STUDIES ON THE TAXONOMY AND DISTRIBUTION OF AMERICAN CENTRIDINE BEES (HYMENOPTERA: ANTHOPHORIDAE)

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ABSTRACT. This study focuses primarily on the Centridini of North America south of the United States and includes a key to the three genera of Centridini: *Centris, Ptilotopus,* and *Epicharis.* Within the genus *Centris* keys are provided for species in the subgenera *Paracentris, Centris, Xanthemisia, Acritocentris, Melanocentris, Trachina, Hemisiella,* and *Heterocentris*; one new monotypic subgenus is described: *Ptilocentris* (type-species: *Centris festiva* F. Smith, 1854).

The following new species are described: *C.* (*Xerocentris*) *griseola* (Mexico); *C.* (*C.*) *aethiocesta* (El Salvador to Panama); *C.* (*Acritocentris*) *satana* (Mexico, United States); *C.* (*Melanocentris*) *agiloides* (Mexico to Costa Rica); *C.* (*M.*) *gelida* (Mexico, Guatemala); *C.* (*Trachina*) *eurypatana* (Mexico); *C.* (*T.*) *xochipillii* (Mexico). *Centris* (*C.*) *meaculpa* is proposed as a new name for *C.* (*C.*) *erubescens* Snelling, 1974, not *C. costaricensis* var. *erubescens* Friese, 1925. *Centris atripes* var. *ferrisi* Cockerell is a valid species in *Paracentris*; the types are males, not females as stated by Cockerell.

The following new synonymy is proposed in *Centris*: *C. cockerelli resoluta* Cockerell = *C.* (*Paracentris*) *cockerelli* W. Fox; *C. clypeata* Friese, *C. anthracina* Snelling = *C.* (*P.*) *nigrocaerulea* F. Smith; *C. limbata* Friese = *C.* (*P.*) *atripes* Mocsáry; *C. strawi* Snelling = *C.* (*Acritocentris*) *albiceps* Friese; *C. robusta* Cockerell, *C. segregata* Crawford = *C.* (*C.*) *inermis* Friese; *C. citrotaeniata* Gribodo, *C. flavifrons* var. *rufescens* Friese, *C. flavifrons* var. *nigritula* Friese = *C.* (*C.*) *flavifrons* (Fabricius); *C. chlorura* Cockerell = *C.* (*Ptilocentris*) *festiva* F. Smith; *C. ignita* F. Smith, *C. bakerella* Friese, *Epicharis cisnerosi* Cockerell = *C.* (*Melanocentris*) *agilis* F. Smith; *C. fusciventris* var. *scutellata* Mocsáry = *C.* (*M.*) *fusciventris* Mocsáry; *C. melanochlaena* F. Smith, *Epicharis zamoranensis* Cockerell = *C.* (*M.*) *obsoleta* Lepeletier; *C. schwarzi* Cockerell = *C.* (*Trachina*) *labiata* Friese; *C. confinis* Pérez = *C.* (*Hemisiella*) *nitida* F. Smith; *C. ruae* Cockerell = *C.* (*H.*) *transversa* Pérez; *C. dentipes* F. Smith, *C. rufomaculata* Cockerell, *C. lanipes subtarsata* Cockerell = *C.* (*H.*) *trigonoides* Lepeletier; *C. costaricensis* var. *erubescens* Friese = *C.* (*H.*) *vittata* Lepeletier; *C. triangulifera* Cockerell = *C.* (*Heterocentris*) *labrosa* Friese.

Ptilotopus is elevated to generic rank from its previous status as a subgenus of *Centris*; *P. zonalis* Mocsáry of Panama is the only species in North America.

A key is given for all the subgenera of *Epicharis* and keys are given for the species of each subgenus known to occur in North America.

Two new species are described in the subgenus *Epicharana*: *E. angulosa* (Costa Rica) and *E. bova* (Costa Rica, Panama). The following are new synonyms: *E. salazari* Cockerell = *E.* (*Epicharana*) *elegans* F. Smith; *E. rustica* var. *flava* Friese = *E.* (*Epicharana*) *rustica* (Olivier); *E. phenacura* Cockerell, *E. conura* Cockerell = *E.* (*Parepicharis*) *metatarsalis* Friese. North American distribution data are cited for all species.

Included is a synonymic list of the recognized North and Central American Centridini.

RESUMEN. Este estudio se refiere principalmente a los Centridini de Norte América al sur de los Estados Unidos e incluye una clave para los tres géneros de Centridini: *Centris, Ptilotopus* y *Epicharis.* Dentro del género *Centris* se incluyen claves para las especies de los subgéneros *Paracentris, Centris, Xanthemisia, Acritocentris, Melanocentris, Trachina, Hemisiella* y *Heterocentris*; un subgénero monotípico nuevo se describe, *Ptilocentris* (especie-tipo: *Centris festiva* F. Smith, 1854).

Ptilotopus se eleva al rango genérico desde su estatus previo de subgénero de *Centris*; *P. zonalis* Mocsáry de Panamá es la única especie en Norte América.

Se da una clave para todos los subgéneros de *Epicharis* y para las especies de cada subgéneros conocidos en Norte América.

Se describen ocho nuevas especies para el género *Centris* y dos para el género *Epicharis.* Estas al igual que los nuevos sinónimos se incluyen en el "Abstract."

Se citan datos de distribucion de Norte América para todas las especies. Se incluye una lista de los Centridini reconocidos de Norte América y de las sinonimias conocidas.

INTRODUCTION

The present paper is a continuation of my earlier work on the *Centris* of North and Central America (Snelling, 1956, 1966, 1974). New data on the distribution of previously treated species, as well as investigations into the systematics of previously unstudied groups are presented below. Although my previous investigations involved only the genus *Centris,*

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Contributions in Science, Number 347, pp. 1–69
Natural History Museum of Los Angeles County, 1984

ISSN 0459-8113

the study has now expanded to include the genera *Epicharis* and *Ptilotopus,* the latter newly elevated to generic status from its previous position as a subgenus of *Centris.*

SPECIMENS EXAMINED

Material utilized in this study is from the following institutional and private collections: American Museum of Natural History (AMNH), Robert W. Brooks, personal collection (RWB), California Academy of Sciences (CAS), Cornell University (CORN), Florida State Department of Plant Industry (DPIF), Museum of Comparative Zoology (MCZ), Museum National d'Histoire Naturelle, Paris (MNHN), Natural History Museum of Los Angeles County (LACM), John L. Neff, personal collection (NEFF), Oregon State University (ORSU), D. Roubik, personal collection (ROUB), United States National Museum of Natural History (USNM), University of California, Berkeley (UCB), University of California, Davis (UCD), University of Kansas (UKAN), and Thomas J. Zavortink, personal collection (TJZ).

SPECIMEN DATA

New data on distribution, capture dates, and plant association are fully cited for many species since there are few published records. Localities are organized by country and by state, province or department within that country. The designation "state," "department," or "province" is omitted to conserve space. Thus, a locality cited under "COSTA RICA, SAN JOSÉ" is from San José Province in Costa Rica.

Specimen data are cited for most species, but some species are common, widely distributed and abundant. For such species, only general range is given.

TERMINOLOGY

In general, the morphological terminology employed below is that which is traditional is apoid systematics, following Michener (1944, 1954, 1965). A few terms, however, should be explained, in order that they may be correctly employed (in the sense of this paper) by others.

Antennal socket diameter. Since the antennal socket is not circular it follows that two different measurements are possible. In this study, the antennal socket diameter is measured perpendicular to the long axis of the head (i.e., the transverse diameter); measurement is made from the summit of the rim on the opposite side. Associated measurements include the *interantennal distance* and the *antennocular distance.*

Interantennal distance is measured as the least distance between the summits of the two antennal socket rims.

Antennocular distance is the least distance from the inner eye margin to the summit of the rim of the adjacent antennal socket.

Several features of the clypeus should be defined for consistent usage. The *clypeal disc* is the central portion of the clypeus, from base to apical margin and roughly bounded on either side by an imaginary line extended distad from the junction of the subantennal sutures with the base of the clypeus. *Clypeal length,* when compared to clypeal width, is measured along the midline, from the base to the apical margin. *Clypeal width* is measured as the greatest distance between the apicolateral extremities of the clypeus (i.e., that portion nearest the inner eye margin). The distance between the clypeus and the eye is measured as the least distance between the apicolateral extremity and the nearest point on the inner eye margin.

Elaiospathe is a new term: It is a combination of the Greek words *elaion* (oil) and *spathe* (a paddle for stirring or mixing; a broad blade). This term refers to the modified oil-gathering structures present in female centridine and exomalopsine bees. The elaiospathe most commonly consists of a row of long, erect, apically spatulate and curved setae, usually on the pro- and mesobasitarsi; in Centridini they are situated anteriorly on the "inner" surface of the segment, in some Exomalopsini they are external and may be present in males as well as females, and are limited to the probasitarsi. However, oil-collecting structures may also be present on the abdominal venter, at least in some species of *Tapinotaspis* (*Tapinotaspoides*). For an excellent survey of the morphology and function of the elaiospathe, see Neff and Simpson (1981).

The *lower frontal width* is measured as the distance between the inner eye margins at the level of the apicolateral angle of the clypeus. It is compared with the upper frontal width to determine the degree of convergence of the inner eye margins. The *upper frontal width* is the minimum distance between the inner eye margins at about the level of the ocelli.

The *diameter of the anterior ocellus* is the greatest transverse (perpendicular to long axis of head) diameter of the anterior ocellus. *Interocellar distance* is the minimum distance between the posterior, or lateral, ocelli. *Ocellocular distance* is the minimum distance between one of the posterior ocelli and the nearest point on the eye margin. *Ocelloccipital distance* is measured in dorsal view and is the minimum distance from the posterior margin of one of the posterior ocelli to the occipital declivity. *Transocellar distance* is measured as the maximum distance between the *outer* margins to the two posterior ocelli. In all cases, the ocellus is, for purposes of measurement, considered to be only the transparent amber-colored lens.

Pilosity. In general, centridines, like most other anthophorids, are densely hairy bees, with much of the head, thorax, and first abdominal tergum clothed with long, plumose, decumbent to fully erect hairs. Similarly, the legs are hairy, but hairs tend to be decumbent to subappressed on the outer faces of the tibiae and basitarsi and are often stout and simple. Long, plumose hairs are usually present, but sparse, on the femora. On the abdomen, the hairs on the discs of the segments generally become longer and more erect on succeeding segments, plumose hairs as a rule being absent from the discs of the second and third terga.

The abdominal sterna normally have long, plumose hairs which tend to be longest and most abundant along the midline. As a rule, males are more densely pubescent on the sterna than are the females.

Punctation. The description of characteristics related to

the punctation of the integument of bees and other Hymenoptera have long been the bane of taxonomists since the terminology has always been undefined and subject to considerable variation in interpretation. Punctures which one author considers to be fine, another might describe as moderate in size. The distances between punctures, whether dense, close, or sparse, have likewise been troublesome. A few years ago I (Snelling, 1980) introduced a system of terminology to solve this difficulty in the genus *Hylaeus*. After considering the objections by Harris (1979), I can find no valid reason not to apply the same terminology of absolute measurements to the Centridini. I do not agree that punctation need be described relative to the size of the entity. Admittedly, I was initially uncomfortable at describing as "coarse" those punctures on a centridine bee that I was accustomed to considering to be moderate-sized. This is, however, strictly a perceptual problem, one which has ceased to disturb my sense of "rightness."

Therefore, I propose to expand the usage of my system to include the Centridini. Such a system must be considered, at this point, to be experimental; some adjustment or modification may prove to be necessary as this method is tried on other groups. A mierometer disk in one ocular of a microscope is, obviously, necessary and I use a minimum magnification of 64×; several punctures of about the same apparent size are measured and averaged. The appropriate terminology is as follows:

minute—puncture diameter 0.010–0.019 mm
fine—puncture diameter 0.020–0.035 mm
moderate—puncture diameter 0.036–0.055 mm
coarse—puncture diameter 0.056–0.070 mm
very coarse—puncture diameter over 0.070 mm

Since punctures are often not uniform in size on a given segment or area, it may be necessary to combine terms into phrases such as "fine to moderate" (puncture diameter varying between 0.020 and 0.055 mm), though usually a more limited size range, such as moderate, may prevail.

The relative density of punctures may also be standardized and I use the following terminology below:

Contiguous—punctures so close that they are often deformed; interspaces are compressed and sharp-edged.

Subcontiguous—punetures separated by more or less flat interspaces up to about 0.30 times a puncture diameter; some punctures may be deformed.

Dense—punctures separated by more or less flat interspaces between 0.30 and 0.70 times a puncture diameter; punctures usually round but may be elongate.

Close—punctures separated by more or less flat interspaces 0.70 to 1.50 times a puncture diameter.

Sparse—punctures separated by more or less flat interspaces 1.50 to 3.00 times a puncture diameter.

Scattered—puncture interspaces are very irregular and range from about 3.00 to 6.00 or more times a puncture diameter.

Variations in puncture density may be expressed by combining terms: "sparse to scattered."

Clypeal punctation is usually described from the middle one-third of the disc.

Mesoscutal punctation is described from the area between the parapsidal line and the median line at the level of the tegula; punctures are commonly less close posteromesally on the segment and are closer laterad of the parapsidal line. Scutellar and metanotal sculpture is described from the mesal one-third of the segment. The middle of the mesopleural disc is the standard for that segment.

The first abdominal segment has a nearly vertical anterior and a horizontal posterior face; the latter is referred to as the disc of the segment. Tergal punctation is described from the mesal one-third of the postgradular area of the segments beyond the first, and anterior to the apical zone.

The distal portion of the abdominal terga, especially of the second and following segments, except the last, is commonly depressed in bees; this area is usually called the apical depression and it is often sculptured differently from the disc. In centridines this area is usually not obviously depressed, especially aeross the middle two-thirds of the segment, but is usually more sparsely and less coarsely sculptured than the disc; herein I refer to this as the *apical zone.*

In the description of new taxa, measurements and proportions are based on the primary type specimens. The corresponding range of measurements and proportions of paratypes only (if any) are indicated parenthetically after those of the primary type.

NESTING BIOLOGY

The little that is known of centridine nesting biology was reviewed by Coville, Frankie, and Vinson (1983). They concluded that the choice of nesting substrate by the female bees is roughly correlated with taxonomic groupings. Thus, those species in the subgenera *Wagenknechtia, Paracentris, Xerocentris, Centris* s. str., *Exallocentris,* and *Melanocentris* normally excavate original tunnels in soil. About one-half of the species cited utilize flat soil and about one-half excavate in more or less vertical banks or mud walls; two species evidently are capable of choosing either flat or vertical surfaces.

Species belonging to the subgenera *Hemisiella* and *Heterocentris* generally utilize preexisting cavities in a variety of substrates. Some species, at least, seem to be highly opportunistic in choice of substrate and may choose old bee cells and burrows in soil, abandoned *Sceliphron* nests, or holes in wood. Of two species of *Trachina* cited, one nested in the walls of a living arboreal termitarium and the other chose flat soil.

Species of *Ptilotopus,* herein treated as a separate genus, were uniform in excavating their nests in the walls of living arboreal termitaria. There is some suggestion that the arrangement of cells within the nest may similarly substantiate the present groupings of subgenera, but the data are very fragmentary.

SYSTEMATICS

The general interpretation of the Centridini has been that there are two genera, *Centris* and *Epicharis* (e.g., Michener, 1954). One result of my recent work in this tribe is that I now believe that *Ptilotopus,* formerly treated as a subgenus

of *Centris*, must be elevated to generic status; justification for this decision will be provided below. The three genera of Centridini which I recognize may be separated as follows.

KEY TO GENERA OF CENTRIDINI

1a. Marginal cell of forewing shorter than distance from its apex to tip of wing; occipital flagelliform setae usually absent, but if present, not reaching as far back as anterior margin of tegula 2

b. Marginal cell of forewing longer than distance from its apex to tip of wing; occipital flagelliform setae present and usually extending to, or beyond, level of anterior margin of tegula ..... *Epicharis*

2a. Occipital flagelliform setae absent; mesosternum of female without tubercles; hypoepimeron flat or slightly convex; pronotal lobe low and moderately convex, never conspicuously tuberculate ..... *Centris*

b. Occipital flagelliform setae present and extending to anterior margin of mesoscutum, or slightly beyond; mesosternum of female with a pair of stout tubercles hidden in dense cluster of hairs; hypoepimeron usually prominently coniform, but if not, its lower margin is sharply elevated above adjacent portions of mesepisternum; pronotal lobe often tuberculate ..... *Ptilotopus*

Genus *Centris* Fabricius

Centris is a primarily tropical genus, with 11 subgenera; these subgenera are separated in keys by Michener (1951) and Snelling (1974). The separation of *Ptilotopus* from *Centris* (see below) removes the only group with flagelliform occipital setae. The North American species of the subgenera *Xerocentris* and *Paracentris* were treated by Snelling (1974). The North American species of the remaining subgenera are treated below.

Subgenus *Xerocentris* Snelling

Centris subg. *Xerocentris* Snelling, 1974:3–4. Type-species: *Centris californica* Timberlake, 1940; original designation.

This subgenus was proposed for a number of species found in arid regions of North and South America. Although *Xerocentris* is related to *Paracentris*, females lack an elaiospathe on the pro- and mesobasitarsi, present in *Paracentris* and *Centris* s.s., and the pygidial plate is convex along the median line. Males are much like those of *Paracentris*, but the ocellocular distance is less than the diameter of a lateral ocellus, and the abdominal terga are covered with abundant fully erect, often pale, hairs.

One new species of *Xerocentris* is described below.

Centris (*Xerocentris*) *griseola*, new species

DIAGNOSIS

Female runs to *C. vanduzeei* Cockerell in my key (1974), but mandible tridentate (quadridentate in *C. vanduzeei*), mesoscutum and scutellum with mixed black and pale erect hairs (wholly pale in *C. vanduzeei*), prepygidial brush blackish brown (bright fulvous in *C. vanduzeei*) and distal portion of median ridge of pygidium low and rounded (cariniform in *C. vanduzeei*). Male unknown.

DESCRIPTION

HOLOTYPE FEMALE. Measurements (mm). Head width 5.18 (5.03–5.28); head length 3.79 (3.23–3.33) wing length 10.1 (10.2–10.3); total length 13.0 (13.0–15.5).

Head. 1.58 (1.51–1.62) times broader than long; occipital margin nearly flat in frontal view; inner orbits strongly convergent above, upper frontal width 0.84 (0.82–0.84) times lower frontal width. Maxillary palp five-segmented. Mandible slender, tridentate, second preapical tooth absent; inner tooth prominent, triangular, and nearly perpendicular to long axis of mandible. Labrum unmodified; shiny between subcontiguous, moderate punctures. Clypeus flattened, weakly protuberant; disc slightly shiny, surface roughened, irregularly, obliquely to transversely rugose. Frons and vertex moderately shiny to shiny between fine subcontiguous to dense punctures, but with extensive smooth areas in front of, and laterad to, ocelli; gena less than half as wide as eye, moderately shiny between fine, dense punctures. Interantennal distance 2.92 (2.32–3.67) times antennal socket diameter; antennocular distance 1.62 (1.65–2.00) times antennal socket diameter; scape short, robust, scape length 0.73 (0.67–0.70) times length of first flagellar segment; first flagellar segment 4.83 (5.06–5.50) times length of second. Ocelli, in frontal view, well below occipital margin; interocellar distance 2.23 (2.20–2.24) times ocellar diameter; ocellocular distance 1.50 (1.52–1.58) times ocellar diameter; ocelloccipital distance 2.50 (2.52–2.65) times ocellar diameter.

Thorax. Mesoscutum shiny between subcontiguous to dense moderate punctures; scutellum narrowly shiny and impunctate across anterior margin but mostly weakly shiny, interspaces conspicuously roughened between dense, moderate punctures; metanotum vertical, shiny between sparse, fine punctures; mesopleuron moderately shiny, moderately tessellate between subcontiguous to dense, fine punctures; metapleuron similar but a little shinier. Propodeal disc smooth and shiny between scattered minute to fine punctures; side of propodeum less shiny, punctures dense to sparse, minute. Metabasitibial plate about twice longer than broad, strongly narrowed apicad, secondary plate poorly defined and merging into primary plate, anterior depression small (all specimens worn, details uncertain); scopal hairs largely plumose along margins, mostly simple elsewhere.

Abdomen. Discs of all terga moderately shiny and weakly tessellate between dense to sparse, fine punctures; pygidium elongate-triangular, apex narrowly rounded; median elevation rounded and not attaining apex.

Color. Generally blackish brown, abdominal terga with weak blue-green reflections; mandibles dark ferruginous; flagellum and legs brown; tergal margins yellowish; tegula piceous; wings slightly brownish, veins and stigma brown.

Pilosity. Of head, thorax and abdomen fully erect, whitish, with that of vertex largely brownish; pale and blackish hairs about equally abundant on mesoscutum, scutellum and pro-

notal lobes; tergal hairs shorter and sparser, plumose; fourth tergite with a few, and fifth with many, long, curled blackish bristles; prepygidial fimbria dark; sixth tergite with dark bristles and hairs; sternites with dark discal hairs and pale distal hair bands, those of fourth and fifth segments broadly interrupted; sixth segment dark pubescent; scopal hairs white; some brownish bristles on protibia; bristles of protarsus and thoracic venter brown; bristles on inner side of meso- and metabasitarsi brownish ferruginous.

TYPE MATERIAL

Holotype female and three paratypes. MEXICO, *GUERRERO:* Iguala, 2000 ft. elev., 4 Feb. 1954 (R.R. Dreisbach). Holotype and two paratypes in UKAN; one paratype in LACM.

ETYMOLOGY

Modern Latin *griseolus* (gray) because of the grayish appearance of the thoracic dorsum.

DISCUSSION

Although *C. griseola* superficially resembles *C. vanduzeei* Cockerell of Lower California, it is easily separated from that species by the characters given above in the Diagnosis. Especially distinctive is the tridentate mandible. The only other species of *Xerocentris* with tridentate mandible is *C. pallida* W. Fox, of the arid western deserts. In that species, the maxillary palp is four-segmented, the pygidial apex is truncate and with a broad median ridge which extends to the apex, the thoracic integument is dull, and the scopal hairs are all plumose.

The unknown male of *C. griseola* probably resembles the female in that the clypeus will be black and the thoracic hairs will be a mixture of dark and light hairs.

Pollen samples from two specimens were examined by J.L. Neff. His conclusion (personal communication) was that in both eases, the samples were ". . . a mixture of *Cercidium* and *Hoffmanseggia* (or possibly *Caesalpinia*) with the former predominating."

Subgenus *Paracentris* Cameron

Paracentris Cameron, 1903:235–236. Type-species: *Paracentris fulvohirta* Cameron, 1903; original designation.
Penthemisia Moure, 1950:390. Type-species: *Centris chilensis* Spinola, 1851; original designation.
Hemisia, subg. *Penthemisia:* Michener, 1951:3–4.
Centris, subg. *Trichocentris* Snelling, 1956:3. Type-species: *Centris rhodoleuca* Cockerell, 1923; original designation.
Centris, subg. *Paracentris:* Snelling, 1974:5–7.

The North American species of *Paracentris* were treated in 1974; 14 species were recognized, four of which were known from only one sex. Since then, I have seen opposite sexes for three of these species. One previously described form, *C. atripes ferrisi* Cockerell, was not considered in 1974 because it was known only from the deficient original description. I have now seen the type specimens. It seems appropriate, therefore, to present a new key to the North American species of *Paracentris* to accommodate these new data.

KEY TO NORTH AMERICAN *PARACENTRIS*

1a. Female, antenna 12-segmented and basitibial plate present on metatibia 2
b. Male, antenna 13-segmented and basitibial plate absent from metatibia 15
2a. Pubescence of head, thorax, and legs entirely or predominantly black, that of mesepisternum wholly black 3
b. Pubescence of head, thorax, and legs entirely or predominantly pale, that of mesepisternum pale, at least in part 7
3a. Pubescence of thoracic dorsum entirely black 4
b. Pubescence of thoracic dorsum largely pale 6
4a. Integument of abdominal tergites black; punctures of second tergite uniformly distributed across disc, not notably sparser along midline, their hairs simple or plumose, interspaces polished or roughened 5
b. Integument of abdominal tergites dark blue; punctures of second tergite dense at sides, distinctly more separated (sometimes sparse) in middle, their hairs decumbent and simple, interspaces polished ..... *laevibullata* Snelling
5a. Punctures of disc of second tergite fine, little greater in diameter than hairs arising from them, hairs fine, plumose, suberect; interspaces of second tergite roughened and dull ..... *nigrocaerulea* F. Smith
b. Punctures of second tergite conspicuously greater in diameter than coarse, simple, decumbent hairs arising from them; interspaces of second tergite polished and shiny ..... *aterrima* F. Smith
6a. Large species, 14.5–18.5 mm long; pubescence of vertex and pronotal lobes black; clypeal punctures sparse, obscure apicad, median impunctate line evanescent ..... *mexicana* F. Smith
b. Smaller species, 12.5–14.5 mm long; pubescence of vertex and pronotal lobe whitish; clypeus with sharply defined median impunctate line, punctures sharply defined ..... *zacateca* Snelling
7a. Clypeal integument entirely blackish 8
b. Clypeal integument at least partially yellowish, orange or red 11
8a. Discs of second and third terga with evenly spaced, distinct punctures throughout 9
b. Discs of second and third terga polished and shiny, with scattered fine punctures which become coarse and distinct laterad, most of disc virtually impunctate ..... *fisheri* Snelling
9a. First flagellar segment a little longer than following three segments combined; abdominal terga black; punctures of scutellum separated by much less than a puncture diameter 10
b. First flagellar segment a little shorter than following three segments combined; abdominal terga with defi-

nite metallic bluish reflections; punctures of scutellum mostly more separated, with many interspaces of more than a puncture diameter ..... *lanosa* Cresson

10a. Median line of clypeus broad, smooth, shiny, and impunctate; punctures of disc mostly well separated; hairs at side of dorsal face of first tergum short, light brown anteriorly, becoming short and fuscous toward distal margin ..... *angustifrons* Snelling

b. Median line of clypeus narrow, roughened and dull; punctures of disc mostly subcontiguous; some hairs of dorsal face of first tergum conspicuously long, erect, plumose, and pale whitish ..... *harbisoni* Snelling

11a. Small species, 8.5–13.5 mm long; clypeus with distinct impunctate median line, punctures elsewhere separated by less than twice a puncture diameter (if clypeal punctures somewhat sparse, scape, femora, and tibiae ferruginous) 12

b. Larger species, 15.5–18.5 mm long; clypeus polished between scattered punctures, usually separated by more than twice a puncture diameter, and median impunctate line undefined (scape, femora, and tibiae dark brownish) ..... *caesalpiniae* Cockerell

12a. Color of mandible, labrum, and clypeus usually not as below; clypeus polished and shiny, median impunctate line present and usually well defined; tergal discs moderately to strongly shiny, with or without bluish reflections; scape, femora, and tibiae brown or red 13

b. Mandible (except apex), labrum, and clypeus dull orange-ferruginous; clypeus usually contiguously punctate, dull and without median impunctate line, but may be moderately shiny and with narrow impunctate line; tergal discs dull and closely tessellate, with dull bluish reflections; scape, femora, and tibiae brown ..... *ferrisi* Cockerell

13a. Basal face of first tergum with abundant long, plumose, white hairs, some of which extend onto dorsal face in middle; terga with definite bluish reflections 14

b. Basal face of first tergum with sparse plumose, white hairs, those in middle shorter and not extending to dorsal face in middle; terga black, without bluish reflections ..... *cockerelli* W. Fox

14a. Mandible, labrum, clypeus, scape, femora, and tibiae mostly or entirely bright ferruginous; apical margins of second and third terga with short bands of appressed pale hairs; first flagellar segment shorter than following three combined ..... *rhodopus* Cockerell

b. Mandible, scape, and legs brown, labrum and most of clypeus yellowish; second and third terga with all hairs blackish; first flagellar segment longer than following three combined ..... *atripes* Mocsáry

