesites*

— Metepisternum narrow throughout length, width much less than width of antennal club, with at most one indistinct row of shallow punctures; rostrum various in form, similar in both female and male 21

21(20). Front coxae very narrowly separated by much less than one-half width of a coxa, anterior and posterior prosternal processes acuminate apically ... . *Phloeophagus*

— Front coxae moderately to widely separated by at least one-half width of a coxa, anterior and posterior prosternal processes broadly truncate apically 22

22(21). Front coxae situated distant from posterior margin of prosternum, separated from margin by obviously more than the length of a coxa; body form markedly dorsoventrally compressed; body size less than 2.0 mm; Florida ..... *Proeces*

— Front coxae situated close to posterior margin of prosternum, separated from margin by slightly less than the length of a coxa; body form subcylindrical; body size various; various locations, including Florida 23

23(22). Middle and hind femora very short, distinctly expanded apically and subtriangular in shape, length about twice width at apex; body size small, less than 2.0 mm; body color testaceous .... *Stenomimus*

— Middle and hind femora moderate in length, slightly expanded apically but more elongate in shape, length greater than twice width at apex; body size various, less than 5.0 mm; body color black, dark brown or testaceous ..... *Caulophilus*

24(18). Front coxae very narrowly separated by less than one-half width of a coxa; posterior and anterior prosternal processes acuminate or subacuminate apically 25

— Front coxae moderately to widely separated by more than one-half width of a coxa; posterior and anterior prosternal processes truncate apically .. 27

25(24). Elytra at base with intervals 2 to 4 swollen and crenulate or minutely dentate; elytral declivity with numerous small denticles; rostrum very short, wider than long, in dorsal view with lateral margins subparallel ..... *Stenoscelis*

— Elytra at base with intervals smooth, not swollen, dentate or crenulate; elytral declivity smooth, lacking denticles; rostrum as long as wide to slightly longer than wide; rostrum with lateral margins (excluding scrobes if visible in dorsal view) convergent apically 26

26(25). Eyes at most only slightly visible in dorsal view, flat, situated low on head (Fig. 53), in lateral view with ventral margin of rostrum directed towards middle or lower one-half of eye .... *Aphanommata*

— Eyes clearly visible in dorsal view, slightly convex, situated higher on head (Fig. 56), in lateral view with ventral margin of rostrum directed below eye (includes *Phloeophagus minor*, *P. californicus*) .. .. *Rhyncolus* (part)

27(24). Rostrum very short, wider than long; pronotum about as wide as long ..... *Rhyncolus* (part)

— Rostrum longer than wide; pronotum longer than wide 28

28(27). Rostrum in dorsal view tapered towards apex, with apex narrower than width of rostrum at position of antennal insertion ..... *Macrancylus*

— Rostrum in dorsal view subparallel or slightly wider towards apex, with apex subequal in width or slightly wider than width of rostrum at position of antennal insertion 29

29(28). Antenna with apex of scape extended well beyond the hind margin of the eye; eyes flat, or very slightly convex, slightly visible in dorsal view . ..... *Macrorhyncolus*

— Antenna with apex of scape extended at most to the posterior margin of the eye; eyes convex, obviously visible in dorsal view 30

30(29). Antenna with scape extended to the hind margin of the eye; head slightly constricted behind eyes; elytral declivity lacking fine setae; Florida..... ..... *Stenancylus*

— Antenna with scape extended to the midlength of the eye; head not constricted behind eyes; elytral declivity with numerous fine setae; California ..... *Trichacorynus*

CLASSIFICATION OF THE NEARCTIC COSSONINAE

31. Cossonini Schoenherr 1825

Cossonus Clairville 1798, 20 spp., generally distributed. Adults are found under bark of various tree species, mostly conifers but also hardwoods. See Van Dyke (1915, 1916), Blatchley and Leng (1916) and Hatch (1971) to separate the species. The genus needs revision.

Borophloeus Wollaston 1873
Isotrogus Wollaston 1873
Hyponotus Wollaston 1873
Heterophasis Wollaston 1873 (valid subgenus)
Drepocossonus Voss 1939 (valid subgenus)
Caenocossonus Voss 1955 (valid subgenus)
Odontocossonus Voss 1956 (valid subgenus)
Otiorcossonus Voss 1956 (valid subgenus)

[*Dynatopechus* Marshall 1931, 1 sp., *D. aureopilosus* (Fairmaire 1849), intercepted in quarantine; California, Oregon and Washington. Not established in North America.]

Mesites Schoenherr 1838, 2 spp., likely adventive; eastern United States. Species are associated with driftwood on Atlantic and Gulf Coast beaches. See Blatchley and Leng (1916) to separate the species.

Odontomesites Wollaston 1873 (valid subgenus)

Stenotrupis Wollaston 1873, 1 sp., *S. acicula* Wollaston 1873, Florida. This species is associated with dead fronds of *Thrinax parviflora* Sw. (Arecaceae) (Anderson 1993a).

Diodimorpha Broun 1883
Pseudaphioda Voss 1956 (valid subgenus)

32. Acamptini LeConte 1876

Acamptus LeConte 1876, 3 spp., generally distributed in the eastern United States and southern Canada, west to Texas and Arizona. Species are associated with dead limbs and injured spots or areas of dead rotten wood such as tree holes or hollowed out trunks of various trees (Kissinger 1964). See Casey (1895) and Sleeper (1954b) to separate the species. The genus needs revision.

Pseudacamptus Champion 1909
Glyphostethus Marshall 1921

33. Dryotribini LeConte 1876

Amaurorhinus Fairmaire 1860, 1 sp., *A. beckwickianus* (Wollaston 1860), South Carolina; adventive.

Mesoxenus Wollaston 1861
Mazagranus Pic 1905 (valid subgenus)

Caulophilus Wollaston 1854, 4 spp., generally distributed in the eastern United States west to Texas, also California; one adventive species, *C. oryzae* (Gyllenhal 1838). Native species are associated with various species of dead trees and grapevines (Blatchley and Leng 1916). *Caulophilus oryzae* is the 'broad-nosed grain weevil' and is found in stored products as well as in avocado seeds and fruits (Anderson 1993a). See Blatchley and Leng (1916) to separate some of the species.

Allomimus LeConte 1876
Tytthomimus Champion 1909

Dryotribus Horn 1873, 1 sp., *D. mimeticus* Horn 1873; Florida and South Carolina. This species is associated with old boards and driftwood washed up along the coast (Anderson 1993a).

Thalattodora Perkins 1900
Pentacotaster Chûjô and Voss 1960

Micromimus Wollaston 1873, 2 spp., Florida. Adults have been collected under bark of various trees, especially *Bursera simaruba* (L.) Sarg. (Burseraceae) (Anderson 1993a).

Paralicus O'Brien 1984, 1 sp., *P. minyops* O'Brien 1984, southern Florida. Adults are found under driftwood and in litter along beaches (Anderson 1993a).

Stenomimus Wollaston 1873, 1 sp., *S. pallidus* (Boheman 1845), generally distributed in the eastern United States. Larvae have been found under bark of *Juglans nigra* L. (black walnut; Juglandaceae) (Anderson 1952).

34. Onycholipini Wollaston 1873

Hexarthrum Wollaston 1860, 3 spp., generally distributed in the eastern United States and southern Canada, disjunct to British Columbia and Idaho; one adventive. Adults occur in woodwork of buildings (Blatchley and Leng 1916). See Brown (1966a) to separate the species.

Pselactus Broun 1886, 1 sp., *P. spadix* (Herbst 1795), eastern United States and California; adventive. This species is associated with driftwood on coastal beaches (Blatchley and Leng 1916).

Codiosoma Bedel 1885; not Kirby 1874
Phloeophagia Aurivillius 1924

Pseudopentarthrum Wollaston 1873, 11 spp., generally distributed in the eastern United States west to Texas and Arizona. Species are associated with dead limbs and injured spots or areas of dead rotten wood such as tree holes or hollowed out trunks of vari-

ous trees (Kissinger 1964; Anderson 1993a). See Blatchley and Leng (1916), Blatchley 1922, 1925, 1928) and Sleeper (1954b) to separate the species. The genus needs revision.

Phloeophagomorphus Wollaston 1873
Pentarthrinus Casey 1892
Micropentarthrum Champion 1909
Neopentarthrum Mutchler 1925
Stenotylus Marshall 1933

Stenoscelis Wollaston 1861, 2 spp., generally distributed in the eastern United States and southern Canada. Species are associated with the dead wood of various trees (Kissinger 1964). See Buchanan (1948) to separate the species.

Dendroctonomorphus Wollaston 1873
Astenoscelis Hustache 1956 (valid subgenus)
Hexastenoscelis Voss 1964 (valid subgenus)

Trichacorynus Blatchley 1916, 2 spp., Indiana, New Jersey, Pennsylvania and California. Adults have been reared from *Yucca* stalks (Liliaceae) in California. See Sleeper (1957b) to separate the species.

35. Pentarthrini Lacordaire 1866

Macroscytalus Broun 1881, 1 sp., *M. chisosensis* (O'Brien 1973), southwestern Texas. This species is associated with the dead, dry leaves of *Agave havardiana* Trel. (Amaryllidaceae) (O'Brien 1973).

Rhinanisus Broun 1883
Baeorhopalus Broun 1883

Pentarthrum Wollaston 1854, 1 sp., *P. huttoni* Wollaston 1854, Quebec; adventive. Adults have been found in floor boards of houses (Warner 1952).

Attarus Broun 1909
Belka Broun 1909
Gaurocryphus Broun 1909
Trachyglyphus Broun 1909

36. Proecini Voss 1956

Proeces Schoenherr 1838, 1 sp., *P. depressus* (Boheman 1838), Florida. Adults have been collected in curled leaf sheaths of *Roystonea elata* Bartr. (F. Harper) (royal palm; Arecaceae) (Anderson 1993a).

Stenotis Wollaston 1854
Eucoptus Wollaston 1873
Borborhynchus Richard 1957

37. Rhyncolini Gistel 1856

Rhyncolina Gistel 1856

Aphanommata Wollaston 1873, 1 sp., *A. tenuis* (Casey 1892), southeastern United States west to Texas. Adults have been collected in tree hollow debris.

Rhamphocolus Casey 1892
Macrancyloides Champion 1909
Oocorynus Champion 1909
Brachytemnoides Folwaczny 1973

Apotrepus Casey 1892, 1 sp., *A. densicollis* Casey 1892, Arizona. This species is associated with scar tissue on wounds of saguaro cactus (Cactaceae) (Kissinger 1964).

Carphonotus Casey 1892, 1 sp., *C. testaceus* Casey 1892, generally distributed in the northern United States and across Canada. Adults have been associated with spruce (Blatchley and Leng 1916).

Elassoptes Horn 1873, 1 sp., *E. marinus* Horn 1873, western United States and Canada. Adults are associated with driftwood on beaches (Kissinger 1964).

Himatium Wollaston 1873, 2 spp., generally distributed in the eastern United States and southern Canada. Adults have been reared from dead branches of *Acer saccharum* L. (Aceraceae) and have been collected in leaf litter (Anderson 1993a). Adults have also been associated with the galleries of *Ips* bark beetles under pine bark. See Blatchley and Leng (1916) to separate the species.

Pholidonotus Wollaston 1873
Choerodemas Faust 1898 (valid subgenus)
Himatinum Cockerell 1906
Macrohimatium Konishi 1962

Macrancylus LeConte 1876, 1 spp., *M. linearis* LeConte 1876, southeastern United States west to Texas, Adults are associated with driftwood on coastal beaches (Blatchley and Leng 1916).

Haloxenus Perkins 1900

Macrorhyncolus Wollaston 1873, 1 sp., *M. littoralis* (Broun 1880), California; adventive. Adults are associated with driftwood on coastal beaches.

Nyssonotus Casey 1892, 1 sp., *N. seriatus* Casey 1892, Arizona, California and Texas. This species is associated with *Yucca* (Amaryllidaceae); larvae are in stalks (Anderson 1952).

Rhyncolus Germar 1817, 15 spp., generally distributed in the eastern United States west to Texas and north to Canada, then across Canada and south into the western United States. Species are associated with dead wood of various types of trees, mostly conifers but also willows, aspens and poplars (Salicaceae). *Rhyncolus pallens* Casey 1892 is associated with *Lupinus arboreus* Sims. (Fabaceae) in California. See Casey (1892), Blatchley and Leng (1916) and Buchanan (1946) to separate the species. Some species in *Phloeophagus* may be better placed as *Rhyncolus* (see note under *Phloeophagus*). The genus needs revision.

Rhyncholus Gistl 1834
Eremotes Wollaston 1861
Syntomocerus Wollaston 1865
Hyperemotes Voss 1934 (valid subgenus)
Xylocomesus Thatcher 1940

Axenomimetes Voss 1955 (valid subgenus)

Stenancylus Casey 1892, 2 spp., Florida. *Stenancylus colomboi* Casey 1892 is associated with *Acrostichum* (Pteridaceae) in Florida (Anderson 1993a). See Blatchley and Leng (1916) to separate the species.

Liolepta Blatchley 1916

Rhinonus Kuschel 1959

Tomolips Wollaston 1873, 1 sp., *T. quercicola* (Boheman 1845); generally distributed in the eastern United States. Larvae develop in dead wood of various trees (Blatchley and Leng 1916).

Wollastonia Horn 1873; not Heer 1852

Wollastoniella Cockerell 1906; not Reuter 1884

Parahornia Cockerell 1906

Phloeophagina Voss 1955

Phloeophagus Schoenherr 1838, 5 spp., generally distributed in the eastern United States north into Canada, west through the north, then south into the western United States. *Phloeophagus minor* Horn 1873 and *P. californicus* Van Dyke 1927 appear not to be congeneric with the remaining species and appear better placed as *Rhyncolus,* which is where they are treated in the key. See Blatchley and Leng (1916) and Van Dyke (1927) to separate the species.

X. Cryptorhynchinae Schoenherr 1825

by Robert S. Anderson

Members of this subfamily are easily recognized by the ventral channel on the sternum (Fig. 59), in which the rostrum lies in repose, being extended beyond the prosternum onto the mesosternum or even the metasternum. Usually, the eyes are covered by the anterolateral margins of the pronotum when the rostrum is in respose, and the tibia possess a large, curved apical tooth. The numbers of genera and species present in North America are very small compared to the taxonomic and structural diversity of cryptorhynchines in the Neotropical Region. A detailed study of the genera is much needed.

Cryptorhynchine larvae generally are borers in dead wood although some mine inside living plants and some species are found in seeds. Most genera are found in terrestrial habitats although species of the genus *Tyloderma* are associated with aquatic habitats. Many species are found in leaf litter and the odd southwestern species *Liometophilus manni* Fall 1912 is associated with ants. Many species are flightless. No species are serious economic pests although the mango weevil, *Sternochetus mangiferae* (Fabricius 1775), is frequently intercepted in quarantine at United States border inspections.

Key to the Nearctic genera of Cryptorhynchinae

1. Tarsus with claws separate, with basal tooth ..... *Phyrdenus*
— Tarsus with claws separate or connate basally, lacking basal tooth 2

2(1). Tarsus with claws connate at base ..... *Faustinus*
— Tarsus with claws separate, not connate at base 3

3(2). Antenna with funicle of 5 or 6 articles 4
— Antenna with funicle of 7 articles 6

4(3). Body nearly glabrous or with sparse, narrow appressed scales; elytra with stria 10 ended above the hind coxa; frequently collected in wetlands ..... *Tyloderma*
— Body with dense, often erect, scales; elytra with stria 10 ended anterior to, or posterior to hind coxa; not in wetlands 5

5(4). Pronotum with anterior portion with two subparallel costae, markedly declivitous posteriorly (Fig. 60); southwestern United States, in association with ants ..... *Liometophilus*
— Pronotum with anterior portion simple, lacking costae, dorsal surface evenly rounded or on same plane; southern Florida ..... *Neoulosomus*

6(3). Metasternum short, the distance between middle and hind coxae distinctly shorter than length of antennal club; generally, the metepisternal suture is not distinct and wings are absent or reduced; scutellum usually not visible, if visible, clothed with scales 7
— Metasternum long, the distance between middle and hind coxae subequal to or distinctly longer than length of antennal club; generally, the metepisternal suture is distinct and wings are present; scutellum usually visible 15

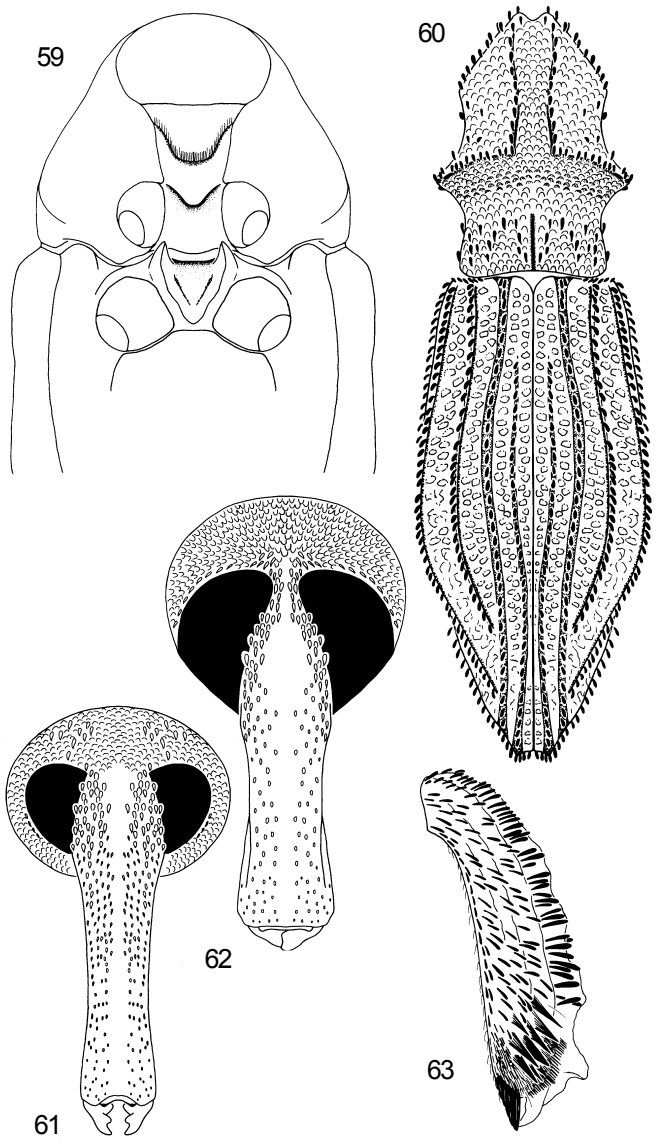
7(6). Abdomen with ventrite 1 about as long as or longer than length of ventrites 2-5 combined, with large, deep transverse depression or smaller lateral impressions near posterolateral margins ..... *Eurhoptus*
— Abdomen with ventrite 1 shorter than length of ventrites 2-5 combined, simple, lacking any depressions 8

8(7). Hind tibia abruptly expanded in basal one-third, about twice as wide as at apex ..... *Canistes*
— Hind tibia subequal in width throughout length or slightly expanded towards apex 9

9(8). Ventrite 2 about as long as ventrites 3-5 combined; pronotum markedly produced anteriorly over head, head not visible in dorsal view; elytra with apices produced, apex broadly truncate ..... *Lembodes*
— Ventrite 2 distinctly shorter than ventrites 3-5 combined; pronotum at most only slightly produced anteriorly over head, head visible in dorsal view; elytra with apices not produced, apex evenly rounded 10

10(9). Abdomen with suture separating ventrites 1 and 2 deep, nearly straight 11
— Abdomen with suture separating ventrites 1 and 2 shallow, indistinct 14

11(10). Frons wider than apex of rostrum in dorsal view; ventrite 2 slightly longer than ventrites 3 and 4 combined ..... *Calles*



FIGURES 59.131-63.131. Cryptorhynchinae. 59. *Cryptorhynchus lapathi* (Linnaeus), thoracic sterna, ventral view; 60. *Liometophilus manni* Fall, dorsal habitus; 61. *Cryptorhynchus lapathi* (Linnaeus), head, anterior view; 62. *Cophes oblongus* (LeConte); head, anterior view; 63. *Zascelis irrorata* LeConte, middle tibia.

— Frons narrower than apex of rostrum in dorsal view; ventrite 2 subequal to or shorter than length of ventrites 3 and 4 combined 12

12(11). Sternal channel with posterior margin not extended posterior to level of hind margin of front coxae; mesosternum posterior to channel with median longitudinal carina; frons impressed between eyes; pronotum with deep, median longitudinal sulcus ..... *Peracalles*

— Sternal channel with posterior margin extended posterior to level of hind margin of front coxae; mesosternum posterior to channel simple, lacking carina; frons mostly flat between eyes; pronotum simple, lacking sulcus 13

13(12). Elytra with stria 10 complete, extended to apex of elytra; scutellum visible, clothed with scales; pronotum in dorsal view widest at base .... *Pseudomus*

— Elytra with stria 10 absent or indicated at most only by a few small punctures in basal one-third of length; scutellum not visible; pronotum in dorsal view widest near middle ..... *Gerstaeckeria*

14(10). Abdomen with ventrite 2 obviously longer than length of ventrites 3 and 4 combined, not shorter than ventrite 5; frons wider than apex of rostrum in dorsal view; sternal channel with posterior margin anterior to level of anterior margin of middle coxae ..... *Pseudoacalles*

— Abdomen with ventrite 2 at most slightly longer than length of ventrites 3 and 4 combined, shorter than ventrite 5; frons as wide as or narrower than apex of rostrum in dorsal view; sternal channel with posterior margin at or posterior to level of anterior margin of middle coxae ..... *Acalles*

15(6). Hind tibia lacking apical comb of stout setae; pronotum markedly produced over head, head not visible in dorsal view; tibia very short, less than one-half as long as femur ..... *Paracamptus*

— Hind tibia with apical comb of stout setae (usually arranged subparallel to long axis of tibia); pronotum not produced over head, head visible in dorsal view; tibia longer than one-half length of femur 16

16(15). Middle coxae separated by about two-thirds width of apex of rostrum 17

— Middle coxae separated by at least width of apex of rostrum 19

17(16). Abdomen with ventrite 2 longer than length of ventrites 3 and 4 combined; hind tibia with apical comb of stout setae longer than width of tibia at apex; metepisternal suture not visible .... *Maemactes*

— Abdomen with ventrite 2 shorter than length of ventrites 3 and 4 combined; hind tibia lacking apical comb of stout setae; metepisternal suture visible 18

18(17). Frons much wider than narrowest part of rostrum in dorsal view; elytra with stria 10 complete; hind tibia with apical comb composed of a complete apical row of setae and a confused row above that; femur simple, not sulcate ventrally .... *Euscepes*

— Frons about one-half as wide as narrowest part of rostrum in dorsal view; elytra with stria 10 ended anterior to hind coxa; hind tibia with short apical comb running perpendicular to long axis and another short row at 45 degree angle to apical comb and located above it; femur sulcate ventrally for reception of tibia ..... *Apteromechus* (part)

19(16). Body with suberect or erect, very fine, long, hair-like vestiture 20

— Body with at most some scattered suberect or erect short, broad scales or scales arranged in tufts, no hair-like vestiture evident 21

20(19). Legs with tibiae with outer margin with large serrations or denticles; antenna with funicle with ar-

ticle 2 long and slender, more or less twice as long as article 3 and about one and one-half times longer than article 1; body length greater than 4.0 mm; Arizona ..... *Cnemidoprion*

— Legs with tibiae with outer margin simple; antenna with funicle with article 2 shorter and stouter, less than twice as long as article 3 and subequal to length of article 1; body length less than 4.0 mm; southern Florida ..... *Eutinobothrus*

21(19). Leg with tibia with outer margin with acute serrate or dentate carina, especially in apical one-third (Fig. 63) ..... *Zascelis*

— Leg with tibia with evenly rounded outer margin, lacking carina 22

22(21). Mandible prominent when closed, with obvious acute tooth on inner margin, angle between basal and apical cusps acute (Fig. 61) 23

— Mandible not prominent when closed, lacking tooth on inner margin or if tooth present, angle between basal and apical cusps obtuse (Fig. 62) 28

23(22). Frons not or only slightly narrower than narrowest part of rostrum in dorsal view (Fig. 61) 24

— Frons about one-half width of narrowest part of rostrum in dorsal view 26

24(23). Pronotum distinctly produced over head, head not visible in dorsal view; eyes almost completely covered by postocular lobes when rostrum is in repose; eyes widely separated by slightly more than width of rostrum at base; rostrum more or less straight ..... *Troezon*

— Pronotum at most slightly produced over head, head partially visible in dorsal view; eyes only partially covered by postocular lobes when rostrum is in repose; eyes moderately separated by slightly less than width of rostrum at base; rostrum more or less evenly curved 25

25(24). Elytra with alternate intervals 3, 5 and 7 variously elevated, sharply carinate or lower and rounded; hind femur with ventral margin with single acute tooth (species with alternate elytral intervals carinate) or with two teeth that are broadly joined at their bases (species with alternate intervals convex) ..... *Eubulus*

— Elytra with intervals of more or less equal height, although alternate intervals 3, 5 and 7 may possess patches of suberect or erect broad scales giving an elevated appearance; hind femur with ventral margin simple or with one or two separate acute teeth ..... *Cryptorhynchus*

26(23). Elytra with stria 10 complete, indicated beyond level of hind coxa; hind tibia with apical comb arranged in two discrete parts ..... *Apteromechus* (part)

— Elytra with stria 10 not extended beyond level of hind coxa; hind tibia with apical comb continuous, not separated into two parts 27

27(26). Abdomen with ventrite 2 markedly narrowed laterally, suture between ventrites 2 and 3 markedly angulate posteriorly at lateral margin for distance about one-half width of ventrite 3; leg with femur simple; rostrum with antenna inserted anterior to midlength; elytra with prominent humerus, obviously wider at base than pronotum at base ..... *Sudus*

— Abdomen with ventrite 2 not narrowed laterally, suture between ventrites 2 and 3 straight lateral margin; leg with femur with ventral tooth; rostrum with antenna inserted posterior to midlength; elytra with humerus rounded, only slightly wider at base than pronotum at base .... *Pseudomopsis*

28(22). Hind tibia with apical comb composed of a double row of setae (may be irregular); elytra either with intervals 3 and 5 prominent or with no intervals prominent and no erect setae or nodules present ..... *Cophes*

— Hind tibia with apical comb composed of a single row of setae; elytra either with erect short stout setae, nodules, or with sutural interval prominent immediately behind scutellum 29

29(28). Elytra with large, polished, prominent nodules; antenna with club lacking distinct sutures; pronotum with dense, round overlapping scales and elytra with small, narrow scales ..... *Hohonus*

— Elytra with short, stout setae or with sutural interval prominent immediately behind scutellum; antenna with club with distinct sutures; pronotum and elytra with similar scales 30

30(29). Elytra laterally at base emarginate to receive prominent hind angle of pronotum; elytra with sutural interval prominent immediately behind scutellum, stria 10 indicated behind level of hind coxa as a fine line; pronotum with postocular lobes prominent and rounded; front femur with ventral margin with small tooth; front tarsus of male elongate and with long, fine setae ..... *Episcirrus*

— Elytra laterally at base simple, not modified to receive hind angle of pronotum; elytra with sutural interval flat immediately behind scutellum, stria 10 not extended behind level of hind coxa; pronotum with postocular lobes slightly developed; front femur simple, lacking tooth; front tarsus of male normal ..... *Rhynchus*

Classification of the Nearctic Cryptorhynchinae

38. Cryptorhynchini Schoenherr 1825

Cryptorhynchina Schoenherr 1825

Apteromechus Faust 1896, 4 spp., generally distributed in the eastern United States and Canada west to Texas and Arizona. Adults come to lights and are associated with various trees such as beech, oak and red bay; larvae have been found mining a dead sassafras limb (Kissinger 1964). See Whitehead (1979) to separate the species.

Acarlosia Hustache 1940

Cnemidoprion Marshall 1933, 1 sp., *C. oblongus* (Horn 1895), Arizona. Adults come to lights and have been collected on low roadside vegetation. A Brazilian species was reared from twigs of *Cienfugosia* (Malvaceae) (Anderson 1998).

Cryptorhynchus Illiger 1807, 4 spp., generally distributed in the eastern United States north into Canada, west across Canada and the northern United States to Oregon, Washington and British Columbia. Adults of *C. fuscatus* LeConte 1876, *C. helvus* LeConte 1878 and *C. minutissimus* LeConte 1876 come to lights and are associated with various species of dead or dying trees. *Cryptorhynchus lapathi* (Linnaeus 1758) is associated with living poplar and willow (Salicaceae). See Blatchley and Leng (1916) to separate the species. The genus in North America likely is composite and needs redefinition.

Arachnipes Villa and Villa 1833
Cryptorrhynchus Bedel 1884
Cryptorrhynchus Champion 1906
Cryptorhynchidius Pierce 1919
Atrichopsis Voss 1954 (valid subgenus)
Cryptorrhynchobius Voss 1965

Eubulus Kirsch 1870, 3 spp., generally distributed in the eastern United States into southern Canada, west in the south to Texas. Arizona and California. Adults of *E. bisignatus* (Say 1831) and *E. parochus* (Herbst 1797) have been associated with dead limbs of chestnut, beech, oak and birch (Blatchley and Leng 1916); larvae likely mine dead branches of various trees. A single adult of *E. obliquus* (Say 1831) has been associated with *Myrica cerifera* L. (Myricaceae) (Anderson 1993a). See Blatchley and Leng (1916) to separate the species.

Eubulosoma Voss 1954 (valid subgenus)

Eutinobothrus Faust 1896, 1 sp., *E. pilosellus* (Boheman 1844), southern Florida. This species is associated with *Ipomoea* (Convolvulaceae) (Anderson 1993a).

Gasterocercodes Pierce 1915

Liometophilus Fall 1912, 1 sp., *L. manni* Fall 1912, Arizona, New Mexico and Texas. This species is associated with nests of the ant *Liometopum apiculatum* Mayr (Formicidae). This is perhaps the oddest-looking weevil in North America.

Maemactes Schoenherr 1837, 1 sp., *M. cribratus* (LeConte 1876), Texas and Kansas.