15a. Clypeus wholly black; pubescence of mesepisternum wholly blackish 16

b. Clypeus largely or entirely whitish, yellowish or reddish; pubescence of mesepisternum pale or dark .. 18

16a. Pubescence of thoracic dorsum pale 17

b. Pubescence of thoracic dorsum blackish ..... *aterrima* F. Smith

17a. Pubescence of pronotal lobe, and usually of entire lateral pronotal area, pale; first flagellar segment 2.6–3.1 times longer than second ..... *zacateca* Snelling

b. Pubescence of entire lateral pronotal area, including lobe, blackish; first flagellar segment 3.8–3.9 times longer than second ..... *mexicana* F. Smith

18a. Pubescence of head and thorax at least partially pale 19

b. Pubescence of head and thorax blackish ..... *nigrocaerulea* F. Smith

19a. Metabasitarsus much broadened toward apex, about twice longer than greatest width; metafemur swollen and about twice longer than wide 20

b. Metabasitarsus slender and parallel-sided, at least 3.5 times longer than wide; metafemur usually about three times longer than wide, but may be swollen 22

20a. Punctures equally dense on mesoscutum and scutellum; mesepisternum finely, closely punctate; clypeus pale yellow 21

b. Punctures of mesoscutum much sparser than those of scutellum; mesepisternum with scattered, obscure, fine punctures; clypeus orange-ferruginous ..... *ectypha* Snelling

21a. First flagellar segment longer than following three combined; punctures of clypeal disc mostly separated by a puncture diameter or more .... *angustifrons* Snelling

b. First flagellar segment a little shorter than following three combined; punctures of clypeal disc mostly separated by less than 0.75 times a puncture diameter ..... *harbisoni* Snelling

22a. Discs of second to fourth tergites closely and sharply punctate, punctures separated by no more than twice a puncture diameter and clearly greater in diameter than hairs arising from them 23

b. Discs of second to fourth tergites polished and shiny between scattered, obscure punctures little greater in diameter than hairs arising from them ..... *fisheri* Snelling

23a. Clypeus polished or not, punctures mostly separated by two puncture diameters or less; ocellocular distance no more than 1.25 times diameter of anterior ocellus; smaller species, head width 3.8–5.3 mm, almost always less than 5.0 mm 24

b. Clypeus polished, nearly impunctate; ocellocular distance at least 1.65 times diameter of anterior ocellus; larger species, head width 5.0–6.5 mm, almost always more than 5.3 mm ..... *caesalpiniae* Cockerell

24a. Clypeus slightly shiny to shiny, punctures of disc mostly subcontiguous, usually with distinct impunctate median line, sometimes with median line roughened and dull; abdominal terga without pale hairs beyond first segment; legs medium to dark brown and metatibia mostly dark pubescent 25

b. Clypeus polished between sparse punctures and median impunctate line very broad and poorly defined; discs (or at least apical margins) of second to sixth terga with subappressed (suberect in metander), mostly simple, pale hairs; legs almost always ferruginous and metatibia at least largely whitish pubescent.. *rhodopus* Cockerell

25a. Face narrow, eye length at least 1.56 (and usually more than 1.60) times interocular distance at level of antennal sockets; ocellocular distance no more than, and usually less than, diameter of anterior ocellus 26

b. Face broad, eye length no more than 1.51 (and usually less than 1.45) times interocular distance at level of antennal sockets; ocellocular distance a little greater than diameter of anterior ocellus 27

26a. Paraocular area, mandible (mostly) and underside of scape (usually) yellow; clypeus elosely punctate and median impunetate line narrow; abdominal terga with bluish reflections ..... *lanosa* Cresson

b. Paraocular area and underside of scape dark, mandible ferruginous; clypeus with median impunctate line broad and punctures mostly separated by about a puncture diameter; abdominal terga black, without bluish reflections ..... *cockerelli* W. Fox

27a. Median area of clypeus sharply roughened and dull, contrasting to shiny, closely punctate areas on either side; discs of abdominal terga two to five sharply tessellate and slightly shiny ..... *ferrisi* Cockerell

b. Clypeal disc shiny, with distinct smooth, impunctate median line; discs of abdominal terga two to five shiny, not obviously tessellate ..... *atripes* Mocsáry

Centris (*Paracentris*) *angustifrons* Snelling

Centris (*Paracentris*) *angustifrons* Snelling, 1966:13–14. ♀.

The type locality for *C. angustifrons* is Huachuca Mountains, Arizona and this species was based on a single female collected nearly 80 years ago. A few additional specimens are now available, including the previously unknown males. The males are very similar to those of *C. harbisoni,* especially in the shape of the metabasitarsus, but are easily separated by the characteristics cited in the key above.

The females of *C. angustifrons* and *C. harbisoni* are even more similar, a fact I had not fully appreciated when I prepared my 1974 key. The present key brings the two species to the same couplet; the differences between them are noted there and should present few difficulties.

NEW RECORDS

MEXICO, *SONORA:* 1♂, Aduana, 15 Mar. 1962 (L.A. Stange, UCD); 6♀♀, 2♂♂, Rio Cuchuhaqui, 8 mi. S Alamos, 1–13 Apr. 1975 (A. Brewster; LACM), on *Parkinsonia* sp. (2♀♀, 1♂), *Fourquieria* sp. (1♂), *Cercidium* sp. (2♀♀), and *Prosopis* sp. (2♀♀).

Centris (*Paracentris*) *aterrima* F. Smith

Centris aterrima F. Smith, 1854:378. ♂.
Centris (*Paracentris*) *aterrima:* Snelling, 1974:7, 8 (key).

NEW RECORDS

UNITED STATES, *ARIZONA, Cochise Co.:* 1♀, Rustler Park, Chiricahua Mountains, 4 Aug. 1971 (LACM); 6♀♀, 1 mi. E Douglas, 14 Aug. 1969 (J.G. and K.C. Rozen; AMNH); 1♀, Yaqui Canyon area, 5370–5700 ft. elev., Huachuca Mountains, 29 Aug. 1972 (R.R. Snelling; LACM), on *Acacia angustissima. Pima Co.:* 2♀♀, Arivaca, 18 July and 24 Aug. 1974 (J.L. Neff; LACM). *Santa Cruz Co.:* 1♀, 1♂, Sycamore Canyon, near Ruby, 16–17 Aug. 1961 (J.C. Bequaert; LACM); 1♂, Nogales, 24 Aug. 1939 (R.H. Crandall; LACM); 1♂, Patagonia, 24 Aug. 1955 (F.G. Werner and G.D. Butler; LACM); 1♀, White Rock Campground, 0.5 mi. S Peña Blanca, 9 Aug. 1972 (D.C. Frack; LACM); 1♀, Peña Blanca, 27 July 1972 (D.C. Frack; LACM). MEXICO, *CHIAPAS:* 1♀, 3♂♂, 12 mi. W Ocozocoautla, 26 July 1953 (E.E. Gilbert and C.D. MacNeill; UCB). *OAXACA:* 1♂, 4 mi. N Pochutla, 150 m elev., 11 Oct. 1975 (J.L. Neff; LACM), on "Mint 7115"; 3♀♀, 4 mi. W Zanatepec, 200 m elev., 16 Sept. 1975 (J.L. Neff; LACM, NEFF), on *Krameria revoluta. SINALOA:* 1♀, 30 mi. E Villa Union, 570 m elev., 20 Mar. 1980 (J.L. Neff; NEFF).

Centris (*Paracentris*) *atripes* Mocsáry

Centris atripes Mocsáry, 1899:254: ♂.
Centris limbata Friese, 1899:44. ♀. NEW SYNONYMY.
Centris atriventris W. Fox, 1899:68. ♀ ♂. Preoccupied.
Centris Foxi Friese, 1900b:350. New name for *C. atriventris* W. Fox.
Centris (*Paracentris*) *atripes:* Snelling, 1974:8, 9–10 (key, distr., var.).

Friese described *C. limbata* from a single female collected by G. Birkmann at Fedor, Lee County, Texas. The most distinctive feature of this species was the presence of distinct bands of pale hairs on the metasomal terga. Since no specimens resembling the description have been subsequently collected, *C. limbata* remained an enigma.

At my request, R.W. Brooks examined the type of *C. limbata* in the Berlin Museum and he provided several photographs and sketches. A photograph of the lateral view of the type specimen clearly shows that the abdomen is glued to the thorax. The abdomen is distinctly fasciate in dorsal view and a prominent, apically truncate pygidial plate, without a secondary plate, is present. In fact, both the abdominal bands and the pygidial plate are typical, not of *Centris,* but of a *Melissodes* male! The head and thorax of the type are just as clearly those of a *C. atripes* female. Since the species was described as a *Centris,* I consider these parts to be the true type; the abdomen is extraneous. This restriction negates any possible nomenclatural confusion within *Melissodes.*

NEW RECORDS

COSTA RICA, *GUANACASTE:* 1♀, 8 km NW Liberia, 9 Feb. 1975 (G.R. Frankie; TAMU), on *Cassia biflora,* 0900. GUATEMALA: 1♀, 8 mi. NE El Progreso, 8 July 1965 (A. Raske and C. Slobodchikoff; UCB); 1♂, Jieara, 8 May 1931 (J. Bequaert; AMNH). UNITED STATES, *OKLAHOMA:* 1♀, Norman, Cleveland Co., "8/4 1949" (W.T. Nailon; UKAN).

Centris (*Paracentris*) *cockerelli* W. Fox

Centris lanosa: W. Fox, 1899:69; Cockerell, 1906:97; Lutz and Cockerell, 1920:556; Timberlake, 1940:138; Snelling, 1956:7 (in part, misidentifications).

Centris cockerelli W. Fox, 1899:68. ♀.
Centris cockerelli resoluta Cockerell, 1923:76–77. ♀ ♂. NEW SYNONYMY.
Centris lanosa lanosa: Snelling, 1966:6 (misidentification).
Centris lanosa resoluta: Snelling, 1966:6.
Centris (*Paracentris*) *cockerelli cockerelli:* Snelling, 1974:10–11.
Centris (*Paracentris*) *cockerelli resoluta:* Snelling, 1974:11.

For complete literature citations of this common species, see Snelling (1974) under *C. cockerelli* and *C. c. resoluta.* This is the species long improperly called *C. lanosa.* Although I have attempted to maintain recognition of *C. c. resoluta,* I no longer believe this to be correct. In the females there are two principal phenotypes: an eastern form with whitish to yellowish clypeus and a western form with a reddish yellow clypeus. There are no apparent differences to be seen in the males associated with these females. The two female forms intergrade continuously from western Texas and Tamaulipas through New Mexico and Chihuahua. In my opinion these variants are the end-points of a cline of variation and are not worthy of formal separation.

Centris (*Paracentris*) *ferrisi* Cockerell

Centris atripes subsp. *ferrisi* Cockerell, 1924:49. "♀" = ♂!

This was described from two specimens from La Paz, Baja California Sur, Mexico; although Cockerell stated the specimens to be females, both are males. The types are in the CAS. In my key (1974), the males will run to *C. atripes.* Males differ from those of *C. atripes,* and other species of similar appearance, in that the integument of the abdominal tergites is dull and sharply roughened between minute, obscure punctures; the clypeus, especially basad, is distinctly roughened between well-separated punctures. The females, too, will key to *C. atripes* and, as in the male, have the tergal sculpture distinct, dulling the surface; the facial marks are dull ferruginous rather than yellow as in *C. atripes*; in *C. ferrisi* the first flagellar segment is as long as the following three combined, shorter in *C. atripes.* The male clypeus is usually ferruginous, but is yellow in some specimens.

In addition to the types of *C. ferrisi* I have seen the following, all from MEXICO, *BAJA CALIFORNIA SUR:* 1 ♂, Cabo San Lucas, 8–14 Sept. 1978 (J.P. and K.E. Donahue; LACM); 1♀, 1♂, Cañon de la Zorra, 260 m elev., 11 km W Santiago, 4–5 Sept. 1977 (R.R. Snelling; LACM), on *Parkinsonia aculeata*; 2♀♀, 4 km N Los Barriles, 10 m elev., 4 Sept. 1977 (R.R. Snelling; LACM); 1♀, 3.7 mi. W La Burrera, 1400 ft. elev., 7–8 Oct. 1975 (R.R. Snelling; LACM), on *Antigonon leptopus*; 1♂, 2.5 mi. SE La Huerta, 2200 ft. elev., 8–9 Oct. 1968 (E.L. Sleeper and F.J. Moore; LACM); 1♀, 2 mi. S La Paz, 6 Aug. 1966 (J.A. Chemsak; UCB), on *P. aculeata*; 1♂, 7 mi. SW La Paz (J.A. Chemsak; UCB), on *Wislizenia refracta* var. *mamillata*; 1♀, 23 km W La Paz, 24–27 Apr. 1975 (E.M. and J.L. Fisher; LACM); 1♀, 68 km S Loreto, Km 76 on Hwy 1, 29 July 1977 (D. Weismann and C. Mullinex; CAS); 1♂, La Paz, 15 Sept. 1983 (R.R. Snelling; LACM), on *A. leptopus*; 1♀, 25 mi. W La Paz, 30 Aug. 1959 (E.W. Radford and F.G. Werner; CAS); 1♀, 3 mi. E San Pedro, 15 Sept. 1983 (R.R. Snelling; LACM), on *A. leptopus*; 1♂, 52 mi. NW La Paz, 15 Mar. 1980 (J.L. Neff; NEFF), on *Cercidium peninsulare*; 1♀, La Laguna (Sierra de la Laguna), 1829 m elev., 23 Oct. 1977 (D.E. and W.R. Breedlove; CAS); 1♂, 11 mi. NE Todos Santos, 16 Sept. 1983 (R.R. Snelling; LACM), on *A. leptopus*; 1♀, 25 km E Todos Santos, near La Burrera, 1829 m elev., 21 Oct. 1977 (D.E. and W.R. Breedlove; CAS); 1♂, Miraflores, 17 Sept. 1983 (R.R. Snelling; LACM), on *A. leptopus*; 1♀, 1 mi. S Agua Caliente, 17 Sept. 1983 (R.R. Snelling; LACM), on *A. leptopus*; 2♀♀, 5 mi. W San Ignacio, 13 Sept. 1983 (R.R. Snelling; LACM), on *Tephrosia tenella*; 2♀♀, same, except 19 Sept. 1983.

Centris (*Paracentris*) *fisheri* Snelling

Centris (*Paracentris*) *fisheri* Snelling, 1974:12. ♂.

This was described from two males collected near San Ignacio, Baja California Sur, Mexico. The female will go to, and closely resembles, *C. harbisoni* Snelling in my key (1974) to species of *Paracentris,* but differs immediately in that the abdominal terga are polished and very sparsely punctate; in *C. fisheri* the first flagellar segment is shorter than the scape and shorter than the combined lengths of the second to fourth flagellar segments; the first flagellar segment is longer in *C. harbisoni.*

NEW RECORDS

MEXICO, *BAJA CALIFORNIA SUR:* 11♀♀, 5♂♂, 5 mi. W San Ignacio, 13 Sept. 1983 (R.R. Snelling; LACM), on *Tephrosia tenella*; 5♀♀, 10♂♂, same, except 19 Sept. 1983; 1♀, 19 km NW Mulegé, 8 Sept. 1977 (R.R. Snelling; LACM), on *Hoffmanseggia* sp.; 1♂, 35 mi. N Loreto, 5 Oct. 1975 (R.R. Snelling; LACM), on *Wislizenia refracta*; 5♂♂, 9.6 mi. N Loreto, 14 Sept. 1983 (R.R.Snelling; LACM), on *Antigonon leptopus*; 1♀, Estación Microondas "Ligui," 48 km S Loreto, 425 m elev., 14 Sept. 1983 (R.R. Snelling; LACM), on *A. leptopus*; 2♂♂, 68 km S Loreto, Km 76 on Hwy 1, 29 July 1977 (D. Weismann and C. Mullinex; CAS).

Centris (*Paracentris*) *harbisoni* Snelling

Centris (*Paracentris*) *harbisoni* Snelling, 1974:14–16. ♀ ♂.

NEW RECORDS

MEXICO, *BAJA CALIFORNIA SUR:* 1♀, San José del Cabo, 11–16 Sept. 1967 (J. Chemsak, A. and M. Michelbacher; UCB); 1♂, 52 mi. NW La Paz, 15 Mar. 1980 (J.L. Neff; NEFF) on *Cercidium peninsulare*; 4♀♀, 106 km N La Paz, 18 Mar. 1980 (J.L. Neff; NEFF), on *Krameria parvifolia.*

Centris (*Paracentris*) *laevibullata* Snelling

Centris (*Paracentris*) *laevibullata* Snelling, 1966:17–18. ♀; Snelling, 1974:7 (key).

This species was described from a female from Orizaba, Vera

Cruz, Mexico (type locality) and another collected 14 mi. NW Zitacuaro, Michoacán, Mexico. The male is unknown.

NEW RECORDS

MEXICO, *DURANGO:* 1♀, Durango, 13 Aug. 1962 (A.E. Michelbacher; UCB). *JALISCO:* 1♀, 3.5 mi. E [Río] Magdalena, 5 Sept. 1965 (A.R. Gillogly; LACM); 1♀, 25 mi. W Guadalajara, 4700 ft. elev., 29 Sept. 1957 (H.A. Scullen; ORSU); 1♀, 13 mi. NW Lagos de Moreno, 3 Sept. 1975 (J.L. Neff; LACM). *MICHOACÁN:* 1♀, 7.7 km NE Pátzcuaro, 2088 m elev., 23 Sept. 1976 (C.D. George and R.R. Snelling; LACM). *NUEVO LEÓN:* 1♀, 18 mi. W Linares, 2700 ft. elev., 26 Sept. 1975 (J.A. Powell, J. Chemsak, and T. Friedlander; UCB). *SAN LUIS POTOSÍ:* 1♀, 52 mi. S. Tamazunchali, 5700 ft. elev., 7 Oct. 1957 (H.A. Scullen; ORSU).

Centris (*Paracentris*) *lanosa* Cresson

Centris lanosa Cresson, 1872:284. ♂.
Centris subhyalina W. Fox, 1899:69. ♀.
Centris birkmanii Friese, 1899:44. ♂ ♀.
Centris (*Paracentris*) *lanosa:* Snelling, 1974:8, 16–17 (key, syn.).

NEW RECORDS

UNITED STATES, *FLORIDA:* 1♀, Austin Carey, Alachua Co., 22–24 May 1975 (G.B. Fairchild; DPIF); 1♀, Gainesville, Alachua Co. (DPIF); 1♀, Trenton, Gilchrist Co., 14 Apr. 1925 (D.M. Bates; DPIF). *KANSAS:* 1♀, 3 mi. S Sawyer, Pratt Co., 16 June 1962 (C.D. Michener and party; UKAN), on *Amorpha canescens. OKLAHOMA:* 1♀, near Ardmore, Carter Co., 3 June 1961 (Univ. Kans. Mex. Exped.; UKAN); 1♀, Cleveland Co., 31 May 1951 (H.L. Parker; UKAN); 1♀, Ft. Sill, Comanche Co., 24 June 1974 (T.E. Rogers; LACM). *TEXAS:* 5♀♀, Bastrop, Bastrop Co., 2 May 1969 (Brothers, Krueger, Michener; UKAN).

Centris (*Paracentris*) *mexicana* F. Smith

Centris mexicana F. Smith, 1854:378. "♀" = ♂!
Centris (*Paracentris*) *mexicana:* Snelling, 1974:7, 8, 17–18 (key, tax., distr.).

NEW RECORDS

MEXICO, *OAXACA:* 4♀♀, 2♂♂, Tamazulapam, 6200 ft. elev., 2 Sept. 1965 (S.J. Arnold; UCB), on *Salvia* sp.; 1♂, Monte Alban ruins, 3 Aug. 1964 (H.V. Daly; UCB). *VERA CRUZ:* 1♀, 2♂♂, Cotaxtla Exp. Sta., Cotaxtla, 9 Aug. 1962 (D.H. Janzen; UCB).

Centris (*Paracentris*) *nigrocaerulea* F. Smith

Centris nigro-caerulea F. Smith, 1874:369. ♀ ♂.
Centris clypeata Friese, 1899:41. ♀ ♂. Preoccupied. NEW SYNONYMY.
Centris (*Paracentris*) *anthracina* Snelling, 1966:14–17. ♀ ♂. NEW SYNONYMY.

DISCUSSION

I have examined the female and male type specimens of *C. nigro-caerulea* and they are conspecific with *C. clypeata* and *C. anthracina.* Smith's types are from an unspecified locality in Mexico; the female is herewith designated lectotype and the male as paralectotype. Both are in the collections of the British Museum (Natural History).

NEW RECORDS

MEXICO, *CHIAPAS:* 3♂♂, 7♂♂, 3 mi. W Navenchuac, 1–2 Apr. 1953 (R.C. Bechtel and E. I. Schlinger; UCB); 1♀, between Tuxtla [Gutierrez] and Chilapa, 23 Jan. 1974 (S. Buchmann; LACM), on *Cassia* sp. *JALISCO:* 3♂♂, "env. de Guadalajara," 1903 and May 1913 (L. Diguet; MNHN). *MORELOS:* 1♀, Cuernavaca, 6000 ft. elev., 7 Feb. 1954 (R.R. Dreisbach; UKAN). *OAXACA:* 1♂, Oaxaca, 12 Oct. 1963 (A.E. and M.M. Michelbacher; UCB); 4♀♀, 20 mi. S Taxco, 6 Feb. 1954 (R.R. Dreisbach; UKAN). *SONORA:* 1♂, Aduana (near Alamos), 15 Mar. 1962 (F.D. Parker; UCD); 1♂, Rio Cuchuhaqui, 8 mi. S Alamos, 1–13 Apr. 1975 (A. Brewster; LACM), on *Parkinsonia* sp. GUATEMALA: 3♀♀, San Miguel Duenas, 5200 ft. elev., 1–7 Dec. 1975 (S.W.T. Batra; LACM); 1♀, Ciudad de Guatemala, Dec. 1911 (W.M. Wheeler; MCZ); 1♀, Universidad del Valle, Ciudad de Guatemala, 25 Nov. 1975 (S.W.T. Batra; LACM). PANAMA, *CHIRIQUÍ:* 2♂♂, Potrero Grande, 28 Jan. 1981 (D.W. Inouye; ROUB).

Subgenus *Acritocentris* Snelling, 1974

Centris subg. *Acritocentris* Snelling, 1974:36. Type-species: *Centris* (*Melanocentris*) *ruthannae* Snelling, 1966; original designation.

In the years subsequent to the description of this subgenus and my treatment of its component species, I have been able to examine many more specimens than were then available. As a result, I can now provide a more adequate account of these species. The key given then (Snelling, 1974) will not always work for the females and should be replaced by the new one given below.

KEY TO SPECIES OF *ACRITOCENTRIS*

1a. Female, antenna 12-segmented and basitibial plate present 2
b. Male, antenna 13-segmented and basitibial plate absent 4
2a. Pubescence of thoracic dorsum whitish 3
b. All pubescence blackish ..... *ruthannae* Snelling
3a. First abdominal tergite nearly impunctate toward apical margin, especially in middle; median area of clypeus dull and roughened but not rugose, laterad with rounded, separated punctures; basal shiny area of clypeus broadened in middle ..... *albiceps* Friese

b. First abdominal tergite closely, though minutely, punctate to apical margin; median area of clypeus rugose and dull, laterad with coarse, close, elongate punctures; basal shiny area narrow across entire clypeal base ..... *agameta* Snelling

4a. Thoracic dorsum dark pubescent 5
b. Thoracic dorsum pale pubescent 6

5a. Labrum, clypeus, paraocular area, and supraclypeal area all yellow-maculate ..... *ruthannae* Snelling
b. Entire face black ..... *satana,* new species

6a. Face marks whitish, absent from paraocular and supraclypeal areas, clypeus broadly blackish along lateral and basal margin, disc smooth and shiny . . . *albiceps* Friese
b. Face marks yellowish, usually present on paraocular and supraclypeal areas, lateral and basal margins of clypeus narrowly, or not at all, blackish, disc dull and roughened ..... *agameta* Snelling

Centris (*Acritocentris*) *albiceps* Friese

Centris mexicana var. *albiceps* Friese, 1899:289. ♂.
Centris (*Melanocentris*) *strawi* Snelling, 1966:27–28. ♂. NEW SYNONYMY.
Centris (*Acritocentris*) *strawi* Snelling, 1974:37, 38 (in part) (key, distr.).

I suggested (1974) that *C. mexicana* var. *albiceps* might be an older name for *C. strawi.* Friese based this name on a specimen from an unknown locality in Mexico. The type is in the Berlin Museum and was examined at my request by R.W. Brooks who confirmed the above synonymy. The type is not so marked, and bears two labels: "11 6 59/Mexico" and "*Centris/mexicana*/v. *albiceps*/Friese 1898."

The females which in 1974 I believed to belong to *C. albiceps* (as *C. strawi*) are now known to be those of *C. agameta.* The true females of this species are very similar to those of *C. agameta,* but the disc of the clypeus, although dull and roughened, lacks the characteristic irregular rugulae present in *C. agameta.* The first two abdominal terga are much more weakly punctate toward the margins in *C. albiceps,* and in *C. albiceps* females the labrum and posterior pronotal lobes are without pale hairs.

NEW RECORDS

MEXICO, *CHIAPAS:* 3♀♀, 9♂♂, Município Chiapo de Corzo, El Chorreadero, 753 m elev., 1 Nov. 1976 (D.E. and J.A. Breedlove; CAS); 1♀, Município Motozintla, betw. Motozintla and Mazapa, 1219 m elev., 5 Oct. 1976 (D.E. and J.A. Breedlove; CAS). *HIDALGO:* 2♀♀, Zimapán, 6400 ft. elev., 8 Oct. 1957 (H.A. Scullen; ORSU). *MICHOACÁN:* 2♀♀, Lake Pátzcuaro, 6800 ft. elev., 21 Sept. 1957 (H.A. Scullen; ORSU); 1♂, 10 mi. N Morelia, 5900 ft. elev., 28 July 1962 (Univ. Kans. Mex. Exped.; UKAN), on Leguminoseae; 1♀, 2♂♂, Carapan, 1 Sept. 1962 (D.H. Janzen; UCB). *NUEVO LEÓN:* 1♀, 30 mi. N Linares, 1500 ft. elev., 11 Oct. 1957 (H.A. Scullen; ORSU). *OAXACA:* 1♂, 22 mi. SE Oaxaca, 5700 ft. elev., 2 Sept. 1957 (H.A. Scullen; ORSU); 1♀, 5 mi. NW Totolapán, 3800 ft. elev., 6 July 1953 (Univ. Kans. Mex. Exped.; UKAN) on *Lonchocarpus*; 5♀♀, 4 mi. N Totolapán, 1849 m elev., 15 Sept. 1975 (J.L. Neff; LACM, NEFF), on "*Cassia* 7064"; 1♀, 2 mi. S Totolapán, 15 Sept. 1975 (J.L. Neff; LACM), on "*Cassia* 7064"; 1♂, near Las Margaritas, 1400 m elev., 15 Sept. 1975 (J.L. Neff; LACM). *PUEBLA:* 1♂, 3 mi. NW Petlalcingo, 4600 ft. elev., 5 Sept. 1972 (Byers and Thornhill; UKAN); 1♀, 22 km NW Izúcar de Matamoros, 1158 m elev., 21 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Cassia laevigata. QUERÉTARO:* 1♀, 10 mi. S Jct. Hwy 55 and 45, 30 Aug. 1963 (Scullen and Bollinger; ORSU). *SAN LUIS POTOSÍ:* 1♀, 9 mi. E Ciudad [del] Maiz, 3975 ft. elev., 23 July 1962 (Univ. Kans. Mex. Exped.; UKAN); 1♀, 5 mi. E Ciudad [del] Maiz, 4700 ft. elev., 22 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN); 1♀, 11♂♂, 6 mi. W Guadalcazar, 2 Sept. 1975 (J.L. Neff; LACM, NEFF), on "mint 7031." *TAMAULIPAS:* 36♀♀, 38 mi. N El Mante, 1050 ft. elev., 11 Oct. 1957 (H.A. Scullen; ORSU); 16♀♀, 9, 12, and 24 mi. S [Ciudad] Victoria, 11 Oct. 1957 (H.A. Scullen; ORSU); 4♀♀, 15 mi. SW Ciudad Victoria, 5000 ft. elev., 19 Sept. 1976 (J.A. Chemsak et al.; UCB); 20♀♀, 35 mi. S Villagran, 15 Sept. 1977 (Chemsak and Michelbachers; UCB), on *Solanum*; 1♀, 7 mi. S Villagran, 26 Sept. 1975 (J. Powell et al.; UCB); 1♀, 15 mi. NE Juamava, 2500 ft. elev., 19 Sept. 1976 (J. Chemsak et al.; UCB). *VERA CRUZ:* 1♂, 3 mi. E Acultzingo, 1600 m elev., 21 Aug. 1977 (E.I. Schlinger; UCB); 1♀, 2♂♂, E Citlaltepetl, 6000 ft. elev., 25 June 1964 (L.W. Swan; CAS).