Baropsis LeConte 1876
Baridopsis Rye 1878

Neoulosomus O'Brien and Wibmer 1982, 1 sp., *N. laticaudis* (Suffrian 1872), southern Florida. Adults have been collected on various dead limbs and vines (Anderson 1993a).

Ulosomus Schoenherr 1826; not Schoenherr 1825

Phyrdenus LeConte 1876, 2 spp., *P. divergens* (Germar 1824) generally distributed in the eastern United States, and *P. muriceus* (Germar 1824), Florida and Arizona. These species are associated with *Solanum* (Solanaceae) (Blatchley and Leng 1916; O'Brien 1961).

[*Sternochetus* Pierce 1917, 1 sp., *S. mangiferae* (Fabricius 1775), intercepted in quarantine; Florida and California. This species is a pest of mango but to date has not become established in North America.]

Sudus Kissinger 1964, 1 sp., *S. floridanus* Kissinger 1964, southeastern United States west to Texas.

Troezon Champion 1906, 1 sp., *T. lutosus* (LeConte 1884), Florida and Louisiana. This species is associated with *Dahlbergia ecastophyllum* (L.) Benth. (Fabaceae); larvae feed in the disc-like fruits (Blatchley and Leng 1916; Anderson 1993a).

Tyloderma Say 1831, 30 spp., generally distributed in the United States (most species in the southeast) and southern Canada. Species are associated with various plants, many in wetlands, in the families Onagraceae, Polygonaceae, Urticaceae, Haloragaceae, Rosaceae, Melostomataceae and Saururaceae (Wibmer 1981). Adults come to lights. See Wibmer (1981) to separate the species.

Analcis Say 1831; not Wagler 1830
Analcis Schoenherr 1833; not Wagler 1830; not Say 1831

Zascelis LeConte 1876, 1 sp., *Z. irrorata* LeConte 1876, southwestern United States. Adults come to lights. A second unnamed (and likely adventive) species is present in southern Florida (Anderson 1993a).

Tylodina Lacordaire 1866

Acalles Schoenherr 1825, 12 spp., generally distributed in the eastern United States into southern Canada, west to Texas, Arizona and New Mexico in the south. Species are associated with various dead branches or palm fronds on the ground, on dead vines and other hanging dead vegetation, and generally in leaf litter (Kissinger 1964; Anderson 1993a). Adults were also found sweeping *Borrichia* (Asteraceae), *Sesuvium* (Aizoaceae) and *Salicornia* and *Suaeda* (Chenopodiaceae) on beaches in southern Florida at night (Anderson 1993a). See Blatchley and Leng (1916) to separate some of the species. The genus needs revision and redefinition. Anderson (1993a) lists six undescribed species as present in southern Florida.

Ulosomus Schoenherr 1825
Microdalotes Gistel 1856
Trachodius Weise 1891
Milichacalles Voss 1960 (valid subgenus)
Trichacalles Voss 1960 (valid subgenus)

Calles Kissinger 1964, 1 sp., *C. cladotrichis* (Pierce 1912), Arizona, New Mexico and Texas. Adults were reared from roots of *Tidestromia lanuginosa* (Nutt.) Standl. (Amaranthaceae) (Pierce 1912). A second undescribed species has been collected in southern Florida on *Salicornia* and *Suaeda* (Chenopodiaceae) at night in coastal areas (Anderson 1993a) and another is known from Arizona.

Canistes Casey 1892, 1 sp., *C. schusteri* Casey 1892, eastern United States west to Texas. Adults have been collected in leaf litter.

Eurhoptus LeConte 1876, 2 spp., *E. pyriformis* LeConte 1876 and *E. sordidus* (LeConte 1876), generally distributed in the eastern and southcentral United States west to Texas and Oklahoma. Adults have been commonly collected in leaf litter. At least three undescribed species are known from Texas; the genus needs revision.

Eurrhoptus Rye 1878

Euscepes Schoenherr 1844, 1 sp., *E. porcellus* Boheman 1844, southern Florida. Adults have been collected on *Ipomoea* (Convolvulaceae) (Anderson 1993a); larvae are likely in the roots or stems.

Hyperomorpha Blackburn 1885
Batatarhynchus Hustache 1933

Faustinus Berg 1898, 1 sp., *F. cubae* (Boheman 1844), southern Florida. Adults and larvae are associated with various Solanaceae (Anderson 1993a).

Euxenus Faust 1896; not Gistel 1856; not LeConte 1876

Gerstaeckeria Champion 1905, 18 spp., southeastern and western United States, north into western Canada. Adults and larvae are associated with various Cactaceae. Adults are flightless and noctural. Larvae mine the pads of *Opuntia* and hollow out smaller pincushion cacti such as *Mamillaria* and *Coryphanta*. See O'Brien (1970b) to separate the species.

Opuntiaphila Pierce 1912
Philopuntia Pierce 1912

Lembodes Schoenherr 1844, 1 sp., *L. solitarius* Boheman 1844, southern Florida. Adults are collected on various types of dead vegetation (Anderson 1993a).

Paracamptus Casey 1895, 2 spp., *P. floridanus* Sleeper 1954 and *P. subtropicus* Casey 1895, southern Florida. Adults of *P. subtropicus* have been collected commonly on dead *Rhizophora mangle* L. (red mangrove; Rhizophoraceae) branches (Anderson 1993a). See Sleeper (1954b) to separate the species.

Peracalles Kissinger 1964, 2 spp., *P. pectoralis* (Leconte 1876), Illinois, Indiana, Ohio, Kentucky and Missouri, and *P. ventrosus* (LeConte 1878), Florida. Adults occur in leaf litter and *P. ventrosus* has been collected from emergent aquatic vegetation at night (C. W. O'Brien, pers. comm.). See Blatchley and Leng (1916; as *Acalles*) to separate the species.

Pseudoacalles Blatchley 1916, 1 sp., *P. nuchalis* (LeConte 1876), Florida and South Carolina. Adults are found in leaf litter (Anderson 1993a).

Pseudomopsis Champion 1905, 1 sp., *P. inflata* (LeConte 1876), southern Florida. Adults are commonly found on *Coccoloba uvifera* L. and *C. diversifolia* Jacq. (Polygonaceae); larvae feed in fruits (Anderson 1993a).

Pseudomus Schoenherr 1837, 2 spp., *P. sedentarius* (Say 1831), Florida and *P. truncatus* LeConte 1876, Georgia and South Carolina. See Blatchley and Leng (1916) to separate the species.

39. Gasterocercini Zherichin 1991

Cophes Champion 1905, 5 spp., generally distributed in eastern United States and southern Canada west into Texas. Adults of most species are associated with dead wood and come to lights. *Cophes texanus* Sleeper 1955 has been reared from dead *Baccharis neglecta* Britt. (Asteraceae). The genus needs revision and redefinition. See Sleeper (1955a) and Blatchley and Leng (1916; as *Cryptorhynchus*) to separate some of the species.

Coelosternus Schoenherr 1835; not Sahlberg 1823
Sternocoelus Kuschel 1955

Episcirrus Kuschel 1958, 1 sp., *E. brachialis* (LeConte 1884), Texas and Arizona. Adults are associated with *Bumelia lanuginosa* (Michx.) Pers. (Sapotaceae); larvae appear to mine dead branches.

Hohonus Kissinger 1964, 1 sp., *H. lacteicollis* (Champion 1906), Texas and Arizona. Adults are associated with *Phoradendron* (mistletoe; Viscaceae); larvae mine the stems (Anderson 1994).

Rhynchus Kissinger 1964, 1 sp., *R. apiculatus* (Gyllenhal 1837), southeastern United States. Adults are associated with *Myrica cerifera* L. (Myricaceae); larvae mine in dead trunks and larger branches (Ford 1985).

XI. Cyclominae Schoenherr 1826

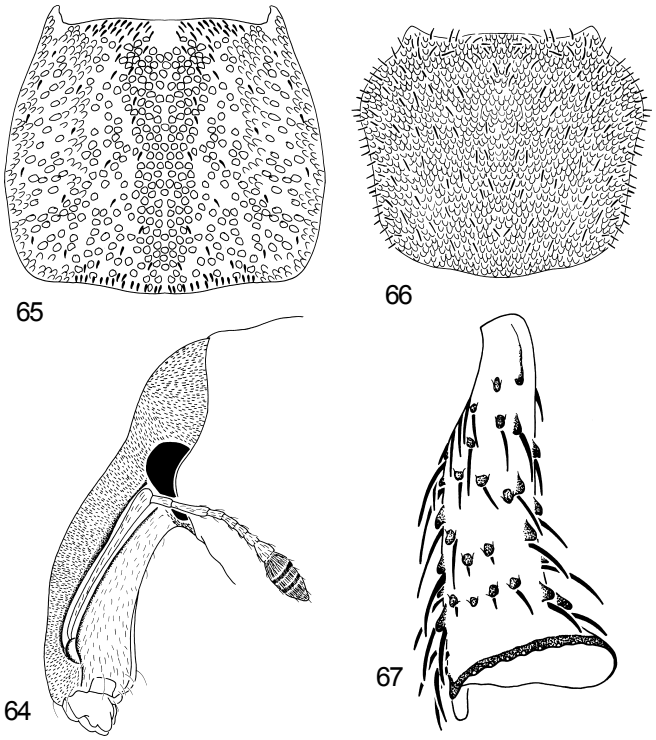
by Robert S. Anderson

This is a small group of three genera of weevils, one of which appears not closely related to the other two. All members have a relatively short snout (but lack any deciduous processes and associated scars) and have well-developed postocular lobes (Fig. 66). The genus *Listroderes*, represented by only 3 species, is introduced from South America, a region of much greater cyclomine diversity. *Listronotus* is a large genus of over 80 species, most of which are associated with semi-aquatic and aquatic habitats. *Emphyastes* is an odd, unrelated genus found associated with seaweed along Pacific coastal beaches.

KEY TO THE NEARCTIC GENERA OF CYCLOMINAE

1. Front tibia prolonged beyond articulation of tarsus into long, flattened paddle; hind tibia markedly expanded at apex, wider than maximum width of hind femur (Fig. 67) ..... *Emphyastes*
— Front tibia not prolonged beyond articulation of tarsus; hind tibia not expanded at apex, not as wide as maximum width of hind femur 2

2(1). Pronotum widest subapically, lateral margins straight and divergent from base to widest point, transversely quadrate in form (Fig. 66); pronotal disk



FIGURES 64.131-67.131. Cyclominae. 64. *Listronotus caudatus* (Say), head, lateral view; 65. *Listronotus oregonensis* (LeConte), pronotum, dorsal view; 66. *Listroderes costirostris* Schoenherr, pronotum, dorsal view; 67. *Emphyastes fucicola* Mannerheim, hind tibia.

broad and flat, lateral profile with anterior margin at middle elevated above level of pronotal disk; body size greater than 5 mm; elytra with erect, stout seta-like scales at least 2 to 3 times longer than diameter of adjacent rounded, flat scales . ..... *Listroderes*

— Pronotum widest near base or at or before midlength, lateral margins rounded from base to widest point (Fig. 65); subcylindrical in form; pronotal disk more or less evenly convex, lateral profile evenly rounded from basal to anterior margin; body size various; elytra with or without erect, stout seta-like scales, but if seta-like scales as long as 2 to 3 times diameter of adjacent, rounded scales, body size is less than 5 mm ..... *Listronotus*

Classification of the Nearctic Cyclominae

40. Rhythirrinini Lacordaire 1863

Emphyastina Lacordaire 1863

Emphyastes Mannerheim 1852, 1 sp., *E. fucicola* Mannerheim 1852, western coastal United States and Canada north into southern Alaska. Adults and larvae are associated with decaying seaweed washed up and buried on sandy beaches (Anderson 1988b). Korotyaev and Egorov (1975) have suggested that this genus is related to *Thalasselephus* (Molytinae).

Listroderina LeConte 1876

Listroderes Schoenherr 1826, 3 spp., *L. costirostris* Schoenherr 1826, *L. difficilis* Germain 1895, and *L. apicalis* Waterhouse 1841, southeastern United States, Texas, Arizona and California; adventive. See Morrone (1993) to separate the species.

Listronotus Jekel 1865, 81 spp., generally distributed in the United States and Canada. Adults are found in wetlands and appear to be associated with a variety of plants (O'Brien 1981, Anderson 1993a). Adults of a few species in coastal Florida and Texas have been collected on *Borrichia frutescens* (L.) DC. (Asteraceae) and *Salicornia* (Chenopodiaceae) (Anderson 1993a). The genus, especially the smaller species originally placed in *Hyperodes*, needs revision. See O'Brien (1981) and Stockton (1963) to separate most of the species.

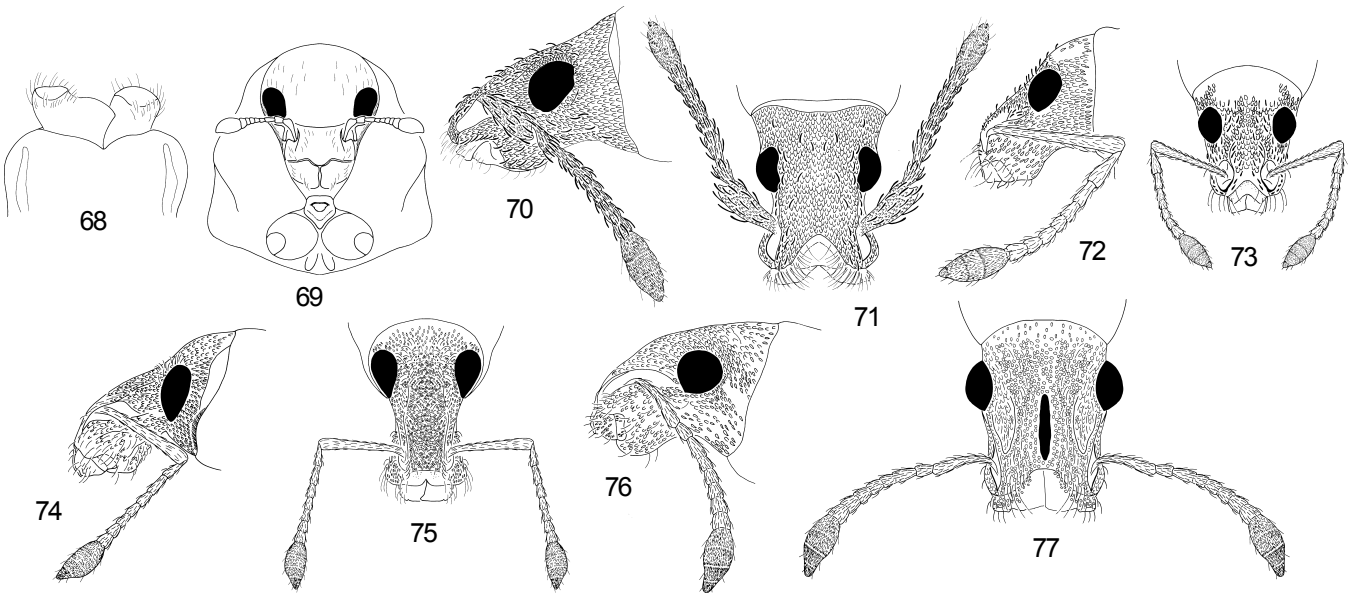
Macrops Kirby 1837; not Wagler 1830; not Burmeister 1835
Hyperodes Jekel 1865
Anchodemus LeConte 1876
Lixellus LeConte 1876
Mascarauxia Desbrochers 1898
Relistrodes Brèthes 1910
Aulametopiellus Brèthes 1926
Pseudohyperodes Hustache 1939

XII. Entiminae Schoenherr 1823

by Robert S. Anderson and Anne T. Howden

Entiminae are generally called the 'broad-nosed' weevils because this is the group of curculionids in which the snouts are the least developed. Aside from the possession of a shorter, broader snout, the best way to recognize them is that nearly all Entiminae have a mandible that bears a deciduous process that breaks off soon after emergence of the adult leaving a definite scar at the point of attachment on the outer face of the mandible. However, not all Entiminae possess this feature (*Thecesternus*, *Sitona*, and members of the tribe Alophini) and one must rely on other features in recognizing their inclusion in the subfamily. Entimines also possess only a short tooth or spine on the inner angle at the apex of the hind tibia and sexual dimorphism in the form of the rostrum is generally not as evident as in other weevils. The antennal scape of some species also extends to or beyond the anterior margin of the eye, a feature otherwise only found in Dryophthorinae.

Most entimines have larvae that feed externally in the soil on roots whereas the adults tend to feed on fresh foliage or reproductive structures such as flowers or buds. Many species are generalists and feed on a very broad range of plant taxa both as adults and larvae (*e.g.*, *Otiorhynchus ovatus* (Linnaeus 1758)) whereas others can be very host specific, feeding on a few closely related species or genera. Oviposition usually takes place in the soil or rarely on the foliage of the host plant, larvae then dropping to the ground to feed in the soil. Adults of many species of Entiminae are flightless and some are parthenogenetic.



FIGURES 68.131-77.131. Entiminae. 68. Mandibles of Entiminae, schematic (after Kissinger 1964). 69. *Thecesternus* sp., head and thorax, ventral view (after Kissinger 1964). 70-71. *Brachystylus sayi* (Alonso-Zarazaga), head, 70. Lateral view; 71. Dorsal view. 72-73. *Sciopithes obscurus* Horn, head 72. Lateral view; 73. Dorsal view. 74-75. *Dyslobus lecontei* Casey, head, 74. Lateral view; 75. Dorsal view. 76-77. *Ericydeus lautus* (LeConte), head, 76. Lateral view; 77. Dorsal view.

Entiminae appear to be very adundant and diverse in arid habitats, particularly in the deserts of the southwestern United States. Some have developed adaptations for sand dwelling that include dense long hairs over the body and fossorial legs. Entimines are also the weevils most often found at higher elevations.

A number of species are pests of ornamental plants and of agricultural produce including citrus and other fruits. These include *Otiorhynchus ovatus* (strawberry root weevil), *O. sulcatus* (Fabricius 1775) (black vine weevil), *Cyrtepistomus castaneus* (Roelofs 1873) (Asiatic oak weevil), *Artipus floridanus* Horn 1876, and species of *Naupactus* and *Sitona*.

Entiminae are the most diverse subfamily in North America with 124 genera in 23 tribes recognized. In some tribes such as Peritelini, identification of the genera is very difficult and generic definitions need to be reassessed.

The portions of the key from couplet 68 to 84 and 105 to 122 are slightly modified from Kissinger (1964). The portion of the key from couplet 85 to 104 was adapted from Sleeper (1955b) and O'Brien (1984). An application is before the International Commission on Zoological Nomenclature to maintain Trachyphloeini (Alonso-Zarazaga and Lyal 1999, p. 8).

Key to the Nearctic Genera of Entiminae

1. Rostrum and sides of head recessed in deep cavity formed by the sides of the prothorax and by prosternum in the form of a small triangular plate originating between fore coxae (Fig. 69); when positioned within the cavity, only dorsal surfaces of rostrum and frons visible; mandible without deciduous process; tarsi without pads on ventral surface; tarsal claws free; body length 6.5-9.0 mm ..... *Thecesternus*

— Rostrum and sides of head not recessed, prosternum not forming such a cavity; mandible with or without deciduous process; tarsi with or without pads on ventral surface, tarsal claws free or connate; body length various 2

2(1). Mandible large, hemispherical externally, inner surface slightly cupped; surface of mandible densely squamate except narrow median edge glabrous; mandible without deciduous process; bucal cavity large, maxillary palpus fully or mostly exposed; scrobes lateral; rostrum similar to head in length and width; anterior edge of prothorax straight laterally, not lobed beneath eye ..... *Sitona*

— Mandible various; if large and densely squamate, then with postocular lobe and/or with scrobe dorsal and/or with deciduous process; other characters various 3

3(2). Mandible prognathous, like a thin roof extending over mouth parts; mandible without a deciduous process, or process very small and inconspicuous; all or most of mouthparts exposed in ventral view; elytra with humeri rounded; tarsal claws free 4

— Mandible not prognathous; mandible with deciduous process or its scar (Fig. 68); elytra with humeri various; tarsal claws free or not 6

4(3). Mentum as wide as bucal cavity, maxillae only briefly exposed basally; mandible with deciduous process or its scar present on extreme outer angle; elytra flat basally in vicinity of scutellum; pronotum with glabrous median carina; body length up to 9.0 mm .... *Byrsopages*

— Mentum as wide as one-third width of bucal cavity; mouthparts completely exposed in ventral view; deciduous process of mandible lacking

or very small; elytra not flat basally; body length up to 6.0 mm 5

5(4). Dorsal surface clothed with appressed oval or fan-shaped scales with fine ribs radiating from point of attachment; body surface not encrusted with dirt; scrobe evanescent dorsally, not reaching anterior edge of eye; scape reaching posterior edge of eye; body length 3.5-5.6 mm ..... *Dirotognathus* and *Lepidophorus*

— Dorsal surface dirt-encrusted, with papillae; scales not readily visible; scrobe well-defined dorsally, continuing above dorsal edge of eye; scape abruptly thickened distally, reaching anterior edge of eye; body length 3.0-3.3 mm ..... *Vitavitus*

6(3). Dorsal surface dirt-encrusted, with papillae, without scales; mentum almost completely covering bucal cavity; scrobe ending well before eye; tarsal claws free; body length 3.5-6.3 mm ..... *Leptopinara*

— Dorsal surface squamate, without papillae, with or without crust of dirt; other characters various 7

7(6). Bucal cavity deeply recessed, occupying approximately one-third width of rostrum, lateral walls of cavity perpendicular, posterior wall formed by distal edge of gula, anterior wall formed by ventral surface of mandibles when closed; mentum distally occupying full width of bucal cavity; maxillae slightly exposed proximally; densely covered with shiny, appressed, whitish, slightly opalescent scales; tarsal claws connate; body length 2.6-3.8 mm ..... *Connatichela*

— Bucal cavity not so deeply recessed, if at all; mentum of various widths; vestiture dense or not; tarsal claws connate or not; other characters various 8

8(7). Side of prothorax with anterior margin produced into slight to very large rounded postocular lobe (Fig. 74); eye flat, tear-drop shaped (Fig. 74) 9

— Side of prothorax with anterior margin straight, not produced (Figs. 70, 72, 76); eye various 44

9(8). Mandible with four or more large setae; femur various 10

— Mandible with three large setae; femur with a tooth on inner edge distally 39

10(9). Ventral edge of postocular lobe very abrupt, angulate 11

— Ventral edge of postocular lobe gradual, more rounded 12

11(10). Elytra oval, scutellum seldom visible dorsally; body length 2.7-3.5 mm ..... *Aracanthus*

— Elytra with humeral angle slanted from stria 7 outwards; scutellum very wide; prothorax and elytra patterned with lines and other markings; body length 4.1-8.0 mm ..... *Eudiagogus*

12(10). Head with a deep sulcus across ventral surface of head-rostrum junction, sulcus continuous with scrobe; humeri quadrate ..... *Colecerus*

— Head without a sulcus across ventral surface of head-rostrum junction; humeri rounded 13

13(12). Base of elytra carinate; rostrum dorsally with fine, deep median sulcus and shorter lateral sulcus at base that is abruptly turned laterally toward antennal scrobe; body length 4.3-5.6 mm ..... *Sapotes*

— Base of elytra not carinate, sloping to mesothorax; rostrum with or without sulci, not with right-angled dorsolateral sulcus; postocular lobe with row of setae of graduated lengths; body length 5.0-25.0 mm 14

14(13). Rostrum with dorsal margin of scrobe well-defined, with a sharp upper angle; antenna with scape and funicle, and dorsal surfaces of tarsal articles all with round overlapping scales; body lacking long, fine, erect hairs ..... *Ophryastes*

— Rostrum with dorsal margin of scrobe less well-defined, with a rounded upper angle; with one or more of antennal scape and funicle, and dorsal surfaces of tarsal articles, lacking round overlapping scales; body with or without long, fine, erect hairs 15

15(14). Mandible with process or its scar linear, very small, rarely observed; sides of mandible large, flattened or slightly concave, irregularly sculptured; scape and funicle without broad scales; rostrum longer than head; eye teardrop shape or oval; size large, length 10.0-17.0 mm 16

— Mandibular process or its scar usually much larger and distinct (Fig. 68); sides of mandible not as above; antennal scape and funicle various; size various 19

16(15). Scutellum triangular, not conspicuous in dorsal view; integument shiny through sparse, elongate scales and stiff dark setae. *Acmaegenius*

— Scutellum rectangular, readily visible in dorsal view, conspicuously densely clothed with appressed setae/scales 17

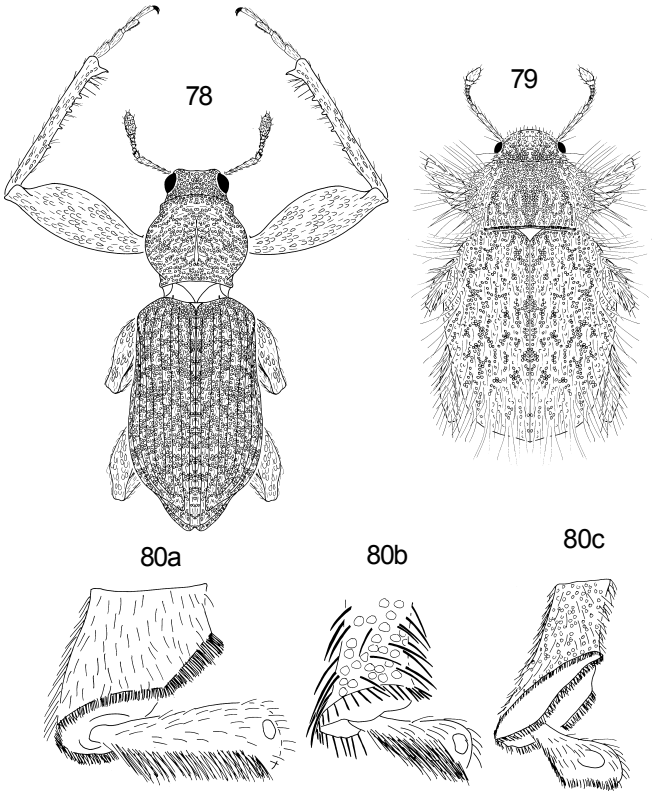
17(16). Rostrum with three very deep sulci; one median dorsal sulcus from interantennal line to frons; one lateral sulcus on each side from near antennal insertion to upper edge of eye, thence following anterior edge of eye to scrobe ..... *Triglyphulus*

— Rostrum with sulci, if present, not present along edge of eye 18

18(17). Elytra with slight humeral angle; striae with deep elongate punctures ..... *Plinthodes*

— Elytra with humeral angle rounded; striae with shallow punctures ..... *Trichalophus*

19(15). All surfaces densely squamate with smooth, shiny scales; with long fine erect hairs as much as 1.0 mm long on dorsal surface including legs and antennal funicle (Fig. 79); front tibia with outer angle expanded, middle tibia less so, hind tibia with outer and sometimes inner angle greatly expanded; tibiae edged distally with row of stout spines; many species with tarsal articles spinose ventrally, particularly article



FIGURES 78.131-80.131. Entiminae. 78-79. Dorsal habitus, 78. *Pandeleteius rotundicollis* (Fall); 79. *Miloderes nelsoni* Kissinger. 80. Hind tibiae of various Entiminae, schematic. a) open corbel, b) semi-closed corbel, c) closed corbel.