Centris (*Acritocentris*) *agameta* Snelling

Centris (*Acritocentris*) *agameta* Snelling, 1974:37–38. ♂.

NEW RECORDS

MEXICO, *GUERRERO:* 1♀, Acapulco, 6 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN). *JALISCO:* 3♀♀, 1♂, Hwy 15, 0.2 mi. from Nayarit State line, 11 Aug. 1963 (D. Byers; UKAN); 3♀♀, 6 mi. NE El Rincón, 3 Aug. 1971 (E.M. Fisher; LACM); 1♀, Puente Grande, 5000 ft. elev., 20 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN); 1♀, Barra de Navidad, 6 Sept. 1966 (E.M. Fisher; UKAN); 1♂, 3 mi. NW Tequila, 4000 ft. elev., 15 July 1953 (Univ. Kans. Mex. Exped.; LACM), on *Vitex pyramidata*; 1♂, 8 km W Tequila, 18 July 1951 (P.D. Hurd; UCB); 1♂, 7 km N Tequila, 6 Sept. 1975 (J.L. Neff; LACM); 1♂, 14 mi. NW [Río] Magdalena, 3500 ft. elev., 19 July 1953 (Univ. Kans. Mex. Exped.; UKAN), on *Vitex pyramidata. MORELOS:* 1♀, 14 mi. S Cuernavaca, 3 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN); 1♀, 12 mi. E Cuernavaca, 4300 ft. elev., 14 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN); 1♀, 8.7 mi. NE Yautepec, 4400 ft. elev., 15 Aug. 1963 (Ordway and Roberts; UKAN); on *Cuphea* sp.; 1♂, 6.7 mi. S Yautepec, 29 July 1963 (Naumann and Willis; UKAN). *NAYARIT:* 3♀♀, Ixtlán del Río, 5 Aug. 1963 (P. Fonda-Bonardi; LACM). *OAXACA:* 3♀♀, 1♂, Salina Cruz, 7 Sept. 1965 (D.H. Janzen; UKAN); 4♂♂, 20 mi. E El Camarón, 7 Aug. 1956 (J.W. MacSwain; UCB). *PUEBLA:* 1♀, 1♂, 7 mi. N Izúcar de Matamoros, 4450 ft. elev., 19 Aug. 1962 (Univ. Kans. Mex. Exped.; UKAN), on *Cuphea* sp. *SAN LUIS POTOSÍ:* 1♂, 9 mi. E Ciudad [del] Maiz, 3975

ft. elev., 23 July 1962 (Univ. Kans. Mex. Exped.; UKAN). *TAMAULIPAS:* 4♂♂, 40 km N Soto la Marina, 5 Sept. 1975 (E.M. and J.L. Fisher; LACM). *SINALOA:* 1♀, 7♂♂, 31 km N Mazatlán, 76 m elev., 29 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Antigonon leptopus.*

Centris (*Acritocentris*) *ruthannae* Snelling

Centris (*Melanocentris*) *ruthannae* Snelling, 1966:28–30. ♂♀.
Centris (*Acritocentris*) *ruthannae:* Snelling, 1974:37, 40 (distr.).

This species has been previously known only from southern Arizona.

NEW RECORDS

MEXICO, *CHIHUAHUA:* 1♀, Temoris, 13 Sept. 1970 (T.A. Sears et al.; UCD). *SINALOA:* 1♀, 2.5 mi. W Concordia, 25 Sept. 1977 (J.A. Chemsak, A. and M. Michelbacher; UCB). *SONORA:* 1♀, Bahia San Carlos, 20 July 1965 (D.S. Verity; LACM); 1♀, 20 km N Guaymas (Km 141), 16 Aug. 1979 (E.M. Fisher; LACM); 1♀, 1♂, Navajoa, 12 Sept. 1964 (A.E. and M.M. Michelbacher; UCB), on morning glory, 0750–0800; 2♀♀, 2♂♂, Cerro Masiaco, ca. 11 road mi. SSE Bacabachi, ca. 750 ft. elev., 29 Aug. 1976 (J.P. and K.E. Donahue; LACM); 1♂, 37 km SE Bacabachi (Km 90), 14 Aug. 1976 (E.M. Fisher; LACM), on *Caesalpinia* sp.

Centris (*Acritocentris*) *satana,* new species

Figures 1–4

DIAGNOSIS

Male unique within *Acritocentris* by the entirely blackish integument and pubescenee; female unknown.

DESCRIPTION

HOLOTYPE MALE. Measurements (mm). Head width 6.15 (5.33–5.74); head length 4.56 (4.00–4.10); wing length 13.5 (13.0–13.5); total length 18.0 (15.0–17.0).

Head. 1.35 (1.33–1.40) times broader than long; occipital margin, in frontal view, very weakly convex and barely raised above level of tops of eyes; ocelli well below occipital margin in frontal view; inner orbits weakly convergent above, upper frontal width 0.91 (0.85–0.87) times lower frontal width. Mandible slender, tridentate. Labrum about two-thirds as long as broad, apical margin narrowly rounded; disc shiny, moderately rugosopunctate to contiguously punctate. Disc of clypeus obtusely raised along midline over basal one-half, integument weakly to moderately shiny, surface with dense, moderate punctures or with very irregular, fine, anastomosing rugules; punctures on side of clypeus subcontiguous, elongate. Remainder of head shiny between fine to moderate, dense to subcontiguous punctures (sparse mesad in ocellocular area), but sparse, minute and obscure over most of gena. Interantennal distance 2.35 (2.13–2.33) times antennal socket diameter; antennocular distance 1.00 (0.87–0.97) times antennal socket diameter; scape moderately stout, 2.36 (2.29–2.42) times longer than wide, scape length 1.06 (1.08–1.14) times length of first flagellar segment; first flagellar segment shorter than length of following three segments combined, 4.00 (3.22–4.06) times length of second; interocellar distance 1.79 (1.61–1.90) times diameter of anterior ocellus; ocellocular distance 1.29 (0.94–1.16) times diameter of anterior ocellus; ocelloccipital distance 2.21 (1.97–2.09) times diameter of anterior ocellus.

Thorax. Mesoscutum shiny between subcontiguous to dense, moderate punctures; scutellum similar, but punctures contiguous to subcontiguous and slightly elongate. Mesepisternum moderately shiny, punctures dense, fine and oblique. Metepisternum shiny, punctures fine and sparse anteriorly, becoming dense to subcontiguous along posterior margin. Metafemur stout, more than twice longer than thick; metabasitarsus about three times longer than broad.

Abdomen. Tergal discs shiny between dense to sparse, fine to moderate punctures which become sparser mesad and on succeeding segments; punctures in apical zone minute. Pygidial plate narrowly truncate to shallowly notched at apex.

Terminalia. Seventh sternite (Fig. 1) with lateral margins of distal process convex, apical margin concave, with definite mesoapical row of short hairs. Eighth sternite (Fig. 2) with distal process slender, compressed; hairs numerous, long, coarsely plumose. Dorsal process of gonocoxite (Fig. 4) long, slender, nearly straight, slightly hooked at apex; gonostylus slender, setae long and coarse along basal margin, shorter and finer distad.

Pilosity. Hairs uniformly dark brown to blackish.

Color. Blackish brown, abdominal terga with strong bluish reflections. Mandible, antenna and legs reddish brown, femora more conspicuously reddish. Wings dark brown, veins and stigma black.

TYPE MATERIAL

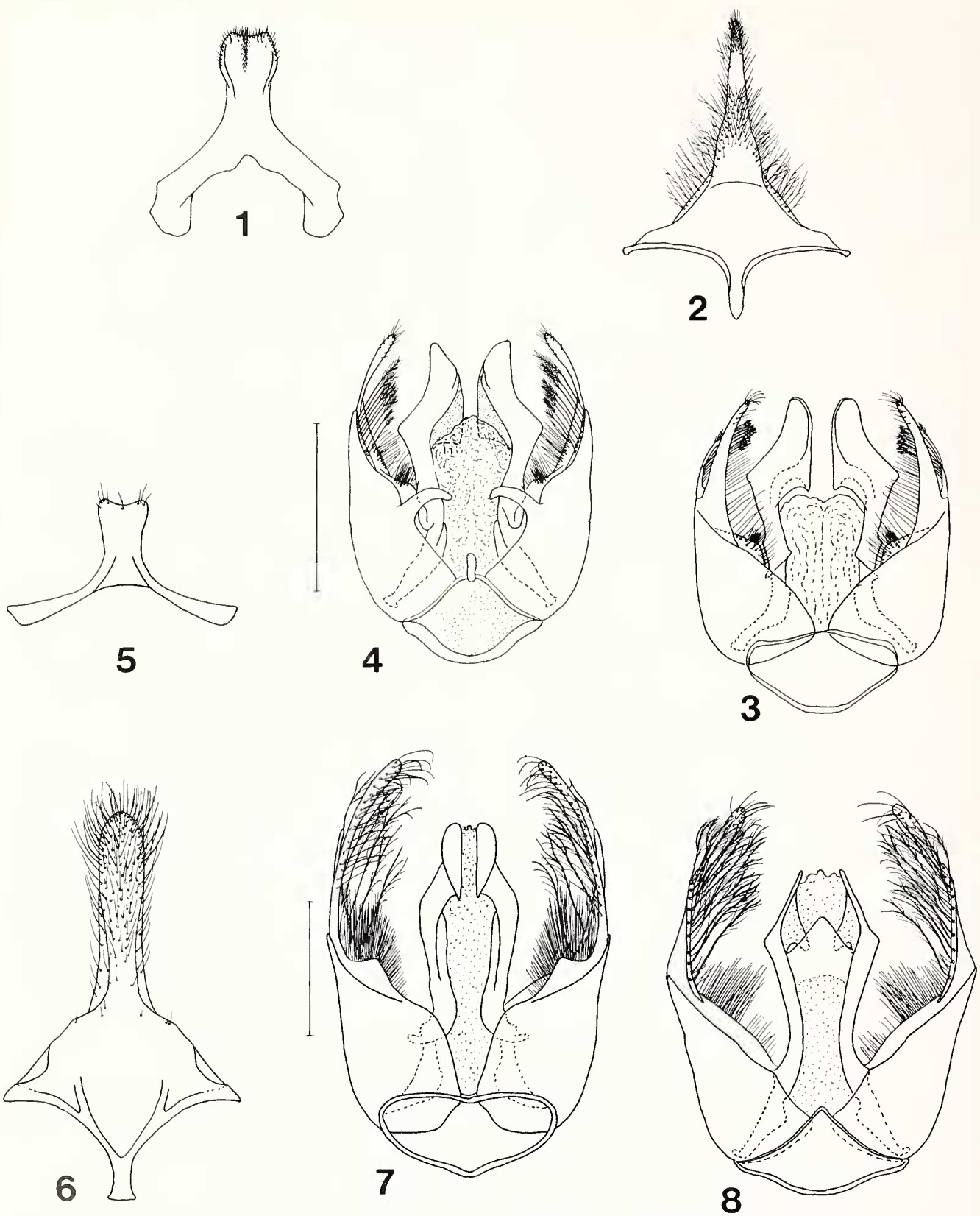
Holotype male: Tepoxtlan, Morelos, MEXICO, 28 Aug. 1964 (E. Fisher and D. Verity), in Natural History Museum of Los Angeles County. Paratypes, MEXICO: 1♂, Carapan, Michoacán, 1 Sept. 1962 (D.H. Janzen; UCB); 1♂, 3.4 km NW Tequila, 1295 m elev., Jalisco, 6 Sept. 1976 (C.D. George and R.R. Snelling; LACM); 1♂, 5 mi. W Durango, Durango, 21 July 1964 (J. Powell; UCB); 2♂♂, 25 mi. W Hidalgo del Parral, 6800 ft. elev., Chihuahua, 15 July 1964 (J.A. Chemsak, J. Powell; UCB); 1♂, "Guanajuato, Mexique" (Duges; MNHN). UNITED STATES: 1♂, Atascosa Mts, 4800 ft. elev., 5.6 mi. W Peña Blanca Lake, Santa Cruz Co., Arizona, 15 Aug. 1974 (T.J. Zavortink; TJZ), on *Acacia angustissima,* 1145–1200.

ETYMOLOGY

From Hebrew, literally an enemy or an evil spirit; in modern zoological nomenclature an epithet for a species of black or dark color or threatening appearance.

DISCUSSION

The wholly black pubescence will immediately separate *C. satana* from *C. agameta* and *C. albiceps,* since both have



Figures 1–8. Male seventh and eighth sternites and genitalia (ventral and dorsal views), respectively, of: **1–4,** *Centris* (*Acritocentris*) *satana*, scale line = 1.00 mm; **5–8,** *C.* (*C.*) *aethiocesta,* scale line = 0.50 mm.

pale dorsal thoracic pubescence. The black, rather than yellow, clypeus will distinguish *C. satana* from *C. ruthannae.* Additionally, males of *C. ruthannae* have metallic blue reflections on the abdominal terga and the hairs of the second and third segments are conspicuously plumose.

The female of *C. satana* is unknown, but very likely will be black-haired like the male and will have a similarly black abdomen, without metallic blue reflections.

Subgenus *Exallocentris* Snelling

Centris subg. *Exallocentris* Snelling, 1974:35. Type-species: *Centris* (*Melanocentris*) *anomala* Snelling, 1966; monobasic and original designation.

Although I had originally plaeed this monotypic subgenus near *Melanocentris,* Neff and Simpson (1981) have rightly pointed out its affinities to *Paracentris.* In *Exallocentris* the elaiospathe of the female pro- and mesobasitarsi is replaced by dense pads of fine-branched setae and the secondary basitibial plate is sharply marginate and projects over the primary plate. Males differ from those of *Paracentris* in lacking branched setae on the gonocoxite at the base of the gonostylus; a conspicuous pygidial plate is present, the innermost mandibular tooth is truncate, and the lateral ocellus is separated from the inner eye margin by about its own diameter. Males resemble those of *Melanocentris,* but the scutellum is not bilobed on its dorsal surface and the upper inner mandibular carina ends near the base of the innermost tooth.

Centris (*Exallocentris*) *anomala* Snelling

Centris (*Melanocentris*) *anomala* Snelling, 1966:31–32. ♂ ♀.
Centris (*Exallocentris*) *anomala:* Snelling, 1974:35–36 (tax.).

This species has previously been known only from the vicinity of Guadalajara, Jalisco, Mexico. I have recently seen a few specimens of the cleptoparasitic bee, *Mesoplia dugesi* (Cockerell), which were collected with the type series of *C. anomala.* One of the specimens bears the following note: "Ericrocis??/Very evasive. flying low/Parasite ?? of the/big Hemisia? not numerous."

NEW RECORDS

MEXICO, *HIDALGO:* 1♂, 22 mi. SW Actopan, 6800 ft. elev., 27 Aug. 1962 (Ordway and Marston; UKAN). *JALISCO:* 1♀, 103 mi. NE Guadalajara, 6200 ft. elev., 1 Oct. 1957 (H.A. Scullen; ORSU); 10♂♂, 8 mi. NE Chapala, 5150 ft. elev., 30 Sept. 1957 (H.A. Scullen; ORSU); 1♀, "env. de Guadalajara" (L. Diguet; MNHN). *MICHOACÁN:* 2♀♀, 33 km NE Arteaga (Hwy 37, km 242), 980 m elev., 10 Nov. 1976 (E. Fisher and P. Sullivan; LACM). *OAXACA:* 1♀, 9 mi. SE Nochixtlan, 7 Nov. 1963 (R.F. Smith; UCB); 3♂♂, Monte Alban, 12 Oct. 1963 (A.E. and M.M. Michelbacher; UCB). *PUEBLA:* 9♂♂, "env. de Tehuacan" (L. Diguet; MNHN). *ZACATECAS:* 1♀, 10 mi. S Jalpa, 18 Sept. 1970 (R.M. Bohart; UCD).

Subgenus *Xanthemisia* Moure

Xanthemisia Moure, 1945:401. Type-species: *Centris bicolor* Lepeletier, 1841; monobasic and original designation.
Hemisia subg. *Xanthemisia:* Michener, 1951:2, 3, 5–6.
Centris subg. *Xanthemisia:* Michener, 1954:140. Snelling, 1974:2, 3.

This subgenus was described for a small group of species characterized, in the females, by possessing a low, blunt tooth on the inner surface of the mandible, near the base of the apical tooth. In this sex, too, the pygidial plate is abruptly narrowed a short distance beyond the secondary plate so that the distal portion is narrow and parallel-sided. Males of *Xanthemisia* possess giant branched setae near the base of the gonostylus, which is much broadened on a vertical plane and the maxillary palp is four-segmented.

KEY TO NORTH AMERICAN *XANTHEMISIA*

1a. Male, antenna 13-segmented, basitibial plate absent 2
b. Female, antenna 12-segmented, basitibial plate present 4
2a. Labrum and clypeus wholly black; pubescence of dorsum of scutellum yellow; erect hairs of mesoscutum longer than interocellar distance 3
b. Labrum, entirely, and clypeus mostly, yellow; pubescence of dorsum of scutellum black; erect hairs of mesoscutum shorter than interocellar distance . . . . . *rubella* F. Smith
3a. Pubescence of mesoscutum wholly yellow; abdomen black and wholly blackish pubescent; ocellocular distance less than diameter of anterior ocellus . . . . . *lutea* Friese
b. Mesoscutum with interalar band of blackish pubescence; abdomen reddish, with golden brown pubescence; ocellocular distance greater than diameter of anterior ocellus . . . . . *carolae* Snelling
4a. Clypeus immaculate and pubescence of dorsum of scutellum yellow; abdomen blackish or dark brown; scopal hairs dark 5
b. Clypeus usually with a pair of preapical spots; pubescence of dorsum of scutellum dark brown; abdomen dull ferruginous; scopal hairs pale . . . . . *rubella* F. Smith
5a. Mesoscutum wholly yellow pubescent; abdomen blackish, with blackish pubescence; first flagellar segment longer than following three combined . . . . *lutea* Friese
b. Mesoscutum wholly blackish pubescent; abdomen dark brown with reddened apical zone and yellowish to yellowish red pubescence; first flagellar segment no longer than following three combined . . . . . *carolae* Snelling

Centris (*Xanthemisia*) *carolae* Snelling

Centris (*Xanthemisia*) *carolae* Snelling, 1966:24–25. ♂.

This species has been previously known only from the unique male type from Tuxtla Chico, Chiapas, Mexico. A few females are now available. They may be separated from our other species by the largely blackish pubescence on the thoracic dorsum, yellowish only on the scutellum and meta-

notum. The pubescence of the abdomen is dull reddish over the brownish integument.

NEW RECORDS

EL SALVADOR: 2♀♀, Cerro Verde, 6800 ft. elev., 29 June 1963 (M.E. Irwin and D.Q. Cavagnaro; UCB); 1♀, same data (CAS). COSTA RICA: 1♀, "El Fuente," 8 July 1937 (A. Alfaro No. 177; AMNH).

Centris (*Xanthemisia*) *lutea* Friese

Centris lutea Friese, 1899:43. ♂ ♀.
Centris (*Xanthemisia*) *lutea*: Michener, 1954:140 (distr.).

Among the North American *Centris*, this species is easily known by the wholly blackish pubescence, except that of the thoracic dorsum which is bright lemon-yellow. Michener (1954) recorded this primarily South American species from Panama.

NEW RECORDS

MEXICO, *CHIAPAS:* 2♂♂, 46 km N Chilpacingo, 580 m elev., 4–6 Aug. 1977 (E.M. Fisher and P. Sullivan; LACM). *JALISCO:* 1♂, 48 mi. N Guadalajara, 8 Sept. 1966 (R.J. Hamton; LACM). *OAXACA:* 1♂, 20 mi. E El Camarón, 21 July 1956 (J.W. MacSwain; UCB). COSTA RICA, *GUANACASTE:* 1♀, [Hacienda] Comelco, 8 km NW Bagaces, 21 Jan. 1972 (P.A. Opler; UCB), on *Byrsonima* sp.; 1♀, Hacienda Comelco, 24 km NW Cañas, 7 Feb. 1972 (E.R. Heithaus; LACM), on *Byrsonima crassifolia,* 0730–0830. *SAN JOSÉ:* 1♀, San José, no further data (USNM).

Centris (*Xanthemisia*) *rubella* F. Smith

Centris rubella F. Smith, 1854:372. ♀.
Hemisia (*Xanthemisia*) *rubella:* Michener, 1951:6 (tax.).

The ferruginous abdomen and maculate female clypeus will readily separate *C. rubella* from all other species of *Xanthemesia.* This species has previously been known only from South America.

NEW RECORDS

PANAMA, *CANAL ZONE:* 1♀, Barro Colorado Island, 19 Aug. 1968 (L.S. Kimsey; LACM), "wood nester"; 3♀♀, same locality, 27 Apr., 3 May, 5 May 1980 (K.E. Steiner; LACM, UCD), on *Byrsonima crassifolia*; 1♀, Gatun, 20 May 1980 (K.E. Steiner; UCD), on *B. crassifolia*; 3♀♀, same locality, 30 Oct. and 3 Nov. 1977 (K.E. Steiner; UCD), on *Stigmaphyllon hypargyreum.*

Subgenus *Centris* Fabricius

Centris Fabricius, 1804:354. Type-species: *Apis haemorrhoidalis* Fabricius, 1775; designated by Internatl. Comm. Zool. Nomencl., op. 567, 1959.
Hemisia Klug, 1807:227. Type-species: *Apis haemorrhoidalis* Fabricius, 1775; designated by Cockerell, 1906.
Centris subg. *Cyanocentris* Friese, 1900b:243. Type-species: *Apis versicolor* Fabricius, 1775; designated by Sandhouse, 1943.
Centris subg. *Poecilocentris* Friese, 1900b:244. Type-species: (*Centris* [*Poecilocentris*] *fasciatella* Friese, 1900) = *Centris fasciata* F. Smith, 1854; designated by Sandhouse, 1943.

Species in this subgenus normally have the abdomen metallic blue or blue-green in both sexes and with pale tergal maculae in the male and often in the female as well. In a few species, such as *C. inermis* Friese, the abdomen is largely ferruginous and in others, such as *C. eisenii* W. Fox, both sexes have much of the terga taken up by yellow bands. In both sexes, too, the mandibles, labrum, and clypeus are conspicuously maculate, the clypeal maculation of the female usually in an inverted T-shape or, more rarely, an inverted Y-shape. Both sexes have five-segmented maxillary palps, the female with slender, usually quadridentate, mandible, and a distinct secondary basitibial plate with an overhanging margin. Males possess giant branched setae along the inner margin of the styliform apical process of gonocoxite.

Some of the most exasperating taxonomic problems in *Centris* are encountered in the nominate subgenus. Many of the species are widely distributed and may be locally abundant. The more widely distributed species tend to exhibit a variety of phenotypes throughout their ranges, phenotypes that are often strikingly different from one another. Many of these variant populations have been given formal names. As a rule, these divergent populations represent selected points along a cline of variation and it is impossible to fix to any of these a discrete distribution and set of identifying characteristics.

The situation becomes more complex when a species is distributed through the islands of the Caribbean. Since the ranges are disjunct, the various insular populations tend to breed true. Even here, however, there usually are discrete clinal trends, proceeding from one end of the island distribution to the other. But, a great deal of collecting must be done in the Caribees before any understanding can be gained of these forms.

Further complicating the taxonomy of this subgenus is the fact that some species perhaps most, possess metanders, i.e., males which are unusually large and robust, with very stout legs, and much more extensively maculate than normal males. Metanders may be easily assumed to represent a different species. In general, all large, robust, richly marked males should be assumed to be probable metanders.

Yet another difficulty is that at least one species (*C. inermis*) is dichromatic in both sexes. There is a color phase with red abdomen and one with metallic blue-green abdomen. There is some evidence that one phase tends to fly earlier than the other, but there is a broad temporal overlap. Not surprisingly, the two color phases have been thought to be separate species. There are very likely more such cases in this subgenus.

The following key is for those species which occur in Cen-

tral America; it does not include *C. errans* W. Fox, a species found only in Florida.

KEY TO CENTRAL AMERICAN *CENTRIS*, S. STR.