1; lacking complete pads on all tarsal articles; associated with sandy environments 20

— Vestiture dense or not; without long fine erect hairs and expanded tibial apices (if long erect hairs and distinct postocular lobes present, see *Paracimbocera*); other characters various . 24

20(19). Epistoma abruptly perpendicular, posterior margin carinate ..... *Trigonoscutoides*

— Epistoma on same plane as remainder of rostrum 21

21(20). Eye convex ..... *Trigonoscuta*

— Eye flat 22

22(21). Tarsal claws connate basally or with a single claw ..... *Eucilinus* (part)

— Tarsal claws free 23

23(22). Antennal scrobe shallow and greatly widened posteriorly ..... *Cimbocera*

— Antennal scrobe deep and only slightly widened posteriorly ..... *Miloderes*

24(19). Body with long fine erect hairs and distinct postocular lobes (as in *Cimbocera*, but tibial apices not expanded); tarsal article 3 with apical tufts (except females of *P. robusta*) ..... *Paracimbocera*

— Body without long fine erect hairs; tarsal article 3 various 25

25(24). Dorsum very irregularly, coarsely sculptured; rostrum with three broad sulci; head with swelling above eye; elytra with costae on intervals 3, 5, 7; with large knob on apical umbone and large knob on declivity ..... *Rhigopsis*

— Surface not irregularly sculptured as above; other characters various 26

26(25). Metepisternal suture present, well defined at least in basal half, usually complete, rarely obliterated; if suture is obliterated, then metepisternum with finer, smaller, and sparser scales than metasternum 27

— Metepisternal suture obliterated entirely or in large part at least in basal half, metepisternum clothed with scales similar in coarseness, size, and density 28

27(26). Dorsal margin of scrobe indistinct posteriorly; scape rests on eye when retracted next to head; rostrum separated from frons by distinct transverse impression; abdominal ventrite 2 longer than 3 and 4 united, suture between ventrites l and 2 deep, straight; article 1 of front tarsus dorsally clothed with sparse round scales ..... *Adaleres*

— Abdominal ventrite 2 not longer than 3 and 4 united, suture between ventrites 1 and 2 deep, straight; article 1 of front tarsus lacking round scales on dorsal surface ..... *Dyslobus*

28(26). Each puncture of elytral stria covered by round scale; elytra usually with sparse, coarse, erect setosity ..... *Panscopus*

— Each puncture of elytral stria either with a fine seta, apparently glabrous, or puncture not distinct; elytral vestiture various 29

29(28). Scape of antenna clothed with round, flat scales 30

— Scape of antenna not clothed with round scales, only suberect, fine setae 35

30(29). Tibia with corbel open (Fig. 80a); body usually dirt-encrusted; with long, erect, sparse, spatulate setae; dorsal margin of scrobe poorly defined posteriorly; scape extended over middle of eye ..... *Phyxelis*

— Tibia with corbel closed (Fig. 80c); other characters various 31

31(30). Elytra clothed with long, fine, erect setae, each seta about five times as long as diameter of an adjacent scale; hind tibia with corbel closed, corbel plate clothed with flat, round scales .. .. *Diamimus*

— Elytra either lacking erect setosity (*Orimodema*) or with stout bristles not more than three times as long as diameter of scales (*Dichoxenus*); hind tibia with corbel closed, corbel plate lacking scales 32

32(31). Body elongate in form; elytra lacking erect setosity, scales of elytra not at all overlapping; dorsal margin of scrobe poorly defined posteriorly; in dorsal view lateral margins of rostrum distinctly converging from base at anterior margin of eye to about the middle, thence

nearly straight to point of insertion of antenna ..... *Orimodema*

— Body shorter and stouter in form; elytra with sparse, erect bristles; in dorsal view lateral margins of rostrum slightly, evenly convergent from base at anterior margin of eye to point of insertion of antenna 33

33(32). Sternite 8 of female compressed distally, the vertical dimension much greater than horizontal dimension; elytra with scales not overlapping, on dorsal surface with short, erect, clavate setae; scape densely squamate ..... *Paranametis*

— Sternite 8 of female shaped like a horizontal shovel, with broad, laterally expanded process distally; other characters various 34

34(33). Scape densely scaled; elytral setae blunt apically; ventral margin of scrobe clearly defined ..... *Dichoxenus*

— Scape mostly setose with a few broad scales; elytral setae fine, acute; ventral margin of scrobe poorly defined ..... *Anametis*

35(29). Basal margin of elytra produced strongly and abruptly perpendicularly before merging with sclerites covered by prothorax 36

— Elytra lacking distinct basal margin, evenly rounded to sclerites covered by prothorax (or elytra lacking erect setosity, *Melanolemma*); dorsal margin of scrobe poorly defined posteriorly 37

36(35). Dorsal margin of scrobe not defined posteriorly, scape passing over middle of eye; corbel of hind tibia open; body lacking erect setae or scales; tarsal claws connate ..... *Tropiphorus*

— Dorsal margin of scrobe well defined posteriorly, scape passing over bottom of eye; corbel of hind tibia narrowly closed; body with erect fine setae usually numerous; tarsal claws free ..... *Peritaxia*

37(35). Elytra clothed with long, fine, erect setae; elytral stria 10 extending posteriorly to above margin of hind coxa, there joining stria 9 .... *Crocidema*

— Elytra lacking erect setae; elytral stria 10 obscure, not joining stria 9 38

38(37). Rostrum flat on dorsal surface, there with fine, longitudinal, glabrous median line; frons two-fifths wider than distance between lateral margins of rostrum at point of insertion of antenna in dorsal view; rostrum lacking deep, fine sulcus distad of eye ..... *Pseudorimus*

— Rostrum on dorsal surface convex, there with very vague, low, median longitudinal carina; frons much less than one-fifth wider than distance between lateral margins of rostrum at point of insertion of antenna in dorsal view; rostrum at base slightly distad of anterior margin of eye with short, deep, fine sulcus perpendicular to longitudinal axis of rostrum .... *Melanolemma*

39(9). Elytra with humeral angle 40

— Elytra with humerus rounded 42

40(39). Femora each with very large tooth bearing one or two smaller teeth on distal edge; scape reaching anterior third of prothorax; base of elytron forming a large lobe between scutellum and interval 5; dorsal elytral setae minute; color dark brown-black with whitish scales, with irregular pattern created by areas of very small scales allowing integument to show through; body length 6.0 -7.0 mm ..... *Myllocerus*

— Femora each with single small tooth; dorsal elytral setae long, slender, arcuate; base of elytra straight; color and body length various 41

41(40). Eye small, separated from anterior margin of prothorax by three or more scales; elytral intervals flat; pronotum and elytra evenly, densely squamose; body length 3.3-4.0 mm ..... *Oedophrys*

— Eye large, separated from anterior margin of prothorax by single row of scales; elytral intervals convex; pronotum and disc of elytra with scales very sparse or absent, replaced with minute setae; scales becoming more numerous laterally; body length 4.5-5.8 mm ..... *Cyrtepistomus*

42(39). Pterygium open apically (Fig. 73); eye with approximately 14 facets along longest axis; prothorax with distinct lobe on anterior edge below eye, prothorax here 1.2x longer than length of pronotum; body length 3.5-3.8 mm ..... *Calomycterus*

— Pterygium various; prothorax straight on anterior edge, longer dorsally than ventrally; other characters various 43

43(42). Pterygium closed apically (Fig. 71); eye small, flattened, with approximately 20 facets along longest axis; prothorax 1.4x longer dorsally than ventrally; elytral scales not sculptured; body length 3.0-4.0 mm ..... *Neoptochus*

— Pterygium open apically; eye with approximately 10 facets along longest axis; elytral scales sculptured in a fan shape; body length 2.4-4.0 mm ..... *Myosides*

44(8). Anterior edge of prothorax laterally with postocular vibrissae in a cluster or tuft, or lacking; without lobe (except *Pachnaeus*); with or without tooth or knob 45

— Anterior edge of prothorax without postocular vibrissae 55

45(44). Elytra with humeral angle well-developed, distinct (Fig. 78; less so in *Pandeleteius simplarius*) 46

— Elytra with humerus rounded 52

46(45). Eye large, flattened; rostrum thick; front coxae contiguous or apparently so; body length 5.0-12.0 mm 47

— Eye smaller; front coxae distinctly separated by continuous prosternal integument; body length less than 5.0 mm 49

47(46). Hind tibia with straight comb of setae on outer edge, comb at least as long as width of tibia at apex; postocular vibrissae set on edge of prothorax; color dorsally dark, vaguely patterned

at most; corbel open; front coxae contiguous; body length 5.5-l0.0 mm ..... *Tanymecus*

— Hind tibia without straight comb of setae; postocular vibrissae set on knob or rounded tooth on edge of prothorax; color pale or brilliant metallic; corbel various; front coxae contiguous or apparently so; body length 6.4-12.0 mm 48

48(47). Front leg not larger, front femur not more swollen than middle and hind femora; eye large, flattened, oval, slightly diagonal; color pastel gray, green, or bluish; many with pollinosity; postocular vibrissae set on a prominent knob ..... *Pachnaeus*

— Front leg larger than middle and hind legs, front femur enlarged; eye moderately convex, slightly transverse; postocular vibrissae lacking (or rudimentary in *H. opalina*); color glossy white or metallic blue, blue-green, green or copper; without pollinosity ... *Hadromeropsis*

49(46). Tarsal claws fused; rostrum extremely short; postocular vibrissae vestigial ..... *Isodrusus*

— Tarsal claws free; rostrum short; postocular vibrissae various 50

50(49). Anterior margin of abdominal ventrites 3, 4, and 5 without modification; contour and vestiture more or less uniform; mandible without scales; postocular vibrissae various, well-developed in most species; front legs distinctly to greatly larger than middle and hind legs (Fig. 78) ..... *Pandeleteius*

— Anterior margin of abdominal ventrites 3, 4 and 5 conspicuously modified; postocular vibrissae present or absent; front legs slightly larger than middle and hind legs 51

51(50). Anterior margin of abdominal ventrites 3, 4, and 5 deeply, narrowly sulcate across width of abdomen; posterior margin of sulcus carinate, right-angled in female, more rounded in male ..... *Scalaventer*

— Anterior margin of abdominal ventrites 3, 4, and 5 shallowly sulcate across width of abdomen or medially only; posterior edge rounded ..... *Pandeleteinus*

52(45). Tarsal articles 1, 2, and 3 on ventral surface with complete pad of dense fine setae; scrobe right-angled, reaching ventral surface, glabrous ... *Isodacrys*

— Tarsal articles 1, 2, and 3 on ventral surface lacking complete pads; at most with small pad at apex of tarsal article 3; pads replaced with spines or long recumbent setae or neither; scrobe not right-angled, squamate 53

53(52). Dorsal surface with very fine long setae, recumbent or semi-erect, setae longer on sides and ventral surface; prothorax distinctly wider than long ..... *Miloderoides*

— Dorsal surface with inconspicuous short, recumbent setae, similar on sides and ventral surface; prothorax distinctly longer than wide... 54

54(53). Side of rostrum with tooth-like extension over scrobe just apicad of eye ..... *Piscatopus*

— Side of rostrum without extension over scrobe ..... *Minyomerus*

55(44). Scrobe dorsal or dorsolateral, indefinite caudad of antennal insertion; scape in repose not situated in scrobe, usually passing over eye .. 56

— Scrobe lateral; scape in repose situated in scrobe 96

56(55). Corbel closed (Fig. 80c); tarsal claws free; humeral angle well-developed 57

— Corbel open or not distinctly closed (Fig. 80a, b); tarsal claws free or connate; humeral angle rounded 61

57(56). Rostrum twice as long as head, abruptly narrowed immediately caudad of antennal insertion where it is one-half as wide as dorsally ..... *Evotus*

— Rostrum shorter, not shaped as above 58

58(57). Scrobe completely dorsal; apex of rostrum with approximately l6 long setae of graduated lengths; scape moderately thick, reaching to a point midway between eye and prothorax; dorsal outline of rostrum and head continuously flat; humeri obsolete; corbel not abruptly differentiated proximally, enclosed space filled with long scaly setae; body length 4.4-5.6 mm ..... *Achrastenus*

— Scrobe lateral or dorsolateral; corbel closed (Fig. 80c), corbel plate various 59

59(58). Scape very thick, short, no longer than thickness of rostrum (Fig. 70, 71); apex of rostrum with 20-30 long setae (Fig. 71); mandible with many very long setae directed to mandibular scar (Fig. 71); body length 5.5-7.5 mm ..... *Brachystylus*

— Scape longer, extended to or beyond eye ... 60

60(59). Eye lateral; anterior margin of prothorax without modified setae; humeri oblique, not prominent; base of each elytron arcuately produced between scutellum and stria 6; corresponding area on prothorax depressed, with different vestiture; body length 7.5-12.5 mm ..... *Compsus*

— Eye slightly encroaching on dorsum; anterior margin of prothorax with a row of 20 or more very fine long setae of graduated lengths directed toward lower edge of eye; humeri quadrate, prominent; base of elytra very slightly produced; body length 13.5-18.0 mm ..... *Diaprepes*

61(56). Funicle with six articles; tarsal claws free..... 62

— Funicle with seven articles; tarsal claws various 63

62(61). Prothorax lacking median sulcus; surface punctate; elytral intervals flat; corbel plate large, glabrous, oval; body length 5.8-6.8 mm ..... *Agraphus*

— Prothorax with median longitudinal sulcus; elytral intervals 3, 5, and 7 more prominent; corbel plate indeterminate; body length 6.2 mm..... *Paragraphus*

63(61). Tarsal claws connate 64

— Tarsal claws free 84

64(63). Eye large, almost touching prothorax; anterior margin of prothorax with postocular lobe; corbel narrowly closed; elytra very convex, sides greatly rounded ..... *Pseudocneorhinus*
— Eye smaller, prothorax without postocular lobe; corbel various; elytra various 65

65(64). Femora with large tooth on inner surface; dorsum with slender, decumbent setae only, or with very small metallic scales; scrobe more lateral than dorsal ..... *Phyllobius*
— Femora without a tooth; other characters various 66

66(65). Rostrum in dorsal view more or less rectangular in outline; entire body and appendages densely scaled; scrobe completely dorsal .... *Aphrastus*
— Rostrum in dorsal view not rectangular 67

67(66). Mandible with more than five setae; elytra globose; body shiny black with white setae .... *Omias*
— Mandible with three setae; elytra more elongate; body color and vestiture various 68

68(67). Tarsal claws free at base; femora with minute tooth on inner edge distally; vestiture of sparse, erect, fine setae; without scales .... *Stomodes*
— Tarsal claws connate at base 69

69(68). Inner apical surface of hind tibia adjacent to tarsal insertion clothed with dense, round scales; funicle and dorsal surface of tarsi clothed with round scales; tarsi on ventral surface with coarse setae 70
— Inner apical surface of hind tibia adjacent to tarsal insertion glabrous; articles 4 to 7 of funicle and dorsal surface of tarsi clothed with elongate, rather fine, hairlike scales; pubescence on ventral surface of tarsi fine 74

70(69). Elytra and prothorax clothed with long, very fine, erect pile, pile longer on lateral portion of body, at least twice as long as width of an interval; dorsal surface of prothorax in lateral view slightly gibbous ..... *Eucilinus* (part)
— Elytra and prothorax with short, stout setae, not longer than width of an interval; dorsal surface of prothorax nearly flat in lateral view 71

71(70). Dorsal comb of setae on apex of hind tibia about twice as long as apical comb and situated almost at 45 degree angle to longitudinal axis of tibia; abdominal ventrite 2 as long as ventrites 3 and 4 combined; ventral and dorsal margin of scrobe not distinct at distance one-half length of eye distad of front margin of eye .... *Rhypodilius*
— Dorsal comb of setae on apex of hind tibia about as long as apical comb and almost parallel to longitudinal axis of tibia; other characters various 72

72(71). Apical comb on hind tibia with anterior spines very short and coarse and posterior spines on ascending portion distinctly finer and almost twice as long; scrobe not reaching eye; scape slightly arcuate; abdominal ventrite 2 as long as 3 plus 4 combined ..... *Dysticheus*
— Apical comb on hind tibia made up of spines almost uniform in length and coarseness; other characters various 73

73(72). Dorsal and ventral margins of scrobe distinctly defined up to eye, scrobe a completely flat bottomed channel; elytra with erect, stout, moderately long, acute setae distinctly longer than scales composing decumbent vestiture; dorsal surface of head and rostrum in lateral view interrupted by erect, stout, acute setae; abdominal ventrite 2 shorter than ventrites 3 and 4 combined; scape strongly arcuate .... *Eucyllus*
— Dorsal margin of scrobe indicated up to slightly distad of eye, ventral margin either merging with dorsal margin distad of eye or else separated from dorsal margin by raised, convex area; elytra with suberect, short, wide, rounded scales slightly longer than those composing decumbent vestiture; dorsal surface of head and rostrum in lateral view slightly interrupted by suberect, short, rounded scales; abdominal ventrite 2 as long as ventrites 3 and 4 combined; scape slightly arcuate ..... *Thinoxenus*

74(69). Female with hind tibia unarmed at apex; scrobe situated more dorsally on rostrum, short, somewhat convergent posteriorly 75
— Female having hind tibia armed with one or more small spines or teeth at apex 76

75(74). Rostrum longer than head, antenna inserted at distance from anterior margin of eye about twice diameter of eye ..... *Thricolepis*
— Rostrum about as long as head, antenna inserted at distance from anterior margin of eye less than the diameter of eye ..... *Peritelinus*

76(74). Female with hind tibia armed with one spine or small tooth at apex 77
— Female with hind tibia armed with two or more spines or small teeth at apex 80

77(76). Scrobes lateral, not convergent posteriorly on dorsal surface of rostrum 78
— Scrobes dorsal, more or less convergent posteriorly on dorsal surface of rostrum 79

78(77). Antenna with scape much shorter than funicle ..... *Aragnomus*
— Antenna with scape as long as funicle .... *Geodercodes*

79(77). Hind tibia at narrowest point in apical third at least two-thirds as wide as widest point of tibia at apex; epistoma separated from rostrum by fine, moderately raised, acute carina; in dorsal anterior view dorsal margins of rostrum distinctly, broadly emarginate above point of antennal insertion, greatly expanded toward apical region, in apical region subparallel sided, subparallel region about one-third wider than narrowest point between points of antennal insertions ..... *Anchitelus*

— Hind tibia at narrowest point in apical third less than one-half as wide as tibia at widest point at apex; epistoma indistinctly separated from rostrum; in dorsal anterior view dorsal margins of rostrum straight, slightly diverging from behind point of antennal insertions to apex of rostrum, subparallel region distad of points of antennal insertions only slightly wider than narrowest point between points of antennal insertions . ..... *Orthoptochus*

80(76). Female with hind tibia armed with three spines or small teeth at apex; funicle with article 7 distinctly longer than wide 81

— Female with hind tibia armed with two small spines or teeth at apex 82

81(80). Suture between abdominal ventrites 1 and 2 almost straight; scape with coarse, elongate scales; elytra with obvious (at 56X) erect, spatulate scales ..... *Stenoptochus*

— Suture between abdominal ventrites 1 and 2 arcuate; scape with fine setae; elytra (at 56X) lacking obvious erect scales, at most with very fine, short, subdecumbent setae .... *Peritelopsis*

82(80). Antennal funicle with article 7 distinctly longer than wide ..... *Nemocestes*

— Antennal funicle with article 7 about as wide as long 83

83(82). Suture between abdominal ventrites 1 and 2 almost straight; prothorax with coarse, erect setiform scales more or less uniformly distributed over dorsal surface, lacking a distinct clump at anterior margin ..... *Paraptochus*

— Suture between abdominal ventrites 1 and 2 arcuate; prothorax with coarse, setiform scales subdecumbent on dorsal surface except at anterior margin with elongate clump of about 10 erect scales on either side of middle line .... *Peritelodes*

84(63). Antenna with scape with vestiture of fine setae and round flat scales; body size small, 2.3-4.5 mm 85

— Antenna with scape with vestiture of fine setae only or with at most a few scattered elongate, recumbent scales intermixed; body size larger, 3.2-13.0 mm, most larger than 5.0 mm 91

85(84). Epistoma large, distinct, occupying approximately half the anterior margin of rostrum, triangular, limited by distinct carina 86

— Epistoma very small, indistinct 87

86(85). Scrobe dorsolateral, usually reaching and often enclosing eye; all tibiae with single strong, almost horizontal apical tooth ... *Trachyphloeus*

— Scrobe dorsal, very short and deep, not reaching eye; front and middle tibiae with single, strong, almost horizontal apical tooth; hind tibia with pair of short vertical apical spines .... *Cercopeus*

87(85). Scrobe lateral, long, passing backward and below the lower angle of eye; all tibiae with apical spine or tooth 88

— Scrobe superior, very short and deep, not reaching eye, not directed below; only front and middle tibiae with apical spine or tooth 90

88(87). Appressed vestiture of dense radiate-pectinate scales; surface encrusted ..... *Chaetechidius*

— Appressed vestiture of imbricate, oval scales, or scales concealed by encrustation 89

89(88). Vestiture short, suberect, broad, spatulate scale-like setae; eye with more than 5 facets across greatest width; elytra more elongate, parallel-sided; Oregon ..... *Cathormiocerus*

— Vestiture of longer, suberect, fine hair-like setae; eye with less than 5 facets across greatest width; elytra more rounded, subglobose; southern United States ..... *Trachyphloeosoma*

90(87). Rostrum short and broad; prementum not emarginate on apical margin; only labial palpi visible ..... *Pseudocercopeus*

— Rostrum long, narrow, almost cylindrical; prementum broadly emarginate; both labial and maxillary palpi visible ..... *Cercopedius*

91(84). Antennal scape stout, short, not exceeding eye 92

— Antennal scape reaching beyond anterior margin of prothorax 94

92(91). Eye not prominent; pronotum smooth, polished; with moderate punctures becoming larger and closer laterad; body length 4.0-4.5mm .... *Lupinocolus*

— Eye very prominent; pronotum with pronounced sculpture 93

93(92). Pronotum with large, irregularly spaced, flat-topped cylindrical protuberances with central depression set with a seta; integument and vestiture black; body length 8.3-9.6 mm .... *Agasphaerops*

— Pronotum with contiguous nodules each slightly depressed caudally; vestiture of slender, elongate coppery, green, or reddish metallic scales/setae on dorsum; oval, opalescent or metallic scales in groups forming pattern on sides of prothorax, elytra; elytra with intervals 3 and 5 slightly elevated; body length 7.5-9.0 mm ..... *Hormorus*

94(91). Eye small, round, prominent, almost touching prothorax; rostrum greatly narrowed between antennal insertions, less than half the width of rostrum between outer edge of pterygia; scape arcuate; body length 3.2-4.0 mm ..... *Agronus*

— Eye moderate; rostrum wider between pterygia; scape arcuate or straight; body length various 95

95(94). Elytra of most species with few sparse scales or no scales; if densely squamose, pronotum similarly squamose or not and nodulate; femora with or without a tooth on inner surface; body length 4.0-13.0 mm ..... *Otiorhynchus*

— Elytra and prothorax densely squamose; femora not dentate; body length 4.9-6.6 mm (Figs. 72-73) ..... *Sciopithes*

96(55). Tarsal claws connate 97
— Tarsal claws free 105

97(96). Corbel closed (Fig. 80c), corbel plate covered with shiny round scales; epistoma concave, steeply angled, posterior margin conspicuously carinate; body length 4.5-8.0 mm ..... *Philopedon*
— Corbel open (Fig. 80a) 98

98(97). Elytra with humerus prominent 99
— Elytra with humerus rounded 100

99(98). Rostrum with a conspicuous curved, glabrous callosity extending between the antennal insertions and paralleling the glabrous epistoma, surface squamose between the glabrous areas; elytral scales elongate ..... *Pachyrhinus*
— Rostrum without a glabrous callosity; elytral scales round; some species with a minute tooth on fore femur ..... *Polydrusus*

100(98). Head constricted dorsally behind eyes; eyes small, prominent; epistoma marked by fine carina; scape extended to posterior margin of eye ..... *Strophosoma*
— Head not constricted behind eyes; other characters various 101

101(100). Epistoma not defined; body form narrow elongate ..... *Brachyderes*
— Epistoma carinate or not (*Barypeithes*); eye flattened; humeri rounded 102

102(101). Vestiture of several sizes of very fine setae, lacking scales; color castaneous; epistoma minute, almost undetectable ..... *Barypeithes*
— Vestiture of scales with or without setae; epistoma distinct 103

103(102). Femora with short, broad tooth ..... *Sciaphilus*
— Femora without tooth 104

104(103). Striae on disc of elytra almost as wide as intervals; striae composed of large foveae; each interval with row of long stiff, erect setae; also with small appressed elongate scales, 2 to 4 abreast; elytra rotund; length less than 3.0 mm ..... *Brachysomus*
— Elytral striae fine; stria 10 distinct; elytra narrow, elongate; length more than 3.0 mm ..... *Mitostylus*

105(96). Apex of rostrum with keel across entire width of rostrum, keel forming posterior edge of epistoma; humeri distinct, quadrate; corbel semi-closed (Fig. 80b); mandibular cusp situated at the apex of an anterior projection of the mandible; front coxae very narrowly separated ..... *Polydacrys*
— Epistoma indistinct, without carinate or keeled margin (except *Glaphyrometopus*, recognized by frons with deep, broad transverse concavity between eyes); humeri mostly rounded; other characters various 106

106(105). Eyes partly encroaching on head; epistoma poorly defined; humeri rounded (except *Lachnopus*, southern Florida only) 107
— Eyes lateral; humeri rounded (except *Ericydeus*, southwestern United States only); rostrum with longitudinal sulcus or impressed line reaching from interantennal line to head, continuing or not with fine impressed line reaching beyond eyes, in some genera to occiput 116

107(106). Rostrum separated from frons by distinct transverse sulcus or depression; dorsal aspect of tarsal articles with scales; tarsi clothed ventrally with "coarse setae" (stiff decumbent setae) 108
— Rostrum not separated from frons when viewed laterally, frons lacking tubercle above eye; maxillae concealed by mentum 110

108(107). Hind tarsus with article 3 bilobed and wider than article 2 ..... *Stereogaster*
— Hind tarsus with article 3 not wider than article 2 109

109(108). Mentum not concealing maxillae; frons above each eye with distinct tubercle which conceals eye in dorsal view; elytra with inconspicuous, sparse, short, suberect spatulate scales or papillae; body length 2.5-3.0 mm ..... *Calyptillus*
— Mentum concealing maxillae; frons lacking distinct tubercle above eye; eye visible in dorsal view; elytra with suberect, fine, acute setae; body length greater than 3.0 mm ..... *Cryptolepidus*

110(107). Head conspicuously constricted behind eye; eyes very prominent ..... *Bradyrhynchoides*
— Head not constricted behind eye; eyes moderately convex but not protuberant 111

111(110). Mesepimeron triangular, anterior margin running straight to angle between elytron and peduncle of mesothorax, mesepisternum not touching side margin of elytron; scutellum well developed; metepisternal suture complete 112
— Mesepimeron short trapezoidal, anterior margin running to side margin of elytron, mesepisternum touching elytron on broad contact 113

112(111). Humeri well-developed, quadrate; scales on body sparse, not imbricate, prothorax and elytra lacking erect scales or setae; article 7 of funicle distinctly longer than wide ..... *Lachnopus*
— Humeri rounded; scales on body dense, imbricate; prothorax and elytra with short, suberect scales and setae; article 7 of funicle more or less wider than long ..... *Omileus*

113(111). Metepisternal suture complete; rostrum lacking impressions on dorsal surface; eye distant from anterior margin of prothorax by more than half its greatest diameter; base of elytra as wide as base of prothorax ... *Stamoderes* and *Amotus*
— Metepisternal suture obliterated in basal half; rostrum on dorsal surface with distinct, lateral, longitudinal impression; eye separated from anterior margin of prothorax by half its diameter or less; base of elytra distinctly wider than base of prothorax 114

114(113). Dorsal surface of tarsi clothed with broad, rounded scales; tarsi on ventral surface with coarse setae on anterior part of articles 1 to 3 ..... *Graphorhinus*
— Dorsal surface of tarsi clothed with fine setae or elongated scales; tarsi on ventral surface clothed with fine, dense setae 115

115(114). Rostrum (excluding mandibles) in dorsal view from anterior margin of eye to apex slightly longer than greatest width in apical region; antenna with short, narrow scales and sparse, long, fine setae; prosternum lacking two close adjacent tubercles behind front coxae ..... *Epicaerus*
— Rostrum (excluding mandibles) in dorsal view from anterior margin of eye to apex distinctly longer than greatest width in apical region; antenna with both short and long, fine setae; prosternum with two closely adjacent tubercles behind front coxae ..... *Barynotus*

116(106). Rostrum trisulcate (Fig. 77) 117
— Rostrum with median sulcus only 118

117(116). Frons with deep, broad transverse concavity between eyes; rostrum with all three longitudinal sulci reaching transverse concavity; humerus absent; length 4.5-5.0 mm ..... *Glaphyrometopus*
— Frons without transverse impression; rostrum with longitudinal sulci extending as far as between eyes (Fig. 77); humerus prominent; length 10.0-18.0 mm ..... *Ericydeus*

118(116). Rostrum with very deep, wide median longitudinal "crater" from apex to at least middle; scape very thick, slightly curved; head with fine longitudinal impressed line; funicle with articles 1 and 2 equal in size; elytral stria 10 evanescent or absent beyond level of hind coxa ..... *Platyomus*
— Rostrum not sulcate from apex; scape not thick; straight; other characters various 119

119(118). Epistoma conspicuous, very wide, occupying most of anterior edge of rostrum; prothorax and elytra with very irregularly shaped, randomly situated large foveae ..... *Artipus*
— Epistoma inconspicuous, occupying half or less of anterior edge of rostrum; prothorax and elytra with only regular sculpture 120

120(119). Head and rostrum in dorsal view forming a flat triangle two times wider than apex of rostrum; epistoma small, inconspicuous; rostral longitudinal sulcus fine, reaching pronotum; corbel plate narrow ..... *Aramigus*
— Head and rostrum less triangular, not flat 121

121(120). Elytral stria 10 complete, but sometimes concealed by vestiture, separate from stria 9; corbel open; some species resembling a *Sitona* or *Tanymecus*, others with more slender rostrum and tuberculate prothorax ..... *Mesagroicus*
— Elytral stria 10 evanescent or absent beyond hind coxae 122

122(121). Funicle with article 2, l.0-1.6x longer than article 1; scales of pronotum in clusters surrounding setae (except some *P. viridis*); corbel plate small, squamate ..... *Phacepholis*
— Funicle with articles 2 and 1 with various ratios; other characters various 123

123(122). Scutellum glabrous, glossy; antennal funicle with article 2 approximately as long as article 1; corbel plate narrow ..... *Atrichonotus*
— Scutellum squamate; antennal funicle with article 2 approximately 1.5 to 2.0x longer than article 1; corbel plate absent or present .... *Naupactus* and *Pantomorus*

Classification of the Nearctic Entiminae

41. Agraphini Horn 1876

Agraphus Say 1831, 1 sp., *A. bellicus* (Say 1831), eastern coastal United States from New York south to Florida. Adults are associated with sandy habitats along the Atlantic coast and in central Florida.

Agraphus Schoenherr 1834; not Say 1831

Paragraphus Blatchley 1916, 1 sp., *P. setosus* Blatchley 1916, Florida.

42. Alophini LeConte 1876

Acmaegenius LeConte 1876, 2 spp., *A. granicollis* Van Dyke 1927, Wyoming, and *A. hylobinus* LeConte 1876, Idaho and Oregon.

Lepidophorus Kirby 1837, 10 spp., generally distributed in the western United States and Canada, north into Alaska, Yukon Territory and the Northwest Territories, including *L. setiger* Hamilton 1895, generally distributed in the eastern United States from New York and Ohio south into Virginia and Tennessee. Adults of all species are flightless and collected in leaf litter or under rocks. The western species are often collected at high elevations. See Buchanan (1936a) to separate the species. This genus is questionably distinct from *Dirotognathus* (Tropiphorini), we could find no character to reliably distinguish the two.

Lophalophus LeConte 1876

Plinthodes LeConte 1876, 2 spp., *P. foveirostris* (Chittenden 1925), Ohio, North Carolina, Tennessee, and Virginia, and *P. taeniatus* (LeConte 1857), British Columbia, Oregon and Washington.

Trichalophus LeConte 1876, 8 spp., generally distributed in the western United States north into Canada and Alaska, then east across the north to Manitoba and Ontario. Adults are collected on several different kinds of plants. The genus needs revision. See Hatch (1971) to separate some of the species.

Triglyphulus Cockerell 1906, 2 spp., *T. ater* (LeConte 1876) and *T. nevadensis* Van Dyke 1938, California, Oregon, Washington and Nevada.

Triglyphus LeConte 1876; not Loew 1840; not Fraas 1866

43. Anypotactini Champion 1911

Polydacrys Schoenherr 1834, 1 sp., *P. depressifrons* Boheman 1840, southern Texas.

44. Brachyderini Schoenherr 1826

Brachyderes Schoenherr 1823, 1 sp., *B. incanus* (Linnaeus 1758), northeastern United States; adventive.
Thylacites Germar 1817
Brachylophus Fischer von Waldheim 1829 (valid subgenus)
Poloposes Gistel 1848
Eumonima Gistel 1856
Gastraspis Flach 1907 (valid subgenus)
Sulciurus Flach 1907
Echopus Desbrochers 1909

Strophosoma Billberg 1820, 1 sp., *S. melanogrammum* (Forster 1771), northeastern United States and adjacent southern Canada, also Washington and British Columbia; adventive. Adults feed generally on foliage.
Strophosomus Schoenherr 1823
Strophosomum Gistel 1856
Leucostrophus Flach 1907; not Rothschild and Jordan 1903
Morphostrophus Flach 1907 (valid subgenus)

45. Cneorhinini Lacordaire 1863

Philopedon Schoenherr 1826, 1 sp., *P. plagiatum* (Schaller 1783), Newfoundland, New Brunswick, Nova Scotia and Prince Edward Island; adventive. This species appears to be found in sandy habitats.
Philopedum Agassiz 1846
Dactylorhinus Tournier 1876
Dactylorrhinus Rye 1878

46. Cyphicerini Lacordaire 1863

Cyphicerina Lacordaire 1863

Cyrtepistomus Marshall 1913, 1 sp., *C. castaneus* (Roelofs 1873), generally distributed in the eastern and southeastern United States west to Texas; adventive. Adults generally feed on foliage. This species is known as the "Asiatic oak weevil".

Myosides Roelofs 1873, 1 sp., *M. seriehispidus* Roelofs 1873, Maryland, Massachusetts and Connecticut; adventive.

Oedophrys Marshall 1941, 1 sp., *O. hilleri* (Faust 1889), eastern United States from Connecticut and Pennsylvania south into Virginia; adventive. Adults feed generally on foliage.

Acanthotrachelina Marshall 1944

Calomycterus Roelofs 1873, 1 sp., *C. setarius* Roelofs 1873, generally distributed in the eastern United States west to Iowa and Nebraska; adventive. Adults generally feed on foliage.
Synolobus Faust 1886

Myllocerina Pierce 1913

Myllocerus Schoenherr 1823, 1 sp., *M. undatus* Marshall 1916, Florida; adventive.
Macrocorynus Schoenherr 1823
Hyperstylus Roelofs 1873
Exmyllocerus Voss 1937 (valid subgenus)
Pachymyllocerus Voss 1937 (valid subgenus)
Isomyllocerus Marshall 1954 (valid subgenus)
Pseudocanoixus Voss 1958 (valid subgenus)
Allomycterops Voss 1959 (valid subgenus)
Calomyllocerus Voss 1959 (valid subgenus)
Mylloceroversus Hoffmann 1961 (valid subgenus)
Corigetellus Hoffmann 1964 (valid subgenus)

Neoptochus Horn 1876, 1 sp., *N. adspersus* (Boheman 1834), Florida, Georgia and South Carolina.

47. Eudiagogini LeConte 1874

Aracanthus Say 1831, 1 sp., *A. pallidus* Say 1831, generally distributed in the southeastern United States west to Iowa and Texas.

Colecerus Schoenherr 1840, 2 spp., *C. dispar* (LeConte 1874), Arizona and Texas, and *C. marmoratus* (Horn 1876), Texas. Adults feed on foliage of various Fabaceae, especially *Prosopis* (mesquite), *Mimosa* and *Acacia*. See LeConte and Horn (1876) to separate the species.
Coleocerus Agassiz 1846
Coleocerus Gemminger and Harold 1871; not Agassiz 1846
Bathyris LeConte 1874

Eudiagogus Schoenherr 1840, 3 spp., generally distributed in the southeastern United States west to Texas, also Arizona and California. Adults feed on foliage of species of *Sesbania* (Fabaceae); larvae feed on nitrogen-fixing root nodules in the soil (Kovarik and Burke 1989). See Warner (1979) to separate the species.

48. Eustylini Lacrodaire 1863

Achrastenus Horn 1876, 1 sp., *A. griseus* Horn 1876, Texas.

Brachystylus Schoenherr 1824, 2 spp., *B. sayi* Alonso-Zarazaga 1994, southeastern United States, west to Texas, and *B. microphthalmus* Champion 1911, southern Texas. Adults of *B. sayi* feed on foliage of *Diospyros* (persimmon; Ebenaceae).
Syntomostylus Scudder 1893

Compsus Schoenherr 1823, 1 sp., *C. auricephalus* (Say 1824), southeastern United States west to Texas and Colorado. Adults generally feed on foliage.

Callopistus Say 1831

Diaprepes Schoenherr 1823, 1 sp., *D. abbreviatus* (Linnaeus 1758), adventive, Florida. Adults feed on foliage and are pests of citrus (Woodruff 1968, 1979).

49. Geonemini Gistel 1856

Barynotus Germar 1817, 3 spp., northeastern United States and eastern Canada, also British Columbia; adventive. Adults generally feed on foliage. See Brown (1950) to separate the species.

Merionus Dejean 1821

Kissodontus Desbrochers 1909

Bradyrhynchoides Pierce 1913, 1 sp., *B. constrictus* Pierce 1913, Texas.

Calyptillus Horn 1876, 1 sp., *C. cryptops* Horn 1876, New Mexico, Colorado, Kansas and Nebraska.

Cryptolepidus Van Dyke 1936, 7 spp., Arizona, California and Nevada. Adults are associated with *Artemisia* (sagebrush; Asteraceae) and other shrubs. See Ting (1940) to separate the species.

Lepidopus Van Dyke 1936; not Gouan 1770; not Dana 1852

Pseudoeucyllus Tanner 1950

Epicaerus Schoenherr 1834, 11 spp., generally distributed in the United States. Adults generally feed on foliage. The genus needs revision. See Pierce (1913) to separate most of the species.

Epagrius Schoenherr 1840

Diorynotus Sharp 1891 (valid subgenus)

Cacochromus Sharp 1891

Bradyrhynchus Sharp 1891

Melbonus Casey 1895

Epagriopsis Champion 1911

Graphorhinus Say 1831, 1 sp., *G. vadosus* Say 1831, Texas, Colorado, Kansas, Wyoming and Missouri.

Graphorhinus Schoenherr 1833; not Say 1831

Lachnopus Schoenherr 1840, 3 spp., southern Florida. *Lachnopus floridanus* Horn 1876 is native and feeds on foliage of various plants. *Lachnopus argus* (Reiche 1840) and *L. hispidus* (Gyllenhal 1834) are adventive species which doubtfully are established in Florida (Anderson 1993a).

Menoetius Dejean 1821

Ptilopus Schoenherr 1823

Omileus Horn 1876, 1 sp., *O. epicaeroides* Horn 1876, Texas.

Stamoderes Casey 1888, 2 spp., *S. lanei* (Van Dyke 1935), British Columbia, Oregon and Washington, and *S. uniformis* Casey 1888, California. Adults of *S. lanei* are found on *Artemisia* (sagebrush; Asteraceae). See Van Dyke (1935b) to separate the species. This genus is questionably distinct from *Amotus* (Tanymecini). We can find no characters to reliably distinguish these two genera.

Stereogaster Van Dyke 1936, 1 sp., *S. globosa* Van Dyke 1936, California.

Trigonoscuta Motschulsky 1853, 64 spp., western United States and adjacent southern Canada. Adults are associated with sandy habitats and feed on various plants. In a posthumous publication, Pierce (1975) described all but a few of the species as well as numerous subspecies. Most of these taxa are of questionable validity and need reassessment. See Pierce (1975) to separate the species and subspecies.

Panormus Casey 1888 (valid subgenus)

Eremocatoecus Pierce 1975 (valid subgenus)

Nesocatoecus Pierce 1975 (valid subgenus)

50. Hormorini Horn 1876

Agasphaerops Horn 1876, 1 sp., *A. niger* Horn 1876, California, Oregon, Washington and British Columbia. Adults are associated with lilies (Liliaceae).

Hormorus Horn 1876, 1 sp., *H. undulatus* (Uhler 1856), generally distributed in the northeastern United States and southern Canada.

Lupinocolus Van Dyke 1936, 1 sp., *L. blaisdelli* Van Dyke 1936, California and Nevada.

51. Naupactini Gistel 1856

Aramigus Horn 1876, 1 sp., *A. tesselatus* (Say 1824), central United States; adventive. Adults are pests on alfalfa and some other crops in Argentina (Lanteri and Díaz 1994). Lanteri and Díaz (1994) describe a number of morphotypes of *A. tesselatus*.

Aomopactus Jekel 1876

Artipus Sahlberg 1823, 1 sp., *A. floridanus* Horn 1876, Florida. This species is a pest of the Florida citrus industry (McCoy *et al.* 1985). (Volume 1, Color Fig. 2)

Artipus Schoenherr 1823; not Sahlberg 1823

Atrichonotus Buchanan 1939, 1 sp., *A. taeniatulus* (Berg 1881), southeastern United States west to Texas; adventive. Adults feed on foliage of various plants, but most frequently Fabaceae (Lanteri and O'Brien 1990).

Floresianus Hustache 1939

Floresianellus Lanteri 1981

Ericydeus Pascoe 1880, 2 spp., *E. lautus* (LeConte 1856) Arizona, California, Colorado, Utah and New Mexico, and *E. placidus* (Horn

1876), Arizona and California. Adults appear to be associated with Fabaceae. See Lanteri (1995) to separate the species.

Glaphyrometopus Pierce 1913, 1 sp., *G. ornithodorus* Pierce 1913, Texas.

Mesagroicus Schoenherr 1840, 9 spp., generally distributed. Adults generally feed on foliage. See Buchanan (1929a) and Burke (1960) to separate the species.

Mesagroecus Agassiz 1846
Lepidocricus Pierce 1910

Naupactus Dejean 1821, 4 spp., *N. godmanni* (Crotch 1867), *N. leucoloma* Boheman 1840, *N. minor* (Buchanan 1942) and *N. peregrinus* (Buchanan 1939), generally distributed in the southeastern United States; adventive. Adults are considered pests and feed on foliage of various plants. See Lanteri and Marvaldi (1995) and Lanteri (1986) to separate the species. We have not seen specimens of *Pantomorus pallidulus* Emden 1936 and thus cannot separate it from *Naupactus*.

Asynonychus Crotch 1867
Mimopactus Jekel 1875
Archopactus Heller 1921
Graphognathus Buchanan 1939

Pactorrhinus Ancey 1881, 1 sp., *P. grisescens* Ancey 1881, Arizona. This genus and species are unknown to us but likely refer to *Ericydeus lautus* (LeConte 1856). It does not appear in the key.

Pantomorus Schoenherr 1840, 1 sp., *P. pallidulus* Emden 1936, Texas. We have not seen specimens of *Pantomorus pallidulus* Emden 1936 and thus cannot separate it from *Naupactus*.

Pantoplanes Schoenherr 1840
Symmathetes Schoenherr 1847
Pantopactus Jekel 1876
Athetetes Pascoe 1886
Antelmia Hustache 1919
Pseudeudius Voss 1934

Phacepholis Horn 1876, 5 spp., central United States. See Lanteri (1990) to separate the species.

Platyomus Sahlberg 1823, 1 sp., *P. flexicaulis* (Schaeffer 1905), southern Texas.

Platyomus Schoenherr 1823; not Sahlberg 1823
Pseudocyphus Schaeffer 1905
Eustylomorphus Pierce 1915
Pachyus Kuschel 1955

52. Omiini Shuckard 1840

Omias Germar 1817, 6 spp., California, Oregon, Washington, Idaho and British Columbia. Adults generally feed on foliage. See Hatch (1971) to separate the species.

Mylacus Boheman 1843
Omorus Gistel 1856

53. Ophryastini Lacordaire 1863

Ophryastes Germar 1829, 35 spp., generally distributed in western United States and adjacent southern Canada. Adults are flightless and are associated with various arid habitat shrubs, mostly in the family Asteraceae, but also *Larrea tridentata* (DC.) Cov. (creosote bush; Zygophyllaceae) and *Atriplex* (saltbush; Chenopodiaceae). See Kissinger (1970) to separate the species.

Ophryastes Say 1831; not Germar 1929
Dystirus Pascoe 1872
Eupagoderes Horn 1876
Caccophryastes Sharp 1891
Tosastes Sharp 1891
Amydrogmus Pierce 1913

Sapotes Casey 1888, 2 spp., *S. longipilis* Van Dyke 1934 and *S. puncticollis* Casey 1888, Arizona, New Mexico and Texas. Adults are associated with arid habitat shrubs, especially *Larrea tridentata* (DC.) Cov. (creosote bush; Zygophyllaceae). See Van Dyke (1934) to separate the species.

54. Otiorhynchini Schoenherr 1826

Agronus Horn 1876, 3 spp., California, Oregon, Montana, Alberta and British Columbia. See Buchanan (1929b) to separate the species.

Otiorhynchus Germar 1822, 14 spp., generally distributed; all adventive. Adults and larvae generally feed on a variety of plants. This genus includes a number of common pest species; *O. ovatus* (Linnaeus 1758), the strawberry root weevil, and *O. sulcatus* (Fabricius 1775), the black vine weevil. Adults are flightless and a number of species have very restricted distributions in eastern coastal North America. See Warner and Negley (1976) to separate the species. Alonso-Zarazaga and Lyal (1999:168-170) list 105 valid subgeneric names, not including synonyms. For brevity, these are not repeated here.

Sciopithes Horn 1876, 6 spp., California, Oregon, Washington and British Columbia. Adults feed generally on foliage. See Van Dyke (1935b) to separate the species.

55. Peritelini Lacordaire 1863

Anchitelus Van Dyke 1936, 1 sp., *A. alboviridis* Van Dyke 1936, California.

Aragnomus Horn 1876, 3 spp., western United States.

Dysticheus Horn 1876, 2 spp., *D. insignis* Horn 1876 and *D. rotundicollis* Van Dyke 1953, California. See Van Dyke (1953) to separate the species.

Eucilinus Buchanan 1926, 3 spp., California, Utah, Idaho and Arizona. See Kissinger (1960) to separate the species.

Thysanocorynus Van Dyke 1938

Eucyllus Horn 1876, 8 spp., generally distributed in the far western United States. Adults are flightless and mostly nocturnal and are associated with various shrubs in arid habitats. See Pelsue and Sleeper (1972) to separate the species.

Geodercodes Casey 1888, 1 sp., *G. latipennis* Casey 1888, California, Oregon, Washington, Idaho, Montana and British Columbia.

Nemocestes Van Dyke 1936, 9 spp., generally distributed in the far western United States and adjacent British Columbia, including *N. horni* (Van Dyke 1936) also in Michigan, New York, Wisconsin, Ontario, Quebec, New Brunswick and Nova Scotia. Adults are flightless and mostly nocturnal and feed on foliage of various plants. See Van Dyke (1936a) and Hatch (1971) to separate the species.

Orthoptochus Casey 1888, 1 sp., *O. squamiger* Casey 1888, California.

Paraptochus Seidlitz 1868, 3 spp., California, Oregon and British Columbia. See Van Dyke (1935b) to separate the species.

Peritelinus Casey 1888, 3 spp., far western United States and adjacent British Columbia. See Van Dyke (1936a) to separate the species.

Peritelodes Casey 1888, 1 sp., *P. obtectus* Casey 1888, California.

Peritelopsis Horn 1876, 1 sp., *P. globiventris* (LeConte 1857), California.

Rhypodillus Cockerell 1906, 2 spp., *R. brevicollis* (Horn 1876), Arizona, New Mexico, Texas and Colorado, and *R. dilatatus* (Horn 1876), California. See LeConte and Horn (1876) to separate the species.

Rhypodes Horn 1876

Stenoptochus Casey 1888, 2 spp., *S. inconstans* Casey 1888 and *S. vanduzeei* Van Dyke 1935, California. See Van Dyke (1935b) to separate the species.

Stomodes Schoenherr 1826, 1 sp., *S. gyrosicollis* Boheman 1843, Maine; adventive.

Thinoxenus Horn 1876, 1 sp., *T. squalens* Horn 1876, California.

Thricolepis Horn 1876, 2 spp., *T. inornata* Horn 1876, generally distributed in the western United States, and *T. simulator* Horn 1876, California. See LeConte and Horn (1876) to separate the species.

56. Phyllobiini Schoenherr 1826

Aphrastus Say 1831, 3 spp., generally distributed in the eastern United States west to Texas, and southern Canada. Adults feed on the foliage of various plants. See Blatchley and Leng (1916) to separate the species.

Aphrastus Schoenherr 1833; not Say 1831

Micronychus Provancher 1877; not Motschulsky 1861

Evotus LeConte 1874, 1 sp., *E. naso* (LeConte 1857), northwestern United States and adjacent Canada. Adults feed on foliage of various plants.

Phyllobius Germar 1824, 3 spp., northeastern United States and adjacent Canada; adventive. Adults feed on foliage of various trees. No key to the three species in North American species is available but the status of *P. glaucus* as established is undetermined. See Côté and Bright (1995) to separate two of the species. Alonso-Zarazaga and Lyal (1999:173-174) list 19 valid subgeneric names, not including synonyms. For brevity, these are not repeated here.

57. Polydrusini Schoenherr 1823

[*Liophloeus* Germar 1817, 1 sp., *L. tessulatus* (Mueller 1776), intercepted in quarantine; New York. Not established in North America.]

Pachyrhinus Schoenherr 1823, 8 spp., generally distributed in the western United States and Canada east to Nova Scotia and south to Pennsylvania and Connecticut. Adults are associated with *Pinus* (pine; Pinaceae). The genus needs revision. See Fall (1901) to separate the species.

Scythropus Schoenherr 1826

Carpomanes Gistel 1856

Polydrusus Germar 1817, 7 spp., generally distributed in the northeastern United States and adjacent southern Canada, also in Arizona and New Mexico; includes 3 adventive species, *P. cervinus* (Linnaeus 1758), *P. impressifrons* (Gyllenhal 1834), and *P. sericeus* (Schaller 1783). Adults generally feed on foliage of various trees. The genus needs revision and the relationships between the native and adventive species reassessed. See Sleeper (1957c) to separate most of the species. Alonso-Zarazaga and Lyal (1999:175) list 24 valid subgeneric names, not including synonyms. For brevity, these are not repeated here.

58. Sciaphilini Sharp 1891

Barypeithes Jacquelin du Val 1854, 1 sp., *B. pellucidus* (Boheman 1834), generally distributed in the northeastern United States and adjacent southern Canada, also in California, Oregon, Washington and British Columbia; adventive. Adults feed on foliage of a wide variety of plants.

Barypithes Gemminger and Harold 1871

Exomias Bedel 1883 (valid subgenus)

Moroderia Reitter 1915

Brachysomus Schoenherr 1823, 1 sp., *B. echinatus* (Bonsdorff 1785), Massachusetts, Minnesota, Quebec and Newfoundland; adventive.

Pavrosomus Fischer de Waldheim 1829
Platytarsus Schoenherr 1840
Thricolepoides O'Brien 1979

Mitostylus Horn 1876, 3 spp., southwestern United States including Texas and Oklahoma. Adults are found on various kinds of low vegetation. The genus needs revision. See Van Dyke (1936b) and Burke (1963) to separate the species.

Derosomus Sharp 1891

Sciaphilus Schoenherr 1823, 1 sp., *S. asperatus* (Bonsdorff 1785), generally distributed in the northeastern United States and adjacent southern Canada, also Idaho, South Dakota and British Columbia; adventive. Adults generally feed on foliage.

Lygophilus Fischer von Waldheim 1829; not Rafinesque 1815
Sphaerilethmus Gistel 1856

59. Sitonini Gistel 1856

Sitona Germar 1817, 11 spp., generally distributed; includes 5 adventive species. Adults are associated with various herbaceous species of Fabaceae. Larvae feed in the soil on roots. Some species such as the pea leaf weevil, *S. lineatus* (Linnaeus 1758), the sweetclover weevil, *S. cylindricollis* (Fahraeus 1840), and the clover root curculio, *S. hispidulus* (Fabricius 1776), are agricultural pests. See Bright (1994) to separate the species.

Charagmus Schoenherr 1826 (valid subgenus)
Clyptus Villa and Villa 1833
Sitones Schoenherr 1840
Parasitones Sharp 1896
Sitonidius Mueller 1913
Coelositona González 1971 (valid subgenus)

60. Tanymecini Lacordaire 1863

Tanymecina Lacordaire 1863

Amotus Casey 1888, 3 spp., California. Adults are associated with *Artemisia* (Asteraceae) and perhaps other shrubs and trees. See Van Dyke (1935b) to separate the species. This genus is questionably distinct from *Stamoderes* (Geonemini). We can find no characters to reliably distiunguish these two genera.

Mimetes Schoenherr 1847; not Eschscholtz 1818; not Leach 1820; not Huebner 1821; not Vigors 1827; not Gloger 1841

Hadromeropsis Pierce 1913, 1 sp., *H. opalinus* (Horn 1876), Arizona. Adults have been collected on *Calliandra eriophylla* Benth. and *Acacia* (Fabaceae) (Howden 1982).

Hadromerus Schoenherr 1834; not Schoenherr 1823
Hadrorestes Howden 1982 (valid subgenus)

Isodacrys Sharp 1911, 2 spp., *I. ovipennis* (Schaeffer 1908) and *I. burkei* Howden 1961, Texas. Adults have been collected sweeping herbaceous Asteraceae. See Howden (1961) to separate the species.

Isodrusus Sharp 1911, 1 sp., *I. debilis* Sharp 1911, Texas.

Miloderoides Van Dyke 1936, 3 spp., Nevada, Colorado, Utah, Wyoming and Idaho. See Tanner (1942) to separate the species.

Minyomerus Horn 1876, 6 spp., southwestern United States, north into Kansas, Wyoming, Montana and Alberta. Adults have been found on various kinds of low vegetation. The genus needs revision and the relationships of this genus to *Piscatopus* need reassessment. No key to species exists.

Elissa Casey 1888
Pseudelissa Casey 1888

Pachnaeus Schoenherr 1826, 2 spp., *P. litus* (Germar 1824), southern Florida, and *P. opalus* (Olivier 1807), coastal southeastern United States from northern Florida north to New Jersey. Adults are general foliage feeders and are citrus pests. The larvae feed on roots. See Woodruff (1981) to separate the species.

Docorhinus Schoenherr 1823
Pachneus Gemminger and Harold 1871

Pandeleteinus Champion 1911, 3 spp., generally distributed in the southwestern United States. Adults have been collected on various species of trees. See Howden (1959) to separate the species.

Pandeleteius Schoenherr 1834, 13 spp., generally distributed in the southwestern and eastern United States and adjacent southern Canada. Adults are frequently found on *Quercus* (oak; Fagaceae) or on various trees in the family Fabaceae. See Howden (1959) to separate the species.

Pandeletius Agassiz 1846
Menetypus Kirsch 1868
Pandeletius Gemminger and Harold 1871; not Agassiz 1846
Pandeletejus Horn 1876
Exmenetypus Voss 1954 (valid subgenus)

Piscatopus Sleeper 1960, 1 sp., *P. griseus* Sleeper 1960. Adults have been found on *Larrea tridentata* (Zygophyllaceae). The relationships of this genus to *Minyomerus* need reassessment.

Scalaventer Howden 1970, 1 sp., *S. subtropicus* (Fall 1907), southern Florida. Adults have been collected on *Bumelia celastrina* H.B.K. (Sapotaceae) and various other trees (Anderson 1993a).

Tanymecus Germar 1817, 3 spp., generally distributed in the eastern, central and southwestern United States north into the prairie provinces of Canada. Adults are usually collected on low herbaceous plants. Adults of *T. lacaena* (Herbst 1797) have been collected commonly on *Sesuvium portulacastrum* (L.) L. (Aizoaceae) in

southern Florida (Anderson 1993a). See Van Dyke (1935b) and Blatchley and Leng (1916) to separate the species.

Hynnulus Villa and Villa 1833
Episomechus Reitter 1903 (valid subgenus)
Geomecus Reitter 1903 (valid subgenus)
Indomecus Pajni and Gandhi 1987

Trigonoscutoides O'Brien 1977, 1 sp., *T. texanus* O'Brien 1977, Texas. Adults are collected on and under *Quercus havardii* Rydb. (O'Brien 1977a).

61. Thecesternini Lacordaire 1863

Thecesternus Say 1831, 7 spp., eastern, central and southwestern United States north into Alberta. Adults are flightless and found under rocks and cow dung (Kissinger 1964). Larvae of *T. hirsutus* Pierce 1909 feed on the roots of *Parthenium hysterophorus* L. (Asteaceae) (McClay and Anderson 1985). The genus needs revision. See Pierce (1909) to separate the species.

Lithodus Germar 1834
Thicosternus Gemminger and Harold 1871

62. Trachyphloeini Lacordaire 1863

Trachyphloeina Lacordaire 1863

Cathormiocerus Schoenherr 1842, 1 sp., *C. curvipes* Wollaston 1854, Oregon; adventive. This genus is questionably distinct from *Trachyphloeus*. We can find no characters to reliably distinguish these two genera.

Scoliocerus Wollaston 1854
Mitomermus Jacquelin du Val 1854 (valid subgenus)
Schaumius Brisout 1866 (valid subgenus)
Cathormiocerinus Escalera 1918 (valid subgenus)

Cercopedius Sleeper 1955, 1 sp., *C. artemisiae* (Pierce 1910), western United States from Nevada, Utah and Colorado north, into British Columbia. Adults are found on *Artemisia* (sagebrush; Asteraceae).

Cercopeus Schoenherr 1842, 11 spp., generally distributed in the eastern United States west into Texas. Adults are flightless and found in leaf litter. The genus needs revision. See Sleeper (1955b), Burke (1963) and O'Brien (1977b) to separate the species.

Cercopius Gemminger and Harold 1871

Chaetechidius Sleeper 1955, 1 sp., *C. speciosus* Sleeper 1955, Colorado. Adults were found under a stone.

Pseudocercopeus Sleeper 1955, 1 sp., *P. setosus* Sleeper 1955, Arizona.

Pseudocneorhinus Roelofs 1873, 1 sp., *P. bifasciatus* (Roelofs 1880), eastern United States; adventive. Adults and larvae feed on a wide variety of plants (Maier 1983).

Trachyphloeosoma Wollaston 1869, 1 sp., *T. advena* Zimmerman 1956, Alabama, Florida, Georgia, Mississippi, North Carolina and South Carolina; adventive.

Trachyphloeops Roelofs 1873

Trachyphloeus Germar 1817, 4 spp., *T. aristatus* (Gyllenhal 1827), *T. asperatus* Boheman 1843, *T. angustisetulus* Hansen 1915, and *T. bifoveolatus* (Beck 1817), northeastern United States and adjacent Canada, also northwestern United States and adjacent Canada; adventive. See Brown (1965) and Borovec (1989) to separate the species. This genus is questionably distinct from *Cathormiocerus*. We can find no characters to reliably distinguish these two genera.

Phyllastolus Gistel 1856
Lacordairius Brisout 1866 (valid subgenus)
Chaetechus Horn 1876
Paratrachyphloeus Desbrochers 1895
Pseudolacordairius Escalera 1923 (valid subgenus)

63. Tropiphorini Marseul 1863

Adaleres Casey 1895, 3 spp., California. See Casey (1895) to separate the species.

Anametis Horn 1876, 2 spp., *A. granulata* (Say 1831), generally distributed in the eastern United States and adjacent southern Canada, and *A. subfusca* Fall 1907, Arizona, Texas, New Mexico and Colorado. The relationships of this genus to *Dichoxenus* Horn 1876, *Peritaxia* Horn 1876 and some species of the Mexican genus *Amphidees* Schoenherr 1842 need to be reassessed. See Fall and Cockerell (1907) to separate the species.

Byrsopages Schoenherr 1842, 1 sp., *B. villosus* Boheman 1842, Alaska.

Strongylophthalmus Motschulsky 1860
Strongylophthalmus Faust 1894; not Motschulsky 1860
Kurilonus Sharp 1896

Cimbocera Horn 1876, 4 spp., generally distributed in the western inland United States and Canada. Adults are found on various woody shrubs at night. See Van Dyke (1935a) and Tanner (1941) to separate the species.

Connatichela Anderson 1984, 1 sp., *C. artemisiae* Anderson 1984, Yukon Territory and Alaska. Adults are associated with *Artemisia frigida* Willd. (Asteraceae) (Anderson 1984).

Crocidema Van Dyke 1934, 5 spp., Arizona, Texas, Utah and California. Adults are found on various woody shrubs at night. The genus needs revision and its relationships to *Pseudorimus* Van Dyke 1934 and *Melanolemma* Van Dyke 1935 reassessed. See Van Dyke (1934, 1951) to separate the species.

Diamimus Horn 1876, 1 sp., *D. subsericeus* Horn 1876, western inland United States north to Montana.

Dichoxenus Horn 1876, 4 spp., eastern and central United States from Illinois and Arkansas west to Texas, Colorado and Wyoming. The relationships of this genus to *Anametis* Horn 1876, *Peritaxia* Horn 1876 and some species of the Mexican genus *Amphidees* Schoenherr 1842 need to be reassessed. See Sleeper (1956b) to separate the species.

Dirotognathus Horn 1876, 2 spp., *D. punctatus* Hatch 1971, Oregon, and *D. sordidus* Horn Arizona, California, Nevada and Colorado. See Hatch (1971) to separate the species. This genus is questionably distinct from *Lepidophorus* (Alophini).

Dyslobus LeConte 1869, 34 spp., generally distributed in the western United States and adjacent Canada. Adults are flightless and noctural and are found on foliage of various plants. The genus needs revision. See Van Dyke (1933) and Hatch (1971) to separate some of the species.