1a. Male, antenna 13-segmented and basitibial plate absent 2
b. Female, antenna 12-segmented and basitibial plate present 9
2a. Disc of fourth tergum with simple, usually blackish, hairs only (plumose hairs may be present on apical zone) 3
b. Disc of fourth tergum with abundant, usually whitish, suberect plumose hairs which extend onto apical zone (may be only a band across segment basad of apical zone, often extended cephalad in middle) 7
3a. Second to sixth abdominal terga with broad preapical yellow bands which cover most of each segment, narrow basal area bluish to rufescent, apical margin transparent; sterna largely rufescent 4
b. Second to sixth abdominal terga largely bluish or ferruginous, second usually with lateral spots only, following segments with lateral spots, narrow transverse bands (often interrupted and usually hidden under margin of preceding segment) or immaculate; if bands are present, they are dull reddish, usually interrupted in middle, and fourth tergum with broad area along distal margin with abundant plumose hairs 5
4a. Facial marks whitish; first flagellar segment at least 1.25 × seape length; hairs along apical band of fourth tergum dark, mostly simple ..... *eisenii* W. Fox
b. Facial marks distinctly yellowish; first flagellar segment about as long as scape, rarely as much as 1.1 × scape length; apical band of fourth tergum with abundant plumose pale hairs ..... *aethyctera* Snelling
5a. Ground color of abdominal segments ferruginous, second segment maculate at side, rarely with a complete or narrowly interrupted subbasal band; transverse bands of remaining segments, if present, hidden under margin of preceding segment 6
b. Ground color of first terga, and of sterna, bluish, sublateral spots or narrowly interrupted bands on one or more segments; rarely, second to sixth segments with broad, transverse, median yellowish or rufescent bands ..... *inermis* Friese (part)
6a. Hairs of thoracic dorsum black-tipped ..... *obscurior* Michener
b. Hairs of thoracic dorsum uniformly ochreous ..... *inermis* Friese (part)
7a. Pubescenee of thoraeic dorsum uniformly ochreous to ferruginous, no blackish hairs present; smaller species, head width less than 6.1 mm and usually less than 6.0 mm; (metander unknown) 8
b. Pubescence of thoracic dorsum pale anteriorly and posteriorly, a broad interalar brown to blaek band present, often replacing mueh pale pubescence, especially on scutellum; larger species, head width at least 5.5 mm and usually over 6.3 mm (*metander* larger, robust, legs and abdomen abundantly yellow maculate or both areas largely ferruginous with limited yellow maculae) ..... *flavifrons* group (see Text)
8a. Apical two or three abdominal terga reddish; mandible mostly yellowish on outer face; pubescence of thoracic dorsum usually ochreous ..... *adani* Cockerell
b. Fourth and fifth, usually sixth, abdominal tergites blue, except colorless margins; mandible with small pale spot near base; pubescence of thoracic dorsum usually dark ferruginous ..... *decolorata* Lepeletier
9a. Terga 2–5 each with entire transverse yellow fascia 10
b. Terga 2–5 without yellow fasciae 11
10a. Hairs of thoracic dorsum black-tipped; scape yellow beneath; fourth tergum with erect, plumose, white hairs; HW less than 6.0 mm ..... *aethyctera* Snelling
b. Hairs of thoracic dorsum not black-tipped; scape immaculate beneath; fourth tergum with simple hairs only; HW at least 6.3 mm ..... *eisenii* Fox
11a. Thoracic dorsum with conspicuous interalar band of black pubescence which may cover much of mesoscutum (sometimes reduced to median patch), sharply contrasting with pale scutellar hairs 12
b. Thoracic dorsum without interalar band of black pubescence; scutellar hairs not contrastingly colored 14
12a. Larger species, head width greater than 6.5 mm, but if as little as 6.25 mm, scopa is principally black; disc of clypeus, in profile, distinctly convex basad and flattened distad (Fig. 16) 13
b. Smaller species, head width 5.95–6.25 mm; scopa pale, with golden brown hairs apicad on metabitarsus; disc of clypeus, in profile, very weakly convex basad (Fig. 15) ..... *aethiocesta,* new species
13a. Larger species, head width 7.17–7.7 mm; scopa with pale hairs at least anterobasally on metatibia, often largely pale; pygidial plate and basitibial plate as in Figs. 38 and 29 ..... *flavifrons* (Fabricius)
b. Smaller species, head width 6.27–7.2 mm; scopa black, a few posteroapical hairs on metabasitarsus pale at tips; pygidial and basitibial plates as in Figs. 39 and 30 ..... *flavofasciata* Friese
14a. Abdomen mostly ferruginous, one or more terga often partially bluish or greenish toward apical margin .. 15
b. At least first three terga wholly dark blue or blue-green 17
15a. Hairs of thoracic dorsum not dark-tipped; if slightly tipped, terga 2–4 with conspicuous apical hair bands; erect plumose hairs of tergum 4 pale 16
b. Hairs of thoracic dorsum eonspicuously dark-tipped *and* terga 2–4 without apical hair bands; erect plumose hairs of tergum 4 dark ..... *obscurior* Michener
16a. Terga 2–4 with conspicuous apical hair bands; basal margin of labrum convex across entire width, convex ridge with fine, widely spaced longitudinal ridges; external stripe of protibia not reaching apical three-fourths of segment ..... *meaculpa,* new name
b. Terga 2–4 without apical hair bands; basal margin of

labrum smooth and flat between punctures; external stripe of protibia reaching three-fourths, or more, of tibial length ..... *inermis* Friese (part)

17a. Apical margin of tergum 4 and all of tergum 5 ferruginous; scopa entirely pale or entirely dark; terga 2–3 with or without apical hair bands 18

b. Terga 4 and 5 blue-green; scopa pale, with brownish setae posteriorly and apically on basitarsus; terga 2–3 without apical hair bands ..... *decolorata* Lepeletier

18a. Scopa black; terga 2–3 without apical hair bands; external stripe of protibia extending half, or more, length of segment ..... *inermis* Friese (part)

b. Scopa pale; terga 2–3 with apical hair bands, that of 2 interrupted in middle; external stripe of protibia less than half length of segment, often absent .... *adani* Cockerell

Centris (*Centris*) *aethyctera* Snelling

Centris (*Centris*) *aethyctera* Snelling, 1974:23–26. ♂ ♀.

Centris aethyctera is a common species ranging from Mexico to Panama. It can only be confused with *C. eisenii* in this region, a larger species with the hairs of the thoracic dorsum without black tips. In previous literature it has been confused with the Antillean species, *C. fasciata* F. Smith (see Snelling, 1974), and all records of *C. fasciata* (or its synonym *C. fasciatella* Friese) in Central America seem to be based on *C. aethyctera*.

In Panamanian populations of *C. aethyctera* the bands of the abdominal terga are conspicuously shorter. The abdomen thus appears to be principally ferruginous, with short, transverse yellow fasciae across the disc of each segment.

Centris (*Centris*) *decolorata* Lepeletier

Centris decolorata Lepeletier, 1841:160. ♂.
Centris (*Cyanocentris*) *decolorata:* Friese, 1900b:243, 325. ♂ (not ♀?).
Centris versicolor: Cheesman, 1929:142. Misidentification.
Centris (*Centris*) *obscuriventris:* Michener, 1954:138. Misidentification.
Centris (*Centris*) *decolorata:* Snelling, 1966:23 (distr.).

Friese (1900b) associated females with *C. decolorata,* but noted that the association might be incorrect. In the event that this should prove to be true, he proposed that the females be called *C. obscuriventris.* Whether or not his female specimens actually are those of *C. decolorata* can only be determined after his specimens are examined. In the meantime, *C. obscuriventris* must be considered a name of dubious validity and identity.

There is no doubt, however, that Central American specimens, previously identified as *C. obscuriventris,* are conspecific with *C. decolorata,* a common species throughout the Caribbean islands, coastal northern South America, and eastern Central America. The range extends north to southern Texas, but *C. decolorata* appears to be absent from Florida, even though present on Cuba. The record from Cristóbal, Canal Zone, Panama, of *C. versicolor* by Cheesman (1929) is based on misidentified specimens of *C. decolorata.*

Centris (*Centris*) *errans* W. Fox

Centris errans W. Fox, 1899:65. ♀.
Centris versicolor: Lutz and Cockerell, 1920:561 (in part); Mitchell, 1962:335–336 (misidentification).
Centris (*Centris*) *versicolor:* Hurd, 1979:2175 (in part, misidentification).

This species occurs in Florida and has often been cited as *C. versicolor* (Fabricius, 1775). However, Moure (1960b) examined the type of *C. versicolor* and redescribed the type specimen; the true *C. versicolor* is "probably confined to lesser Antilles," according to Moure. Until all the representatives of this very difficult complex can be reexamined, it seems best to follow Moure's restricted interpretation of *C. versicolor* and to regard *C. errans* as a distinct species.

Centris (*Centris*) *inermis* Friese

Centris inermis Friese, 1899:46. ♂ ♀.
Centris poecila var. *segregata* Crawford, 1906:159. ♀. NEW SYNONYMY.
Centris inermis var. *gualanensis* Cockerell, 1912:568. ♂. ♀.
Centris (*Rhodocentris*) *robusta* Cockerell, 1949:478–479. ♂. NEW SYNONYMY.
Centris inermis subsp. *pallidifrons* Cockerell, 1949:479. ♂.
Centris (*Centris*) *inermis:* Snelling, 1974:30 (syn., var.).
Centris (*Centris*) *segregata:* Snelling, 1974:34–35 (tax., distr.).

This is a common Central American species, ranging from Mexico to Panama and into northern South America. It is also a very unusual species, one which suggests that the taxonomy of the nominate subgenus may be fraught with more complexities than was previously supposed. Males of *C. inermis* are morphologically bimodal; there is a metandric form, very different in appearance from the normal males. Additionally, however, there are two very different color phenotypes in both sexes.

The nominate phenotype, in both sexes, has the legs and abdomen ferruginous; in females there is usually a conspicuous patch of metallic blue across the base of the fourth tergite. The second phenotype was described as *C. poecila* var. *segregata* and later considered to be a separate species. In this form the legs are blackish brown and the first four abdominal segments are dark metallic blue.

The recognition of *C. segregata* as a synonym of *C. inermis* is possible thanks to the observations of R. Coville and G. Frankie. They have found that emergent bees from nests provisioned by *C. inermis* females were, sometimes, the blue-abdomen form, *C. segregata.* This fact, coupled with the lack of morphological differences between the two forms, is the basis for the current synonymy. Additional support lies in

the complete allopatry of the two forms. Frankie and Coville will publish their observations separately.

Centris (*Centris*) *meaculpa*, new name

Figure 33

Centris (*Cyanocentris*) *nitens:* Friese, 1900b:330. ♀ (in part; misidentification).

Centris (*Centris*) *erubescens* Snelling, 1974:27–28. ♀. Preoccupied.

My *C. erubescens* is a junior homonym of *C. costaricensis* var. *erubescens* Friese, 1925, a synonym of *C. vittata* Lepeletier. The new specific epithet is, of course, the Latin phrase for "my fault" and seems apropos in this case.

In some of the specimens recorded below, the abdominal tergites, especially the second to fourth segments, are extensively bluish, rather than wholly ferruginous. They thus somewhat resemble females of *C. adani*. However, *in C. adani* the erect hairs of the the fourth tergite are longer and are plumose at their tips, as noted in the key. In most specimens of *C. meaculpa* the clypeus is more or less distinctly obliquely rugulose, the rugulae directed toward the apical middle portion of the segment. The clypeus of *C. adani* tends to be smooth between well spaced punctures.

The female which Friese (1900b) recorded from Mexico as *C. nitens* Lepeletier, a Brazilian species, is misidentified. The specimen is in the Paris Museum and has been made available to me; it is a female of *C. meaculpa* with the first three abdominal terga primarily metallic bluish and the specimen agrees well with the characteristics of this species, especially in the structure of the labrum and of the basitibial plate.

When I originally described this species, I was not fully aware of its apparent affinities with a small group of primarily Brazilian species. Included in this group are *C. aenea* Lepeletier, 1841, *C. caixensis* Ducke, 1907, and *C. nitens* Lepeletier, 1841. Females of this group are similiar in that the pubescence of the thorax is ochreous (paler on the sides), the abdominal terga, except the fifth and sixth, are metallic greenish to bluish, the discs of the second and third segments possess abundant appressed simple hairs, and the margins of the second and third segments have a definite fascia of appressed pale hairs which may be plumose. In these Brazilian species the basal margin of the labrum is flat and is smooth and shiny between sparse punctures. The labrum of *C. meaculpa* has a definite convexity across the basal margin and the convex area is crossed by widely spaced longitudinal ridges.

Of the Brazilian species, *C. caixensis* appears to be the most distinct. I have seen a single female, marked as "Type," from the collections of the Paris Museum: Maranhão, Caixas, 30 June 1907, collected by A. Ducke. The second to fifth terga each bear a small, lateral, pale yellow mark; the basitibial plate (Fig. 32) is short, and the secondary plate is short, broad, and convexly transverse. In all of the other species, including *C. meaculpa* (Fig. 33), the secondary plate is elongate, with its anterior margin approximately parallel with, and well removed from, the anterior margin of the primary plate. The fascial hairs of the second and third terga of *C. caixensis* are yellow and simple.

Of the two remaining species, *C. aenea* may be recognized by the golden or somewhat coppery color of the discal and fascial hairs of the second and third terga. In *C. nitens* the discal hairs are fuscous, sharply contrasting with the golden to coppery color of the fascial hairs. The secondary pygidial plate is more abruptly narrowed in *C. nitens,* which is the smaller of the two species.

This species was described from two females 67 km E Escarcega, Campeche, Mexico. A few additional specimens are now available.

NEW RECORDS

MEXICO, *TAMAULIPAS:* 1♀, 8 mi. NW Nuevo Morelos, 22 July 1962 (Univ. Kans. Mex. Exped.; UKAN), on *Kallstroemia* sp. *SAN LUIS POTOSÍ:* 1♀, El Salto, 1800 ft. elev., 8 June 1961 (Univ. Kans. Mex. Exped.; UKAN); 1♀, El Salto (above falls), 21 July 1962 (Ordway and Roberts; UKAN), on Leguminoseae. *VERA CRUZ:* 1♀, 22 mi. SE Jalapa, 1100 ft. elev., 29 June 1953 (Univ. Kans. Mex. Exped.; UKAN); 2♀♀, 3 mi. SW Paso del Toro, 50 ft. elev., 23 June 1961 (Univ. Kans. Mex. Exped.; UKAN). *YUCATÁN:* 1♀, Piste, 12 June 1967 (E.C. Welling; LACM). *STATE UNKNOWN:* 1♀, "Mexique, Cote Occid.," no date except 1864 (L. Biart; MNHN).

Centris (*Centris*) *obscurior* Michener

Centris (*Centris*) *obscurior* Michener, 1954:138–140. ♀ ♂.

This species has previously been reported only from Panama.

NEW RECORDS

COSTA RICA, *HEREDIA:* 1♀, Puerto Viejo, Sarapiqui, 30 July 1965 (D.H. Janzen; UKAN); 8♀♀, 37♂♂, Finca La Selva, near Puerto Viejo, 6 May to 27 July (D.R. Perry; LACM), on *Dipteryx panamensis, Dussia* sp., *Hymenolobium* sp., *Byrsonima* sp., and *Vochysia* sp. *PUNTARENAS:* 1♀, 6 km S San Vito, 19–21 Mar. 1967 (UKAN). *SAN JOSÉ:* 2♀♀, San José, 1160 m elev., 17 July 1964 (M. Naumann; UKAN), on *Solanum* sp.; 2♀♀, San José, 1160 m elev., 8 June 1963 (C.D. and D.R. Michener; UKAN), on *Solanum wendlandi*; 2♀♀, Ciudad Universitaria, San José, 28 July 1965 (S.J. Arnold; UCB), on *Duranta repens*; 16♀♀, 1 mi. ESE San Isidro de General, 21 July 1965 (S.J. Arnold; UCB), on *Rhynchanthera mexicana,* 0815–0950. MEXICO, *CHIAPAS:* 1♀, Simojovel, 1–16 Aug. 1958 (J.A. Chemsak; UCB); 1♀, Santo Domingo, 15 mi. S Simojovel, 8 July 1958 (J.A. Chemsak; UCB); 3♂♂, 3 mi. SE San Juan del Bosque, 16 Aug. 1958 (J.A. Chemsak; UCB); 1♀, Yaxoquintela, 560 m elev., 30 Aug. 1978 (J.E. Rawlons; CORN).

Centris (*Centris*) *flavifrons* Group

To this group are assigned a number of medium-sized to large species in which the integument of the head, thorax,

and legs is blackish with limited whitish or yellowish marks on the face and legs. The abdomen is mainly metallic blue to blue green, in the males with yellowish maculations, at least in the second tergite; the apical segments may be reddish. In both sexes the thorax is either largely cinereous pubescent and with a broad interalar band of blackish hairs, or principally dark pubescent but with the scutellum and metanotum pale pubescent. The wings are light brownish to blackish.

Morphologically, the species tend to be very similar and species limits are, at present, very poorly understood. The following key will serve to separate those species which I am presently able to recognize.

KEY TO SPECIES, *C. FLAVIFRONS* GROUP

1a. Male, antenna 13-segmented and basitibial plate absent 2
b. Female, antenna 12-segmented and basitibial plate present 6
2a. Ocellocular distance no more than 0.90 times diameter of anterior ocellus and usually less; lower inner mandibular carina ending in a small, obscure tooth-like process (Fig. 13); smaller species, head width less than 5.8 mm 3
b. Ocellocular distance at least 0.95 times diameter of anterior ocellus and often greater; lower inner mandibular carina often terminating in a prominent tooth-like process (Fig. 14); usually larger species, head width usually more than 6.0 mm, but may be a little as 4.8 mm . . 4
3a. Clypeus moderately shiny, punctures fine and close, interspaces very finely roughened; apical margin of third tergite with transverse band of pale yellowish hairs; pubescence of side of propodeum pale (Ecuador, Peru) ..... *buchwaldi* Friese
b. Clypeus shiny and subpolished between fine, close punctures, except in broad, impunctate median line; third tergum blackish pubescent along apical margin; side of propodeum brown pubescent (El Salvador, Costa Rica, Panama) ..... *aethiocesta,* new species
4a. Larger species, head width always over 5.2 mm and usually greater than 6.0 mm; clypeal disc, at least in large part, shiny and weakly, or not at all, tessellate; second tergum, at least, with transverse yellow fascia across base, sometimes narrowly interrupted in middle (widespread) 5
b. Smaller species, head width less than 5.0 mm; clypeal disc moderately shiny, conspicuously tessellate and roughened, more weakly so along midline; second tergum with a pair of widely separated spots (Eucador) ..... *nigrofasciata* Friese
5a. Lower inner mandibular carina ending in a long, acute tooth-like process. *Normal male* with broad, basal, yellow fasciae across base of second to fourth terga which are complete or narrowly interrupted, that of second nearly as long as apical area beyond it; punctures of clypeal disc numerous and close, interspaces more or less distinctly tessellate, especially basad. *Metander* with clypeus slightly roughened, punctures close to sparse; clypeal disc entirely yellow (S Arizona to Panama) ..... *flavofasciata* Friese
b. Lower inner mandibular carina ending in low, obtusely triangular process (Fig. 14). *Normal male* with narrow basal fasciae on second to fourth terga, that of second often broadly interrupted in middle, or, when complete, distinctly shorter in middle than apical area beyond it; clypeal disc smooth and polished, punctures at side sparse. *Metander* with clypeus smooth and polished, punctures sparse to scattered; laterobasal black mark of clypeus extending onto disc (widespread) . . *flavifrons* (Fabricius)
6a. Apical margin of third tergite with a narrow band of white or yellowish red hairs which sharply contrast with the black discal hairs, the pale hairs closer than those of disc and projecting well beyond margin 7
b. Apical margin of third tergite, across middle one-half with hairs short, black, no closer than short, black hairs of disc and hardly projecting beyond margin of segment 8
7a. Scopa pale; marginal hairs of third tergite whitish, straight; scape pale beneath; fifth tergite wholly ferruginous (Ecuador) ..... *nigrofasciata* Friese
b. Scopa dark; marginal hairs of third tergite yellowish red, their tips curved laterad; scape dark; fifth tergite mostly metallic blue-green (Ecuador, Peru) . . *buchwaldi* Friese
8a. Head width usually exceeding 6.7 mm, rarely as little as 6.2 mm; scopa usually mostly dark; clypeal punctures moderate in size and on side of disc separated by a puncture diameter or more; hairs of side of propodeum pale, but if dark, pleural hairs also dark 9
b. Head width less than 6.3 mm; scopa pale; clypeal punctures fine and close; pleura with pale hairs and side of propodeum with brown hairs (El Salvador, Costa Rica, Panama) ..... *aethiocesta,* new species
9a. Larger species, head width 7.0–7.7 mm; scopa with pale hairs, at least anterobasally on metatibia, often largely pale; pygidial and basitibial plates as in Figs. 38 and 29 (widespread) ..... *flavifrons* (Fabricius)
b. Smaller species, head width 6.2–7.2 mm; scopa black, a few pale-tipped hairs posteroapically on metabasitarsus; pygidial and basitibial plates as in Figs. 39 and 30 (S Arizona to Panama) ..... *flavofasciata* Friese

Centris (*Centris*) *aethiocesta,* new species

Figures 5–8, 13, 15, 31, 40

Centris (*Centris*) *nigrofasciata:* Michener, 1954:138. Misidentification.

DIAGNOSIS

Medium-sized species with thoracic pubescence whitish, but with black interalar band and brown pubescence on propodeal side; abdomen metallic blue-green. Female with pale scopa, broad basitibial plate, and clypeal disc flattened in profile. Male with clypeal disc flattened in profile; abdominal terga 4–7 metallic green, immaculate; punctures of clypeal

disc numerous and mostly separated by about a puncture diameter.

DESCRIPTION

HOLOTYPE FEMALE. Measurements (mm). Head width 5.54 (5.95–6.26); head length 4.26 (3.95–4.21); wing length 11.0 (11.0–12.0); total length 15.5 (16.6–18.0).

Head. 1.43 (1.49–1.53) times broader than long; occipital margin nearly flat in frontal view and slightly below level of tops of eyes; ocelli anterior to occipital margin; inner orbits moderately convergent above, upper frontal width 0.90 (0.89–0.92) times lower frontal width. Mandible slender, tridentate, apical margin oblique. Labrum about twice broader than long, apical margin narrowly rounded. Disc of clypeus weakly depressed, nearly flat in profile (Fig. 15); broad median line impunctate, punctures fine on either side and mostly separated by about 1.5 times a puncture diameter, interspaces shiny, a little less so basad. Frons slightly to moderately shiny betwcen fine, subcontiguous punctures; ocellocular area moderately shiny, impunctate adjacent to ocellus, densely to subcontiguously punctate near eye, with fine and minute punctures; preoccipital area slightly shiny between dense to subcontiguous fine punctures; gena shiny between irregularly close to subcontiguous punctures which are minute near eye, becoming fine to moderate ventrad. Interantennal distance 3.41 (3.13–3.48) times antennal socket diameter; antennocular distance 1.63 (1.57–1.63) times antennal socket diameter; scape slender, 2.29 (2.23–2.36) times longer than wide, scape length 0.72 (0.70–0.75) times length of first flagellar segment; first flagellar segment 5.28 (5.28–5.50) times length of second and distinctly longer than combined length of following three segments. Interocellar distance 2.09 (2.00–2.12) times diameter of anterior ocellus; ocellocular distance 1.31 (1.32–1.45) times diameter of anterior ocellus; ocelloccipital distance 1.88 (1.88–2.03) times diameter of anterior ocellus.

Thorax. Mesoscutum shiny between fine, dense punctures; scutellum similar, but punctures dense to subcontiguous and narrow median line impunctate; metanotum moderately shiny between scattered minute punctures; meso- and metepisterna shiny between dense, fine punctures. Basal area of propodeum moderately shiny, sharply tessellate and with sparse fine punctures except along anterior margin; propodeal side shiny between dense, fine punctures. Basitibial plate (Fig. 31) about twice longer than wide, lower margin broadly rounded; lower margin of secondary plate rounded.

Abdomen. First three terga shiny between dense, minute punctures; fourth and fifth terga shiny between dense, fine punctures which are a little more separated than on basal segments; pygidial plate (Fig. 40) narrow, apex narrowly truncate; secondary plate with margins slightly concave toward gradually narrowed apical ridge.

Color. Head, thorax, and legs blackish brown; scutellum dull reddish; first to fifth abdominal terga metallic blue-green, fourth and fifth more greenish; abdominal sterna brownish, with obscure metallic greenish tints, especially laterad. The following whitish: basal spot on mandible; labrum, except apex and along basal margin (sometimes reduced to lateral spots); inverted T-shaped clypeal mark (may be reduced to narrow median stripe and sublateral, preapical spots); narrow supraclypeal mark (present only in holotype); elongate spot on malar area; broad mark on paraocular area, ending narrowly on eye margin at, or slightly above, level of lower margin of antennal socket; basal spot on pro- and mesotibia (preapical protibial spot sometimes present). Tegula reddish. Wings dark brown; veins and stigma blackish.

Pilosity. Hairs whitish on head, but with broad preoccipital band of long, dark brown hairs; ocellar area pale-haired, but with brownish hairs on frons anterior to ocelli. Hairs of thorax whitish, but with broad interalar band of dark brown hairs and brown hairs on metepisternum and side of propodeum. Hairs on front face of first tergum pale; hairs on dorsal face of first, and on second and third terga appressed, simple, blackish, very short; hairs of fourth and fifth terga long, erect, mostly plumose, whitish; prepygidial fimbria golden reddish to brown. Hairs of legs mostly brownish black, but with glistening whitish hairs on coxae, trochanters, and posterior margins of profemora and protibia; scopal hairs whitish, becoming brownish distad on metabasitarsus.

MALE. Measurements (mm). Head width 5.79 (5.33–5.85); head length 3.79 (3.44–3.79); wing length 12.0; total length 14.0

Head. 1.53 (1.51–1.56) times broader than long; occipital margin nearly flat in frontal view and slightly below tops of eyes, ocelli anterior to occipital margin; inner orbits very strongly convergent above, upper frontal width 0.80 (0.72–0.82) times lower frontal width. Mandible slender, tridentate, inner tooth broad and with its apical margin concave. Labrum about 1.6 times broader than long, moderately shiny between sparse fine punctures and with interspersed minute punctures. Disc of clypeus nearly flat in profile, about as in female, moderately shiny, with broad median impunctate line, punctures on either side fine, mostly separated by about a puncture diameter. Punctation of remainder of head about as in female. Interantennal distance 2.72 (2.47–2.81) times diameter of antennal socket; antennocular distance 0.79 (0.77–0.93) times diameter of antennal socket; scape stout, 2.18 (2.07–2.18) times longer than wide, 0.71 (0.70–0.79) times length of first flagellar segment; first flagellar segment 5.60 (5.33–5.60) times length of second and longer than following three segments combined. Interocellar distance 1.82 (1.84–1.94) times diameter of anterior ocellus; ocellocular distance 0.88 (0.84–0.90) times diameter of anterior ocellus; ocelloccipital distance 1.76 (2.00–2.06) times diameter of anterior ocellus.

Thorax. As described for female, but mesoscutal punctures subcontiguous and scutellum slightly depressed along midline. Metafemur about twice longer than thick (dorsoventrally); metabasitarsus about three times longer than broad, posterior margin weakly curved.

Abdomen. As described for female; apex of last tergite broadly bilobate.

Terminalia. Sides of distal process of seventh sternite (Fig. 5) slightly divergent distad, apical margin weakly incised; setae short, sparse, simple. Distal process of eighth sternite (Fig. 6) weakly narrowed subbasally; setae long, numerous.

Gonostylus (Figs. 7, 8) a little broadened distad; ventral process broadly rounded.

Pilosity. As described for female, but hairs of apical abdominal sternite pale brown; hairs of metatibia and metabasitarsus mostly dark brownish, but with some along posteroapical margins of metatibia golden brown and some along posterior margin of metabasitarsus light brown, with pale tips.

Color. Body color as described for female, except whitish marks as follows: spot at base of mandible; entire labrum; clypeus, except along laterobasal margin; broad supraclypeal mark; spot on malar area; paraocular area, ending narrowly on inner eye margin slightly above level of lower margin of antennal socket; underside of scape; basal spot on all tibiae; outer stripe on protibia; sublateral mark at base of second tergite. Tarsi reddish brown to brown. Wings light brown.

TYPE MATERIAL

Holotype female and allotype: airstrip, Isla El Rey, Islas Perlas, PANAMA, 22 Feb. 1981 (D.W. Roubik), flying around *Dioclea megacarpa,* in Natural History Museum of Los Angeles County. Paratypes: 1♀, same data as holotype; 5♂♂, Coiba Island, Veraguas, PANAMA, 21–24 Oct. 1979 (D. Roubik); 1♀, Fort Kobbe, Canal Zone, PANAMA, 9 Sept. 1958 (W.J. Hanson); 1♂, Patilla Point, Canal Zone, PANAMA, 15 Jan. 1929 (C.H. Curran); 1♂, Bruja Point, Canal Zone, PANAMA, 25 Jan. 1929 (C.H. Curran); 1♀, La Chorrera, Panamá, PANAMA, 22 May 1912 (A. Busck); 1♂, 5 km E Comarca de San Blas, Puerto Obaldia, PANAMA, 11 Oct. 1979 (D. Roubik); 3♀♀, Tamarindo Beach, Guanacaste, COSTA RICA, 28 Feb. 1980 (G.W. Frankie); 2♀♀, same locality and collector, 30 Mar. 1980, on *Haematoxylon brasiletto*; 2♂♂, La Union, Playa El Icacal, EL SALVADOR, 8 July 1975 (E.M. and J.L. Fisher). Paratypes in AMNH, LACM, ROUB, UCB, UKAN, and USNM.

ETYMOLOGY

Combines the Greek words *aithiops* (swart or dark) and *kestos* (girdle or band).

DISCUSSION

Although this species superficially looks much like *C. flavifrons* and *C. flavofasciata,* it is smaller than either. The disc of the clypeus, in profile, is distinctly flatter in *C. aethiocesta* than in the other two species (compare Fig. 15 with Fig. 16) and, in both sexes, the disc is more closely and abundantly punctate. Small females of *C. flavofasciata* may be no larger than females of *C. aethiocesta* but have the tibial scopa black and the hairs of the side of the propodeum are whitish. The much larger size (head width greater than 7.0 mm) will separate *C. flavifrons* females from *C. aethiocesta,* as will the sparser clypeal punctation and the differently shaped basitibial plate. Males of *C. aethiocesta* have the apical abdominal segments dark and immaculate; in *C. flavifrons* and *C. flavofasciata* males the apical segments are usually reddish and commonly are yellowish maculate; in these two species, the hairs of the propodeum are usually whitish.

Two South American species also resemble *C. aethiocesta* and are of about the same size. Females of *C. buchwaldi* Friese, 1900, have a dark scopa, pale propodeal hairs, a band of prostrate, simple, golden brown hairs across the apical margin of the third tergite, and the erect hairs of the fourth tergite are simple. In females of *C. nigrofasciata* Friese, 1899, there is a band of pale hairs across the apical margin of the third tergite, the apical margin of the fourth tergite is ferruginous, the fifth tergite is ferruginous and with simple erect hairs, and the basitibial plate is more elongate, with a more acute apex.

In the males of both *C. buchwaldi* and *C. nigrofasciata* the clypeus is only slightly shiny, with the integument conspicuously roughened. Neither of these has brown hairs on the side of the propodeum and in both species the fifth and sixth tergites are ferruginous. Males of *C. nigrofasciata* also differ in that the ocellocular distance is greater than the diameter of the anterior ocellus.

Centris (*Centris*) *flavifrons* (Fabricius)

Figures 14, 29, 38

Apis flavifrons Fabricius, 1775:383. ♂.
Apis flavifrons brasiliana Christ, 1791:140.
Centris flavifrons: Lepeletier, 1841:152. F. Smith, 1874:361.
Centris citrotaeniata Gribodo, 1894:267. ♀. NEW SYNONYMY.
Centris flavifrons var. *nigritula* Friese, 1899:46. ♀. NEW SYNONYMY.
Centris flavifrons var. *rufescens* Friese, 1899:46. ♂. NEW SYNONYMY.
Centris (*Cyanocentris*) *flavifrons:* Friese, 1900b:317–318 (in part) (tax., distr.).
Centris (*Centris*) *flavifrons:* Michener, 1954:137 (distr.). Moure, 1960b:125–126 (tax.).
Centris (*Centris*) *rufescens:* Michener, 1954:137 (tax., status).
"*Centris fulvifrons*" Moure, 1960a:10 (lapsus for *C. flavifrons*).
Centris (*Centris*) *citrotaeniata:* Moure, 1960a:10–11 (tax.).
Centris (*Centris*) *nigritula:* Snelling, 1974:30–31 (tax. status).

Moure (1960b) examined and redescribed the type of *C. flavifrons,* from "Brasilia." He noted that, according to current concepts, *C. flavifrons* ranges from southern Brazil to Mexico. Throughout this range this is often a common bee and one subject to considerable variation. It is now apparent that my effort to separate *C. f. nigritula* as a distinct species (Snelling, 1974) was futile. Since that time I have examined several hundred specimens and seen so broad a range of variation that it is now apparent that *C. nigritula* is not worthy of recognition at any level.

Friese (1899) described *C. flavifrons* var. *rufescens* from a male from Chiriquí, Panama. It was said to differ from the nominate form in possessing wide, yellow abdominal bands and reddish pubescence on the legs. Although Michener (1954) thought that this seemed to represent a distinct species, I do not agree. Neither Michener nor I has seen the type of var. *rufescens* but I suspect that it is nothing more than a metander. Metanders of both *C. flavifrons* and *C. flavofasciata* are

characterized by possessing broad abdominal fasciae and ferruginous pubescence on the legs. Since nothing in Friese's brief description would indicate to which of these species this form should be assigned, I have arbitrarily elected to follow Friese and include it under *C. flavifrons,* as a synonym. In Panama, *C. flavifrons* is more common than is *C. flavofasciata* and it seems more likely than the var. *rufescens* belongs with the former species.

Centris citrotaeniata was also described from Chiriquí, Panama, based on a single female specimen. The type is in the collections of the Museu Civico de Storia Naturale, Genoa, Italy, and was examined by Moure (1960a). Moure noted that this species was close to "*C. fulvifrons,*" evidently a lapsus for *C. flavifrons.* From the original description, as well as the supplemental notes provided by Moure, it is clear that *C. citrotaeniata* is equivalent to dark Panamanian individuals of *C. flavifrons,* and so Gribodo's species is here placed in synonymy.

Variation in females of *C. flavifrons* chiefly involves the extent of pale versus blackish pubescence on the thorax and on the scopa. In females from Brazil the thoracic hairs are mostly whitish, with a conspicuous broad interalar band of blackish pubeseence; a few dark brown hairs are present below the wing bases and the scopa is uniformly pale. In material from Guyana and French Guiana, there is considerable replacement of the pale pleural hairs by blackish hairs and the scopa is largely dark, but with conspicuous white hairs anteriorly on both the tibia and basitarsus. This dark variant also has many dark hairs on the fourth and fifth terga. A similar variant also appears sporadically in samples from Panama and Costa Rica. The darkest phenotype is from Trinidad, the var. *nigritula.* In these specimens, the thorax is entirely blackish pubescent, with only the axilla, scutellum, and thoracic venter whitish pubescent. Curiously, the scopa is predominantly pale, with only a few brownish hairs distally on the tibia and along the posterior margin of the basitarsus. Some of the Panamanian females have the thoracic hairs wholly pale, except for a small median patch of dark hairs on the mesoscutum; in these individuals the scopa is mainly dark.

The Central American populations vary on a smaller scale. Specimens from Mexico typically have a large inverted T-shaped clypeal mark, the labrum is mostly dark and the lateral face mark fills the paraocular area below the level of the tentorial pit. The transverse mesoscutal fascia of dark hair is preceded by a narrow band of white pubescence, the mesopleuron is largely dark pubescent, and the tibial scopa is only about one-half pale. Coloration becomes progressively darker toward the south and specimens from Costa Rica may be much darker: the labrum wholly black, the clypeal mark broken into two or three narrow segments, and the mesoscutum with only a small cluster of pale hairs on the anteromedian portion; the scopa is almost entirely dark, with pale hairs anteriorly on the metatibia and anterobasally on the metabasitarsus. Another characteristic of the Costa Rican specimens is that the hairs of the dorsal face of the first tergite are blackish. In the Mexican specimens the hairs are pale at the sides and across the basal portion of the dorsal face.

The tendency toward increasing melanism is partially reversed in Panama. A long series from Panamá Province, collected by R.W. Brooks, exhibits considerable variation. In some specimens the interalar fascia is nearly absent and in others it may cover up to two-thirds of the mesoscutum. In most specimens the mesepisternum has only a few dark hairs below the tegula and in others there may be a blackish hair patch over the upper one-half or more of the segment. The scopa varies from nearly wholly pale to about one-half black. Face marks may be greatly reduced: mandible and labrum entirely dark; clypeus with narrow median line and widely separated apicolateral spots and scape wholly dark. Reduction of face marks is not correlated with increased melanism in pubescence. Many of these specimens will match the color pattern of the type of *C. citrotaeniata.*

The darkest Costa Rican specimens superficially resemble the form from Guyana, French Guiana, and Trinidad described by Friese as the var. *nigritula.* They differ from that form, however, in that the plumose hairs of the fourth tergite are uniformly pale. In the var. *nigritula* there are many dark hairs on the fourth tergite and, in some specimens, pale hairs may be entirely lacking.

In general, then, this species becomes progressively more melanic, proceeding from central Brazil to northeastern South America. Westward across northern South America there is a reversal, toward decreased melanism, in Venezuela, Colombia, and Panama. The melanic trend is again evident in Costa Rica and Nicaragua, but decreases once more at the northern (Mexican) extremities of the range. There are numerous localized phenotypes which may depart, in one way or another, from the general cline.

The discussion thus far has focused primarily on the females, though the pubescent patterns of the males of *C. flavifrons* generally follow those of the females. There are, however, problems that are peculiar to the males. Both this species and the similar *C. flavofasciata* possess metanders, males which are unusually large and robust and much more extensively marked with bright yellow, especially on the legs and abdomen. While it is possible to separate normal males of the two species, the metanders are much less convincingly handled.

In part, this is due to a scarcity of fully developed metanders which can be assigned with surety to one or the other of these two species. And, in part, the metanders that are available tend not to exhibit the differences which separate the normal males. I do not believe that this in any way invalidates the distinctions between the two species, but it is merely another manifestation of a common problem within some subgenera: within a given complex males may be much less readily separated than their respective females. A final difficulty is that, unlike the situation in such subgenera as *Xerocentris* and *Paracentris,* the metandrous and normal males form a more or less continuous series, with many individuals of intermediate stature.

A series of about 30 males collected by J.A. Chemsak near Mazatlán, Sinaloa, Mexico, 12 Dec. 1980 (UCB) consists largely of metanders of *C. flavofasciata,* but with a few normal males and intermediates. While I have seen many males

of *C. flavifrons* that seem to be intermediates, I have only three that are clearly fully developed metanders, two from Brazil and one from Mexico.

Normal males of *C. flavifrons* possess the following characteristics, each subject to moderate variation: the lower inner mandibular carina terminates in a low, obtusely triangular process (Fig. 14); the clypeal disc is smooth and polished throughout between fine, scattered punctures and is not wholly yellow; the laterobasal black mark of the clypeus extends onto the disc and sometimes the clypeus bears only an inverted (though broad) T-mark. The second to fourth abdominal terga are maculate; the maculation of the second segment often consists merely of two somewhat elongate sublateral spots, but may extend across the base of the segment as a continuous or narrowly interrupted band; when it is a band, it is almost always much shorter in the middle than the dark area distad to it.

In normal males of *C. flavofasciata* the lower inner mandibular carina ends in an elongate, acute, tooth-like process. The disc of the clypeus is wholly yellow and the areas on either side of the shiny, impunctate median line are less shiny and distinctly roughened between fine punctures that are mostly separated by 1.0 to 1.5 times a puncture diameter. The abdominal terga are almost always continuously fasciate and the yellow band of the second segment is as long as, or longer than, the dark area that follows it.

Most of these distinctions disappear in the metanders, or are at least less certain. Some metanders of *C. flavofasciata* have the clypeal disc nearly polished and the punctures about as sparsely distributed as in *C. flavifrons*. While very nearly all metanders of *C. flavofasciata* have the clypeal disc wholly yellow, there are a few in which the laterobasal black mark does extend slightly onto the disc. The abdominal banding breaks down completely, since metanders of both species have broad, continuous yellow fasciae on the second to sixth segments and an interrupted band across the dorsum of the first segment.

The only feature that seems to hold up is the shape of the termination of the lower inner mandibular carina. In metanders of *C. flavifrons* the terminus is low and obtuse, much as in the normal males. It is an acutely tooth-like process in *C. flavofasciata*. How consistent this difference is, I cannot now state, only that it does hold true for the specimens examined thus far.

There is obviously much to be done before the phenomenon of metandry can be adequately dealt with taxonomically. Presumably, the metanders of such species as *C. flavifrons* and *C. flavofasciata* are behaviorally different from their normal counterparts, perhaps in a manner similar to the situation in such species as *C.* (*Xerocentris*) *pallida* W. Fox, the only species studied thus far (Alcock et al., 1976, 1977). In that species metanders seek newly emerging females at nest sites of the previous year. The normal males establish territories at nectar/pollen sources and attempt to mate with females there.

A large nesting aggregation of *C. flavifrons* was observed in Panama. Normal males and the rufescent variety were present. Males were observed to "... purposely attack *Mesoplia* in the nest area—with a frequency far higher than the pursuit of other males or females" (D. Roubik and D. Yanega, in prep.).

Centris (*Centris*) *flavofasciata* Friese

Figures 16, 30, 39

Centris flavifrons var. *flavofasciata* Friese, 1899:46. ♂.
Centris (*Cyanocentris*) *flavifrons* var. *flavofasciata:* Friese, 1900b:318. ♂ (distr., tax.).
Centris (*Centris*) *flavofasciata:* Michener, 1954:137 (distr.). Snelling, 1966:23 (distr.).

Centris flavofasciata is a common Mexican species which ranges from southern Arizona to Panama. It is possible that the range extends into northern South America, but I have seen no specimens to substantiate that assumption. Most of the features by which this species may be separated from other members of the *C. flavifrons* groups are summarized in the keys.

Females of *C. flavofasciata* consistently have a dark scopa, with a few of the posteroapical hairs of the metabasitarsus with pale tips. Most females have a small patch of dark hairs below the base of the forewing; none has the side of the thorax extensively dark pubescent, as is usually true of Central American material of *C. flavifrons*. Those specimens of *C. flavifrons* with little dark pleural pubescence are from Panama.

Facial maculations of *C. flavofasciata* tend to be somewhat whitish in females, rather than definitely yellow as in *C. flavifrons* and, in both sexes, are more extensive; in the male the entire clypeal disc is yellow, not encroached upon by the black laterobasal mark. In females of *C. flavofasciata* the labrum is largely pale, rather than extensively dark and the vertical and lateral arms of the inverted T-mark of the clypeus are broad and never broken into segments.

Ptilocentris, new subgenus

DIAGNOSIS

Differs from other subgenera of *Centris* by the following combination of characters. Maxillary palp five-segmented; tergal integument metallic blue-green, first four terga with pubescence long, dense, erect, plumose. Female: secondary basitibial plate with distinct overhanging margin, pro- and mesobasitarsi with elaiospathe; clypeal disc evenly rounded into lateral and basal faces, gently convex from side to side. Male: metabasitarsus without posterior carina; genitalia without branched setae; upper inner mandibular carina ending at base of inner tooth; eighth sternite expanded at apex.

DESCRIPTION

Mandible narrow, neither subapically broadened nor bent; tri- (male) or quadridentate (female); upper inner carina ending near base of innermost tooth; lower inner carina not subangularly produced, continuous to innermost tooth along upper margin. Labrum of female about 1.3 times broader than long, apex subacute; about as broad as long in male.

Clypeus broader than long and separated from inner eye margin by less than diameter of anterior ocellus; disc not at all flattened, low-convex from side to side and evenly rounded onto lateral faces and gently sloping toward base. First flagellar segment about as long as following three combined (female) or shorter (male). Ocellocular distance greater than anterior ocellus diameter. Pro- and mesobasitarsi with anterior elaiospathe on inner surface; basitibial plate of female with distinct secondary plate, its lower margin overhanging primary plate; metafemur of male robust, without ventral ridge or tubercle; metabasitarsus simple, without posterior ridge or carina. Female pygidial plate V-shaped, apex narrowly rounded; secondary plate distinct, apex acute. Male without distinct pygidial plate; seventh sternite (Fig. 9) subapically broadened and apical margin deeply emarginate; with abundant long, plumose hairs at apex, with short, simple hairs at base of apical lobe; eighth sternite (Fig. 10) with distal process long, its apex angularly spatulate, apical one-half of shaft and broadened distal portion with long, plumose hairs; genital capsule (Figs. 11, 12) robust, gonocoxite massive; gonostylus short, broad, with a few fine, simple setae. Abdominal terga metallic blue-green and four basal segments with abundant, erect, plumose hairs on discs.

TYPE-SPECIES

Centris festiva F. Smith, 1854, by present designation.

ETYMOLOGY

The subgeneric name combines Greek *ptilon* (feather) with the generic name *Centris* and refers to the presence of abundant long, erect, plumose hairs on the abdominal terga.

The subgeneric name proposed here was originally conceived by J.S. Moure and appears on specimens of *C. festiva* in various collections which he identified 20 years ago. It is an appropriate name and I am pleased to adopt it here.

DISCUSSION

The type-species is the only known representative of this subgenus.

Ptilocentris seems to be another segregate of the *Paracentris-Centris* s. str. complex of subgenera. In my key to the subgenera of *Centris* (Snelling, 1974) the female will go to *Centris* s. str.

Females differ from those of the nominate subgenus in lacking a stipital comb; in *Centris* s. str. the comb consists of a long row of stout, close-set, coarse, acute bristles. The labrum in *Centris* s. str. is much broader, with the apical margin broadly rounded. The broad, distinctly flattened, or slightly depressed, clypeal disc which abruptly slopes basad and toward the lateral margins is also distinctive of *Centris* s. str. In this regard, *Ptilocentris* is more like some species of *Paracentris* from which it immediately differs in possessing a sharply defined secondary basitibial plate with a distinct margin which extends slightly over the disc of the primary plate. Also, *Paracentris* is like *Centris* s. str. in the form of the comb of the stipes.

The male of *Ptilocentris* is unique among the *Paracentris-Centris* s. str. complex in the form of the genitalic structures. The shapes of the seventh and eighth sternites are distinctive and the lack of coarse, plumose setae on the genitalic capsule is also an unusual feature in this complex. So, too, is the short, broad gonostylus.

Centris (*Ptilocentris*) *festiva* F. Smith

Figures 9–12

Centris festiva F. Smith, 1854:375. ♀.

Centris chlorura Cockerell, 1919:188–189. ♀. NEW SYNONYMY.

This attractive and unusual species is easily recognized by the characteristic pattern of erect hairs on the discs of the abdominal terga. In most specimens the second and third terga have a basal zone of blackish hairs, but in some specimens the hairs may be wholly pale; one such pale haired specimen was the basis for *C. chlorura*, the type of which has been examined.

There are no previous records of this species from Central America. In South America, *C. festiva* is known to be present in Colombia, Ecuador, and Peru.

NEW RECORDS

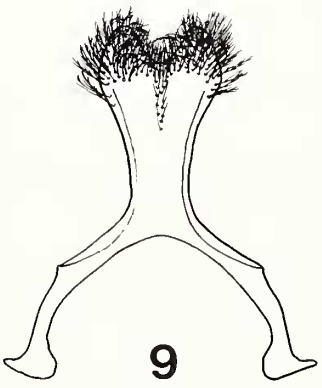
MEXICO, *DISTRITO FEDERAL:* 1♂, Los Venados, 6 Nov. 1938 (G. Vivas-Berthier; USNM). COSTA RICA, *ALAJUELA:* 1♂, 5 km S Vara Blanca, 11 Nov. 1973 (P.A. Opler; LACM). *SAN JOSÉ:* 1♀, San José, "1.6.19" (M. Valerio; USNM). PANAMA, *CHIRIQUÍ:* 1♂, Osra Clara, 26 Jan. 1981 (D.W. Inouye; ROUB). According to Roubik (pers. comm.): "Sandy Knapp also collected *C. festiva* in Chiriquí on 22 April 82 . . . at Cerro Colorado, about 1000 m elevation."

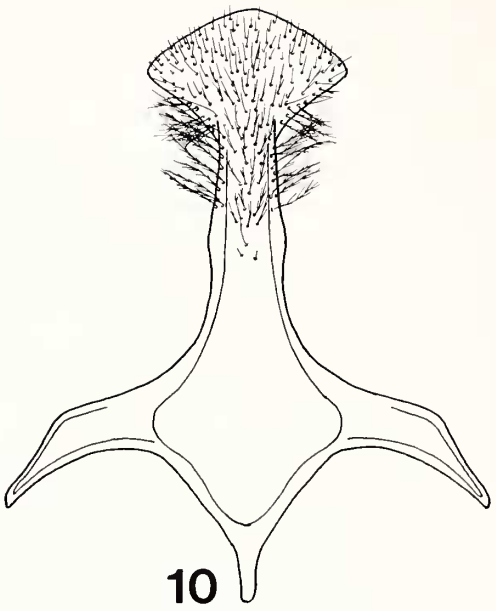
Subgenus *Melanocentris* Friese

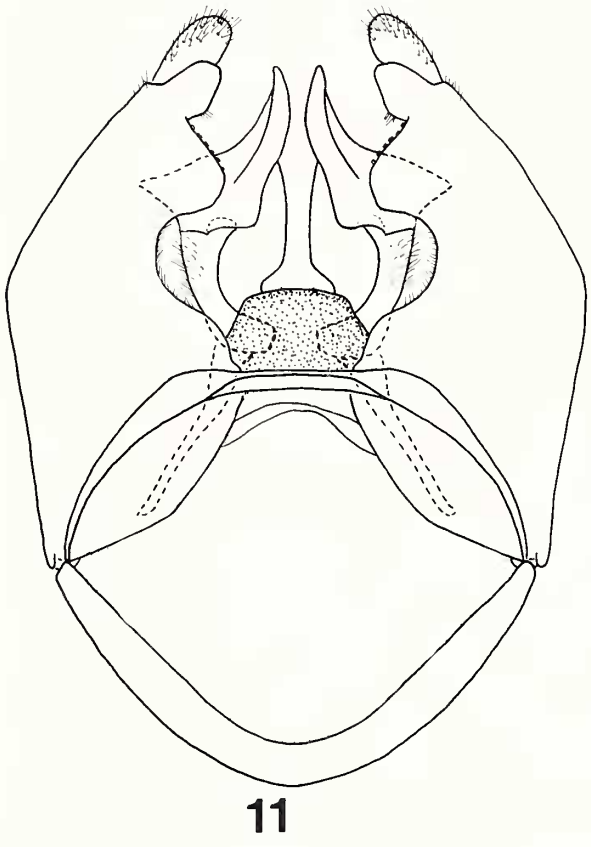
Centris subg. *Melanocentris* Friese, 1900b:241, 244. Type-species: *Centris atra* Friese, 1900b; designated by Sandhouse, 1943.

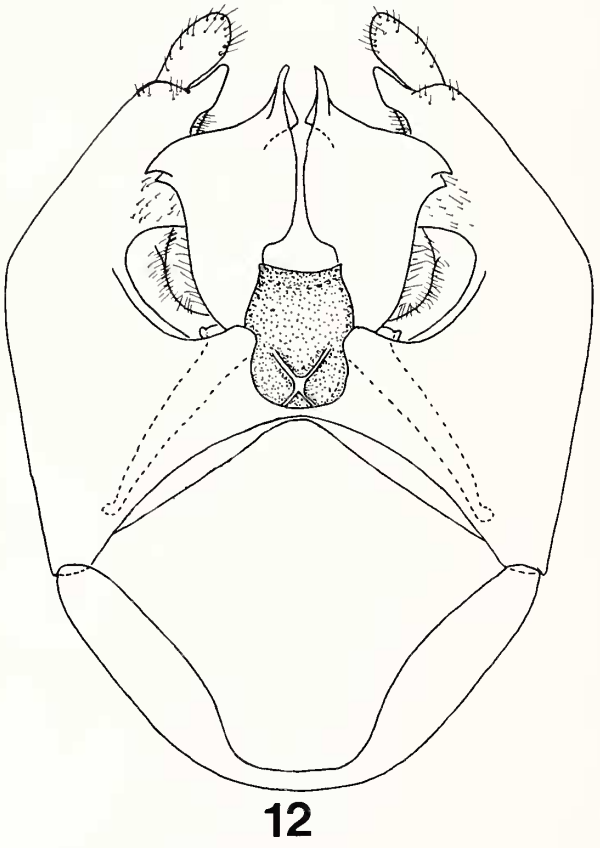
Species belonging to the subgenus *Melanocentris* are medium-sized to large bees, usually black (though with pale face marks in the males) or with the abdomen more or less dusky ferruginous. Less commonly the abdomen may have metallic blue or green reflections. The pubescence is mostly dark but there may be limited amounts of pale pubescence on the thorax, the hind legs, and on the abdomen. In both sexes the maxillary palp is five-segmented and the mandible is stout, quadridentate in the female and tridentate in the male; in the female the mandible is broadened and abruptly bent near the apex.

Additional characteristics of the female include the presence of an elaiospathe on the pro- and mesobasitarsi, the weakly bilobate scutellum, the upper inner carina of the mandible ends near the base of the subbasal tooth, and the margin of the secondary basitibial plate overhangs the primary plate. Males lack giant branched setae on the genitalia, the meta-

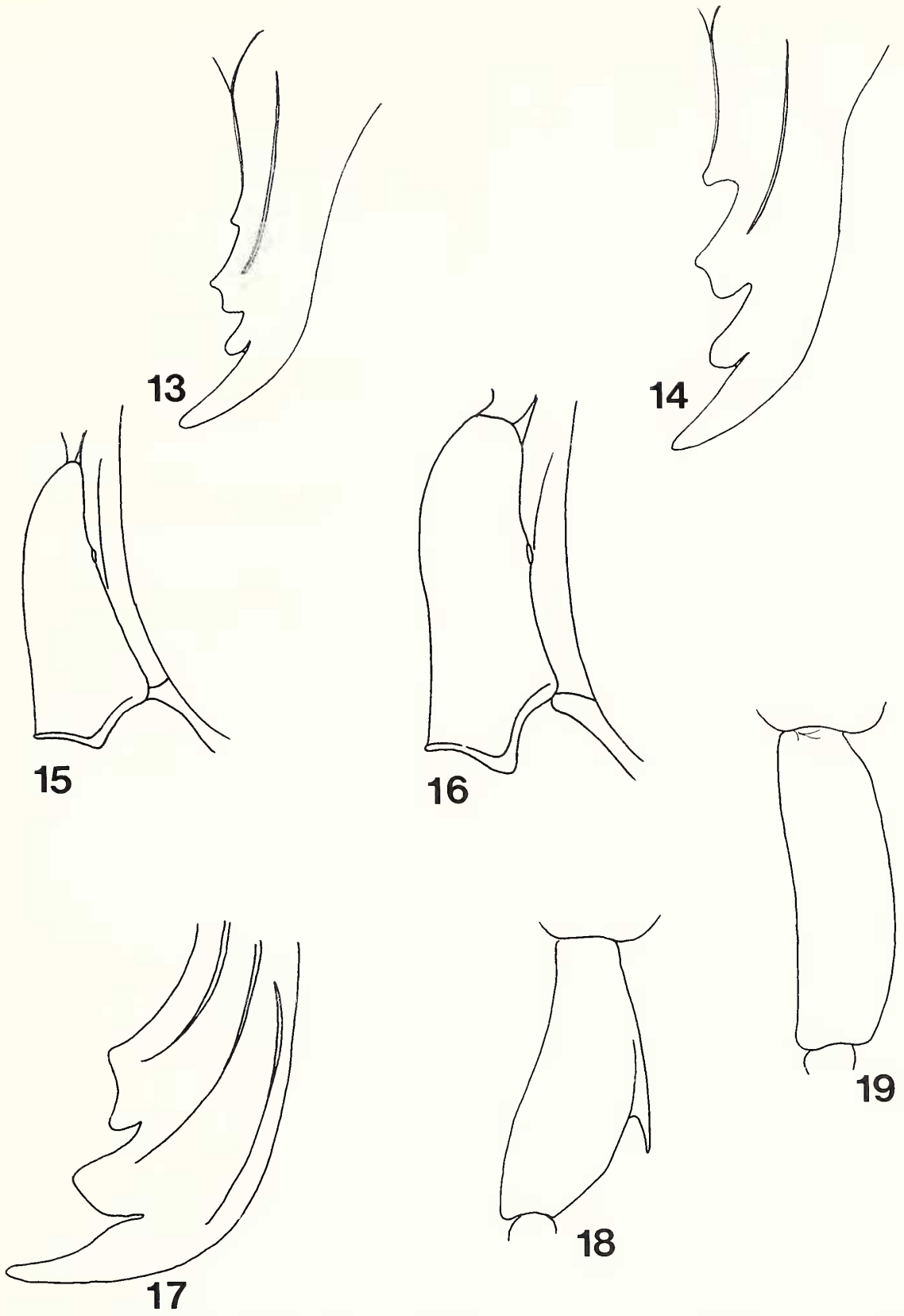








Figures 9–12. *Centris* (*Ptilocentris*) *festiva*, male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm.