Lepesoma Motschulsky 1845; not Spix 1825
Lepidosoma Agassiz 1846; not Wagler 1830; not Swainson 1839
Ledidosoma Gemminger and Harold 1871; not Wagler 1830; not Swainson 1839; not Agassiz 1846
Melamomphus Horn 1876
Amnesia Horn 1876
Thricomigus Horn 1876

Leptopinara O'Brien 1981, 2 spp., *L. papillata* O'Brien 1981, New Mexico and Texas, and *L. flemingi* Anderson 1993, Texas. See Anderson (1993c) to separate the species.

Melanolemma Van Dyke 1935, 1 sp., *M. montana* Van Dyke 1935, Colorado. The relationships of this genus to *Pseudorimus* Van Dyke 1934 and *Crocidema* Van Dyke 1934 need to be reassessed.

Miloderes Casey 1888, 6 spp., Utah, Nevada, Arizona and California. See Kissinger (1960) to separate some of the species.

Orimodema Horn 1876, *O. protracta* Horn 1876, generally distributed in the southwestern United States.

Panscopus Schoenherr, 1842, 28 spp., generally distributed throughout the United States and southern Canada. Adults are mostly noctural and are associated with various types of plants. Most species are in forests but a few are found in more arid habitats. The genus needs revision. See Buchanan (1936b) and Hatch (1971) to separate most of the species.

Nocheles LeConte 1874 (valid subgenus)
Phymatinus LeConte 1876 (valid subgenus)
Nomidus Casey 1895 (valid subgenus)
Neopanscopus Pierce 1913 (valid subgenus)
Panscopidius Pierce 1913
Pseudopanscopus Buchanan 1927 (valid subgenus)
Dolichonotus Buchanan 1936 (valid subgenus)
Parapanscopus Buchanan 1936 (valid subgenus)

Paracimbocera Van Dyke 1938, 3 spp., Wyoming, Idaho, Colorado, Nevada and California. *Paracimbocera robusta* (Van Dyke 1935) has been recorded from *Ephedra nevadensis* S. Wats. (Ephedraceae) (Sleeper and Jenkins 1967) and *P. artemisiae* Ting 1940 from *Artemisia* (Asteraceae) (Ting 1940). See Ting (1940) to separate the species.

Paranametis Burke 1960, 1 sp., *P. distincta* Burke 1960, Texas.

Peritaxia Horn 1876, 7 spp., southwestern United States north to Wyoming and Montana. Adults are noctural and collected on various kinds of plants. The genus needs revision and the relationships of this genus to *Dichoxenus* Horn 1876, *Anametis* Horn 1876 and some species of the Mexican genus *Amphidees* Schoenherr 1842 need to be reassessed. There is no key to species.

Phyxelis Schoenherr 1842, 2 spp., generally distributed in the eastern United States and adjacent southern Canada. The genus needs revision since at least two undescribed species are known. See Blatchley and Leng (1916) to separate the species.

Geoderces Horn 1876

Pseudorimus Van Dyke 1934, 2 spp., Arizona and New Mexico. The relationships of this genus to *Melanolemma* Van Dyke 1935 and *Crocidema* Van Dyke 1934 need to be reassessed. See Van Dyke (1934) to separate the species.

Rhigopsis LeConte 1874, 1 sp., *R. effracta* LeConte 1874, California.

Tropiphorus Schoenherr 1842, 3 spp, Newfoundland, Nova Scotia and Quebec; adventive. See Brown (1967) to separate the species.

Brius Dejean 1821
Tropidophorus Gistel 1856; not Duméril and Bibron 1839
Tropidophorus Gemminger and Harold 1871; not Duméril and Bibron 1839; not Gistel 1856; not Jan 1865
Synirmus Bedel 1883
Dochorhynchus Desbrochers 1897

Vitavitus Kissinger 1974, 1 sp., *V. thulius* Kissinger 1974, Alaska, Yukon Territory, Northwest Territories and Nunavut. Adults are flightless and are collected in tundra and dry south-facing slopes (Anderson 1997).

XIII. Hyperinae Marseul 1863

by Robert S. Anderson

Only the genus *Hypera* occurs in North America. It is recognized by a short snout (Fig. 81) (lacking deciduous processes and associated scars), the pronotum lacks a postocular lobe, and at least some of the scales of the body are bifid. In Mexico, Central and South America several related genera are found. Larvae of all hyperines feed externally on plant foliage and make loosely woven cocoons, which they attach to the host plants, in which they

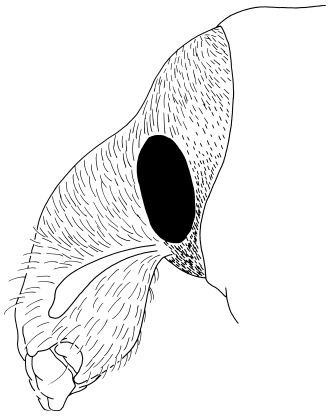


FIGURE 81.131. Hyperinae. 81. *Hypera punctata* (Fabricius), head, lateral view.

pupate. Plants in the Polygonaceae and Fabaceae appear to be the primary hosts.

Classification of the Nearctic Hyperinae

64. Hyperini Marseul 1863

Hypera Germar 1817, 17 species, generally distributed throughout the United States and Canada, north into Alaska; 6 species are adventive. Adults and larvae feed externally on foliage of various Fabaceae and Polygonaceae (Titus 1911, Puttler *et al.* 1973). A number of pest species are included in the genus, namely, *H. postica* (Gyllenhal 1813), the alfalfa weevil; *H. brunneipennis* (Boheman 1834), the Egyptian alfalfa weevil; *H. nigrirostris* (Fabricius 1775), the lesser clover weevil; *H. punctata* (Fabricius 1775), the clover leaf weevil; *H. meles* (Fabricius 1792), the clover head weevil; and *H. rumicis* (Linnaeus 1758). The genus needs revision. See Titus (1911) to separate most of the species.

Phytonomus Schoenherr 1823
Dapalinus Capiomont 1868 (valid subgenus)
Eririnomorphus Capiomont 1868 (valid subgenus)
Tigrinellus Capiomont 1868 (valid subgenus)
Phytonomidius Capiomont 1868
Antidonus Bedel 1886 (valid subgenus)
Spongifer Petri 1901
Heteromorphus Petri 1901
Boreohypera Korotyaev 1999 (valid subgenus)

XIV. Lixinae Schoenherr 1823

by Robert S. Anderson

This is a relatively small subfamily of generally large-sized weevils associated mostly with arid habitats. Lixines are readily recognized by the large tooth at the apex of the hind tibia, their larger size, and short, globular and telescoping labial palpi of 3 articles (but appearing composed of 1 article) (Fig. 90), ventrally situated at the apex of the large prementum. Females possess large paired symbiont sacs attached to the vagina near the base of the gonocoxites but this can only be seen in dissections. The rostrum of lixines can be short and wide or long and slender and most species are grey or otherwise dull in color and scale pattern.

Larvae of most species mine in the roots and stems of various plants but a few such as *Rhinocyllus* and *Larinus* have larvae that feed in reproductive structures on seeds. Many species are associated with Asteraceae and Fabaceae but members of the genus *Lixus* are also found in semi-aquatic and aquatic habitats. Several genera have been introduced into North America for biological control of noxious or pest weeds especially in rangelands of western North America.

Key to the Nearctic genera of Lixinae

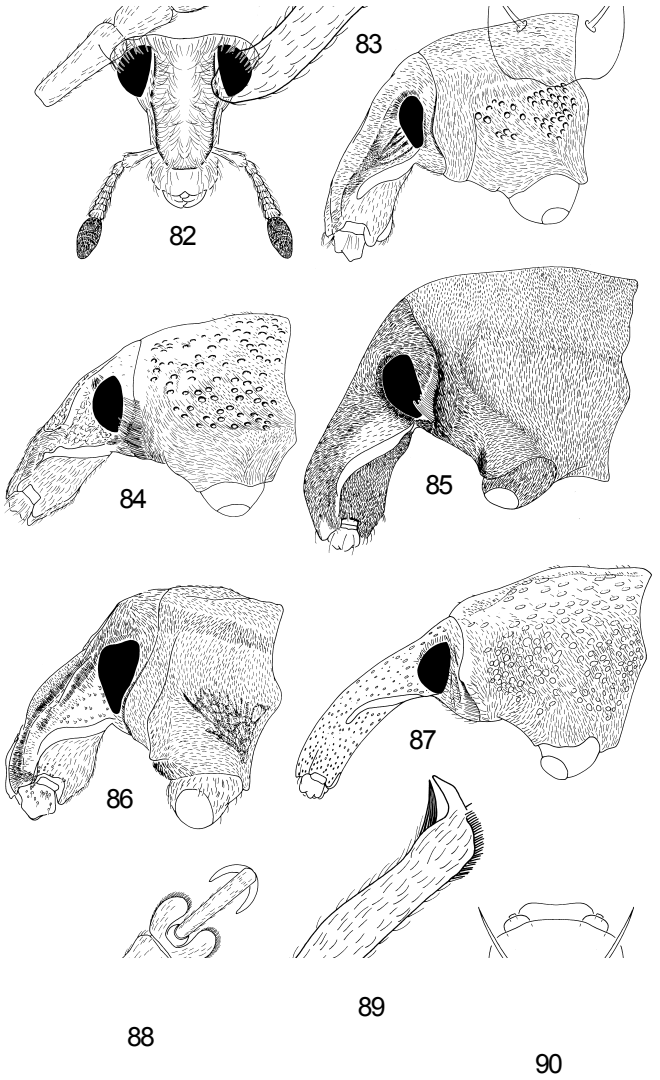
1. Rostrum short and broad in dorsal view, from apex of epistoma to anterior margin of eye, more or less as long as greatest width (Fig. 82); body size small, at most slightly greater than 5 mm 2
— Rostrum more elongate, in dorsal view, from apex of epistoma to anterior margin of eye, much longer than greatest width; body size moderate to large, subequal to or greater than 5 mm 4

2(1). Elytron with intervals each with a row of conspicuous, erect setae in addition to appressed hair-like scales; anterolateral margin of pronotum straight, with long postocular vibrissae immediately behind eye; eye more or less round ..... *Microlarinus*
— Elytron with intervals lacking erect setae, with only appressed to suberect hair-like scales; anterolateral margin of pronotum with rounded postocular lobe and short postocular vibrissae; eye distinctly elongate-oval 3

3(2). Prosternum with a pair of prominent lateral ridges which form a deep ventral channel; dorsal vestiture of pronotum and elytra with scales in part bifid ..... *Bangasternus*
— Prosternum lacking ridges, no ventral channel evident; dorsal vestiture of pronotum and elytra with scales simple ..... *Rhinocyllus*

4(1). Ventral and dorsal surfaces of body with numerous long, fine, erect hairs, some hairs about as long as antennal scape; white vestiture of both dorsal and ventral surfaces, especially prosternum and abdomen, composed of numerous pectinate suberect or appressed scales ..... *Eustenopus*
— Ventral and dorsal surfaces of body with at most suberect short hair-like scales, or erect hairs if present, sparse and many times shorter than antennal scape; white vestiture of both dorsal and ventral surfaces composed of simple appressed scales, some scales of mesosternum and coxae bifid or pectinate 5

5(4). Pronotum dorsally and laterally with numerous shiny, glabrous tubercles, lacking distinct punctures (Figs. 83-84) 6
— Pronotum dorsally and laterally with distinct punctures, with at most the outer margins of punctures at lateral margins swollen, glabrous and shiny 7



FIGURES 82.131-90.131. Lixinae. 82. *Bangasternus orientalis* (Capiomont), head, dorsal view. 83-87. Head and pronotum, lateral view, 83. *Cleonis pigra* (Scopoli); 84. *Cyphocleonus achates* (Fahraeus); 85. *Apleurus albovestitus* (Casey); 86. *Stephanocleonus plumbeus* LeConte; 87. *Lixus scrobicollis* Boheman. 88-89. *Lixus scrobicollis* Boheman, 88. Fore tarsus; 89. Fore tibia. 90. Labial palpi, Lixinae, schematic (after Anderson 1988a)

6(5). Rostrum with single median sulcus; pronotum with anterolateral margin with rounded postocular lobe (Fig. 83) ..... *Cleonis*

— Rostrum carinate medially throughout length, lateral margins raised towards base, appearing as lateral carinae; pronotum with anterolateral margin straight behind eye, lacking postocular lobe (Fig. 84) ..... *Cyphocleonus*

7(5). Mesosternum with mesosternal process markedly tumescent; male with aedeagus expanded laterally from midlength to apical one-third .... *Apleurus* (part)

— Mesosternum with mesosternal process flat or at most slightly convex, not tumescent; male with aedeagus more or less uniform in width throughout median portion of length 8

8(7). Tibia with apical flange rounded (Fig. 89); elytron with all intervals equally flat or with at most only humerus and very base of interval 3 swollen and convex; pronotum with disk with scale pattern various; prosternum with or without swellings, swellings, if present, situated immediately anterior to each front coxal cavity and lateral to each prosternal impression 9

— Tibia with apical flange sharp, carinate; elytron with all intervals equally flat or with humerus and variously sutural interval, intervals 3, 5, 7 and 9 elevated and convex throughout the greater part of their length; pronotum with disk with large white scales in a lateral stripe of various width, small and fine in moderately broad to very broad apically narrowed median stripe, median area largely black in color, underlying dark cuticle not obscured by overlying scales; prosternum with or without swellings, swellings, if present, situated immediately anterior to each prosternal impression 11

9(8). Antenna with article 2 of funicle distinctly longer than wide; distinctly longer than each of articles 3 to 6, slightly shorter than to distinctly longer than article 1; pronotum with anterolateral margin straight, slightly sinuate, or with at most variously developed (usually small) acute, postocular projection, postocular vibrissae unequal in length, greatest length (more or less equal to one-half width of eye) behind base of each eye (Fig. 87); femur with ventral surface dentate or not .... *Lixus*

— Antenna with article 2 of funicle more or less as long as wide; more or less subequal in length to each of articles 3 to 6, shorter than article 1; pronotum with anterolateral margin straight or with slightly to well-developed rounded postocular lobe, postocular vibrissae uniformly short (less than one-half width of eye in length) to unequal in length, greatest length (more or less equal to or greater than one-half width of eye) behind base of each eye; femur with ventral surface not dentate 10

10(9). Elytra elongate-narrow (width at midlength less than 0.65 times length); pronotal disk with distinct white scales of various sizes; elytra with white scales, various in size, but more or less obscuring view of underlying cuticle over large part of elytral surface ..... *Scaphomorphus*

— Elytra more robust (width at midlength greater than 0.65 times length); pronotal disk with at most only very short fine setae, distinct scales absent; elytra with scattered patches of elongate fine hair-like scales in addition to very short setae, underlying cuticle not obscured by scales ..... *Larinus*

11(8). Epistoma with anterior margin emarginate; pronotum with well-developed, rounded postocular lobes, postocular vibrissae indistinct, uniformly short (Fig. 86); eyes widest near upper margin, flat or only slightly convex in dorsal view .... *Stephanocleonus*

— Epistoma with anterior margin rounded; pronotum with anterior margin straight behind eyes or with small acute projection immediately behind base of eye, postocular vibrissae distinct and long, longest immediately behind base of eye (Fig. 85);

eyes widest near midheight, protruding and moderately to markedly convex in dorsal view .... *Apleurus* (part)

CLASSIFICATION OF THE NEARCTIC LIXINAE

65. Lixini Schoenherr 1823

Eustenopus Petri 1907, 1 sp., *E. villosus* (Boheman 1843), locally distributed in the western United States. Introduced for the biological control of *Centaurea solstitialis* L. (yellow star-thistle) (Asteraceae).

Larinus Dejean 1821, 3 spp., locally distributed in the northeastern and northwestern United States, British Columbia, Manitoba and Nova Scotia, adventive. In North America, the species *L. planus* (Fabricius 1792), *L. obtusus* Gyllenhal 1836, and *L. minutus* Gyllenhal 1836 have been introduced for the biological control of *Cirsium arvense* (L.) Scop. (Canada thistle), and *Centaurea solstitialis* L. (yellow star-thistle), *C. maculosa* Lam. (spotted knapweed) and *C. diffusa* Lam. (diffuse knapweed) (all Asteraceae) (Lang 1997a, b). There is no key to the North American species.

Rhinobatus Germar 1817; not Walbaum 1792; not Schneider 1801
Larinus Germar 1824; not Dejean 1821
Phyllonomeus Gistel 1856 (valid subgenus)
Larinodontes Faust 1898
Cryphopus Petri 1907 (valid subgenus)
Lariniorhynchus Reitter 1924
Larinomesius Reitter 1924 (valid subgenus)

Lixus Fabricius 1801, 69 species, generally distributed throughout the United States and Canada. Adults are associated with various plants in the Asteraceae and Polygonaceae. The genus needs revision. See Blatchley and Leng (1916) to separate some of the species. Alonso-Zarazaga and Lyal (1999:190) list 18 valid subgeneric names, not including synonyms. For brevity, these are not repeated here.

Microlarinus Hockhuth 1847, 2 spp., *M. lareynii* (Jacquelin du Val 1852) and *M. lypriformis* (Wollaston 1861), southwestern United States and Washington. Adults have been introduced for the biological control of *Tribulus terrestris* L. (puncturevine; Zygophyllaceae) (Kirkland and Goeden 1977, 1978a, b). See Hatch (1971) to separate the species.

66. Cleonini Schoenherr 1826

Apleurus Chevrolat 1873, 6 spp., southwestern United States east to Texas, north to Idaho. Adults are associated with various arid habitat plants (Anderson 1988a). See Anderson (1988a) to separate the species.

Cleonopsis LeConte 1876
Cleonaspis LeConte 1876
Centrocleonus LeConte 1876; not Chevrolat 1873
Dinocleus Casey 1891
Gibbostethus Anderson 1988 (valid subgenus)

Cleonis Dejean 1821, 1 sp., *C. pigra* (Scopoli 1763), far northeastern United States and adjacent southern Canada, adventive. Adults are associated with *Cirsium arvense* (L.) Scop. (Canada thistle) and *C. vulgare* (Savi) Tenore (bull thistle) (Anderson 1988a).

Geomorphus Schoenherr 1823
Cleonus Schoenherr
Xerobia Gistel 1856

Cyphocleonus Motschulsky 1860, 1 sp., *C. achates* (Fahraeus 1842), Colorado, Wyoming, Montana, Oregon and British Columbia. This species was introduced as a biological control agent for *Centaurea maculosa* Lam. (spotted knapweed) and *C. diffusa* Lam. (diffuse knapweed) (Asteraceae) (Lang 1997c). It has been introduced in other states but does not appear to be established.

Scaphomorphus Motschulsky 1860, 19 spp., generally distributed in the western and central United States and adjacent southern Canada, also along the eastern coastal United States from Florida north into New York. Adults mostly are associated with various arid habitat Fabaceae and Asteraceae (Anderson 1988a). See Anderson (1988a; as *Cleonidius*) to separate the species.

Scaphidomorphus Lacordaire 1863; not Hope 1841
Cleonidius Casey 1891
Lixestus Reitter 1916

Stephanocleonus Motschulsky 1860, 6 spp., western montane United States north into the Yukon Territory and east across Canada to Newfoundland. See Anderson (1988a, 1989b) to separate the species.

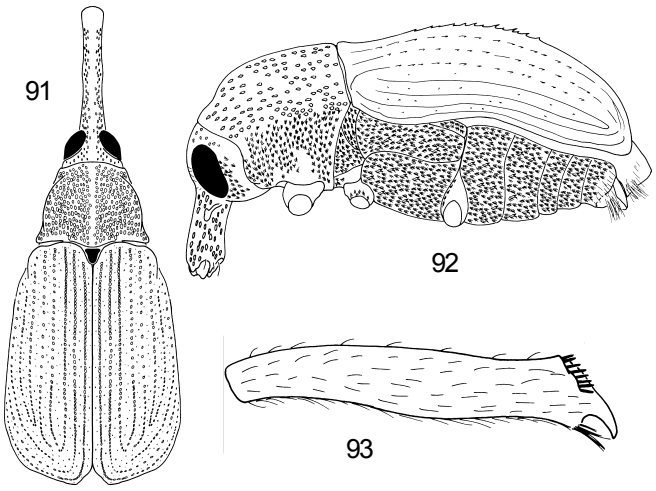
Eucleonus Faust 1904; not Gistel 1856
Deracanthopsis Voss 1967 (valid subgenus)
Eremocleonus Ter-Minasian 1974 (valid subgenus)
Taeniocleonus Ter-Minasian 1974 (valid subgenus)
Sanzia Alonso-Zarazaga and Lyal 1999 (valid subgenus)

67. Rhinocyllini Lacordaire 1863

Bangasternus Gozis 1882, 2 spp., *B. orientalis* (Capiomont 1873) and *B. fausti* Reitter 1890, California, Montana, Nebraska and Oregon. These species have been introduced for the control of *Centaurea solstitialis* L. (yellow star-thistle), *C. diffusa* Lam. (diffuse knapweed) and *C. maculosa* Lam. (spotted knapweed) (Asteraceae) (Lang 1997d). There is no key to separate the two species in North America.

Coelostethus Capiomont 1873; not LeConte 1861

Rhinocyllus Germar 1817, 1 sp., *R. conicus* (Froelich 1792), locally distributed throughout most of the United States and adjacent southern Canada. This species was introduced for the biological control of *Carduus nutans* L. (nodding or musk thistle; Asteraceae); larvae feed in flowerheads (Kok 1998). Louda *et al.* (1997) report the species has apparently expanded its host range and is now a threat to native species of *Cirsium* at various locations in the United States.



FIGURES 91.131-93.131. Mesoptiliinae. 91. *Magdalis lecontei* Horn, dorsal habitus; 92. *Laemosaccus nephele* complex, lateral habitus; 93. *Magdalis lecontei* Horn, hind tibia.

XV. Mesoptiliinae Lacordaire 1863

by Robert S. Anderson

This is a very small subfamily of only three genera in North America. They are recognized by the presence of a large hook-like apical tooth on the hind tibia (Fig. 93), the pronotum is only slightly narrower than the base of the elytra (Fig. 91), and the elytra have the basal margin from intervals 2-4 extended anteriorly and overlapping the base of the pronotum (Fig. 91). The genus *Laemosaccus* are compact cylindrical beetles with a short, straight rostrum (Fig. 92), whereas *Magdalis* and *Trichomagdalis* have a very different, anteriorly tapered form, with the width across the apices of the elytra generally the widest part of the beetle.

Larvae of all species mine in wood (both hardwoods and conifers) or in stems of herbaceous plants. The genus *Magdalis* does not extend far into Mexico, but the genus *Laemosaccus* has many Neotropical species, most undescribed. The center of diversity for Mesoptilinae appears to be in Chile.

Key to the Nearctic genera of Mesoptiliinae

1. Front coxae separated by prosternum; rostrum stout, short and straight (Fig. 92); elytra black with red markings or entirely black ..... *Laemosaccus*
— Front coxae contiguous; rostrum elongate, cylindrical, curved ventrally or straight; elytra unicolorous, black or reddish 2

2(1). Elytra more or less parallel sided in dorsal view, with numerous fine, elongate scales; tarsus with claws simple; pronotum with anterolateral angles smooth, not serrate ..... *Trichomagdalis*
— Elytra usually widened posteriorly in dorsal view (Fig. 91), nearly glabrous; tarsus with claws simple or toothed basally; pronotum with anterolateral angles serrate or smooth ..... *Magdalis*

Classification of the Nearctic Mesoptiliinae

68. Laemosaccini Lacordaire 1866

Laemosaccus Schoenherr 1823, 2 spp., *L. nephele* (Herbst 1797), generally distributed in the eastern United States and adjacent southern Canada west into Texas, New Mexico and Arizona; and, *L. texanus* Champion 1903, southern Texas and Arizona. Adults of *L. nephele* are associated with species of *Quercus* (Fagaceae) and *Prosopis* (Fabaceae), and *L. texanus* with various Malvaceae (Blatchley and Leng 1916); larvae mine twigs or stems. The genus needs revision; *L. nephele* is a composite of a number of distinct host-specific species. See Champion (1903) to separate the species.

69. Magdalidini Pascoe 1870

Magdalis Germar 1817, 25 spp., generally distributed, *M. barbicornis* (Latreille 1804) is adventive. Adults are associated with various trees; larvae mine in bark of dead or dying trees (Blatchley and Leng 1916). The genus needs revision. See Fall (1913), Blatchley and Leng (1916) and Hatch (1971) to separate some of the species.

Rhina Latreille 1802; not Schneider 1801
Edo Germar 1819 (valid subgenus)
Porrothus Dejean 1821 (valid subgenus)
Rhinodes Dejean 1821
Panus Schoenherr 1823 (valid subgenus)
Thamnophilus Schoenherr 1823; not Vieillot 1816
Magdalinus Germar 1843
Porrhothus Agassiz 1846
Scardamyctes Gistel 1848
Panopsis Daniel 1903 (valid subgenus)
Neopanus Reitter 1916
Laemosaccidius Smreczynski 1972 (valid subgenus)
Odontomagdalis Barrios 1984 (valid subgenus)

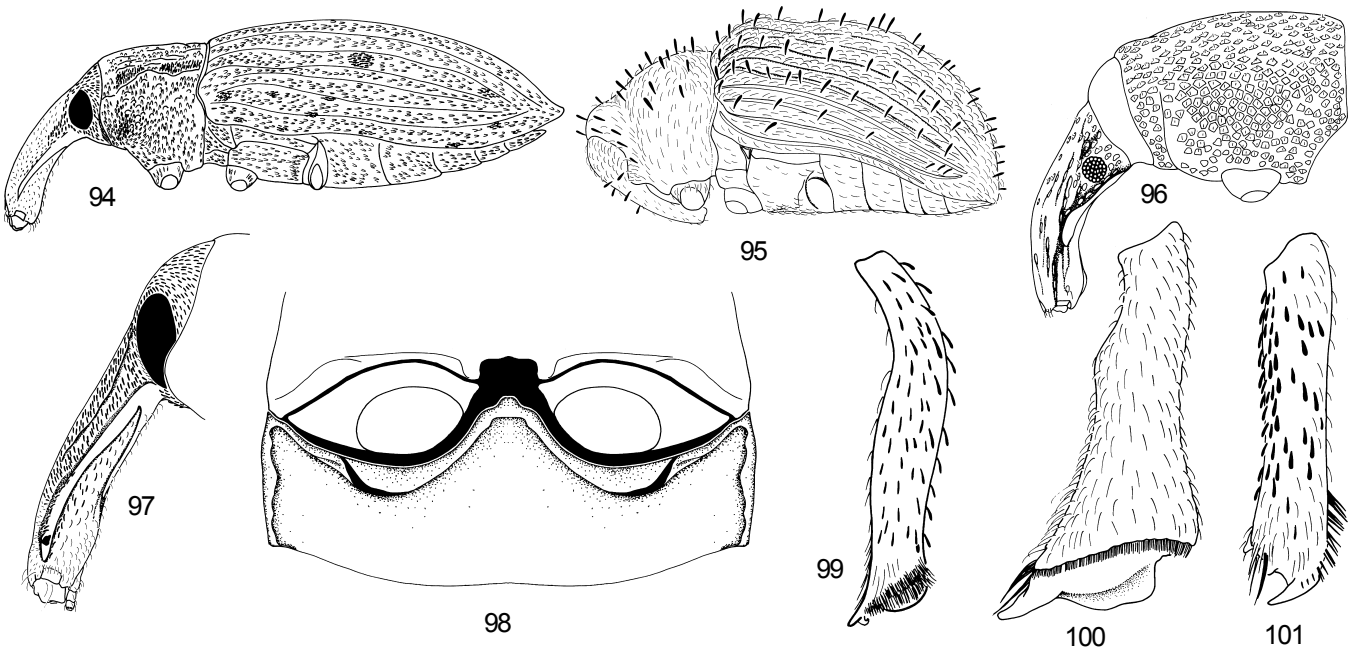
Trichomagdalis Fall 1913, 3 spp., California. See Fall (1913) to separate the species.

XVI. Molytinae Schoenherr 1823

by Robert S. Anderson

Like Curculioninae, this subfamily is also somewhat of a conglomerate of likely unrelated forms. They are grouped together here primarily because they all share a large, hook-like apical tooth on the hind tibia, or have various modifications to the apex of the hind tibia related to the development of the tooth (Figs. 99-101).

Most taxa of molytines are associated with woody plants and have larvae that feed in dead wood or other dead and decaying plant material. Some taxa such as *Lepilius*, *Epacalles* and *Lymantes* are associated with leaf litter and likely have larvae that develop in fallen plant debris. Larvae of others such as *Cholus* mine stems, or some such as *Conotrachelus*, feed in the seeds,



FIGURES 94.131-101.131. Molytinae. 94-95. Lateral habitus, 94. *Lepyrus* sp.; 95. *Microhyus setiger* LeConte. 96. *Dioptrophorus repens* (Casey), head and pronotum, lateral view. 97. *Hilipinus nearcticus* O'Brien, head, lateral view. 98. *Heilus bioculatus* (Boheman), hind coxae and first abdominal ventrite. 99-101. Hind tibia, 99. *Conotrachelus posticatus* Boheman; 100. *Pachylobius picivorus* (Germar); 101. *Pissodes strobi* (Peck).

fruits or reproductive structures of living plants. Several taxa represented in the United States by only one species, such as *Hilipinus*, *Heilus* and *Heilipus*, are significantly more diverse in the Neotropical Region with hundreds of species found there. *Odontopus* and *Piazorhinus* have larvae that mine leaves.

With over 500 species, the genus *Conotrachelus* may prove to be the most diverse genus of weevil in the Americas. The odd genera *Thalasselephas* and *Hormops* are associated with seaweed and tree squirrel nests, respectively.