Figures 13–14, apex of left mandible of male; **13,** *Centris* (*C.*) *aethiocesta*; **14,** *C.* (*C.*) *flavifrons.* **Figs. 15–16,** clypeal profile of female: **15,** *C.* (*C.*) *aethiocesta*; **16,** *C.* (*C.*) *flavofasciata.* **Fig. 17,** apex of left mandible of male *C.* (*Melanocentris*) *fusciventris.* **Figs. 18–19,** metabasitarsus of male: **18,** *C.* (*Trachina*) *labiata*; **19,** *C.* (*T.*) *longimana.*

basitarsus is without an elevated carina on the posterior margin, the scutellum is weakly swollen on either side of the middle, and the upper inner mandibular carina ends near the base of the middle tooth.

This is primarily a South American group, and much in need of revisionary study. The few North American species may be separated by the following key.

KEY TO NORTH AMERICAN *MELANOCENTRIS*

1a. Male, antenna 13-segmented and basitibial plate absent 2
b. Female, antenna 12-segmented and basitibial plate present 8
2a. Integument of abdominal terga shiny, reddish or blackish, never strongly metallic; if dull, punctures subcontiguous to dense, sharply defined at least on second tergum; metafemur swollen, but without ventral ridge 3
b. Integument of abdominal terga dull to slightly shiny, dark blue, punctures on discs of second and third tergites very fine, obscured by dense tessellation and well separated; metafemur swollen, with low ventral ridge which terminates slightly beyond middle ..... *plumipes* F. Smith
3a. Pilosity of thorax buff-colored to ferruginous (hairs of mesoscutum may be dark-tipped) 4
b. Pilosity of thorax dark brown to blackish (one species with light hairs on scutellum, metanotum, and propodeum) 5
4a. Inner mandibular tooth broad, cutting margin incised so that mandible approaches quadridentate condition (Fig. 17); pilosity of third and following tergites blackish ..... *fusciventris* Mocsáry
b. Inner mandibular tooth narrow, triangular, mandible definitely tridentate; pilosity of third and following tergites ferruginous ..... *flavilabris* Mocsáry
5a. Clypeus narrow, about 1.10 to 1.25 times broader than long; lower facial width no more than 1.5 times broader than interocular distance, latter always greater than transocellar distance 6
b. Clypeus broader, at least 1.40 times broader than long; lower facial width at least 1.6 (and usually more than 1.8) times minimum interocular distance, latter usually no more than transocellar distance, often less 7
6a. Abdomen dusky ferruginous; posterior part of thorax, metatibia and metabasitarsus pale pilose; disc of second tergum dull, punctures mostly separated by less than a puncture diameter ..... *agiloides,* new species
b. Abdomen brownish to blackish; pilosity of thorax and leggs blackish; disc of second tergum moderately shiny between punctures mostly separated by a puncture diameter or more ..... *sericea* Friese
7a. Dorsal face of scutellum depressed along midline and slightly raised on either side, apex of eminence impunctate or nearly so; basal area of propodeum slightly shiny and conspicuously tessellate; pubescence of legs dark ..... *obsoleta* Lepeletier
b. Dorsal face of scutellum neither depressed along midline nor raised on either side, uniformly subcontiguously punctate; basal area of propodeum shiny, with very weak tessellation; hairs pale on metatibia and metabasitarsus ..... *agilis* F. Smith
8a. Apex of pygidial plate broad, deeply and angularly incised (Fig. 42); scopa pale; yellowish marks often present on some part of lower face 9
b. Apex of pygidial plate narrowly truncate or acute, never incised (Figs. 41, 43); scopa often dark; face rarely maculate 10
9a. First four abdominal terga black, with strong metallic blue reflections ..... species A
b. Entire abdomen dusky ferruginous ..... *flavilabris* Mocsáry
10a. Lower half of clypeal disc slightly shiny to shiny, but conspicuously roughened or ridged between punctures; labrum and side of clypeus black; paraocular area usually black; integument of frons and mesopleuron black, without metallic bluish or greenish-bronze reflections 11
b. Lower half of clypeal disc smooth and polished between punctures; most of labrum, at least side of clypeus, and paraocular area yellowish maculate; frons and mesopleuron with metallic bluish or greenish-bronze reflections ..... *plumipes* F. Smith
11a. Discs of second and third terga moderately to strongly shiny, punctures various but usually not subcontiguous and much coarser than hairs arising from them (if subcontiguous, scopa dark); scopa often dark; abdomen often black 12
b. Discs of second and third terga dull, contiguously punctate, punctures much coarser than hairs arising from them; scopa pale; abdomen ferruginous ..... *agiloides,* new species
12a. Punctures of disc of second tergum, when visible, little larger than hairs arising from them and finer than those on disc of following segment; pubescence of thorax and/or scopa often partly pale; basitibial plate and pygidium various 13
b. Punctures of disc of second tergum subcontiguous, much coarser than hairs arising from them and conspicuously coarser than punctures of apical zone and of following segment; thoracic and scopal hairs black; secondary basitibial plate acute (Fig. 24); pygidial plate narrowly V-shaped, secondary plate short and broad ..... *sericea* Friese
13a. Dorsal face of first tergum, across middle one-third, polished, without evident punctures and with only a few widely scattered, appressed simple hairs; pygidial plate broadly V-shaped and broadly truncate at apex, lateral margins somewhat convex at about midlength, secondary plate elongate and with median raised ridge extending from its apex to apical truncation (not always visible in worn specimens) (Fig. 43); scopa pale ..... *agilis* F. Smith
b. Dorsal face of first tergum pubescent and/or punctate across middle half at least at summit of declivity; py-

gidium not as above (Fig. 41); scopa pale or dark . . 14

14a. Scopa entirely pale; abdomen largely reddish 15

b. Scopa entirely black or pale on tibia and brownish on basitarsus; abdomen dark 16

15a. Mesepisternal pubescence dark brownish; disc of second tergite with distinct, minute, close punctures; apex of pygidial plate narrowly truncate .... *gelida*, new species (part)

b. Mesepisternal pubescence pale, at least in part; disc of second tergite without obvious minute punctures, but with a few scattered, moderate, shallow punctures; apex of pygidial plate acute ..... *fusciventris* Mocsáry

16a. Pubescence of first and second terga and of scopa blackish; clypeal punctures, except along impunctate midline, uniformly subcontiguous on disc .... *obsoleta* (Lepeletier)

b. Pubescence of adbominal terga pale (brownish golden on second segment); tibial scopa mostly pale; punctures of clypeal disc very irregularly spaced .... *gelida*, new species (part)

Centris (*Melanocentris*) *agilis* F. Smith

Figure 43

Centris agilis F. Smith, 1874:361. ♂.

Centris ignita F. Smith, 1874:362. ♀. NEW SYNONYMY.

Centris bakeri Friese, 1912:199. ♂. Preoccupied.

Centris bakerella Friese, 1913:89. New name for *C. bakeri* Friese, 1912, not *C. bakeri* Cockerell, 1912. NEW SYNONYMY.

Epicharis cisnerosi Cockerell, 1949:180. ♀. NEW SYNONYMY.

F. Smith (1874) described the two sexes as *C. agilis* and *C. ignita*. This is a common species in Mexico and one that is variable in the color of the abdominal integument. In both sexes, the abdominal terga, beyond the blackish first segment, may be wholly ferruginous. In these specimens the dense, short, simple discal hairs appear to be yellowish red. In other specimens, one or more of the following three segments may be blackish and when this is the case, the discal hairs appear to be yellowish or somewhat whitish, imparting a distinctly "frosted" appearance.

Friese's *C. bakeri* and Cockerell's *Epicharis cisnerosi* are based on specimens with dark tergites. Although I have seen no type material of *C. bakeri*, the description matches well the characteristics of dark males of *C. agilis*. I have examined the type of *Epicharis cisnerosi*; it is a normal, dark female of *C. agilis*.

NEW RECORDS

MEXICO, *CHIAPAS:* 1♀, 10 mi. NW Comitan, 9 Aug. 1963 (F.D. Parker and L.A. Stange; UCD); 1♀, Municipio Ocozocautla, El Aguacero de Derna, 762 m elev., 1 Sept. 1976 (D.E. and J.A. Breedlove; CAS); 1♀, 18♂♂, Municipio Angel Albino Corzo, Rio Custepec, below Finca Gadow, 853 m elev., 12 Sept. 1976 (D.E. and J.A. Breedlove; CAS); 1♂, Sumidero, Tuxtla Gutierrez, 17 Aug. 1964 (E. Fisher and D. Verity; LACM) 1♂, 82 mi. W Tuxtla Gutierrez, 2100 ft. elev., 30 Aug. 1957 (H.A. Scullen; ORSU); 2♀♀, NW slope Cerro Baul, 1768 m elev., W of Rizo de Oro, 12 Oct. 1979 (D.E. and J.A. Breedlove; CAS). *COLIMA:* 1♂, 10 mi. W Colima, 1 Aug. 1954 (M. Cazier, W. Gertsch, Bradts; AMNH). *GUERRERO:* 1♂, 4 mi. W Chilpancingo, 1530 m elev., 27 Aug. 1977 (E.I. Schlinger; UCB). *JALISCO:* 1♀, 25 mi W Guadalajara, 4700 ft. elev., 29 Sept. 1957 (H.A. Scullen; ORSU); 2♀♀, 5.6 km E Plan de Barranca, 914 m elev., 25 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Cassia* sp.; 1♀, 3.4 km E Plan de Barranca, 960 m elev., 25 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Cosmos sulphureus*. *MICHOACÁN:* 2♀♀, Tuxpan, 6550 ft. elev., 19 Sept. 1957 (H.A. Scullen; ORSU). *MORELOS:* 1♂, no locality or date (Crawford; LACM); 1♂, 7 mi. NE Yautepec, 4000 ft. elev., 18 Aug. 1962 (Univ. Kans. Mex. Exped.; UKAN) on Leguminosae; 1♀, 0.6 km S Teacalco, 1021 m elev., 16 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Crotalaria incana*; 1♂, Lake Tequesquitengo, 5000 ft. elev., 13 Sept. 1957 (H.A. Scullen; ORSU). *NAYARIT:* 2♀♀, 8 mi. N Tepic, 1 Sept. 1962 (D.H. Janzen; LACM). *OAXACA:* 2♂♂, El Camarón, 20 Aug. 1959 (L.A. Stange and A.S. Menke; UCB); 2♂♂, 48 mi. E La Ventosa, 21 July 1963 (J. Doyen; UCB); 1♀, near Pinotepa Nacional, 200 m elev., 12 Oct. 1975 (J.L. Neff; LACM), on Legume 7123; 2♀♀, 4 mi. W Zanatepec, 7 Oct. 1975 (J.L. Neff; LACM), on *Cassia* 7070; 1♀, Mixtla, 5600 ft. elev., 22 Aug. 1963 (Scullen and Bolinger; ORSU). *PUEBLA:* 1♀, 16.1 km NW Izúcar de Matamoros, 1250 m elev., 17 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Caesalpinia cacalaco;* 3♀♀, 22 km NW Izúcar de Matamoros, 1158 m elev., 21 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Cassia laevigata*. *SINALOA:* 6♀♀, 14 mi. SE Espinal, 14 Sept. 1964 (A.E. Michelbacher; UCB); 2♀♀, 33 km SE Esquinapa, 11 Sept. 1974 (E.M. Fisher; LACM). *VERA CRUZ:* 1♂, Catemaco, 6 Oct. 1976 (E. Barrera; LACM). HONDURAS: 1♀, Zamorano, 2 Nov. 1946 (G. Cisneros; USNM) (type of *Epicharis cisnerosi*). COSTA RICA, *SAN JOSÉ:* 1♀, San José, no date (M. Valerio, USNM).

Centris (*Melanocentris*) *agiloides*, new species

Figures 20–23

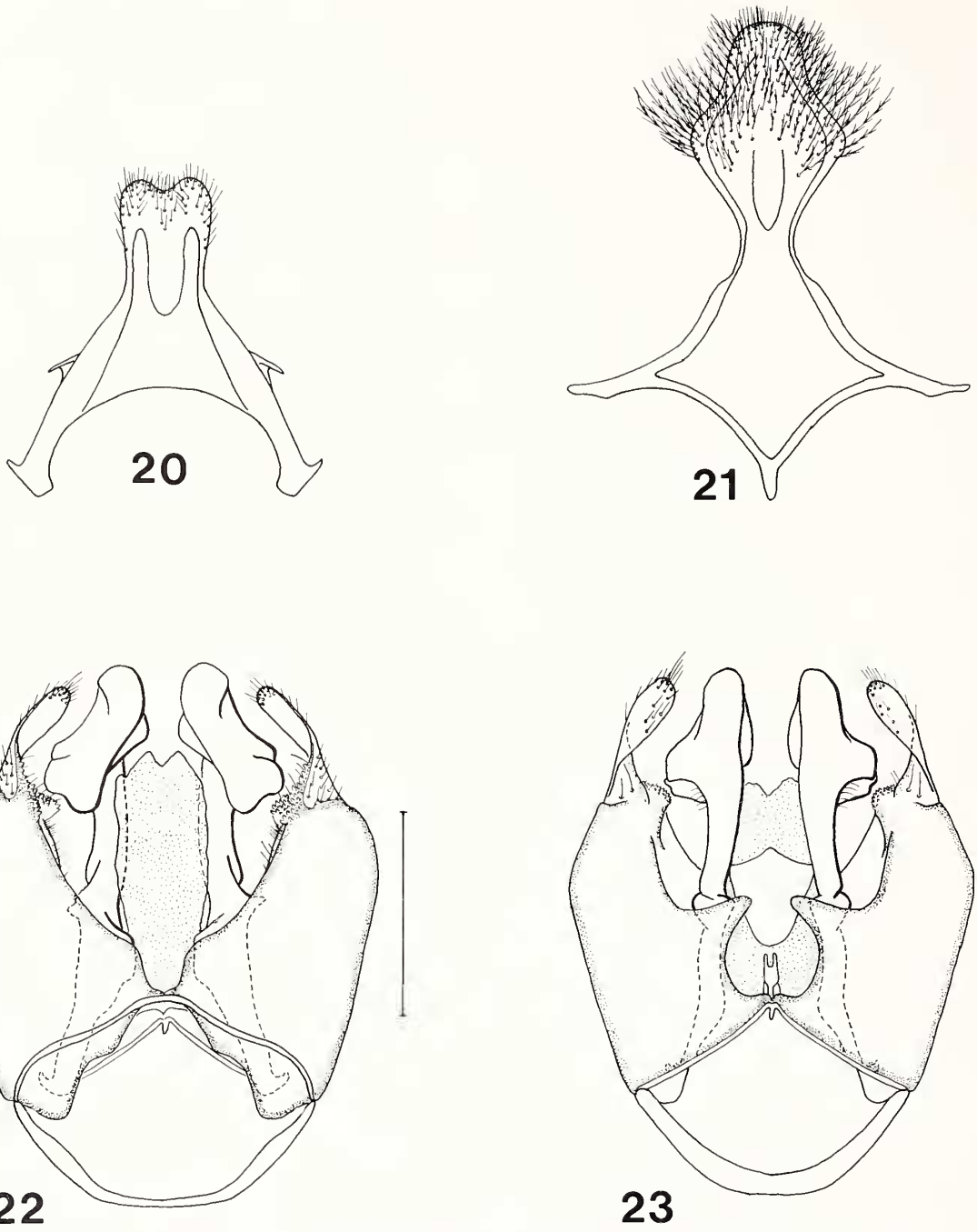
DIAGNOSIS

Abdomen ferruginous in both sexes, second tergite dull, subcontiguously punctate; male with clypeus narrow, pubescence of thoracic dorsum blackish except on metanotum and metafemur without ventral ridge; female with narrowly truncate pygidial plate and pale scopa.

DESCRIPTION

HOLOTYPE MALE. Measurements (mm). Head width 6.41 (6.00–6.62); head length 4.97 (4.56–5.03); wing length 15.0 (14.0–16.5); total length 19.0 (17.0–21.0).

Head. 1.29 (1.29–1.37) times broader than long; occipital margin slightly concave between tops of eyes; ocelli well anterior to occipital margin; inner orbits moderately convergent above, upper frontal width 0.65 (0.62–0.71) times



Figures 20–23. *Centris* (*Melanocentris*) *agiloides,* male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm.

lower frontal width. Mandible stout, tridentate, inner tooth acute and nearly as large as second tooth. Labrum about 1.5 times wider than long, apex subacute; disc shiny between dense to subcontiguous moderate punctures. Clypeus narrow, 1.1–1.2 times wider than long; median impunctate line narrow and poorly defined, basal area of disc moderately shiny, roughened and with sparse fine punctures, distal one-half, more or less, shiny and weakly or not roughened and with close to dense, fine punctures. Frons and preoccipital area moderately shiny between dense to subcontiguous fine punctures, except usual nearly impunctate areas adjacent to ocelli; gena shiny between sparse to close fine, punctures. Interantennal distance 1.62 (1.50–1.77) times antennal socket diameter; antennocular distance 0.46 (0.32–0.47) times anten-

nal socket diameter; scape stout, 2.05 (1.90–2.21) times longer than wide; scape length 0.75 (0.69–0.76) times length of first flagellar segment; first flagellar segment longer than following three segments combined, 5.94 (5.00–5.53) times length of second. Interocellar distance 1.35 (1.26–1.47) times diameter of anterior ocellus; ocellocular distance 0.38 (0.30–0.50) times diameter of anterior ocellus; oeelloccipital distance 2.22 (2.16–2.50) times diameter of anterior ocellus.

Thorax. Mesoscutum moderately shiny between dense to subcontiguous, fine punctures which are a little more separated posteromedially; scutellum with a low, rounded eminence on either side, moderately shiny between dense to subcontiguous, fine punctures, shiny along midline; metanotum dull, conspicuously tessellate and with scattered fine punctures; mesepisternum and metepisternum moderately shiny, punctures subcontiguous to contiguous, fine, and shallow. Basal area of propodeum moderately shiny, tessellate between sparse, fine punctures; side and posterior face similar, but punctures dense to subcontiguous. Metafemur stout, about 1.9 times longer than thick; thickest at basal one-third; without ventral ridge; metabasitarsus weakly curved, about four times longer than wide.

Abdomen. Dorsum of first tergite moderately shiny, weakly tessellate between sparse, fine punctures; remaining tergites dull and sharply tessellate between subcontiguous, moderate punctures, sparser on fourth and following segments; seventh tergum weakly bilobate at apex.

Terminalia. Distal process of seventh sternite (Fig. 20) short, not well differentiated from disc; apical emargination broad and shallow; hairs sparse, mostly short and weakly plumose or simple. Median expansion of eighth sternite (Fig. 21) evenly rounded; apex slightly convex; hairs abundant, long, conspicuously plumose. Dorsal process of gonocoxite (Figs. 22, 23) nearly triangular; gonostylus nearly reaching level of apex of penis valve; ventral lobe of penis valve only slightly extended laterad of dorsal lobe.

Pilosity. Blackish brown on front and top of head, on thoracic dorsum, upper mesepisternum, anterior and middle legs, and first tergite; hairs on discs of second and third tergites very short, simple, decumbent, longer and more erect on following segments, with some very long, plumose, reddish brown hairs, especially laterad; hairs on underside of head, posterior margin of scutellum, metanotum, and remainder of thorax light brown. Metafemur and metabasitarsus with scopa-like yellowish hairs.

Color. Head and thorax blackish brown, legs and antenna more rufescent. Large labral mark, large discal spot on clypeus and narrow paraocular mark all very pale yellowish. Abdomen dull ferruginous. Wings dark brown, veins and stigma blackish.

FEMALE. Measurements (mm). Head width 6.56–7.08; head length 4.82–5.13; wing length 14.5–16.0; total length 20.0–24.5

Head. 1.26–1.38 times broader than long; ocelli well anterior to nearly flat occipital margin in frontal view; inner orbits moderately convergent above, upper frontal width 0.84–0.90 times lower frontal width. Mandible quadridentate, inner tooth acute and slightly larger than subbasal tooth. Labrum about twice broader than long, apex broadly rounded; disc shiny between subcontiguous to contiguous, moderate punctures. Clypeus mostly moderately shiny, but disc with variable area which is conspicuously shiny (up to distal two-thirds of median area); median impunctate line poorly defined; disc with sparse moderate punctures and a few low, irregular rugulae which are usually convergent distad or curved mesad at their lower ends. Punctation of frons and occipital area as described for male, but interspaces (including ocellar area) moderately shiny and conspicuously tessellate; gena as described for male. Interantennal distance 2.00–2.31 times antennal socket diameter; scape robust, 1.98–2.13 times longer than wide; scape length 0.71–0.77 times length of first flagellar segment; first flagellar segment slightly longer than following three segments combined, 4.52–5.40 times length of second. Interocellar distance 1.55–1.72 times diameter of anterior ocellus; ocellocular distance 1.08–1.21 times diameter of anterior ocellus; ocelloccipital distance 1.71–2.00 times diameter of anterior ocellus.

Thorax. As described for male, but scutellum tessellate and slightly shiny, except in basal middle where it is shiny. Basitibial plate slender, apex narrowly rounded.

Abdomen. Dorsal face of first tergite moderately shiny and weakly tessellate between close to dense, moderate punctures; second and following terga dull, contiguously and finely punctate to tergal margins; apex of pygidial plate narrowly truncate.

Pilosity. On head and thorax, as described for male, but hairs of metanotum and propodeum often very pale brownish; scopa yellowish white. Hairs on dorsal face of first tergite erect, dark, plumose; dark, very short, appressed, and simple on disc of second segment, becoming progressively longer and less appressed on following segments; fourth and fifth terga with a few suberect to erect dark bristles on either side; prepygidial fimbria dark reddish brown.

Color. As in male, but without pale face marks.

TYPE MATERIAL

Holotype male: Finca La Selva, 500 ft. elev., near Puerto Viejo, *Heredia Prov.*, COSTA RICA, 3 June 1975 (D.R. Perry), on *Dipteryx panamensis,* 0703–1100, in Natural History Museum of Los Angeles County. Allotype: same locality and collector, 6 May 1979, on *Dussia* sp., 1045–1115 (LACM). Paratypes (all COSTA RICA): 11♂♂, 6♀♀, same data as allotype (LACM); 1♂, same locality and collector, 4 June 1975, on *Dipteryx panamensis,* 1100–1400 (LACM); 1♂, same locality and collector, 14 June 1975, on *Dipteryx panamensis,* 0830–1030 (LACM); 1♂, same locality and collector, 24 July 1978 (LACM), on *Hymenolobium* sp.; 1♂, 8 km S Puerto Viejo, *Heredia Prov.*, 28–29 May 1971 (P.A. Opler; UCB), on *Ipomaea* sp., pink fl.; 1♂, Zapote de Upala (vic. Bijagua), *Alajuela Prov.*, 19 May 1972 (F. Cordero; UCB); 1♀, Dulce Nombre, *Cartago Prov.*, 25 Aug. 1967 (R.W. McDiarmid; LACM).

ADDITIONAL SPECIMENS (not paratypes)

MEXICO, *CHIAPAS:* 1♂, Mahosik', Tenejapa, 4800 ft. elev., 9–12 July 1966 (D.E. Breedlove and J. Emmel; CAS). *SAN*

LUIS POTOSÍ: 1♂, 26 mi. SW Tamazunchale, 4–5 July 1964 (E. Fisher and D. Verity; LACM); 1♀, 15 mi. Xilitla, 1350 m elev., 15 Aug 1977 (E.I. Schlinger; UCB). *VERA CRUZ:* 1♀, Peñuela, 13 Sept. 1974 (M. Sousa; LACM); 4♀♀, same locality, 2 Aug. 1974 (A. Delgado S.; LACM), on "*C. Doylei,*" 0800–1002; 1♀, "Rig. de Cordoba (A. Genin; MNHN). COSTA RICA, *SAN JOSÉ:* 2♂♂, San José, no date (M. Valerio; USNM). PANAMA, *PANAMÁ:* 1♂, Cerro Azul, N of Tocumen, 28 Apr. 1958 (W.J. Hanson; UKAN); 1♂, Curundu, 19 May 1981 (R.W. Brooks; RWB), on *Genipa americana.*

ETYMOLOGY

Combines the Latin suffix *-oides* (resembling) to *agilis,* because of the superficial resemblance to *C. agilis.*

DISCUSSION

Variation in non-meristic characters is negligible. In some specimens, particularly those of Mexico, the pubescence of the metanotum and propodeum is not conspicuously paler than that of the thoracic dorsum. In some males, the posterior femur, tibia, and basitarsus may be extensively reddish, but mostly dark in other specimens. The supraclypeal mark may be present or absent, and when it is present, it is transverse and very narrow. Although the scape is usually black in the males available, there is a distinct ventral maculation in the males from Mexico and Panama. One of the Mexican males has the clypeus largely pale.

In the females there is considerable variation in the extent of the shiny area on the clypeal disc. In most specimens the shiny portion of the disc occupies about one-half the length of the disc; in a few this is exceeded (up to nearly the entire length) and in others reduced to the apicomedian one-fourth of the segment. Similarly, the development of the oblique rugulae of the clypeal disc is variable, and the rugulae, while never becoming a dominant feature, are always present.

The uniformly subcontiguously punctate, dull, red abdomen is diagnostic for *C. agiloides.* The only species with a similarly dull abdomen is *C. sericea* but in both sexes of that species the abdomen is black, the posterior legs are black-haired, the abdominal punctures become much finer toward the margins of the segments, and the punctures of the third segment are much finer than those of the second.

Centris (*Melanocentris*) *flavilabris* Mocsáry

Centris flavilabris Mocsáry, 1899:253. ♀.
Centris flavilabris var. *boliviensis* Mocsáry, 1899: 253. ♀.

This is a primarily South American species, not previously recorded from Central America.

NEW RECORDS

COSTA RICA, *GUANACASTE:* 1♂, Volcán Miravalles, 2 km W Rio Navinjo, 15 Mar. 1973 (P.A. Opler; UCB). *PUNTARENAS:* 1♀, Rincon, 25 Apr. 1975 (C.L. Hogue; LACM).

Centris (*Melanocentris*) *fusciventris* Mocsáry

Figure 15

Centris fusciventris Mocsáry, 1899:252. ♀.
Centris fusciventris var. *scutellata* Friese, 1900b:273. ♂♀. NEW SYNONYMY.
Centris (*Melanocentris*) *fusciventris:* Moure, 1950:388 (tax.).
Centris (*Melanocentris*) *fusciventris scutellata:* Michener, 1954:144 (distr.).

The var. *C. f. scutellata* was described from both sexes from Chiriquí, Panama. The nominate form occurs widely in South America (Brazil, Colombia, Bolivia, Venezuela). Differences between the two forms are slight and fall within the range of variation seen in South American material.

NEW RECORDS

COSTA RICA, *HEREDIA:* 3♀♀, 1♂, Finca La Selva, near Puerto Viejo, 6 May 1979 (D.R. Perry; LACM), on *Dussia* sp. PANAMA, *COLÓN:* 2♂♂, Puerto Pilón, 22 km NE Santa Rita, 23 May 1982 (D. Roubik; ROUB). *DARIÉN:* 3♂♂, Bayano Bridge, 184 km SE Canglon, 16 May 1980 (D. Roubik; ROUB). *PANAMÁ:* 2♂♂, Panamá, Curundu, 17 May 1981 (R.W. Brooks, RWB), on *Genipa americana.*

Centris (*Melanocentris*) *gelida,* new species

DIAGNOSIS

Female only: scopa yellowish on metatibia, brown on metabasitarsus; abdomen mostly ferruginous, dorsum shiny (obscured by pubescence) between minute punctures; dorsal face of first tergite pubescent and minutely punctate in middle; pubescence of first and second tergites pale. Male unknown.

DESCRIPTION

HOLOTYPE FEMALE. Measurements (mm). Head width 7.49 (7.38–7.64); head length 5.13 (5.03–5.13); wing length 18.0 (17.5–19.0); total length 22.0 (22.0–25.0).

Head. 1.46 (1.46–1.49) times broader than long; occipital margin nearly flat in frontal view and slightly below tops of eyes; ocelli anterior to occipital margin; inner orbits strongly convergent above, upper frontal width 0.85 (0.81–0.84) times lower frontal width. Mandible stout, quadridentate. Labrum about twice broader than long. Disc of clypeus slightly depressed, moderately shiny (duller, obviously tessellate laterobasad), with broad, poorly defined median impunctate line, punctures fine and irregularly spaced a puncture diameter or more apart. Frons roughened and slightly shiny between fine, dense punctures; vertex slightly shiny and with punctures minute and subcontiguous in ocellocular area, shiny between dense to sparse fine punctures in preoccipital area; gena shiny between dense to close, minute punctures. Interantennal distance 2.04 (2.00–2.24) times antennal socket diameter; antennocular distance subequal to antennal socket diameter; scape stout, about twice longer than wide, scape length 0.72 (0.63–0.72) times length of first flagellar segment; first fla-

gellar segment slightly longer than following three combined, 4.33 (4.35–4.65) times longer than second. Interocellar distance 1.60 (1.42–1.59) times diameter of anterior ocellus; ocellocular distance 1.07 (1.00–1.07) times diameter of anterior ocellus; ocelloccipital distance 1.72 (1.68–1.82) times diameter of anterior ocellus.

Thorax. Mesoscutum and dorsum of scutellum shiny between fine, dense to close punctures, posterior face of scutellum with subcontiguous, fine punctures; scutellum weakly depressed along midline; metanotum slightly shiny, sharply tessellate between sparse, minute punctures; mesepisternum moderately shiny between subcontiguous to dense, fine punctures; basal area of propodeum slightly depressed on either side, moderately shiny and tessellate between sparse, fine punctures; disc shinier, closely and more finely punctate; side shiny between fine, close punctures. Basitibial plate about twice longer than wide, secondary plate narrowly rounded at apex, primary plate more broadly rounded. Scopal hairs plumose nearly to tips.

Abdomen. Summit of first tergite shiny between sparse micropunctures in middle and close to sparse, minute punctures laterad; discs of second and third tergites shiny between dense to close, minute punctures; fourth tergite less shiny, densely, finely punctate; fifth tergite slightly shiny, subcontiguously, finely punctate. Pygidium narrowly truncate at apex, sides straight, secondary plate acute at apex.

Color. Color generally blackish brown, distal half of second, all of following tergites and all sternites ferruginous; tarsi and underside of flagellum dark ferruginous. Wings strongly brownish, veins and stigma blackish brown.

Pilosity. Dark brown to blackish on head, thorax, and legs, except most of metatibial scopa yellowish and metabasitarsal scopa light brown; hairs of mesoscutum very dense, concealing surface; hairs of first tergite moderately long, erect, plumose, dirty white; hairs of second to fifth tergites short, simple, subappressed, whitish to yellowish brown, especially on discs of second and third segments; prepygidial and pygidial fimbriae ferruginous; sternites with sparse erect whitish hairs, longer along midline and forming weak distal fimbriae, that of fifth segment ferruginous.

TYPE MATERIAL

Holotype female: Santa Rita, 10 mi. E Nahuala, 7100 ft. elev., Dept. Solola, GUATEMALA, 3 Sept. 1965 (S.J. Arnold), on *Canavalia villosa,* in California Academy of Sciences. Paratypes: 2♀♀, same data as holotype (UCB); 1♀, 25 mi. S El Bosque, 5500 ft. elev., Chiapas, MEXICO, 5 Sept. 1965 (S.J. Arnold; UCB); one paratype in LACM, two in UCB.

ETYMOLOGY

The specific name is a Latin word for "frosted" and refers to the characteristic appearance of the abdominal dorsum.

DISCUSSION

An additional female, not a paratype, is from Município Motozintla, ridge between Cerro Boqueron and Niguivil, 2438–2743 m elev., Chiapas, MEXICO, 15 Dec. 1976 (D.E. and J.A. Breedlove; CAS). This specimen is assumed to be conspecific with the type series, agreeing closely in most features. It does differ, however, in having the abdomen uniformly blackish, rather than mostly dull reddish. Abdominal color is somewhat variable in some members of this subgenus.

The only other species in Central America with a similarly "frosted" abdomen is *C. agilis.* In *C. agilis* the disc of the first tergite is polished and nearly devoid of punctures and pubescence across most of its breadth and the secondary plate of the pygidium is extended distad as a cariniform ridge.

Centris (*Melanocentris*) *obsoleta* Lepeletier

Figure 39

Centris obsoleta Lepeletier, 1841:153. ♀.

Centris melanochlaena F. Smith, 1874:360. ♂. NEW SYNONYMY.

Epicharis zamoranensis Cockerell, 1949:480. ♀. NEW SYNONYMY.

DISCUSSION

I have examined the type of *C. melanochlaena,* from Orizaba, Mexico. It corresponds to the concept of *C. obsoleta,* in the sense of Friese (1900b) and subsequent workers, and it is typical of Central American males since the clypeus is almost wholly yellowish.

I have also seen the type and one cotype of *Epicharis zamoranensis.* Cockerell described the thoracic dorsum as being devoid of hairs; this is true of the type, but not of the cotype. The hairs are worn off in the type specimen. There is no doubt that *E. zamoranensis* is conspecific with *C. obsoleta,* a common species in Central America and northern South America.

NEW RECORDS

MEXICO, *NAYARIT:* 1♀, 16 mi. S Acaponeta, 12 Aug. 1963 (M.G. Naumann; UKAN). *OAXACA:* 1♂, 5♀♀, Salina Cruz, 7 Sept. 1965 (D.H. Janzen; UKAN); 1♀, 12 mi. S Chivela, 18 Aug. 1959 (A.S. Menke and L.A. Stange; UCD); 1♂, 8 km W Tehuantepec, 9–10 Aug. 1974 (E.M. and J.L. Fisher; LACM). *PUEBLA:* 1♀, 16.1 km S Izúcar de Matamoros, 1280 m elev., 17 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Caesalpinia cacalaco. SINALOA:* 1♀, 35 km SE Esquinapa, 11 Sept. 1974 (E.M. Fisher; LACM). HONDURAS: 2♀♀, Zamorano, 2600 ft. elev., 5 Nov. 1946 (G. Cisneros; USNM, LACM) (type and cotype *E. zamoranensis*). COSTA RICA, *GUANACASTE:* 1♂, Hacienda Comelco, 8 km NW Bagaces, 19 Nov. 1971 (P.A. Opler; UCB), on *Stachytarpheta frantzii.*

Centris (*Melanocentris*) *sericea* Friese

Figures 24–28

Centris sericea Friese, 1899:41. ♀.

Dr. R.W. Brooks has examined the type of *C. sericea,* a female from an unspecified Mexican locality, and found it

to be conspecific with those recorded below. I have redescribed *C. sericea* to facilitate its comparison with similar species.

DIAGNOSIS

Abdomen black and hind legs black pubescent in both sexes. Male metafemur swollen, without ventral ridge; inner mandibular tooth acute; clypeus about 1.2 times broader than long; punctures of second tergum separated by a puncture diameter or more. Female with punctures of disc of second tergum coarser than those of apical zone; pygidial plate with margins strongly convergent apicad, apex subacute; thoracic pubescence wholly dark.

DESCRIPTION

MALE. Measurements (mm). Head width 5.90–6.31; head length 4.46–4.72; wing length 15.0–16.0; total length 18.5–20.0.

Head. 1.32–1.34 times broader than long, occipital margin, in frontal view, slightly concave between tops of eyes, ocelli well anterior to occipital margin; inner orbits moderately convergent above, upper frontal width 0.68–0.70 times lower frontal width. Mandible robust, tridentate, inner tooth acute and subequal to middle tooth. Labrum about twice broader than long; apical margin narrowly rounded; disc shiny between subcontiguous, moderate punctures. Clypeus narrow, about 1.2 times broader than long; disc moderately shiny to shiny (apical area), minutely roughened between close to sparse, moderate punctures, without distinct median impunctate area. Frons slightly shiny between dense, fine punctures, area in front of anterior ocellus and laterad of posterior ocelli impunctate, tessellate and moderately shiny; vertex moderately shiny between dense, fine punctures; preocciput similar but punctures sparse; gena moderately shiny, punctures sparse to close, minute near eye grading to fine toward gular margin. Interantennal distance 1.75–1.89 times antennal socket diameter; antennocular distance 0.48–0.61 times antennal socket diameter; scape stout, 1.97–2.08 times longer than broad; scape length 0.69–0.77 times length of first flagellar segment; first flagellar segment longer than following three combined, 4.41–5.44 times length of second. Interocellar distance 1.54–1.67 times diameter of anterior ocellus; ocellocular distance 0.51–0.69 times diameter of anterior ocellus ocelloccipital distance 2.03–2.15 times diameter of anterior ocellus.

Thorax. Mesoscutum shiny between dense to subcontiguous, moderate punctures, interspaces tessellate and moderately shiny in posterior middle; scutellum slightly shiny, tessellate between dense to subcontiguous, moderate punctures, a very low convexity on either side of middle; metanotum moderately shiny and sharply tessellate between sparse, weak, fine punctures; mes- and metepisterna moderately shiny between dense to subcontiguous, moderate punctures. Basal area of propodeum moderately shiny and sharply tessellate between sparse, fine punctures; side moderately shiny and roughened between close to dense, fine punctures. Metafemur robust, about 1.8 times longer than thick, without ventral ridge; metabasitarsus slender, about 3.6 times longer than broad.

Abdomen. Elevated basal area of dorsal face of first tergite much shorter, in middle, than apical zone, slightly shiny and tessellate between sparse, fine punctures; apical zone of first tergite long, shiny between scattered fine punctures; disc of second tergum moderately shiny between dense, moderate punctures which are conspicuously coarser and closer than those of apical zone; disc of third tergite moderately shiny and tessellate between close, fine punctures which are replaced with fine setigerous papillae on apical zone; fourth to sixth tergites moderately shiny and tessellate between close, slightly coarser setigerous papillae.

Terminalia. Seventh sternite (Fig. 25) with apical incision deeper and more angular than in *C. agiloides* (Fig. 18) and hairs more numerous and more conspicuously plumose. Eighth sternite (Fig. 26) more angularly expanded in middle than in *C. agiloides* (Fig. 19). Gonostylus (Figs. 27, 28) ending well short of level of end of penis valve; ventral lobe of penis valve extended well beyond margin of dorsal lobe.

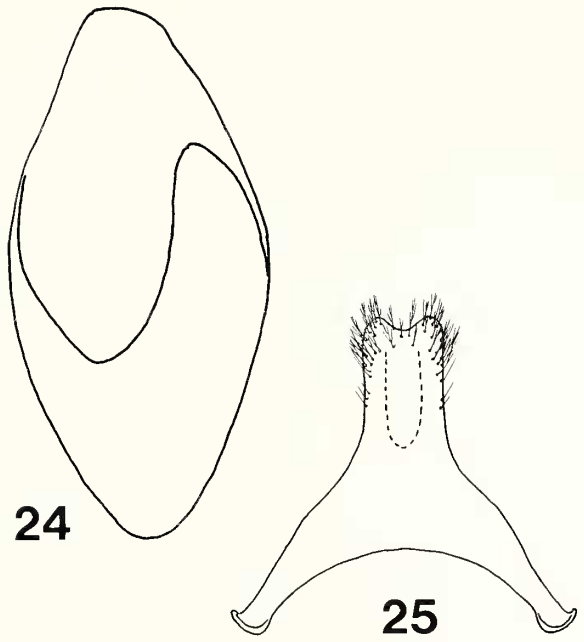
Pilosity. Blackish brown on head, thorax, legs, and first tergite; second and following tergites with whitish hairs, very short and appressed on second segment, becoming progressively longer and more erect on succeeding segments; golden-brown hairs laterad on fourth and following terga, on pygidial plate and on sternites.

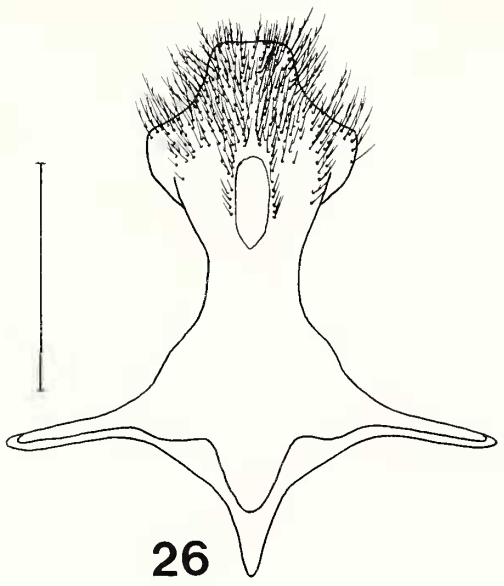
Color. Integument blackish brown on most areas; antenna, tegula, and legs dark reddish brown; apical abdominal segments light brown. The following pale yellow: large spot on labrum; clypeus, except small sublateral brown spots near base; transverse supraclypeal mark; paraocular area, not extending above lower margin of antennal socket; preapical spot on underside of scape. Wings dark brown, veins and stigma blackish.

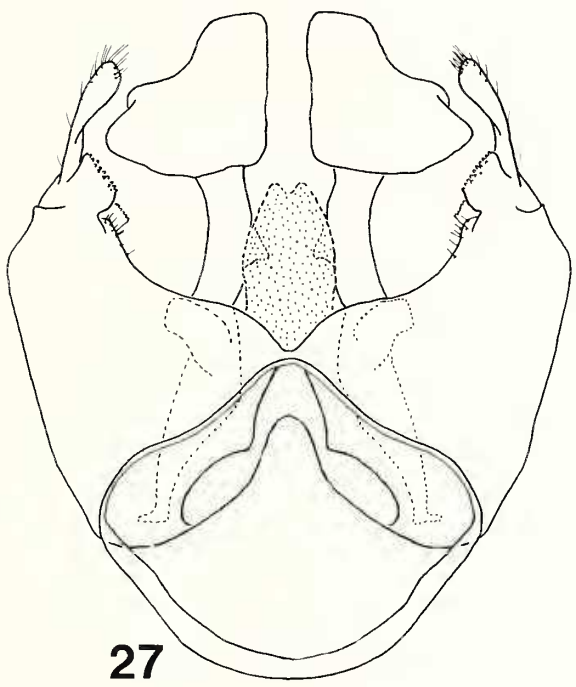
FEMALE. Measurements (mm). Head width 6.67–7.08; head length 4.92–5.33; wing length 16.0–17.0; total length 20.5–23.0.

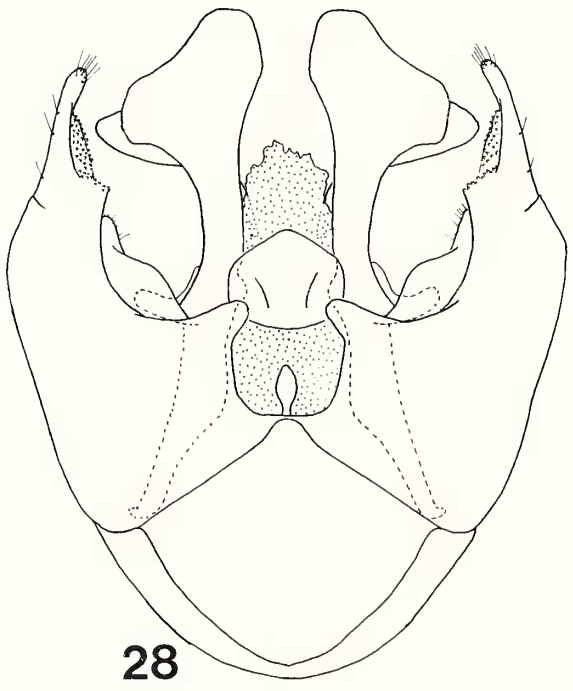
Head. 1.31–1.37 times broader than long; occipital margin, in frontal view, nearly flat and, in center, slightly above level of tops of eyes; ocelli well below occipital margin; inner orbits weakly convergent above, upper frontal width 0.85–0.93 times lower frontal width. Mandible stout, quadridentate, inner tooth acute and subequal to adjacent tooth. Labrum about twice broader than long, apex narrowly rounded, shiny between subcontiguous, moderate punctures. Clypeus as described for male, but about 1.3 times broader than long and median impunctate line a little more evident, but still poorly defined. Punctation of frons, occipital area, and gena as in male. Interantennal distance 2.37–2.53 times antennal socket diameter; scape stout, 2.00–2.27 times longer than broad, scape length 0.61–0.73 times length of first flagellar segment; first flagellar segment longer than following three segments combined, 4.64–5.41 times longer than second. Interocellar distance 1.66–1.95 times diameter of anterior ocellus; ocellocular distance 1.24–1.45 times diameter of anterior ocellus; ocelloccipital distance 1.87–1.97 times diameter of anterior ocellus.

Thorax. Punctation and form as described for male. Basi-









Figures 24–28. *Centris* (*Melanocentris*) *sericea*, female basitibial plate, male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line (25–28) = 1.00 mm.

tibial plate (Fig. 24) elongate, apices of primary and secondary plates narrowly rounded.

Abdomen. First tergum as described for male, but tessellate area limited to lateral areas of dorsal face; disc of second tergum slightly shiny and tessellate between fine, subcontiguous punctures which are conspicuously coarser than punc-

tures of apical zone; disc of third tergite slightly shiny between dense, minute and scattered, fine punctures; fourth tergite slightly shiny, more sharply tessellate between dense, fine punctures; fifth tergite duller between subcontiguous, fine punctures and scattered setigerous papillae. Margins of pygidial plate strongly convergent apicad, apex narrowly truncate or subacute; secondary plate short and broad.

Pilosity. As described for male; prepygidial fimbria golden brown.

Color. As described for male, but pale facial marks absent and fifth tergite dull reddish.

SPECIMENS EXAMINED

MEXICO, *MÉXICO:* 1♀, Cañon de Lobos, 1200 m elev., 12–13 July 1969 (M. Sousa; LACM). *MORELOS:* 2♀♀, Yautepec, 31 July 1963 (F.D. Parker and L.A. Stange; UCD); 1♀, 4 mi. SW Yautepec, 3800 ft. elev., 2 July 1961 (C.D. Michener; UKAN), on *Cassia* sp.; 1♂, 4.3 mi. W Yautepec, 4000 ft. elev., 17 Aug. 1962 (Ordway and Marston; UKAN). *NAYARIT:* 2♂♂, Km 190, 1200 m elev., NW of Guadalajara, 6 Sept. 1975 (J.L. Neff; LACM), on "legume 7046"; 9♀♀, 8 mi. N Tepic, 1 Sept. 1962 (D.H. Janzen; UCB), on *Crotalaria* sp.

DISCUSSION

Although the male of *C. sericea* closely resembles that of *C. obsoleta,* the clypeus is broader in the latter species, at least 1.4 times broader than long. The inner margins of the eyes are more strongly convergent above in *C. obsoleta,* so that the distance between the eyes at their upper ends is less than the distance between the lateral margins of the two posterior ocelli. In *C. sericea* males the transocellar distance is less than the distance between the eyes at their upper ends. These same features will readily distinguish *C. sericea* from *C. agilis,* as will the less shiny, uniformly dark abdomen and the lack of the pale hairs on the hind legs. From males of *C. agiloides,* this species may be separated by the blackish abdomen, lack of pale pubescence on the hind legs, the mostly pale clypeus, and the generally more uniformly dark thoracic pubescence, as well as differences in abdominal punctation.

Females of *C. sericea,* by virtue of their uniformly dark color and narrowly truncate pygidial plate can only be confused with those of *C. obsoleta.* They differ from that species, however, in that the disc of the second tergite is densely punctate, the punctures conspicuously coarser than those of the apical zone and those on the disc of the following segment. Additionally, the clypeus is less closely punctate and the pygidial plate is more strongly narrowed distad and less broadly truncate.

Centris (*Melanocentris*) *plumipes* F. Smith

Centris plumipes F. Smith, 1854:373. ♀ ♂.

This species, originally described from Santarem, Brazil, is easily recognized by the features cited in the key.

NEW RECORDS

COSTA RICA, *HEREDIA:* 3♂♂, Finca La Selva, near Puerto Viejo, 6 May 1979 (D.R. Perry; LACM), on *Dussia* sp.; 5♂♂, same locality and collector, 24 July 1979 (LACM), on *Hymenolobium* sp.

Centris (*Melanocentris*) species A

Figure 42

This is known only from four females. In this species, pubescence is dark, except light brownish on the posterior part of the scutellum and yellowish on the scopa, the apex of the pygidial plate is angularly emarginate, and the clypeus is conspicuously maculate. Although the integument is generally blackish, the abdominal terga have weak metallic bluish reflections.

SPECIMENS EXAMINED

COSTA RICA, *HEREDIA:* 1♀, Finca La Selva, near Puerto Viejo, 6 May 1979 (D.R. Perry; LACM), on *Dussia* sp. PANAMA, *CANAL ZONE:* 1♀, Barro Colorado Island, 9 July 1979 (H. Wolda; ROUB); 1♀, Frijoles, 19 May 1980 (K.E. Steiner; UCD), on *Byrsonima crassifolia*; 1♀, Pipeline Road, 3.7 mi. NW Gamboa, 9 May 1980 (K.E. Steiner; LACM), on *B. crassifolia.*

Subgenus *Trachina* Klug

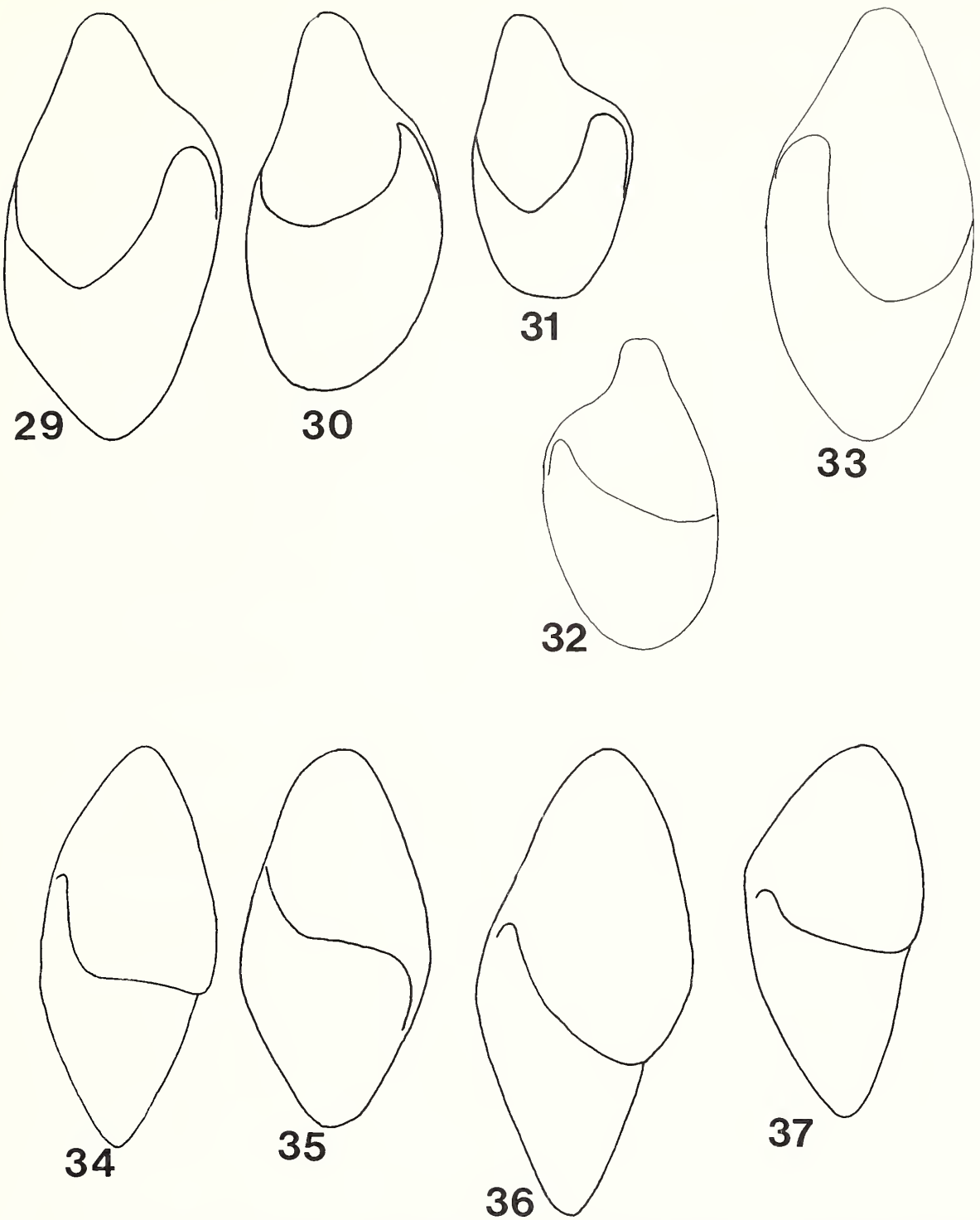
Trachina Klug, 1807:226. Type-species: *Centris longimana* Fabricius, 1804; monobasic.

Paremisia Moure, 1945b:406. Type-species: "*Paremisia lineolata* (Lepeletier, 1841)" = *Bombus similis* Fabricius, 1804.

Trachina is a member of a small group of subgenera, the other two being *Heterocentris* and *Hemisiella,* characterized by the three-segmented maxillary palp in both sexes, the swollen hind legs of the male and the metabasitarsus of the male with a sharp posterior carina or ridge which terminates in a raised tooth (Fig. 18).

Michener (1951) suggested that these three subgenera might well be united into a single genus. While there are some similarities, it seems to me that *Trachina,* at least, is distinct from both *Heterocentris* and *Hemisiella.* The latter two subgenera share a procoxal modification which appears to be unique in *Centris.* There is a sharply depressed groove along the inner, ventral margin of the procoxa; such a groove is not present in *Trachina* or the other subgenera. Females of *Heterocentris* and *Hemisiella* have some scopal hairs, especially basad on the metatibia, simple; in *Trachina* and other subgenera, the scopal hairs are conspicuously plumose. *Trachina* females possess a distinct secondary basitibial plate; in *Heterocentris* and *Hemisiella,* the basitibial plate has a basal convexity, but no secondary plate.