KEY TO THE NEARCTIC GENERA OF MOLYTINAE

1. Eyes absent or reduced in size to less than 12 facets 2
— Eyes present, well-developed, composed of more than 12 facets 3

2(1). Antenna with funicle of 8 articles; eyes absent; southern Florida ..... *Caecossonus*
— Antenna with funicle of 7 articles; eyes absent (but indicated by setose swelling on basal portion of rostrum) or present, composed of up to 11 facets; eastern United States (not southern Florida) west into southwestern Texas ..... *Lymantes*

3(2). Head with eyes obviously situated on basal portion of rostrum, head distinctly constricted and globular behind eyes (Fig. 96) ..... *Dioptrophorus*
— Head with eyes obviously situated on head, not on rostrum (Fig. 97); head may be constricted and globular behind base of rostrum 4

4(3). Rostrum in repose received into ventral channel on prosternum 5
— Rostrum in repose not received into ventral channel, but may rest between front, middle and/or hind coxae 13

5(4). Tarsus with claw simple, free or connate, lacking basal tooth 6
— Tarsus with claw with basal tooth 10

6(5). Tarsus with claws connate at base; pronotum coarsely strigose or punctate; some with metallic sheen ..... *Chalcodermus*
— Tarsus with claws free; pronotum finely and shallowly punctate; not with metallic sheen 7

7(6). Pronotum and elytra with sparse, long, erect stout seta-like scales (Fig. 95); body length less than 2.5 mm ..... *Microhyus*
— Pronotum and elytra lacking long, erect vestiture, with only appressed scales; length various 8

8(7). Body form elongate; California ..... *Micromastus*
— Body form oval; eastern United States west into Texas 9

9(8). Pronotum and elytra with scattered short, clavate, recurved setae and appressed scales; eyes lateral in placement, separated dorsally by a distance slightly greater than width of rostrum at base; metasternum steeply sloped between hind coxae; extreme southwestern Texas ... *Lepilius*
— Pronotum and elytra with only appressed scales; eyes lateral in placement, but with upper portion encroached on dorsal surface of head, separated dorsally by a distance slightly less than width of rostrum at base; metasternum gradually sloped between hind coxae; eastern United States into central Texas ..... *Epacalles*

10(5). Pronotum with only slightly developed postocular lobe; dorsum with at most a few scattered, unpigmented scales; pronotum coarsely strigose or rugulose or regularly punctate ... *Rhyssomatus*
— Pronotum with distinct postocular lobe; dorsum with more or less dense, appressed, pigmented scales; pronotum regularly finely or coarsely punctate, median impunctate line or carina present or not 11

11(10). Elytra with all intervals carinate or alternate intervals carinate or at least swollen throughout most of their length, in some specimens carina or swelling only or most evident on declivity; femora, especially middle and hind with distinct tooth on ventral margin ..... *Conotrachelus*
— Elytra with all intervals flat or slightly but evenly swollen throughout most of their length; femora with or without tooth of ventral margin 12

12(11). Dorsum of pronotum and elytra with long, erect setae and appressed scales; rostrum long and slender ..... *Pheleconus*
— Dorsum of pronotum and elytra with only appressed scales; rostrum short and stout ..... *Micralcinus*

13(4). Front coxae very narrowly to widely separated by prosternal processes 14
— Front coxae contiguous, not separated by prosternal processes 24

14(13). Metepisternal suture absent; pronotum deeply, coarsely punctate, distance between punctures less than the diameter of a puncture; elytra with numerous, low, setiferous tubercles ..... *Anchonus*
— Metepisternal suture present, although may be defined only in anterior one-half; pronotum various, but not deeply, coarsely punctate; elytra smooth or with two large tubercles at about midlength on interval 2 15

15(14). Metepisternal suture visible and subcarinate in only anterior one-half; elytra with scattered tufts of suberect broad scales ..... *Trachodes*
— Metepisternal suture visible throughout length; elytra with appressed scales or fine vestiture 16

16(15). Hind tibia with equally large tooth at both outer and inner apical angles; mandibles with apices divergent, not overlapping 17
— Hind tibia with large tooth at outer apical angle only (Fig. 101), or also with much smaller tooth at inner apical angle; mandibles convergent, overlapping 18

17(16). Pronotum with anterolateral margin with distinct postocular lobe; adventive, in greenhouses ..... *Cholus*
— Pronotum with anterolateral margin almost straight, lacking distinct postocular lobes; native, extreme southern Arizona ..... *Neoerethistes*

18(16). Eyes narrowly separated by less than width of antennal club; front femur with obvious tooth; tarsal claw with basal process 19
— Eyes separated by more than width of antennal club; front femur lacking obvious tooth; tarsal claw simple 20

19(18). Front femur with large, serrate tooth; rostrum about as long as pronotum, subcylindrical; elytra lacking scales ..... *Odontopus*
— Front femur with small, simple tooth; rostrum shorter than length of pronotum, dorsoventrally compressed, spatulate, especially towards apex; elytra with narrow scales ..... *Piazorhinus*

20(18). Front coxae widely separated by the width of a coxa; body form markedly dorsoventrally compressed, upper contour flat ..... *Nanus*
— Front coxae very narrowly separated by much less than one-third the width of a coxa; body form more subcylindrical, upper contour rounded 21

21(20). Hind tibia with apex with apical comb of stout setae oriented longitudinally along axis of tibia on outer margin (Fig. 101) ..... *Pissodes*
— Hind tibia with apex with apical comb transverse or obliquely oriented to long axis of tibia across outer apical margin 22

22(21). Body size moderate, greater than 3.0 mm; scutellum large and distinct; California, adventive .... *Tranes*
— Body size small, less than 3.0 mm; scutellum minute or not visible; coastal beaches of Pacific states, British Columbia, and Florida 23

23(22). Pronotum sculptured with paramedian broad impression, lateral impressions and low lateral tubercles at anterior one-third; elytra with alternate intervals elevated especially so on declivity; body color dark brown or black; Florida .... *Gononotus*
— Pronotum smooth and virtually impunctate, lateral margins evenly rounded; elytra with intervals flat; body color pale brown; Pacific coastal states and British Columbia ..... *Thalasselephas*

24(13). Tarsus with claws connate at base 25
— Tarsus with claws free at base 26

25(24). Elytra with acute lateral subhumeral tubercle; eyes moderate in size, widely separated ventrally; front tibia with tooth on inner margin ..... *Sternechus*
— Elytra with lateral margins simple, lacking tubercle; eyes very large and elongate, subcontiguous ventrally; front tibia with inner margin simple ... . *Hormops*

26(24). Metepisternal suture absent; body size small to moderate, length less than 6.0 mm 27
— Metepisternal suture present; body size moderate to large, length greater than 6.0 mm 28

27(26). Metasternum and abdominal ventrites 1 and 2 with large, deep excavations ..... *Gastrotaphrus*
— Metasternum and abdominal ventrites 1 and 2 smooth, lacking large, deep excavations .... *Sthereus*

28(26). Pronotum markedly constricted and tubulate at base; rostrum very long and fine, about twice as

long as length of pronotum; body black and glossy, lacking distinct broad scales ..... *Sicoderus*

— Pronotum not constricted or tubulate at base, broad; rostrum moderate in length and somewhat stout, shorter than length of pronotum; body various, not black and glossy, with at least some broad appressed scales 29

29(28). Hind tibia markedly expanded at apex, wider at apex than apex of femur; area adjacent to tarsal articulation on hind femur with large flat flange (Fig. 100); front tibia with outer angle produced and spatulate ..... *Pachylobius*

— Hind tibia not significantly expanded at apex, width at apex narrower than width of femur at apex; area adjacent to tarsal articulation on hind femur with at most a low cariniform extension; front tibia with outer angle rounded, not produced or spatulate 30

30(29). Femur with inner margin lacking tooth, evenly rounded at apical one-third; tibia with inner margin simple, not cariniform or expanded, outer margin more or less straight 31

— Femur with inner margin with variously developed tooth at apical one-third; tibia with inner margin cariniform and slightly to markedly expanded at point of occlusion with femoral tooth, outer margin arcuate 33

31(30). Pronotum with anterolateral margins lacking distinct postocular lobes; eyes rounded, distinctly convex; metepimeron visible, with vestiture and sculpture similar to metepisternum (Fig. 94) .... *Lepyrus*

— Pronotum with anterolateral margins with distinct postocular lobes; eyes elongate-oval, flat or slightly convex; metepimeron not visible, concealed by elytra, if metepimeron visible because of displaced elytra, vestiture and sculpture finer than on metepisternum 32

32(31). Antenna with funicle with article 2 longer than 1; elytra with pattern of brown scales with patches of paler scales surrounded by black scales along length of interval 4 and at apical callus, scales about twice as long as wide, striae with small, rounded punctures, each with a broad flat scale; associated with Taxodiaceae ..... *Eudociminus*

— Antenna with funicle with article 2 shorter than 1; elytra with pattern of scattered, white or cream colored scales, scales many times longer than wide, striae with large, deep, elongate punctures, each with a fine hair-like seta; associated with Pinaceae ..... *Hylobius* (part)

33(30). Metasternum between middle and hind coxae shorter than length of a middle coxa; pronotum and elytra with numerous, small, glossy, round nodules; surface sculpture coarse and irregular ..... *Steremnius*

— Metasternum between middle and hind coxae longer than length of a middle coxa; pronotum and elytra punctate or rugose (pronotum); surface sculpture regular and more or less smooth 34

34(33). Abdomen with ventrite 1 with raised anterior margin with posteriorly expanded, slightly crenulate area immediately behind hind coxa (Fig. 98); elytra with single, rounded patch of black scales forming an 'eyespot' at posterior two-fifths .... *Heilus*

— Abdomen with ventrite 1 with anterior margin evenly developed immediately behind hind coxa, no expanded area evident; elytra with scale pattern various, lacking 'eyespots' 35

35(34). Rostrum above scrobe coarsely punctate, not at all sulcate; pronotum and elytra with contrasting pattern of black cuticle and bright white, glossy scales arranged around periphery; eyes separated dorsally by less than one-half width of the rostrum at base ..... *Heilipus*

— Rostrum above scrobe with shallow, longitudinal sulcus oriented parallel to dorsal margin of scrobe (Fig. 97); pronotum and elytra scale pattern various, not contrasting; eyes separated dorsally by a distance greater than or subequal to width of the rostrum at base 36

36(35). Elytra with punctures each with a fine hair-like scale; rostrum with a slight longitudinal impression immediately above scrobe, impression not defined dorsally but more or less continuous with dorsum of rostrum; hind tibia with apical comb composed of a single row of setae ... *Hylobius* (part)

— Elytra with punctures each with a broad scale; rostrum with a distinct, moderately deep longitudinal impression immediately above scrobe, impression defined dorsally by a low but distinct carina, not continuous with dorsum of rostrum; hind tibia with apical comb composed of a long apical row of setae and a second short preapical row towards the dorsal end of the apical row .... *Hilipinus*

Classification of the Nearctic Molytinae

70. Molytini Schoenherr 1823

Plinthina Lacordaire 1863

Gastrotaphrus Buchanan 1936, 1 sp., *G. barberi* Buchanan 1936, far western United States and British Columbia. Adults have been collected in moss and leaf litter (Anderson 1988b).

Steremnius Schoenherr 1835, 3 spp., *S. carinatus* (Boheman 1842) and *S. tuberosus* Gyllenhal 1836, far western United States, British Columbia and Alaska, and *S. shermani* (Fiske 1906), North Carolina, Tennessee and Virginia (at high elevations). Adults have been collected in leaf litter; larvae feed in phloem of slash or roots of dead conifers (Anderson 1988b). See Brown (1966b) to separate the species.

Paraplinthus Faust 1892

Sthereus Motschulsky 1845, 4 spp., far western United States, British Columbia, Alaska, Nova Scotia and Newfoundland. Adults of *S. multituberculatus* Buchanan 1936, *S. quadrituberculatus* Motschulsky 1845, and *S. horridus* (Mannerheim 1952) have been associated with various conifers and collected in leaf litter; adults of *S. ptinoides* have been collected under driftwood on beaches

(Anderson 1988b). See Hatch (1971) or Zimmerman (1964) to separate the species.

Stereus Mannerheim 1846
Lobosoma Buchanan 1936
Philostratus Zimmerman 1964
Lobosoma Zimmerman 1964

71. Trachodini Gistel 1848

Trachodes Germar 1824, 1 sp., *T. hispidus* (Linnaeus 1758), Newfoundland; adventive.

Blastophila Gistel 1856
Metrachodes Marshall 1948
Atrachodes Morimoto 1962 (valid subgenus)

72. Anchonini Imhoff 1856

Anchonus Schoenherr 1825, 4 spp., Florida. Adults frequently are collected in association with driftwood and in the litter of coastal hardwood hammocks (Thomas and O'Brien 1999). See Thomas and O'Brien (1999) to separate the species.

Choristorhinus Fairmaire 1899

73. Camarotini Schoenherr 1833

Alonso-Zarazaga and Lyal (1999) place these weevils as Curculioninae but the structure of the uncus at the tibial apex suggests they are Molytinae or related. Here they are placed as a tribe within Molytinae.

Prionomerina Lacordaire 1863

Odontopus Say 1831, 1 sp., *O. calceatus* (Say 1831), generally distributed in eastern United States. This species is associated with *Sassafras* (Lauraceae) and *Liriodendron* (Magnoliaceae); larvae mine leaves.

Prionomerus Schoenherr 1835

74. Cholini Schoenherr 1825

Cholina Schoenherr 1825

Cholus Germar 1824, 1 sp., *C. cattleyae* (Champion 1916), Washington, DC, New Jersey and Wisconsin; adventive. This species has been found in greenhouses; it is not established in the wild in North America.

Archarias Dejean 1821
Dionychus Germar 1824
Litomerus Schoenherr 1833
Polyderces Schoenherr 1833
Aphyoramphus Guérin-Méneville 1844 (valid subgenus)
Lonchocerus Chevrolat 1879
Sternoxus Chevrolat 1879
Platypachys Chevrolar 1879
Gymnonotus Chevrolat 1879
Ardoleucus Checrolat 1881
Atroniscus Desbrochers 1906

Rhinastina Vaurie 1973

Neoerethistes O'Brien and Wibmer 1982, 1 sp., *N. arizonicus* (Sleeper 1954), Arizona.

75. Cleogonini Gistel 1856

Rhyssomatus Schoenherr 1837, 17 spp., generally distributed with the exception of the northwestern United States and adjacent Canada. Adults are associated with various plants in the families Asclepiadaceae, Asteraceae, Convolvulaceae and Fabaceae (Blatchley and Leng 1916; Kissinger 1964; Anderson 1993a). The genus needs revision. See Casey (1895) and Blatchley and Leng (1916) to separate some of the species.

Polydus Pascoe 1872
Sermysatus Casey 1895 (valid subgenus)

76. Conotrachelini Jekel 1865

[*Chaleponotus* Casey 1892, 1 sp., *C. elusus* Casey 1892, Indiana. This genus and species are known only from the type specimen, labelled from "Indiana". There is considerable doubt that this is a North American taxon. At the time of its description Casey was studying Brazilian Baridinae and there is the possibility that the locality reference is to Indiana, Brazil and not the state of Indiana in the United States.]

Conotrachelus Dejean 1835, 63 spp., generally distributed throughout the United States and Canada. Adults are associated with various plants; many come to lights. Larvae feed in developing fruits and in injured or dying wood (Kissinger 1964). A number of species are associated with *Quercus* (Fagaceae) and other hardwoods. *Conotrachelus nenuphar* (Herbst 1797) is the plum curculio and *C. crataegi* Walsh 1863 is the quince curculio. The genus needs revision; a number of undescribed species are known from Florida (Anderson 1993a). See Schoof (1942) and Blatchley and Leng (1916) to separate some of the species. This treatment of *Conotrachelus* includes *C. parvulus* Champion 1904, and *Pheleconus cribricollis* (Say 1831) and *P. infector* (Boheman 1845); see also notes about *Micralcinus* and *Pheleconus*. Relationships of these genera need to be reassessed.

Cyphorhynchus Schoenherr 1837
Glycaria Pascoe 1880
Edesius Pascoe 1881
Enops Pascoe 1889
Loceptes Casey 1910
Pseudocomus Varga 1951 (valid subgenus)

Epacalles Kissinger 1964, 1 sp., *E. inflatus* Blatchley 1916, eastern United States west into central Texas. Adults are collected in leaf litter.

Lepilius Champion 1905, 1 sp., undescribed, extreme southwestern Texas. Adults of an undescribed species have been collected in leaf litter in Big Bend National Park, Texas.

Micralcinus LeConte 1876, 3 spp., southeastern United States west into Texas. Adults of *M. cribratus* LeConte 1876 have been associated with *Amaranthus* (Amaranthaceae) and adults of *M. maculatus* (Blatchley 1916) with *Sesuvium portulacastrum* (L.) L. Aizoaceae (Anderson 1993a). I have not seen specimens of *M. kalmbachi* Buchanan 1927. See Sleeper (1955c) to separate the species (note that *M. stehri* Sleeper 1955 is a junior synonym of *Conotrachelus parvulus* Champion 1904; Wibmer and O'Brien 1989).

Microhyus LeConte 1876, 1 sp., *M. setiger* LeConte 1876, eastern United States and adjacent southern Canada. Adults have been associated with dead *Fagus* (beech; Fagaceae).

Echinaspis Blatchley 1922; not Haeckel 1881

Micromastus LeConte 1876, 1 sp., *M. gracilis* (Boheman 1859), California.

Pheloconus Roelofs 1875, 1 sp., *P. hispidus* (LeConte 1876) generally distributed in the eastern United States west to Louisiana. Adults of *P. hispidus* (LeConte 1876) have been associated with *Malvastrum corchorifolium* (Desc.) Britt. (Malvaceae). Two additional species, *P. infector* (Boheman 1845) and *P. cribricollis* (Say 1831) have been considered as *Pheleconus* but do not fit the generic definition and are likely *Conotrachelus*. See Blatchley and Leng (1916; as *Conotrachelus* groups III and VI) to separate this complex of species.

77. Cycloterini Lacordaire 1863

Cycloterina Lacordaire 1863

Gononotus LeConte 1876, 1 sp., *G. angulicollis* (Suffrian 1871), Florida. Adults are common under debris on beaches (Anderson 1993a).

Nemosinus Faust 1892

78. Erodiscini Lacordaire 1863

Alonso-Zarazaga and Lyal (1999) place these weevils as Curculioninae but the structure of the uncus at the tibial apex suggests they are Molytinae or related. Here they are placed as a tribe within Molytinae.

Sicoderus Vanin 1986, 1 sp., *S. tinamus* (LeConte 1884), Florida. This species appears to be associated with *Bumelia celastrina* (Nutt.) R. W. Long (Sapotaceae) (Anderson 1993a).

79. Hylobiini Kirby 1837

Hylobiina Kirby 1837

Eudociminus Leng 1918, 1 sp., *E. mannerheimi* (Boheman 1836), southeastern United States west to Louisiana. Adults are associated with *Taxodium distichum* (L.) Rich. (bald cypress; Taxodiaceae).

Eudocimus Boheman 1836; not Wagler 1832

Heilipus Germar 1824, 1 sp., *H. apiatus* (Olivier 1807), Florida, Georgia, South Carolina, North Carolina and Tennessee. Adults have been associated with various plants. In Florida the larvae bore into the cambium at the base of *Persea americana* Mill. (American avocado; Lauraceae) (Woodruff 1963). Two additional species, *H. lauri* Boheman 1845 and *H. pittieri* Barber 1919 have been found in greenhouses.

Hilipus Agassiz 1846

Hilipus Gemminger and Harold 1871; not Agassiz 1846

Heilus Kuschel 1955, 1 sp., *H. bioculatus* (Boheman 1843), southern Florida, adventive. Adults and larvae have been associated with *Bursera simaruba* (L.) Sarg. (Burseraceae) (Anderson 1993a).

Hilipinus Champion 1902, 1 sp., *H. nearcticus* O'Brien 1982, Florida, Louisiana and Mississippi. Adults come to lights.

Hylobius Germar 1817, 8 spp., generally distributed throughout the eastern and central United States and all of Canada; one adventive species. Adults and larvae of the native species are associated with conifers (Warner 1966). *Hylobius transversovittatus* (Goeze 1777) has been introduced from Europe for the biological control of *Lythrum salicaria* (purple loosestrife; Lythraceae) and is now established in New York, Pennsylvania, Maryland, Virginia, Ohio, Indiana, Illinois, Iowa, Michigan, Wisconsin, Minnesota, South Dakota, Colorado, Montana, Oregon and Washington in the United States (Weeden 2000), and in British Columbia, Alberta, Manitoba and Nova Scotia in Canada (Harris 2001). See Warner (1966) to separate the seven native species.

Callirus Dejean 1821 (valid subgenus)

Hypomolyx LeConte 1876

Hylobitelus Reitter 1923

Poiyaunbus Kôno 1934

Pachylobius LeConte 1876, 1 sp., *P. picivorus* (Germar 1824), generally distributed in the eastern United States and adjacent southern Canada. Adults are associated with *Pinus* (Pinaceae); larvae mine the inner bark of roots and stumps of dying or injured trees (Franklin and Taylor 1970).

80. Lepyrini Kirby 1837

Lepyrus Germar 1817, 6 spp., generally distributed in the northern and western montane United States and across Canada including the far north and Alaska. Adults are often associated with *Salix* (willow; Salicaceae) but larvae likely feed on the roots of other plants (Anderson 1997). The genus needs revision. Several subspecies of questionable status are recognized in North America and no attempt has been made to compare the North American

fauna to those of Asia. See Van Dyke (1928) to separate the forms.

Dirus Dejean 1821

81. Lymantini Lacordaire 1866

Caecossonus Gilbert 1955, 1 sp., *C. dentipes* Gilbert 1955, southern Florida. Adults are frequently collected in soil and leaf litter (Howden 1992).

Dioptrophorus Faust 1892, 1 sp., *D. repens* (Casey 1892), California, Oregon and Washington. Adults have been collected in leaf litter.

Metopotoma Casey 1892

Anculopus Van Dyke 1927

Lymantes Schoenherr 1838, 4 spp., southeastern United States north to Ohio and west to western Texas and Oklahoma. Adults have been collected in leaf litter. The genus needs revision. See Sleeper (1965) to separate the species.

Typhloglymma Dury 1901

Stenpeckia Osella 1980

82. Petalochilini Lacordaire 1863

Hormops LeConte 1876, 1 sp., *H. abducens* LeConte 1876, southeastern United States north to Ohio and west to Texas. Adults are found in the nests of fox and grey squirrels (Blatchley 1918).

83. Piazorhinini Lacordaire 1863

Alonso-Zarazaga and Lyal (1999) place these weevils as Curculioninae but the structure of the uncus at the tibial apex suggests they are Molytinae or related. Here they are placed as a tribe within Molytinae.

Piazorhinus Schoenherr 1835, 4 spp., generally distributed in eastern United States and southeastern Canada. Species are associated with *Quercus* (Fagaceae) and *Coccoloba diversifolia* Jacq. (Polygonaceae) (Anderson 1993a, b). See Blatchley and Leng (1916) to separate the species.

Acamatus Schoenherr 1833

Polyponus Kirsch 1875

Piazorrhinus Champion 1903

84. Pissodini Gistel 1856

Pissodina Gistel 1856

Pissodes Germar 1817, 22 spp., generally distributed throughout the United States and Canada. Adults and larvae are associated with various conifers. Some species are of economic importance. The genus needs revision. See Hopkins (1911) to separate the species.

Piniphilus Dejean 1821

Epipissodes Voss 1956 (valid subgenus)

85. Sternechini Lacordaire 1863

Chalcodermus Dejean 1835, 7 spp., generally distributed in the eastern and central United States west into Texas and Arizona. Adults of *C. aeneus* Boheman 1837 have been associated with *Vigna luteola* (Jacq.) Benth. (Fabaceae); larvae develop in seed pods (Ainslie 1910). Adults of *C. collaris* Horn 1873 have been reared from seed pods of *Cassia chamaechrista* L. (Fabaceae) (Alsterlund 1937a, b). Adults of *C. martini* Van Dyke 1930 have been collected from two species of *Brickellia* (Asteraceae) in Arizona and Texas. The genus needs revision. See Blatchley and Leng (1916) to separate some of the species.

Anthobates Gistel 1848

Sternechus Schoenherr 1826, 2 spp., *S. armatus* (Casey 1895), southeastern United States north to Illinois and New Jersey, and *S. paludatus* (Casey 1895), Arizona. Some tropical species are associated with Fabaceae (Anderson 1993b).

Sternuchus Gemminger and Harold 1871; not LeConte 1850

Sternuchus Suffrian 1871; not LeConte 1850; not Gemminger and Harold 1871

Plectromodes Casey 1895

86. Thalasselephantini Alonso-Zarazaga and Lyal 1999

Thalasselephas Egorov and Korotyaev 1976, 1 sp., *T. testaceus* (LeConte 1876), California, Oregon and British Columbia. Adults are found under seaweed on sandy coastal beaches (Anderson 1988b). Korotyaev and Egorov (1975) have suggested that this genus is related to *Emphyastes* (Cyclominae).

Phycocoetes LeConte 1876; not Agassiz 1846

Neophycocoetes O'Brien and Wibmer 1982

87. Trypetidini Lacordaire 1866

Nanus Schoenherr 1844, 1 sp., *N. uniformis* Boheman 1844, southern Florida. Adults are associated with palms and banana trees.

Homaloxenus Wollaston 1873

Incertae sedis

Tranes Schoenherr 1843, 1 sp., *T. internatus* Pascoe 1870, California, adventive. Adults have been collected in association with introduced *Encephalartos* (Cycadaceae) from Australia. It is not known whether the genus is established in North America.

Platyphaeus Pascoe 1877

XVII. Scolytinae Latreille 1807

by Robert J. Rabaglia

Subfamily common name: The bark and ambrosia beetles

Subfamily synonyms: Hylurgidae Zimmerman 1868; Ipidae Latreille 1804

The general body shape of these small beetles ranges from very stout to moderately elongate and cylindrical. Typically the body is brownish with moderate pubescence. The geniculate antennae have a distinct club.

Description: (modified from Wood 1982) Very small to small in size, 1-9 mm, mostly 1-3 mm; shape stout to cylindrical; color brownish or piceous; pubescence sparse to abundant, mostly consisting of very fine, short setae or stout, flat setae.

Head prominent, or withdrawn into pronotum; surface punctate to granulate. Antennal scape well developed, funicle one to seven segmented, club large, either solid, annulated or rarely pseudolamellate; inserted on the sides of head between eyes and mandibles. Labrum absent; mandibles short, curved, the apices blunt, dentate; maxillary palpi three segmented, segments short and stout. Gular region reduced to a small pregula, gular sutures confluent; mentum moderate, variable; labial palpi three segmented, small, stout, apically acute. Eyes lateral, moderate, flat, transverse.

Pronotum slightly broader than head; shape truncate anteroventrally, quadrate to subcircular, borders margined or not; surface punctate, asperate, rugose or striate; pleural region broad; prosternum short in front of coxae, some with a small median process projecting posteriorly; procoxal cavities closed behind. Legs moderate in length; trochantins not exposed; anterior coxae globular, contiguous to widely separated; middle coxae round, flat, separate; hind coxae subtriangular, separate; trochanters small, triangular; femora swollen, short; tibiae compressed, mostly toothed with apical hooks or, with marginal teeth or denticles; tarsal formula 5-5-5, apparently 4-4-4, slender, third segment narrow or dilated, fourth segment minute; claws large, simple divergent. Scutellum small, quadrate, triangular or absent. Elytra entire, apically rounded, mostly declivous and often with tubercles, denticles or spines apically; striae mostly distinct, punctate; epipleural fold obscure. Wing venation and folding pattern not described.

Abdomen with five visible sterna, sutures entire; surface microrugose to punctate. Male genitalia with penis stout, apically blunt, basally with a pair of slender, articulating struts; parameres absent; pars basalis reduced to a slender complete or incomplete ring and a curved, slender basal strut of variable length. Female genitalia undescribed.

Larvae C-shaped, subcylindrical, fleshy; size 2 mm - 10 mm in length; vestiture ranges from absent to a few, simple setae; color near white. Head partly retracted or distinctly exserted, mouthparts hypognathous or nearly prognathous with a faint epicranial suture surrounding the frons. Antennae very small to absent. Mandible mostly short, stout, gouge-shaped, subtriangular without mola or retinaculum; maxilla with cardo, fused stipes and mola; maxillary palpi one or two segmented. Stemmata absent in most. Thorax frequently broader than abdomen; legs absent, but with fleshy lobes ventrally. Abdomen with three or more plicae on each segment; nine or ten segmented, segments 8 -10 in some with pigmented tubercles dorsally. Spiracles on mesothorax and abdominal segments one to eight, annular, annular-biforous or biforous, or inconspicuous.

Habits and habitats. Most bark and ambrosia beetles live in injured, weakened or dying woody plants. Hosts must contain sufficient moisture for development and most species complete only one generation in a host. A few species breed in roots and stems of non-woody plants, others breed in seed or cones, but the majority of species are considered bark beetles or ambrosia beetles. Bark beetles feed on the phloem of the inner bark of their woody host plant. Fewer than half the species in the family are bark beetles, but they are the majority of species in the temperate regions. Ambrosia beetles cultivate and feed on symbiotic ambrosia fungi in the xylem of the host plant. Most tropical species exhibit this habit.

Typically, adult bark and ambrosia beetles bore through the outer bark and construct an egg gallery either in the phloem-cambial region (bark beetles) or in the xylem (ambrosia beetles). Females lay eggs at regular intervals on either side of the gallery. Among bark beetles, larval feeding mines radiate out from the egg gallery, and engrave the inner bark or wood or both. These characteristic engravings can often be found under the bark of dead or dying trees. Ambrosia beetle larvae feed on the ambrosia fungus in small cradles off of the egg gallery. After pupation, the next generation of bark beetles emerges through individual exit holes in the bark, giving it a characteristic "shot hole" appearance. Ambrosia beetle adults usually emerge through the parental entrance hole.

Most of the life stages of these beetles occur within the host plant, however, upon emergence adults must find suitable host material in which to feed and breed. They are often among the first insects to colonize a dying tree; therefore, rapid location of hosts is an important part of their biology. In many species, host location is mediated by olfactory responses to host odors (e.g., terpene hydrocarbons), tree degradation products (e.g., alcohols) or conspecific semiochemicals (pheromones). Several species utilize pheromones not only for attraction of potential mates, but also for mass aggregation to overcome resistance of the host tree. The pheromone biology of species of *Dendroctonus*, *Ips* and *Scolytus*, among others, has been well studied, and the complex inter- and intraspecific interactions elucidated (Wood, D.L. 1982, Borden 1982, Raffa *et al.* 1993).

Many bark and ambrosia beetle species have distinctive, subsocial behaviors. Social organization associated with reproductive behavior ranges from simple monogamy to heterosanguineous polygyny to consanguineous polygyny. Division of labor in gallery construction and maintenance is marked by sexual dimorphism, especially in structures on the head and elytral declivity.

Ecologically and economically this is a very important group of beetles. Members of *Dendroctonus* and *Ips* kill or degrade vast expanses of forest each year. Species of *Scolytus* are well known as vectors of the Dutch elm disease fungus. In the tropics, ambrosia beetles stain and degrade valuable wood products. In North America, several species of exotic xyleborines cause damage to young, stressed trees in the landscape and nurseries, and species of *Gnathotrichus, Monarthrum* and *Trypodendron* degrade wood products in the Pacific Northwest (Furniss and Carolin 1977).

There have been numerous studies on the biology, chemical ecology and control of many of the economically important genera.

Status of the classification. This book treats bark and ambrosia beetles as a subfamily of Curculionidae following Crowson (1967); however, the following Key and Classification of Tribes and Genera follow Wood (1973) and a family catalog by Wood and Bright (1992), but with the status of the subfamilies and tribes reduced to tribes and subtribes. See Wood (1973 and 1986) for a discussion of this issue.

Bark and ambrosia beetles occur on all continents except Antarctica. In North America, the fauna has been well studied within the past century, and is now well known. Wood (1982) published a monograph on the bark and ambrosia beetles of North and Central America, including a key to all genera and species in the region (at the time about 1430 species were recognized). Wood and Bright (1992) published a catalog of the worldwide Scolytidae, followed by a recent update (Bright and Skidmore 1997). The taxonomic status of tribes and genera in the Key and Classification sections below follows these catalogs. The two exceptions are the new genera *Dryoxylon* Bright and Rabaglia (1999) and *Pseudips* Cognato (2000) which have been added to the key.

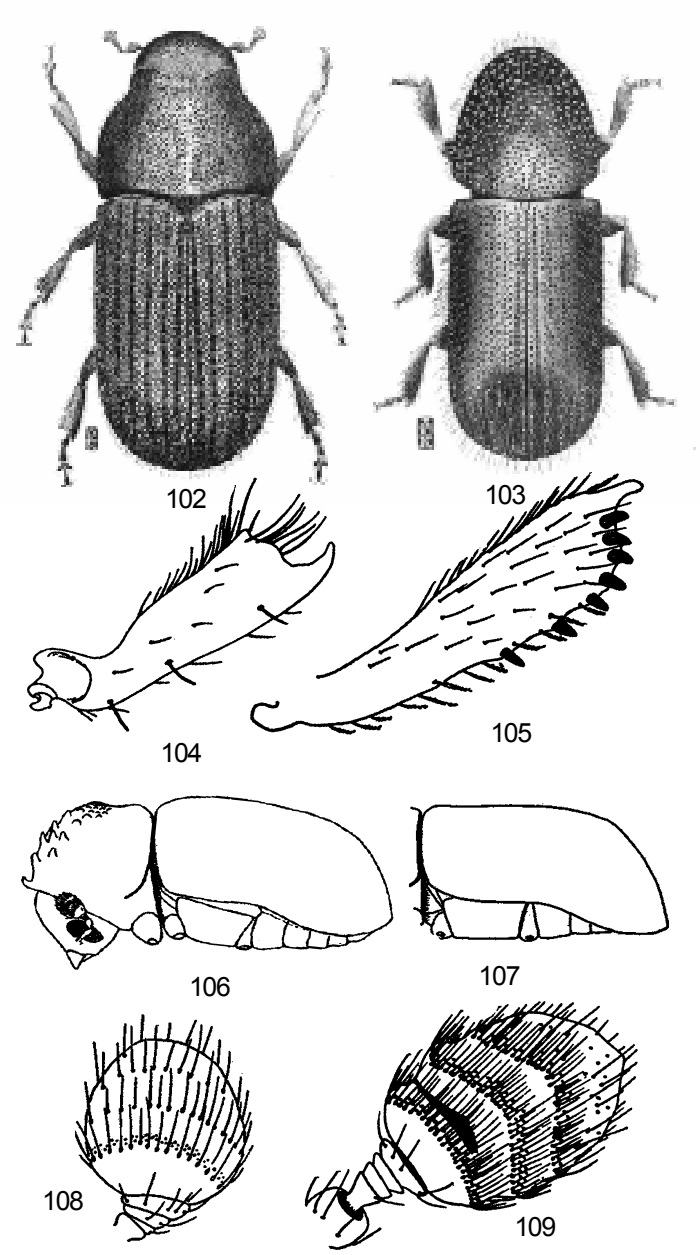
Distribution. There are approximately 5,800 species worldwide, with about 525 species and subspecies described from the United States and Canada. Bark beetles can be found from the subalpine forests of the north to the subtropical forests of Florida. Distinctive faunas exist in the desert plateau of the southwest, the deciduous forests of the southeast, the northern coniferous forests, the Pacific Coast and southern Florida. Bark beetles tend to be more restricted by host than ambrosia beetles. Within a bark beetle genus, most species are restricted to a limited number of host species; for example, *Phloeosinus* are found mostly in Cupressaceae and *Pseudopityophthorus* are found almost exclusively in *Quercus*.

Wood (1977) estimated that there were 37 Old World species established in North and Central America. Since then approximately 10 additional species new to North America have been reported (Atkinson *et al.* 1990, Hoebeke 1991, Haack and Kucera 1993, Rabaglia and Cavey 1994, Bright and Rabaglia 1999, Vandenberg *et al.* 2000, Hoebeke 2001 and Mudge *et al.* 2001).

Key to the Nearctic Genera of Scolytinae
(Modified from D. E. Bright, unpublished 2000)

1. Anterior margins of elytra procurved and bearing a series of crenulations; pronotum unarmed in most; head visible from above (Fig. 102) (Hylesinini) 2
— Anterior margins of elytra forming a straight line across body, unarmed, smooth and either rounded or with a fine raised line; pronotum, in most, armed by granules or asperities on at least anterior third; head concealed from above (Fig. 103) (Scolytini) 24

2(1). Prothorax longitudinally strigose; prothoracic tibia with a curved bifid process, meso- and metathoracic tibiae with a single curved spine extending beyond spine of inner apical angle; antennal funicle 7-segmented; lateral prosternal area bearing a sharply elevated ridge from coxa to anterior margin; crenulations on elytral bases rather small (Bothrosternina) 3
— Prothorax punctate or asperate, never longitudinally strigose; all tibiae bearing several teeth, none extending beyond tarsal insertion; antennal funicle and prosternal area variable 4



FIGURES 102.131-109.131. Scolytinae. 102-103. Dorsal habitus, 102. *Dendroctonus pseudotsugae* Hopkins; 103. *Dryocoetes affaber* Mannerheim. 104-105. Protibia, 104. *Scolytus* sp.; 105. *Procryphalus* sp. 106-107. Lateral habitus, 106. *Hypothenemus* sp.; 107. *Pityophthorus* sp. 108-109. Antennal club, 108. *Cryptocarenus* sp.; 109. *Hypothenemus* sp. (Figures 102-103 after Swaine 1918; Figure 104 after Chamberlin 1958; Figures 105-109 after Wood 1982.)

3(2). Sutures of antennal club straight; rostrum distinctly wider than distance between eyes; body and frons not as below ..... *Cnesinus*
— Sutures of antennal club procurved; rostrum width at tip equal to distance between eyes; body oval; frons excavated, with median tubercle just above epistoma ..... *Pagiocerus*

4(2). Prothoracic precoxal area rather large, lateral margin strongly elevated from anterior margin to coxa 5
— Prothoracic precoxal area short, lateral prosternal ridge poorly developed or absent 8

5(4). Crenulations on elytral bases forming a single row of teeth; first and second segments of antennal club subequal in length; body rather stout, length less than 2.5 mm; in roots of herbaceous legumes (Hylesinina, part) ..... *Hylastinus*
— Crenulations on elytral bases obsolete, if visible, then irregularly placed, not forming a definite single row; first segment of antennal club distinctly longer than second; body mostly larger than 3 mm, very slender if smaller; not in herbaceous legumes (Hylastina) 6

6(5). Anterior coxae widely separated; surface of elytra and between punctures on pronotum dull; vestiture sparse, recumbent, yellow; body color dull reddish brown ..... *Scierus*
— Anterior coxae narrowly separated, almost contiguous; surface between punctures on pronotum and elytra smooth and glossy; the longer hairlike vestiture erect; mature color glossy, dark brown or black 7

7(6). Pronotum, in most, constricted anteriorly, discal surface with about equal numbers of small and large punctures intermixed; third tarsomere broad, bilobed ..... *Hylurgops*
— Pronotum not noticeably constricted anteriorly, discal surface with punctures uniformly large, with very few small punctures; third tarsomere narrower, emarginate ..... *Hylastes*

8(4). Scutellum visible, elytral bases notched for its reception 9
— Scutellum not visible, elytral bases straight 20

9(8). Antennal club symmetrical, sutures transverse 10
— Antennal club with sutures oblique, pseudolamellate or absent 18

10(9). Pronotum asperate on anterolateral areas (Hylesinina, part) 11
— Anterolateral areas of pronotum unarmed 12

11(10). Eye entire; vestiture scalelike; costal margins of elytra ascending slightly at apex, abdomen ascending to meet them; hosts *Fraxinus* species ..... *Hylesinus*
— Eye shallowly emarginate; vestiture hairlike; costal margins of elytra descending to apex, abdomen horizontal; hosts *Alnus* species ..... *Alniphagus*

12(10). Scutellar notch between elytra very deep, acute; elytra extended anteriorly over pronotum, posterolateral area of pronotum abruptly grooved to accommodate elytral margins; xylophagous species (Phloeosinina, part) ..... *Dendrosinus*
— Scutellar notch between elytra emarginate, but not deeply grooved; elytra not extended anteriorly, pronotum not grooved; phloeophagous species (Tomicina) 13

13(12). Fore coxae widely separated 14
— Fore coxae contiguous, or at most very narrowly separated 16

14(13). Elytral vestiture hair-like; antennal club slightly flattened, segment 1 occupying one-fourth of club length; in *Ulmus* ..... *Hylurgopinus*
— Elytral vestiture scale-like; antennal club conical, segment 1 occupying less than one-fourth of club length; in conifers 15

15(14). Each elytral interspace bearing a row of erect, flattened scales in addition to recumbent ground cover; antennal funicle 5-segmented ..... *Xylechinus*
— Elytral interspaces bearing a row of erect, hairlike setae, ground cover scale-like or stout setae; antennal funicle 7-segmented ..... *Pseudohylesinus*

16(13). Antennal funicle 5-segmented; antennal club with sutures slightly procurved; anterior margin of pronotum distinctly emarginate; 2.5-9.0 mm in length ..... *Dendroctonus*
— Antennal funicle 6-segmented 17

17(16). Elytra with erect interstrial setae abundant, randomly placed; a short median carina on frons extending from epistomal margin to level of antennal insertion, ending dorsally in an acute elevation; elytra densely rugose ..... *Hylurgus*
— Elytra with erect interstrial setae in uniseriate rows; a fine median carina on frons extending from epistoma to middle of frons, of equal height throughout; elytra smooth ..... *Tomicus*

18(9). Antennal club pseudolamellate, constricted at sutures and movable at intersegmental lines (Phloeotribina) ..... *Phloeotribus*
— Antennal club fused at sutures, sutures oblique or partly to entirely obsolete (Phloeosinina, part) 19

19(18). Antennal club with three oblique sutures; funicle attached to base of club; pronotum unarmed; eye deeply emarginate; hosts Cupressinine trees, rarely other conifers ..... *Phloeosinus*
— Antennal club solid and unmarked by sutures; funicle attached to side of club; pronotum, in most, armed by a few asperities in anterolateral areas; eye entire; hosts mostly hardwoods ..... *Chramesus*

20(8). Eye emarginate or completely divided; pronotum never armed by asperities; crenulations at bases of elytra widely distributed, extending laterally beyond interstriae 5; antennal funicle 5- or 6-segmented (Polygraphina) 21
— Eye sinuate or entire; pronotum armed by a few scattered or clustered asperities; crenulations at bases of elytra restricted to area between suture and interstriae 5; antennal funicle 4- or 5-segmented (Hypoborina) 23

21(20). Eye completely divided into two parts; antennal club solid, unmarked by sutures ... *Polygraphus*
— Eye less than half divided by an emargination; antennal club marked by sutures 22

22(21). Antennal funicle 5-segmented ..... *Carphoborus*
— Antennal funicle 6-segmented ..... *Carphobius*

23(20). Antennal funicle 4-segmented, sutures of club indicated only by marginal notches; elytra with uniseriate rows of erect, broad interstrial scales and recumbent strial hair of equal length; pronotum armed by 3 or 4 pairs of median tubercles, the anterior pair marginal .. *Liparthrum*
— Antennal funicle 5-segmented, sutures of club transverse, distinct; elytral vestiture without conspicuous recumbent hair; pronotum armed by 2 or 3 widely separated paired clusters of lateral teeth ..... *Chaetophloeus*

24(1). Lateral margin of anterior and posterior tibia unarmed except for a single curved process at outer apical angle that curves toward and extends beyond process of inner apical angle (Fig. 104); lateral line of pronotum sharply elevated; antennal club flattened, the sutures strongly procurved; antennal funicle 7-segmented (Scolytina) 25
— Lateral margin of anterior tibia armed by several toothlike processes, none of which curve toward the inner process (Fig. 105); lateral line of pronotum raised or not; antennal club and funicle variable 26

25(24). Elytra slightly if at all declivous behind, the abdomen ascending abruptly behind to meet them; scutellum depressed; antennal scape distinctly shorter than funicle ..... *Scolytus*
— Elytral declivity rather steep, descending to meet the horizontal abdomen; scutellum small, flush with surface of elytra; antennal scape at least as long as funicle ..... *Cnemonyx*

26(24). Metepisternum visible to posterior extremity (Fig. 106); antennal club varying from flat to obliquely truncate; tibia and antennal funicle variable 27
— Metepisternum largely covered by elytra, visible only in front (Fig. 107); antennal club strongly flattened with sutures on both sides, those on posterior surface not strongly displaced apically; tibia slender, in most, bearing about three teeth on apical portion; antennal funicle 1- to 5-segmented 66

27(26). Lateral margins of prothorax subacutely elevated; procoxae widely separated (Ctenophorina) .. 28
— Lateral margins of prothorax rounded; procoxae subcontiguous 29

28(27). Anterior area of pronotum transversely rugose; pronotum and elytra subglabrous .... *Scolytodes*
— Pronotum uniformly punctured, unarmed; vestiture of pronotum and elytra abundant, consisting of erect, stout, almost scalelike bristles ..... *Pycnarthrum*

29(27). Fore tibia with sides parallel, in most, armed only on apical margin by small teeth never with process on outer apical angle exceeding tarsal insertion; procoxae separated; (Micracina) 30
— Fore tibia much wider apically, armed on lateral margin by several denticles; procoxae contiguous 36

30(29). Antennal club small, greatest width through basal half, apex narrowly rounded, sutures straight, transverse 31
— Antennal club larger, greatest width through apical half, apex broadly rounded, sutures procurved 32

31(30). Elytral declivity subvertical, bisulcate, obtusely angulate behind; sutures of antennal club distinctly marked by rows of setae; antennal pedicle and scape about equal in length ... *Stenocleptus*
— Elytral declivity more gradual, evenly convex, rather narrowly rounded behind; sutures of antennal club indicated only by marginal notches; scape distinctly longer than pedicle ..... *Pseudothysanoes* (part)

32(30). Elytra broadly rounded behind; margins of antennal club, in most, constricted at first suture 33
— Elytra acuminate behind; antennal club without sutural constrictions at sides 34

33(32). Pronotum wider than long, widest near base, summit more prominent; fore tibia more slender, apically obliquely truncate, mucro often bifurcate ..... *Psuedothysanoes* (part)
— Pronotum longer than wide, widest near middle, summit less prominent; fore tibia rather broad, more nearly truncate apically, mucro undivided ..... *Thysanoes*

34(32). Sutures of antennal club broadly procurved, the first appearing bisinuate and extending less than one-third length of club; scape club-shaped, with few setae; eye oval, rather small; fore tibia more slender, slightly wider apically, with supplemental tubercles on posterior face ..... *Hylocurus*
— Sutures of club very strongly, narrowly procurved, the first most often reaching middle of club; scape compressed, subtriangular, with numerous long setae; eye elongate, large; fore tibia broad, sides subparallel, posterior surface devoid of tubercles except for teeth on apical margin 35

35(34). Eyes moderately separated beneath, entire; fore tibia with all five teeth on distal margin, mucro broad ..... *Micracis*
— Eyes subcontiguous beneath, emarginate; fore tibia with at least one of the five teeth on outer margin, mucro more slender ..... *Micracisella*

36(29). Male frons bearing a very large, long, partly double process which may curve upward and backward over prothorax, in some, reaching its posterior margin; pronotum asperate to base in median area, summit on basal third, in most, extending behind its basal margin and over scutellum; body usually covered by an incrustation (Cactopinina) ..... *Cactopinus*
— Male frons not armed by a large median process; pronotal summit at or slightly behind middle of prothorax, basal third devoid of asperities 37

37(36). Antennal club more strongly flattened, with sutures on both faces, those on posterior face strongly procurved and limited to apical half; costal margins of elytra slightly ascending posteriorly; vestiture scale-like (Cryphalina) 38
— Antennal club obliquely truncate or at least with sutures of posterior face restricted to less than apical one-fourth; costal margins of elytra descending posteriorly; vestiture hairlike setae 46

38(37). Pronotum without a fine, raised lateral line; eye, in some, sinuate, never emarginate; costal margins of elytra ascending only slightly posteriorly 39
— Pronotum acutely margined at sides, and with a fine, raised line at least on basal one-third; eye emarginate or entire; costal margins of elytra distinctly ascending posteriorly 42

39(38). Antennal funicle 5-segmented; antennal club narrow, pointed at tip, sutures straight, not septate; basal half of pronotum without scale-like setae ..... *Trypophloeus*
— Antennal funicle 4-segmented; antennal club broadly rounded at tip, sutures curved, partly septate or not septate; basal half of pronotum with scalelike setae 40

40(39). Antennal club not septate, sutures indicated by 3 strongly procurved rows of setae (Fig. 108) .... *Ernoporicus*
— Antennal club with at least part of first suture septate, none of sutures indicated by strongly procurved rows of setae (Fig. 109) 41

41(40). Sutures of antennal club straight, the first septate; anterior margin of pronotum slightly produced; pronotum with no indication of a fine raised lateral margin ..... *Procryphalus*
— Antennal club with a strongly oblique septum on one side, no other sutures indicated; anterior margin of pronotum broadly rounded; pronotum with an indistinct, fine, raised lateral line .... *Scolytogenes*

42(38). Antennal club with sutures indicated by rather strongly recurved rows of setae; third tarsomere broad and emarginate ..... *Cryphalus*
— Sutures of antennal club straight or procurved; third tarsomere cylindrical 43

43(42). Eye entire; antennal club large, aseptate, funicle normally 3-segmented, rarely 4-segmented; body stout, less than 2.3 times longer than wide; body shorter than 1.1 mm ..... *Trischidias*
— Eye emarginate; antennal funicle 5-segmented, rarely 4- or 3-segmented; in most, body longer than 1.1 mm 44

44(43). Strial punctures obscure, not impressed; posterior half of pronotum finely granulate; antennal club large, not septate; male and female similar in size and appearance ..... *Hypocryphalus*
— Strial punctures distinct; posterior half of pronotum not closely granulate, in most, punctate; male much smaller than female 45

45(44). Antennal club not septate; raised lateral margin of pronotum extending two-thirds of distance from basal margin; elytra glabrous except for a few subcapitate interstrial bristles ... *Cryptocarenus*
— Antennal club with suture 1 partly septate; raised lateral margin extending only one-third of distance from basal to anterior lateral margin; elytra clothed by rows of strial and interstrial setae ... . *Hypothenemus*

46(37). Antennal funicle 2- or 3-segmented; pronotum unarmed, punctured over entire surface, lateral line not sharply raised; length 2.0 mm or less (Crypturgina) 47
— Antennal funicle 4- or 5-segmented; pronotum mostly armed anteriorly by granules or asperities, if unarmed, lateral line sharply raised; length mostly over 2.0 mm 48

47(46). Antennal funicle 2-segmented, club with 1 obscure suture indicated at tip ..... *Crypturgus*
— Antennal funicle 3-segmented, club with 3 sutures ..... *Dolurgus*

48(46). Eye completely divided by an emargination; antennal funicle 4-segmented, club without distinct sutures (Xyloterina) 49
— Anterior margin of eye sinuate or emarginate, never completely divided; antennal funicle 4- or 5-segmented, club, in most, with evident sutures 50

49(48). Antennal club with subcorneous basal area strongly, rather narrowly procurved; protibia of female thickened and tuberculate on posterior face, flattened and finely tuberculate in male; male head deeply, broadly excavated, the prothorax sub-quadrate; female frons convex, anterior margin of female pronotum rounded .... *Trypodendron*
— Antennal club with subcorneous basal area broadly procurved; protibia flattened and devoid of tubercles on posterior face; frons not excavated in either sex; anterior margin of prothorax rounded in both sexes ..... *Xyloterinus*

50(48). Pronotum either punctate or else finely granulate over almost entire surface, dorsal profile evenly convex, not strongly declivous anteriorly, anterior margin never armed; tibia rather slender and armed by few, coarse teeth; declivity unarmed (Dryocoetina) 51
— Pronotum coarsely asperate and strongly declivous anteriorly, in most, punctate at least on posterior third, in some, anterior margin armed; tibia variable; declivity frequently armed by spinous processes 55

51(50). Antennal club compressed or with membranous apical portion extended beyond corneous portion, sutures procurved; scutellum very small 52
— Antennal club subtruncate, sutures transverse or recurved; scutellum moderate to large 53

52(51). Antennal funicle 4-segmented; club compressed, sutures strongly arcuate; pronotum granulate on anterior half, punctate behind; host *Acer* .... *Lymantor*

— Antennal funicle 5-segmented; club less strongly compressed, sutures rather broadly procurved; pronotum granulate to base; host *Cucurbita* ..... *Dendrocranulus*

53(51). Frons convergently aciculate; elytral declivity evenly convex, extending over at least posterior one-third of elytra, granules absent; protibia armed on lateral margin by 2-4 socketed teeth; posterior face of antennal club with 2 sutures . *Coccotrypes*

— Frons never convergently aciculate; elytral declivity flattened or impressed, confined to posterior one-fourth of elytra, granules mostly present; protibia armed on lateral margin by 5 or more socketed teeth; posterior face of antennal club without sutures or with 1 suture 54

54(53). Pronotum 1.4 times longer than wide, anterior margin slightly notched or emarginate; elytral declivity moderately deeply, evenly sulcate ..... *Dryoxylon*

— Pronotum 1.0-1.2 times longer than wide, anterior margin evenly rounded; elytral declivity evenly convex to slightly flattened, may have second interspace impressed ..... *Dryocoetes*

55(50). Meso- and metathoracic tibia rather slender, abruptly narrowed apically, armed by a few rather widely spaced coarse teeth; males and females similar in size and general shape (Ipina) 56

— Meso- and metathoracic tibia rather broadly dilated to a point slightly beyond middle then gradually narrowed to apex, and armed by a series of small closely set teeth of more or less uniform size and shape; males rare, in most, smaller and radically different in shape (Xyleborina) 61

56(55). Elytral declivity rather narrowly bisulcate, margins moderately elevated, rounded and armed by not more than 3 teeth; lower margin of declivity rounded; in most, body shorter than 3.0 mm 57

— Elytral declivity broadly, rather deeply excavated, margins acutely elevated and armed by 3 or more tubercles or teeth; lower margin of declivity with an acutely elevated transverse ridge separating declivital excavation from apical margin; body mostly longer than 3.0 mm 58

57(56). Female frons deeply, rather narrowly excavated; male declivity with 2 or 3 pairs of enlarged teeth; antennal club compressed, 2 sutures visible on distal third of posterior face ..... *Pityogenes*

— Female frons convex; male declivity more narrowly impressed with 2 or 3 pairs of very small teeth or granules; antennal club obliquely truncate, without sutures on posterior face ..... *Pityokteines*

58(56). Antennal club obliquely truncate, with sutures recurved; elytral declivity less strongly excavated, the third tooth displaced mesally, not on summit of declivital margin ..... *Orthotomicus*

— Antennal club flattened, with sutures procurved or strongly bisinuate; elytral declivity broadly excavated, armed by 3 to 6 major denticles, all denticles on summit of lateral margin 59

59(58). Lateral margins of elytral declivity armed by 4 to 6 pairs of spinelike denticles; ventrolateral margin of elytral declivity very strongly produced, circumscribing an arc much less than one-third of a circle, its lateral extremities ending a long distance from largest denticle; sutures 1 and 2 of antennal club weakly bisinuate to strongly angulate ..... *Ips* (part)

— Lateral margins of elytral declivity armed by 3 pairs of spinelike denticles; ventrolateral margin of elytral declivity only slightly to moderately produced, circumscribing an arc at least one-third of a circle, its lateral extremities ending near third (last and largest) denticle; sutures 1 and 2 of antennal club weakly to very strongly, broadly procurved 60

60(59). Sutures on antennal club weakly procurved, almost straight; strial punctures at least twice as large as those of interstriae, in clearly defined rows; spine 3 on elytral declivity cylindrical or conical, not constricted before apex; body length 2.3-3.6 mm ..... *Ips* (part, *latidens* group)

— Sutures on antennal club very strongly procurved; strial and interstrial punctures subequal in size, not always in clearly definable rows; spine 3 on declivity subcapitate, distinctly constricted before apex; body length 3.5-5.0 mm ..... *Pseudips*

61(55). Antennal club more strongly compressed, corneous area small, near base, its distal margin strongly procurved, distal pubescent portion reaching basal one-fifth at sides; pregula not impressed; elytra obliquely truncate behind, declivity broadly, concavely excavated and acutely margined on a complete circle at periphery ..... *Premnobius*

— Antennal club thickened basally, corneous area larger with its distal margin recurved, pubescent area not reaching basal third; pregula depressed; elytral declivity convex, not acutely margined on upper half 62

62(61). Procoxae widely separated; body stout, elytra less than 1.3 times as long as pronotum ..... *Xylosandrus*

— Procoxae contiguous; body elongate, often slender, elytra at least 1.5 times as long as pronotum 63

63(62). Pronotum wider than long, subquadrate, anterior margin unarmed 64

— Pronotum longer than wide, subcircular, anterior margin armed by a series of median serrations 65

64(63). Pronotum asperate to base; declivity steep, bearing several granules or rather large denticles, strial and interstrial punctures small ..... *Ambrosiodmus*

— Pronotum asperate only on anterior half, punctate on basal half; declivity more sloping, bearing small tubercles, strial and interstrial punctures larger ..... *Euwallacea*

65(63). Scutellum conical; lower margin of declivity, beginning about interspace 7, bearing a series of pointed tubercles, the one nearest suture (at end of interspace 2) largest ..... *Xyleborinus*

— Scutellum flat; lower margin of declivity acute or rounded, unarmed ..... *Xyleborus*

66(26). Antennal funicle 5-segmented (3-segmented in *Dendroterus*) club mostly small, symmetrical; pubescence more abundant; bark or twig beetles (Pityophthorina) 67
— Antennal funicle 1-, 2-, or 5-segmented, club much larger, asymmetrical in most; pubescence less abundant; ambrosia beetles (Corthylina) 73

67(66). Basal and lateral margins of prothorax rounded, without a fine raised line; antennal club somewhat large in size; vestiture shorter and more uniform in length 68
— Basal and posterior portion of lateral margins of prothorax with an obvious, fine, raised line; antennal club proportionately smaller; most with vestiture longer on declivity than on disc 69

68(67). Antennal funicle 3-segmented; club less than twice as long as funicle; female pronotum without patches of pilose pubescence; elytral pubescence abundant ..... *Dendroterus*
— Antennal funicle 5-segmented, club at least twice as long as funicle; female prothorax with a pair of pilose pubescent areas on middle third of lateral areas; elytral pubescence sparse ... *Pityoborus*

69(67). Antennal club devoid of sutures except for one strongly oblique septum on anterior half of club only; prothorax evenly rounded in dorsal profile, summit inconspicuous, asperities fine, transition from asperate to punctate area gradual ..... *Araptus*
— Antennal club with at least two complete sutures indicated at least by setae; prothorax more strongly declivous anteriorly, summit and arrangement of asperities variable 70

70(69). Sutures of antennal club not septate; in most, pronotal asperities extending behind middle at sides, the transition from asperate to punctate area gradual; body moderately to very stout .... *Conophthorus*
— First and second sutures of antennal club septate; pronotal asperities mostly not reaching middle, the transition from asperate to punctate area usually abrupt, summit usually well developed; body slender to moderately stout 71

71(70). Pronotum and elytra minutely densely punctured; vestiture very short, mostly dense, almost always scalelike; antennal club with first segment shorter than others; greater development of frontal vestiture a male character; hosts *Quercus*, rarely other broadleaf trees ..... *Pseudopityophthorus*
— Pronotum and elytra more coarsely, less densely punctured; vestiture usually longer, less abundant, always hairlike; greater development of frontal vestiture a female character; hosts usually conifers, but also broadleaf trees and shrubs ... 72

72(71). Pregular area greatly enlarged and ornamented by a beard-like brush of exceedingly long hair .... *Pityotrichus*
— Pregular area small, without conspicuous vestiture ..... *Pityophthorus*

73(66). Antennal funicle 5-segmented, club smaller, less than twice as long as funicle ..... *Gnathotrichus*
— Antennal funicle 1- or 2-segmented; club very large, more than three times as long as funicle 74

74(73). Antennal funicle 2-segmented; posterior surface of fore tibia tuberculate; elytra emarginate or divaricate at sutural apex ..... *Monarthrum*
— Antennal funicle 1-segmented; posterior surface of fore tibia smooth; elytra evenly rounded behind, without a sutural notch at apex ..... *Corthylus*

Classification of the Nearctic Scolytinae

88. Hylesinini Erichson 1836

Hylastina Leconte 1876

Scierus LeConte 1876, 2 spp., northern and western North America in *Picea*; usually found in the phloem of roots and stumps of standing dead trees or next to the ground in boles of downed trees.

Hylurgops LeConte 1876, 6 spp., 2 with subspecies, throughout coniferous forests of North America; all species breed in the phloem of stumps, roots and souring logs. The genus is closely related to *Hylastes* from which some species are distinguished with difficulty.

Hylesinites Germar 1813
Hylastities Hagedorn 1906
Myelophites Hagedorn 1906
Hylescierites Schedl 1947

Hylastes Erichson 1836, 14 spp. in Pinaceae throughout America north of Mexico, *H. opacus* Erichson 1836 is an adventive from Europe. All species breed in the phloem of stumps and roots.

Hylesinina Erichson 1836

Hylastinus Bedel 1888, 1 sp., *H. obscurus* (Marsham 1802), native to Palearctic, now found throughout North America. Breeds in roots of legumes, especially *Trifolium* species.

Alniphagus Swaine 1918, 2 spp. in western North America (an additional species occurs in east Asia). All species breed in phloem of *Alnus* species.

Hylastinoides Spessivtev 1919

Hylesinus Fabricius 1801, 7 spp. throughout America north of Mexico in mostly *Fraxinus* hosts. Adults and larvae deeply mine the wood in the phloem-cambial area. Adults construct biramous galleries and larvae mine parallel to the grain of the wood.

Leperisinus Reitter 1913
Apidocephalus Wickham 1916

Tomicina Thomson 1859

Hylurgopinus Swaine 1918, 1 sp., *H. rufipes* (Eichhoff 1868) occurs east of the Rocky Mountains. This phloeophagous species breeds in large branches and boles of *Ulmus,* and is a vector of the Dutch elm disease fungus.

Pseudohylesinus Swaine 1917, 9 spp., 2 with subspecies, occur in western North America (2 additional species occur in Mexico). They breed in the phloem of limbs, boles and roots of weakened conifers.

Xylechinus Chapuis 1869, 2 spp. occur in northern and western North America coincident with their *Picea* hosts. They are phloeophagous in small, weakened trees.

Pruniphagus Murayama 1958
Squamosinus Nunberg 1964
Xylechinops Browne 1973

Hylurgus Latreille 1807, 1 sp., *H. ligniperda* (Fabricius 1787), native to Europe, was recently found in cut pine stumps in New York State (Hoebeke 2001). All species are native to Palearctic.

Tomicus Latreillle 1802, 1 sp., *T. piniperda* (L. 1758), native to Palearctic, was first found in North America in 1992. It is now recorded from the Lake States, Maine, Maryland, New Hampshire, New York, Pennsylvania, Vermont, West Virginia, Ontario and Quebec. Adults feed in shoots of *Pinus* and breed in boles of weakened or downed trees.

Blastophagus Eichhoff 1864
Myelophilus Eichhoff 1878

Dendroctonus Erichson 1836, 13 spp. found throughout America north of Mexico. Most species breed in the boles of conifers and some are capable of killing healthy hosts. Species in this genus are among the most economically important bark beetles.

Bothrosternina Blandford 1896

Cnesinus LeConte 1868, 1 sp., *C. strigicollis* LeConte 1868, in southeast United States and Mexico (an additional 100 species occur from Mexico to Argentina). Twigs and small woody stems are selected for attack. Adults bore through the bark and into the wood, normally reaching the pith. Larvae feed in the center of twigs extending the parental gallery.

Nemophilus Chapuis 1869

Pagiocerus Eichhoff 1868, 1 sp., *P. frontalis* (Fabricius 1801) occurs north of South America from North Carolina to Mexico (additional species occur in South America.). This species infests large seeds of trees and other plants, especially corn.

Phloeotribina Chapuis 1869

Phloeotribus Latreille 1796, 9 spp. occur north of Mexico; 2 in the west and 7 in the east, especially in the southeast. Adults breed in the phloem-cambial region of hosts. *P. liminarus* (Harris 1852) occasionally is a pest of *Prunus*.

Phloeophthorus Wollaston 1854
Dryotomus Chapuis 1869
Phthorophloeus Rey 1885
Elzearius Guillebeau 1893
Eulytocerus Blandford 1897
Comesiella DelGuercio 1925
Neophleotribus Eggers 1943
Dryotomicus Wood 1962

Phloeosinina Nusslin 1912

Dendrosinus Chapuis 1869, 1 sp., *D. bourreriae* Schwarz 1920, in the Florida Keys (nine additional species occur in Central and South America). Adults and larvae feed in the wood of small woody plants.

Phloeosinus Chapuis 1869, 25 spp., 3 of which occur in the east and the remainder in the west. All species, except *P. pini* Swaine 1915, attack Cupressaceae and Taxodiaceae. Adults construct longitudinal galleries under the bark that usually deeply engrave the wood.

Phloeosinites Hagedorn 1906

Chramesus LeConte 1868, 9 spp. are found north of Mexico. These small beetles are phloeophagous in twigs and small branches of hardwood trees and shrubs.

Rhopalopleurus Chapuis 1869
Thaumasinulus Reitter 1913
Prochramesus Wood 1956

Hypoborina Nusslin 1911

Chaetophloeus LeConte 1876, 9 spp., eight in western North America and one in the Florida Keys and adjacent islands. All species attack branches and twigs. Long larval mines radiate from the parental gallery, deeply engraving the xylem and phloem.

Renocis Casey 1886
Pseudocryphalus Swaine 1917

Liparthrum Wollaston 1854, 2 spp., one in Arizona and one in Mississippi and Indiana. These phloeophagous species are very small and attack small twigs of woody plants.

Erineosinus Blackman 1920
Phloeochilus Schedl 1953
Phloeotrypetus Wood 1960
Dacryophthous Schedl 1971
Trypanophellos Bright 1982

Polygraphina Chapuis 1869

Polygraphus Erichson 1836, 3 spp. of the 60 worldwide species occur in North America. They are phloeophagous in recently broken, cut or fallen *Picea*.

Lepisomus Kirby 1837

Spongotarsus Hagedorn 1908
Pseudopolygraphus Seitner 1911
Ozophagus Eggers 1919
Nipponopolygraphus Nobuchi 1981

Carphoborus Eichhoff 1864, 9 spp. in the 48 states and one additional species in northern Canada and Alaska. All are phloeophagous in small or broken branches of Pinaceae.
Estenoborus Reitter 1913

Carphobius Blackman 1943; 1 sp., *C. arizonicus* Blackman 1943, in Arizona, extends north from Central America. Two additional species occur in Central America. They are phloeophagous in small broken branches of conifers.

89. Scolytini Latreille 1807

Scolytina Latreille 1807

Cnemonyx Eichhoff 1868, 2 spp. of this Neotropical genus are found in the Florida Keys. They are phloeophagous in woody hosts.
Ceratolepis Chapuis 1869
Loganius Chapuis 1869
Minulus Eggers 1912
Coptodryas Schedl 1948
Coptosomus Schedl 1952

Scolytus Geoffroy 1762, 20 spp. found throughout America north of Mexico. Native western species are found in conifers, while most eastern species are in hardwoods. Three Palearctic species are established in North America, most notably, *S. multistriatus* (Marsham 1802), which transmits the Dutch elm disease fungus. All are phloeophagous and construct characteristic galleries under the bark.
Ekkoptogaster Herbst 1793
Coptogaster Illiger 1807
Eccoptogaster Gyllenhal 1813
Scolytochelus Reitter 1913
Ruguloscolytus Butovitsch 1929
Archaeoscolytus Butovitsch 1929
Spinuloscolytus Butovitsch 1929
Tubuloscolytus Butovitsch 1929
Pygmaeoscolytus Butovitsch 1929
Pinetoscolytus Butovitsch 1929
Confusoscolytus Tsai and Huang 1962

Ctenophorina Chapuis 1869

Pycnarthrum Eichhoff 1878, 1 sp., *P. hispidum* (Ferrari 1867), infests *Ficus* limbs and boles in south Florida and Texas.
Nemobius Chapuis 1869
Monebius Hopkins 1914
Nomebius Navas 1915

Scolytodes Ferrari 1867, 1 sp., *S. schwarzi* (Hopkins 1902) infests *Ficus* in south Florida. Approximately 100 spp. occur in Central and South America.
Hexacolus Eichhoff 1868
Ctenophrus Chapuis 1869
Prionosceles Blandford 1897
Epomadius Blandford 1897
Erinophlius Hopkins 1902
Hylocurosoma Eggers 1940
Hexacolinus Schedl 1963

Micracina LeConte 1876

Pseudothysanoes Blackman 1920, 19 spp. throughout the United States, one of which extends into Canada; most inhabit arid areas in the western states, three species are found in the east and southeast (approximately 60 additional species occur in Central America). Within this genus a wide variety of hosts are attacked. Several western species breed in the phloem of dying mistletoe (*Phoradendron*), other species occur in the twigs of hardwood trees. This is a very diverse genus, and several species groups were previously treated as distinct genera. Species keying out to couplet 31 in this section's key were previously recognized as the genus *Cryptocleptus*. Species with the antennal scape short and broadly expanded are placed in the subgenus *Aphanocleptus*, and those with an elongate and slender antennal scape are placed in the subgenus *Psuedothysanoes*.
Cryptocleptes Blackman 1920
Chalcohyus Blackman 1943
Bostrichips Schedla 1951
Gretschkinia Sokanovskii 1959
Aphanocleptus Wood 1960
Cryptulocleptus Wood 1967
Neoglostatus Schedl 1978

Stenoclyptus Blackman 1943, 1 sp. in U.S., *S. sulcatus* (Bruck 1936). Two species in the genus, one in California and one in Mexico. The genus is closely related to *Pseudothysanoes*. They are phloeophagous in small branches of woody plants.

Thysanoes LeConte 1876, 7 spp. across the southern United States, 1 species extends north to Illinois and Pennsylvania. Apparently they are xylophagous in small branches of trees.

Hylocurus Eichhoff 1872, 15 spp. north of Mexico, most of which occur in the southeast (more than 40 additional species occur in Central and South America). The *rudis* group needs further study; Atkinson (1989) suggests the synonymy of some species. All species are xylophagous in small branches.
Micracisoides Blackman 1920

Micracisella Blackman 1928, 5 spp. in eastern and southern United States. These small (1.0-2.5 mm) beetles breed in the pith of damaged, small twigs.
Pseudomicracis Blackman 1920

Micracis LeConte 1868, 4 spp. in the United States, 1 extends to Canada, 2 are known only from Arizona. They are xylophagous in twigs.

Cactopinina Chamberlin 1939

Cactopinus Schwarz 1899, 5 spp. in southwestern United States, additional species occur in Mexico. The unique, paired epistomal male horns distinguish this genus. They are phloeophagous in woody plants, but more commonly feed subepidermally in *Cereus* and related cacti.

Cactopinorus Bright 1967

Ipina Bedel 1888

Pityogenes Bedel 1888, 7 spp. across the United States and Canada. One species, *P. bidentatus* (Herbst 1784), is native to the Palearctic. The North American species of this primarily Eurasian genus are phloeophagous in branches, limbs and boles of *Pinus*.

Eggersia Lebedev 1926

Pityoceragenes Balachowsky 1947

Pityokteines Fuchs 1911, 6 spp. in North America, one of which, *P. sparsus* (LeConte 1868) occurs in the east. They often construct star-shaped galleries in the phloem of limbs and boles of dying trees. This genus is closely related to *Orthotomicus*. Various Pinaceae serve as hosts.

Othotomides Wood 1951

Orthotomicus Ferrari 1867, 1 sp. found across North America, *Orthotomicus caelatus* (Eichhoff 1868), is phloeophagous in *Pinus, Picea and Larix* (about 10 species are known from the Palearctic).

Neotomicus Fuchs 1911

Ips DeGeer 1775, 23 spp. plus subspecies are currently recognized from across North America. Some species placed in synonomy by Wood (1982) are recognized as valid species (Lanier 1987, Lanier *et al.*1991). Species in this relatively large genus have been put into various species groups by several workers (Hopping 1963, Lanier 1970a, 1970b, 1972, Wood 1982, Cognato and Sperling 2000). Cognato and Vogler (2001) recently revised *Ips* as monophyletic with the removal of the *latidens* group and their tentative placement in *Orthotomicus*. In addition, they also named four subgenera for monophyletic groups of *Ips* species. This well known and important genus is phloeophagous in *Pinus* and *Picea*. Most breed in dying trees and slash, but some may attack the boles and tops of healthy trees. Characteristic egg galleries engrave the phloem-cambial area.

Cumatomicus Ferrari 1867

Cyrtotomicus Ferrari 1868

Pseudips Cognato 2000, 2 spp. in North America and 1 species in Asia. Cognato (2000) used molecular, morphological and behavioral characters to separate these species from *Ips*. The two North American species occur in the west where they are phloeophagous on *Picea* (*Pseudips concinnus* (Mannerheim 1852)) and *Pinus* (*Pseudips mexicanus* (Hopkins 1905)).

Dryocoetina Lindemann 1876

Dendrocranulus Schedl 1937, 3 spp. in southern and western United States. All species infest stems of Cucurbitaceae. The genus is closely related to the Old World *Xylocleptes* Ferrari.

Lymantor Lovendal 1889, 1 sp. in eastern United States and Canada and 1 species in Alaska. These beetles are phloeophagous in small, dry, often dead, branches of *Acer* and, rarely, other hosts.

Dryocoetes Eichhoff 1864, 7 spp. in United States and Canada. They are phloeophagous in the boles of mostly conifers, except *D. betulae* Hopkins 1915, which infests the bole of *Betula*.

Anodius Motschulsky 1860

Dryocoetinus Balachowsky 1949

Dryoxylon Bright and Rabaglia 1999, 1 sp., *D. onoharaensum* (Murayama 1934), native to Japan, originally described as a *Xyleborus*, is established in southeastern United States. Little is known about the biology, but it appears to feed in the xylem (Bright and Rabaglia 1999). Normark *et al.* (1999) discussed the genetic affinities of this genus and other Dryocoetini to Xyleborini.

Coccotrypes Eichhoff 1878, 9 spp. are known from United States, mostly Florida and California. This genus contains many species, mostly from southeast Asia and Africa, and species found in most other areas, including the United States, have arrived through commerce (Wood 1986). Females mate with dwarfed siblings before they emerge to seek a new host. They most often infest large seeds; however, a few species are phloeophagous. Wood (1986) stated that this genus is "in a state of taxonomic chaos". Jordal *et al.* (2000) showed the genetic relatedness of the genus to Xyleborini.

Poecilips Schaufuss 1897

Cryphaloides Formanek 1908

Thamnurgides Hopkins 1915

Spermatoplex Hopkins 1915

Dendrurgus Eggers 1923

Crypturgina LeConte 1876

Dolurgus Eichhoff 1868, 1 sp. is known from western North America. *Dolurgus pumilus* (Mannerheim 1843) occurs from Alaska to California where it breeds in dying *Picea*. It utilizes the entrance holes of larger bark beetles, and its galleries are often wholly in the bark.

Crypturgus Erichson 1836, 3 spp. occur in America north of Mexico, one of which, *C. pusillus* (Gyllenhal 1813), is native to Europe and Asia. They utilize the entrance holes of other beetles to gain access to the phloem in the boles of conifers.

Xyloterina Lindemann 1876

Trypodendron Stephens 1830, 5 spp. in North America, additional species occur in Europe and Asia. These are monogamous ambrosia beetles that breed in either conifers or hardwoods. *Trypodendron lineatum* (Olivier 1795), which occurs across North America and into northern Europe and Asia, is often a pest of conifer logs in processing yards.

Xyloterus Erichson 1836

Xyloterinus Swaine 1918, 1 sp., *Xyloterinus politus* (Say 1826), is recognized in the genus, which is found throughout eastern North America. This monogamous ambrosia beetle is commonly found attacking weakened hardwood trees.

Xyleborina LeConte, 1876

Premnobius Eichhoff 1878, 1 sp., *P. cavipennis* Eichhoff 1878, from Africa is found in Florida. This genus is unique within the Xyleborini. Browne (1961) treated it as a distinct tribe, and Normark *et al.* (1999), using DNA, showed a separate origin from Xyleborini and a closer relationship to Ipini. Males of these ambrosia beetles are flightless and mate with siblings (consanguineous polygyny) before the females leave the brood gallery.

Premnophilus Browne 1962

Ambrosiodmus Hopkins 1915, 7 spp. occur in the eastern United States, mostly in the southeast. They are consanguineously polygynous in a wide variety of hosts. Most attacks occur in the lower bole and stumps of trees.

Phloeotrogus Motschulsky 1863
Brownia Nunberg 1963

Euwallacea Hopkins 1915, 1 sp., *E. validus* (Eichhoff 1875), native to Asia, is now established in the eastern United States. It is a consanguineously polygynous ambrosia beetle that breeds in the stumps and boles of hardwoods and conifers.

Xyleborus Eichhoff 1864, (Vandenberg *et al.* 2000, key to eastern United States species); 17 spp. are identified from America north of Mexico, 5 of which are native to Europe and Asia. Most United States species are found in the east. More than 500 species are described from the neotropics, Africa and Asia. Representatives of this large and important genus attack almost all parts of woody plants. Most of these ambrosia beetles attack declining trees, but some may attack apparently healthy plants. Flightless, haploid males mate with sibling or parental females within the brood galleries before emergence. Extreme inbreeding and partial parthenogenesis may be the cause of the many morphological races and species. In addition, this mating system has allowed for new founder populations to be easily distributed through commerce (Atkinson *et al.* 1990). The generic and tribal limits of these rapidly radiating species need taxonomic revision. Jordal *et al.* (2000) and Normark *et al.* (1999) showed genetic relatedness to Dryocoetini and Wood (1986) suggests a relationship with Xyloterini.

Anisandrus Ferrari 1867
Anaertus Duges 1887
Progenius Blandford 1896
Heteroborips Reitter 1913
Xyleborips Reitter 1913
Boroxylon Hopkins 1915
Notoxyleborus Schedl 1934

Xylosandrus Reitter 1913, 4 spp. in eastern North America, 3 of which are native to Asia. The three exotic species are becoming very common, and occasionally aggressively attack apparently healthy, small trees. *Xylosandrus compactus* (Eichhoff 1875) often attacks healthy, vigorous twigs of living trees. All species cultivate ambrosia fungi and are consanguineously polygynous.

Apoxyleborus Wood 1980

Xyleborinus Reitter 1913, 3 spp. occur in America north of Mexico, 2 are exotic. *Xyleborinus saxeseni* (Ratzburg 1837), native to Europe, is found across the United States; *X. alni* (Niisima), from Europe and Asia, has recently been found on the west coast of North America (Mudge *et al.* 2001). The genus was often treated as a subgenus or synonym of *Xyleborus,* but it is morphologically distinct. Their biology is similar to *Xyleborus*, attacking limbs and boles of weakened trees.

Cryphalina Lindemann 1876

Trypophloeus Fairmaire 1868, 4 spp. in northern and western North America. These small, less than 2 mm, beetles are monogamous and phloeophagous in the bark of thin-barked limbs and boles of *Alnus*, *Salix* and *Populus*.

Glyptoderes Eichhoff 1878

Procryphalus Hopkins 1915, 2 spp. in western North America, one additional species in Asia. Biology is similar to *Trypophloeus*.

Ernoporicus Berger 1917, 1 sp., *E. kanawhae* Hopkins 1915, known only from the type series taken in flight in West Virginia.

Eocryphalus Kurenzov 1941
Ernopocerus Balachowsky 1949

Scolytogenes Eichhoff 1878, 1 sp., *S. knabi* (Hopkins 1915), occurs in vines in south Florida. Many other species are found in subtropical and tropical areas of the world.

Lepicerus Eichhoff 1878
Cryphalomorhpus Schaufuss 1891
Letznerella Reitter 1913
Hypothenoides Hopkins 1915
Neocryphalus Eggers 1922
Negritus Eggers 1923
Cylindrotomicus Eggers 1936
Lepicerinus Hinton 1936
Cryphalophilus Schedl 1970
Xylocryptus Schedl 1975

Hypocryphalus Hopkins 1915, 1 sp., *H. mangiferae* (Stebbing 1914), native to Asia, occurs in mango, *Mangifera*, in south Florida. They are phloeophagous in branches of their host.

Dacryphalus Hopkins 1915

Cryphalus Erichson 1836, 3 spp. occur in conifers in northern and western North America. They are generally less than 2 mm and infest declining branches and small trees. Adults construct cave-type galleries in the phloem. Several hundred nominate species occur in Asia to Australia, and a worldwide taxonomic revision is needed (Wood 1986).

Pseudocryphalus Ferrari 1868
Taenioglyptes Bedel 1888
Cryptarthrum Blandford 1896
Allarthrum Hagedorn 1912
Ericryphalus Hopkins 1915
Piperius Hopkins 1915
Ernocryphalus Murayama 1958
Acryphalus Tsai and Li 1963
Jugocryphalus Tsai and Li 1963

Cryptocarenus Eggers 1937, 2 spp. are found in south Texas and Florida and extend through Central and South America. Males are flightless in these consanguineous polygynous pith borers of small twigs.

Tachyderes Blackman 1943

Hypothenemus Westwood 1836, 21 spp. have been recorded from the United States, many of which are native to Asia or Africa. Most United States species occur in the southern half of the country. These small, less than 2 mm, beetles infest twigs, vines, pith, seeds and other plant material. They are consanguineously polygynous and have been widely distributed through commerce. Over 200 species have been assigned to this genus, and species identification is often difficult.

Stephanoderes Eichhoff 1872
Homoeocryphalus Lindemann 1876
Triarmocerus Eichhoff 1878
Adiaeretus Hagedorn 1909
Stylotentus Schedl 1939
Chondronoderes Schedl 1940
Archeophalus Schedl 1941
Pachynoderus Schedl 1941
Lepiceroides Schedl 1957
Ernophloeus Nunberg 1958
Epsips Beeson 1941
Macrocryphalus Nobuchi 1981

Trischidias Hopkins 1915, 5 spp. occur in the southeastern United States. These very small, less than 1 mm, beetles are relatively rare. One species feeds on fungus pustules under the bark of mangrove, and others are phloeophagous in injured, often fungus-infested twigs.

Pityophthorina Eichhoff 1878

(This group has been treated as a subytribe of Corthylina by Wood and Bright (1992).)

Dendroterus Blandford 1904, 2 spp. in United States, one in Texas in *Jatropha* and one in California in *Bursera*. They are phloeophagous in the bark of declining branches.

Plesiophthorus Schedl 1940
Xylochilus Schedl 1956

Araptus Eichhoff 1872, 1 sp., *A. dentifrons* Wood 1974, occurs in south Florida (Atkinson and Peck 1994) and possibly Texas. This Neotropical species breeds in the pith of vines. *Araptus politus* (Blandford 1904) has been intercepted in large seeds in the port of Miami, but it is not known to be established.

Neodryocoetes Eggers 1933
Thamnophthorus Schedl 1938
Neopityophthorus Schedl 1938
Sphenoceros Schedl 1939
Hypertensus Hagedorn 1950
Brachydendrulus Schedl 1951
Gnathocranus Schedl 1951
Gnathoborus Schedl 1970

Conophthorus Hopkins 1915, 8 spp. are currently recognized from America north of Mexico, 2 spp. occur in the east and 6 in the west. All species breed in the cones of *Pinus*.

Pityoborus Blackman 1922, 2 spp. in United States, one in southeast and one in southwest. They are phloeophagous in dying branches of *Pinus*. Their galleries in the cambium deeply score the xylem.

Pityotrichus Wood 1962, 2 spp. in southwest United States (Arizona and New Mexico). These species are distinguished from closely related *Pityophthorus* by the unique pregula referenced in the key. They are monogamous and feed in the phloem of small branches.

Pityophilus Blackman 1928

Pseudopityophthorus Swaine 1918, 11 spp. across America north of Mexico. All species breed in branches or boles of *Quercus*, except *P. fagi* Blackman 1931 which is found in *Fagus*.

Xenophthorus Wood and Yin 1986

Pityophthorus Eichhoff 1864, 104 spp. are recognized north of Mexico, more than 200 additional species occur in Central and South America and more than 50 in Europe, Asia and Africa. This large and diverse genus is found throughout the United States in many different hosts. Representatives may be found breeding in twigs, seedlings, boles or pith. Most are heterosanguinously polygynous and some are monogamous.

Trigonogenius Hagedorn 1912
Hagedornus Lucus 1920

Myeloborus Blackman 1928
Gnathophorus Schedl 1935
Conophthocranulus Schedl 1935
Breviophthorus Schedl 1938
Pityophthoroides Blackman 1942
Cladoborus Sawamoto 1942
Neomips Schedl 1954
Ctenyophthorus Schedl 1955
Gnathophthorus Wood 1962
Hypopityophthorus Bright 1981

Corthylina LeConte 1876

Gnathotrichus Eichhoff 1869, 7 spp. north of Mexico. *G. materiarius* (Fitch 1858) occurs in *Pinus* throughout eastern North America, the remaining species are in the west in oaks and conifers. They are monogamous ambrosia beetles breeding in dying or fallen trees or logs. Some species are pests in wood processing yards, especially in the Pacific Northwest.

Gnathotrichoides Blackman 1931
Ancyloderes Blackman 1938
Paraxyleborus Hoffman 1942
Prognathotrichus Bright 1972

Monarthrum Kirsch 1866, 5 spp. north of Mexico, 2 spp. throughout the east and 3 spp. in the west. More than 100 additional species are found in Central and South America. These ambrosia beetles attack logs and boles of dying hardwoods, especially oaks.

Corthylomimus Ferrari 1867
Cosmocorynus Ferrari 1867
Pterocyclon Eichhoff 1869
Anchonocerus Eichhoff 1878
Phthorius Eichhoff 1878
Trypocranus Eichhoff 1878
Eupteroxylon Eggers 1936

Corthylus Erichson 1836, 3 spp. in United States, one of which occurs in Canada; all are found east of the Rocky Mountains. Approximately 100 additional species occur in Central and South America. These ambrosia beetles breed in a variety of locations on a tree. *Corthylus papulans* Eichhoff 1869, in Florida, breeds in small branches; *C. punctatissimus* (Zimmermann 1868) breeds in sapling trees, especially *Acer*, near ground level and *C. columbianus* Hopkins 1895 breeds in the xylem of living trees, usually *Acer*, which survive after the brood emerges.

Morizus Ferrari 1867
Pseudocorthylus Ferrari 1867
Corthylomimus Schedl 1972

XVIII. Platypodinae Shuckard 1840

by Robert S. Anderson

Platypodinae are an enigmatic group that have been recognized either as a distinct family or a subfamily within Curculionidae. There are 4 genera in North America based on the recent division of the genus *Platypus* into a variety of smaller genera (Wood 1993). Traditionally they have been closely allied with Scolytinae, but Lyal (1995) could not find support for a monophyletic group comprised only of scolytines and platypodines nor could he find support for them having a separate ancestry from Curculionidae. Similarly, Thompson (1992) chose to give Platypodidae family level status while at the same time considering Scolytinae as a subfamily within Curculionidae. A review of their phylogenetic position is given by Kuschel *et al.* (2000).

Platypodinae are easily recognized by the lack of a rostrum, presence of pregular sutures, pregular sclerite distinct, located between median gular suture and labial articulation, at least one pair of tibiae with denticles or stout socketed setae along the dorsal (outer) margin, tarsus with article 1 as long as articles 2-5 combined, pronotum usually with a lateral constriction near the middle and the antennal club without sutures (Fig. 131).

Where known, adults and larvae infest the wood of dead or recently cut or dying trees. Larvae mine galleries deep into the wood which become stained black by ambrosia fungi which grow on the walls of the tunnels and serve as the larval food (Bright 1993).

Key to the Nearctic genera of Platypodinae

1. Metasternum and metepisternum near hind coxa weakly or not impressed for reception of femur, anterior margin of impressed area not continuously carinate or with a row of small spines, surface of impressed area with at least some setae ..... *Treptoplatypus*
— Metasternum and metepisternum near hind coxa impressed for reception of femur, anterior margin of impressed area either continuously carinate or with a series of small spines, surface of impressed area glabrous 2

2(1). Male with ventrite 3, 4 or 5 simple, not armed with spines ..... *Euplatypus*
— Male with ventrite 3, 4 or 5 with a pair of widely separated coarse spines 3

3(2). Male with ventrite 3 with a pair of spines; female with mycetangia pores moderate in size ..... *Myoplatypus*
— Male with ventrite 4 with a pair of spines; female with mycetangia pores unusually large in size ..... *Oxoplatypus*

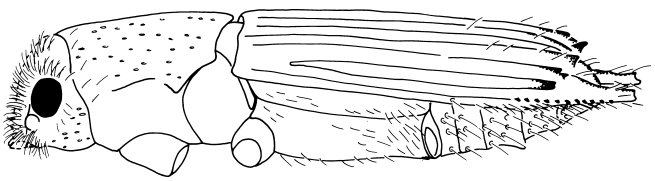


FIGURE 110.131. Platypodinae. 110. *Myoplatypus flavicornis* (Fabricius), lateral habitus.

Classification of the Nearctic Platypodinae

90. Platypodini Shuckard 1840

Treptoplatypus Schedl 1972, 2 spp., *T. abietis* (Wood 1958) and *T. wilsoni* (Swaine 1916), northwestern United States and British Columbia. Species are associated with timber of conifers (Bright 1993).

Myoplatypus Wood 1993, 1 sp., *M. flavicornis* (Fabricius 1776), southern Florida.

Oxoplatypus Wood 1993, 1 sp., *O. quadridentatus* (Olivier 1795), southeastern United States. This species is associated with various species of *Quercus* (oak; Fagaceae) (Wood 1993).

Euplatypus Wood 1993, 3 spp., *E. parallelus* (Fabricius 1801), *E. compositus* (Say 1824) and *E. pini* (Hopkins 1905), southern United States; one species adventive.

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