Both sexes of *Trachina* differ from species of *Hemisiella* and *Heterocentris* in possessing a longitudinal, median yellow line on the clypeus. Sometimes, this line may not be evident when the black of the clypeus is reduced to a pair of subbasal, sublateral spots. Clypeal maculae in *Heterocentris* and *Hemisiella* are usually present as a pair of subapical spots or a subapical band (females, some males) or else the clypeus is yellow except across the base (some males). Males of *Tra-*

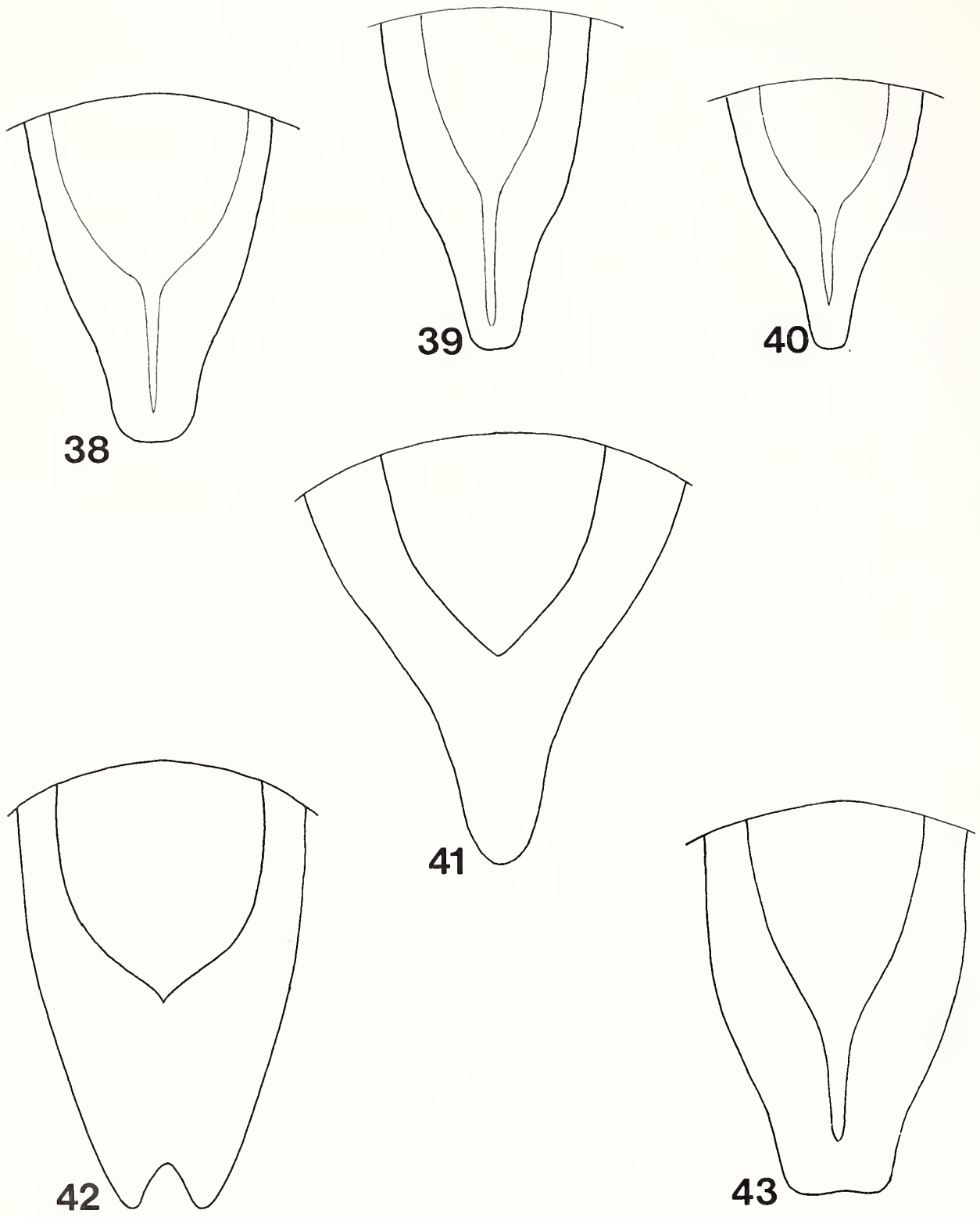


Figures 29–37, left basitibial plate of female: **29,** *Centris* (*C.*) *flavifrons*; **30,** *C.* (*C.*) *flavofasciata*; **31,** *C.* (*C.*) *aethiocesta*; **32,** *C.* (*C.*) *caixensis*; **33,** *C.* (*C.*) *meaculpa*; **34,** *C.* (*Trachina*) *eurypatana*; **35,** *C.* (*T.*) *fuscata*; **36,** *C.* (*T.*) *dentata*; **37,** *C.* (*T.*) *xochipillii*.

china further differ in that the apical lobe of the seventh sternite is greatly reduced, so that the segment is essentially a transverse band.

KEY TO NORTH AMERICAN *TRACHINA*

1a. Male, antenna 13-segmented, basitibial plate absent 2



Figures 38–43, pygidial plate of female: **38,** *Centris* (*C.*) *flavifrons*; **39,** *C.* (*C.*) *flavofasciata*; **40,** *C.* (*C.*) *aethiocesta*; **41,** *C.* (*Melanocentris*) *obsoleta*; **42,** *C.* (*M.*) species A; **43,** *C.* (*M.*) *agilis*.

b. Female, antenna 12-segmented, basitibial plate present 10

2a. Ocellocular distance greater than diameter of anterior ocellus; in full frontal view, distance from anterior ocellus to clypeal base a little shorter than distance from anterior ocellus to occipital margin 3

b. Ocellocular distance less than diameter of anterior ocellus; in full frontal view, distance from anterior ocellus to clypeal base much greater than distance from anterior ocellus to occipital margin 4

3a. Thoracic pubescence uniformly blackish, except white on scutellum and metanotum; metabasitarsus with sharp ridge along posterior margin, terminating in sharp spiniform process beyond midlength (Fig. 18) ..... *labiata* Friese

b. Hairs of mesoscutum dark brownish distally, base and branches pale, so that pubescence appears "clouded"; metabasitarsus without posterior ridge (Fig. 19) ..... *longimana* (Fabricius)

4a. Abdomen largely or wholly ferruginous; if brownish or blackish, hairs of mesoscutum red or pale ochreous 5

b. First three, and most of fourth, terga blackish, apical band of fourth and all of fifth to seventh terga pale reddish; hairs of mesoscutum black except for band of whitish hairs across anterior one-fourth ..... *vidua* Mocsáry

5a. At least first four terga dark brown to blackish (fourth may be ferruginous on apical margin 6

b. Abdomen largely or entirely ferruginous 7

6a. Terga 5–7 dark, with glistening whitish hairs; mesoscutal hairs pale to dark ferruginous; in frontal view, occiput arcuately raised above tops of eyes ..... *similis* (Fabricius)

b. Terga 5–7 ferruginous, with yellowish to ferruginous hairs; mesoscutal hairs pale ochreous; in frontal view, occiput flat or slightly concave between tops of eyes ..... *xochipillii,* new species

7a. Procoxa without distal spine; wings uniformly light yellowish brown 8

b. Procoxa with slender distal spine (hidden in dense pubescence); forewing, basad of basal vein, clear and colorless and distinctly brownish beyond basal vein ..... *eurypatana,* new species

8a. Hairs of mesoseutum pale ochreous or ferruginous; metafemur usually stout, subbasal ventral process usually tooth-like (Fig. 57, 58); second and third terga moderately shiny, disc finely tessellate; middle and hind legs with conspicuous brownish to blackish pubescence 9

b. Hairs of mesoscutum (and of most of thorax) whitish, though often slightly dusky anteriorly; metafemur less stout, subbasal ventral process low and not tooth-like (Fig. 56); second and third terga shiny, discs weakly or not at all tessellate; pubescence of legs whitish to pale ferruginous, ferruginous on inner surface of metabasitarsus ..... *heithausi* Snelling

9a. Disc of seventh sternite triangular, apex acute (Fig. 46); apical swelling of eighth sternite short and broad (Fig. 47); basal lobes of penis valve short and broad ..... *dentata* F. Smith

b. Disc of seventh sternite quadrate, apical margin straight or concave (Fig. 44); apical swelling of eighth sternite long and narrow (Fig. 45); basal lobes of penis valve relatively slender ..... *fuscata* Lepeletier

10a. Hairs of mesoscutum dark brownish to blackish and either (a) with a transverse band of white hairs across front of mesoscutum or (b) hairs of scutellum whitish 11

b. Hairs of mesoscutum whitish, yellowish, red or with dark apices, but without sharply contrasting pale hairs anteriorly or on scutellum 12

11a. Mesoscutum with a band of whitish hairs across anterior margin and hairs of scutellum and metanotum dark; first four terga blackish (fourth pale reddish apically), last two segments pale reddish ..... *vidua* Mocsáry

b. Mesoscutum without pale hairs anteriorly, but whitish hairs on posterior margin of scutellum and all of metanotum; terga wholly ferruginous ..... *labiata* Friese

12a. First three terga dark brownish to blackish 13

b. First three terga ferruginous 14

13a. Terga 4 and 5 dark, margins colorless, with long, glistening whitish hairs; scopa black; mesoscutal hairs usually dark reddish; tergum 4, across middle, with fine dense piligerous punctures ..... *similis* (Fabricius)

b. Terga 4 and 5 ferruginous, with yellowish hairs, scopa pale yellowish; mesoscutal hairs ochreous; tergum 4, across middle, with sparse fine piligerous punctures ..... *xochipillii,* new species

14a. Head width less than 5.75 mm; in frontal view, occiput weakly convex between tops of eyes; ocellocullar distance less than 1.5 × diameter of anterior ocellus; hairs of thoracic dorsum whitish to ferruginous 15

b. Head width more than 7.0 mm; in frontal view, occiput arcuately raised above tops of eyes; occellocular distance about twice diameter of anterior ocellus; hairs of thoracic dorsum with blackish shafts and pale branches near base ..... *longimana* (Fabricius)

15a. Thoraeic pubescence ochreous to light brownish ferruginous; scape distinctly maculate beneath; second and third terga finely and closely punctate, surface moderately shiny 16

b. Thoracic pubescence whitish, tinged with pale brownish on mesoscutum; scape obscurely, if at all, maculate; second and third terga shiny between fine punctures mostly separated by twiee a puncture diameter or more ..... *heithausi* Snelling

16a. Wings light to medium yellowish brown; lower margin of secondary basitibial plate strongly oblique (Fig. 36) *or,* if somewhat transverse, posterior margin is continuous with that of primary plate (Fig. 35) 17

b. Wings blackish brown; lower margin of secondary basitibial plate transverse, anterior margin curved basad

well before anterior margin of primary plate (Fig. 34) ..... *eurypatana*, new species

17a. Basitibial plate broad, lower margin of secondary plate usually transverse across middle portion, posterior margin continuous with that of primary plate (Fig. 35) ..... *fuscata* Lepeletier

b. Basitibial plate narrow, lower margin of secondary plate strongly oblique throughout, posterior margin extended over that of primary plate (Fig. 36) . *dentata* F. Smith

Centris (*Trachina*) *dentata* F. Smith

Figures 36, 46, 47, 58

Centris dentata F. Smith, 1854:374. ♂.
Centris proxima Friese, 1899:45. ♂ ♀.

Michener (1954) recorded *C. dentata* from Panama. In addition to material from Panama, I have seen several females from Mixtepec, Oaxaca, Mexico, 28 Feb. 1974 (M. Sousa; LACM). This appears to be an uncommon species in Central America, although widely distributed in South America; the types of both *C. dentata* and *C. proxima* were from Brazil.

Centris (*Trachina*) *eurypatana*, new species

Figures 34, 48–51, 57

DIAGNOSIS

Male distinguished from all other *Trachina* by the presence of a slender spine at the apex of the procoxa. Female separable from other *Trachina* by the following combination: pubescence pale ochreous, abdomen ferruginous, wings dark brown, posterior margin of secondary basitibial plate extended beyond that of primary plate.

DESCRIPTION

HOLOTYPE MALE. Measurements (mm). Head width 5.90; head length 4.10; wing length 13.0; total length 15.0.

Head. 1.44 times broader than long; occipital margin weakly convex in frontal view, ocelli well anterior to margin; inner orbits strongly convergent above, upper frontal width 0.68 times lower frontal width. Mandible slender, tridentate, inner tooth large and its lower edge slightly sinuate. Labrum about 1.4 times broader than long, apical margin broadly rounded; disc shiny between subcontiguous, fine punctures. Clypeus about 1.4 times broader than long; disc shiny across apical margin, otherwise slightly shiny and distinctly tessellate between dense to subcontiguous, fine punctures, impunctate median line narrow and slightly elevated. Frons moderately shiny between dense to subcontiguous, fine to moderate punctures, sparsely punctate areas adjacent to ocelli moderately shiny and distinctly tessellate; preoccipital area shiny between dense subcontiguous, fine to minute punctures; gena shiny between close to dense, fine punctures. Interantennal distance 0.82 times antennal socket diameter; scape robust, 1.97 times longer than wide; scape length 0.70 times length of first flagellar segment; first flagellar segment 5.63 times longer than second, distinctly longer than combined lengths of second to fourth segments. Interocellar distance 1.90 times diameter of anterior ocellus; ocellocular distance 0.55 times diameter of anterior ocellus; ocelloccipital distance 2.84 times diameter of anterior ocellus.

Thorax. Mesoscutum shiny between subcontiguous, fine punctures which become well separated posteromedially; scutellum shiny between scattered, minute to fine punctures; metanotum dull, sharply tessellate and with scattered, minute punctures; mesepisternum and metepisternum shiny between dense to subcontiguous, fine to moderate punctures. Basal area of propodeum shiny and weakly tessellate between sparse to close, moderate punctures; side and disc shiny between close to dense, fine to moderate punctures. Procoxa with narrow, distal, spiniform process; metafemur stout, about twice longer than thick, ventral process stout (Fig. 57); process on anterior margin of metatibia slender, spiniform; metabasitarsus about 3.2 times longer than broad, posterior ridge ending at about midlength.

Abdomen. Dorsal face of first tergite moderately shiny and tessellate between sparse, minute punctures; disc of second tergite shiny and weakly tessellate between sparse to dense, fine punctures, punctures of apical zone minute; third tergite similar, but punctures dense; fourth tergite similar to third, but punctures variably spaced from sparse to subcontiguous; fifth tergite similar to fourth, but punctures sparse; apex of seventh tergite distinctly bilobed, hidden under dense hairs.

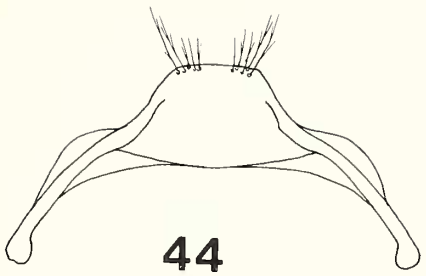
Terminalia. Process of seventh sternite (Fig. 48) short, broad, apical margin convex; margin with long, plumose hairs, disc with a few short, simple hairs. Eighth sternite (Fig. 49) moderately flared preapically, apex acute; hairs fine, plumose. Dorsal process of gonocoxite short, broad, apex rounded; distal tubercles of gonostylus not visible in dorsal view (Figs. 50, 51).

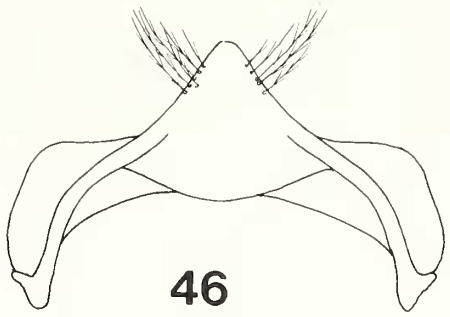
Pilosity. Generally pale ochreous, slightly brownish across vertex, on thoracic dorsum, and on legs, darker on meso- and metatibiae and tarsi; some brown hairs on inner surface of meso- and metatibiae and basitarsi. Second tergite with long, suberect, plumose, blackish brown hairs across base, discs of second to fourth terga with sparse, simple, dark hairs which become progressively longer and more erect on succeeding segments; hairs on fifth to seventh terga long, suberect to erect, slightly yellowish to ferruginous. Ventral abdominal pubescence dense, light yellowish brown.

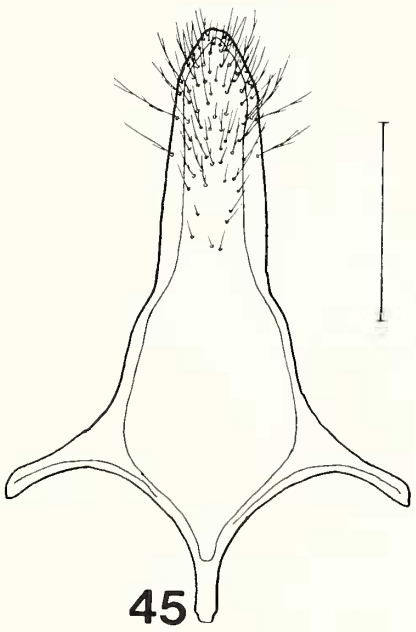
Color. Head and thorax blackish brown, abdomen ferruginous; antenna and legs variably light to dark reddish brown. The following yellow: mandible, except apical teeth; labrum; clypeus, except a pair of brown submedian spots near base; transverse supraclypeal stripe; paraocular area, upper end constricted and terminating on eye margin at about midlevel of antennal socket; broad ventral stripe on scape; dorsal, apical spot on profemur; basal spot on pro- and mesotibia. Tegula clear yellowish-brown. Wings clear and very light brown basad of vein M, darker brown distad; veins and stigma blackish brown.

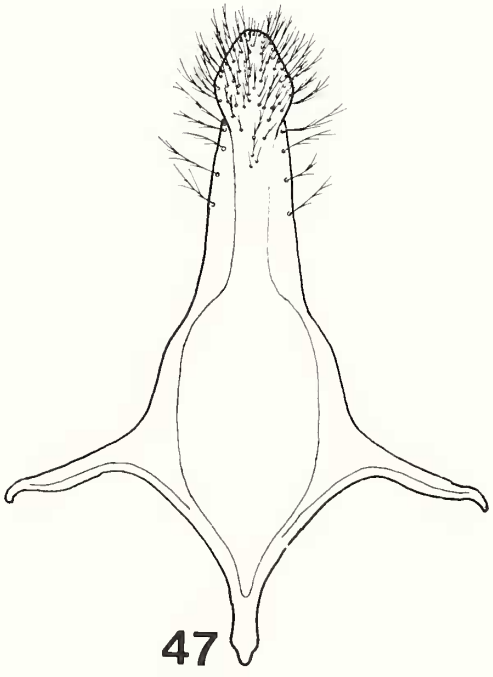
FEMALE. Measurements (mm). Head width 5.87–6.10; head length 4.05–4.27; wing length 11.5–12.5; total length 15.0–17.0.

Head. 1.43–1.44 times broader than long; in frontal view, occipital margin gently convex, ocelli well anterior to margin;









Figures 44–47, seventh and eighth sternites of male: **44–45,** *Centris* (*Trachina*) *fuscata*; **46–47,** *C.* (*T.*) *dentata*. Scale line = 0.50 mm.

inner orbits moderately convergent above, upper frontal width 0.87–0.89 times lower frontal width. Mandible tridentate, inner tooth large, blunt. Labrum about 1.5 times broader than long, margin broadly rounded; disc shiny between subcontiguous, fine to moderate punctures. Clypeus about 1.6 times broader than long, otherwise as described for male. Frons and preoccipital area as described for male; gena shiny, punctures close and minute near eye, becoming dense and fine ventrad. Interantennal distance 2.79–3.00 times antennal socket diameter; antennocular distance 1.61–1.71 times antennal socket diameter; scape stout, 2.03–2.17 times longer than wide, scape length 0.67–0.72 times length of first flagellar segment; first flagellar segment 5.63–5.88 times longer than second, longer than following three segments combined. Interocellar distance 2.14–2.30 times diameter of anterior ocellus; ocellocular distance 1.33–1.48 times diameter of anterior ocellus; ocelloccipital distance 2.80–3.00 times diameter of anterior ocellus.

Thorax. As described for male. Procoxa without ventral spine; basitibial plate (Fig. 34) narrowly rounded at apex, posterior margin of secondary plate beyond that of primary plate.

Abdomen. First two terga as described for male, third with punctures of disc minute and sparse, becoming more minute and scattered in apical zone; fourth tergum less shiny than third, punctures very irregularly spaced, moderate and some-

what elongate, close to dense. Pygidial plate with margins strongly convergent distad, apex narrowly truncate; secondary plate obsolete.

Pilosity. About as described for male, but some hairs on disc of fourth tergite at least weakly plumose; scopa pale yellowish; prepygidial fimbria light golden brown.

Color. As described for male, except mandibular apex more extensively dark, dark clypeal spots reaching base, supraclypeal spot greatly reduced or absent and legs approximately concolorous with abdomen. Wings darker brownish.

TYPE MATERIAL

Holotype male: Estación Biologia Chamela, Jalisco, MEXICO, 17 May 1980 (S.H. Bullock, #373), in Natural History Museum of Los Angeles County. Allotype: same locality and collector, 7 Apr. 1982 (#922; LACM). Paratypes (all MEXICO): 1♀, same locality and collector, 12 May 1980 (#372); 2♀♀, 30 mi. E Villa Union, 570 m elev., Sinaloa, 10 Mar. 1980 (J.L. Neff; NEFF). One paratype each in collections of the Estación Biologia de Chamela and in the personal collection of J.L. Neff, the remaining specimens in the Natural History Museum of Los Angeles County.

ETYMOLOGY

The specific epithet combines the Greek *eurys* (broad) and *patanas* (plate), in allusion to the broad secondary basitibial plate of the female.

DISCUSSION

The male is easily distinguished from all previously described species of *Trachina* by the presence of a distinct spine-like process at the apex of the procoxa. It is otherwise very similar to the males of *C. dentata, C. fuscata, C. heithausi,* and *C. xochipillii.* All of these differ from males of *C. eurypatana* in having lighter colored wings, particularly that of *C. heithausi,* which further differs in the paler pubescence of the head and thorax. Males of *C. dentata* have the ventral tooth of the metafemur higher and more slender and the tooth on the anterior margin of the metatibia is stouter than in *C. eurypatana.* The brown, rather than ferruginous, first three abdominal terga will differentiate *C. xochipillii* from *C. eurypatana.*

The female of *C. eurypatana* is best recognized from other members of this complex by the broad secondary basitibial plate, ochreous pubescence, dark wings, and wholly red abdomen. In *C. xochipillii* the first three abdominal segments are brown; in *C. heithausi* the thoracic pubescence is whitish and the wings only faintly brown; in *C. dentata* the median line of the clypeus is shiny and the punctures on either side are moderate rather than fine, and the second tergite is duller, more sharply tessellate and closely punctate. Since the secondary basitibial plate of *C. fuscata* does not overhang the first, this species is easily separated from *C. eurypatana.*

Centris (*Trachina*) *fuscata* Lepeletier

Figures 34, 44, 45

Centris fuscata Lepeletier, 1841:167. ♂.
Centris bimaculata Lepeletier, 1841:168. ♀.

This species, also described from Brazil, is much more common in Central America than the similar *C. dentata.* Females of *C. fuscata,* however, have a narrow secondary basitibial plate (Fig. 35), a feature which will separate this species from superficially similar species. Males most closely resemble those of *C. dentata,* but have the ventral tooth of the metafemur short and stout; in *C. dentata* this tooth is long, slender, and somewhat curved.

I have seen Central American material from Mexico, Guatemala, Costa Rica, and Panama. Michener (1954) has also recorded *C. fuscata* from Panama and Lutz and Cockerell (1920) cite it from Guatemala.

Centris (*Trachina*) *heithausi* Snelling

Figure 56

Centris (*Trachina*) *heithausi* Snelling, 1974:20–23. ♂ ♀.

This species was described from many specimens from Guanacaste Province, Costa Rica. I have seen numerous additional specimens from the same general area. One female, however, was collected 20 km SSE of Chiquimula, Depto. Chiquimula, Guatemala, 25 Feb. 1966 (D.P. Gregory; UCB).

Centris (*Trachina*) *labiata* Friese

Figure 18

Centris labiata Friese, 1904:91. ♂.
Centris schwarzi Cockerell, 1919:192. ♀. NEW SYNONYMY.

This is evidently not a common species. Friese's male type is from San Carlos, Costa Rica. The type of *C. schwarzi* is from Alta Vera Paz, Guatemala. I have seen the type of *C. schwarzi,* in the USNM, and it is the same as females I had already associated with *C. labiata* males. Both sexes are characterized by the dark thoracic pubescence (but pale on the scutellum and metanotum) and the red abdomen.

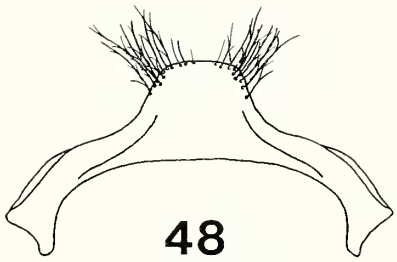
NEW RECORDS

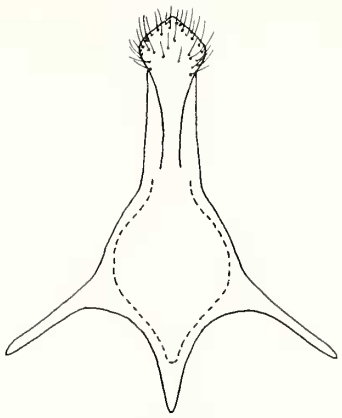
MEXICO, *OAXACA:* 2♂♂, 20 mi. E El Camerón, 21 July 1956 (J.W. MacSwain; UCB); 2♂♂, 19 mi. W Tequisistlan, 29 Aug. 1970 (E.M. and J.L. Fisher; LACM). *VERA CRUZ:* 1♂, El Palmar, 28 Mar. 1954 (D.H. Janzen; LACM). *YUCATÁN:* 1♀, Pisté, 29 June 1967 (E.C. Welling; LACM). BELIZE: 1♀, no further data (LACM).

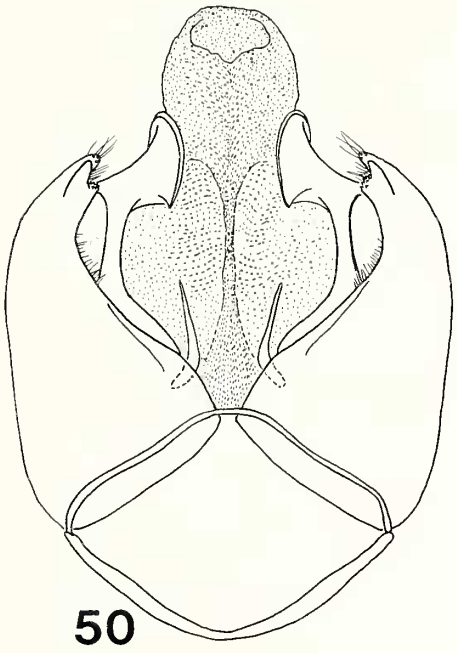
Centris (*Trachina*) *longimana* Fabricius

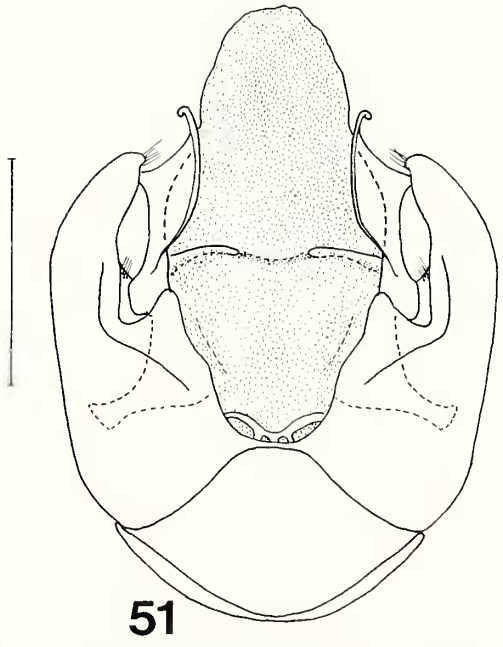
Figure 19

Centris longimana Fabricius, 1804:356. ♀ ♂.









Figures 48–51. *Centris* (*Trachina*) *eurypatana,* male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm.

Centris personata F. Smith, 1874:362. ♂.

Michener (1954) reported *C. longimana* from several Panamanian localities. In addition to specimens from Panama, I have seen material from Nicaragua and Costa Rica.

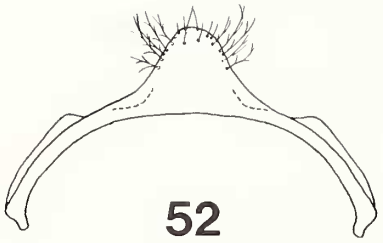
Centris (*Trachina*) *similis* (Fabricius)

Bombus similis Fabricius, 1804:351. ♀.
Centris lineolata Lepeletier, 1841:158. ♀.
Centris lineolata castaneiventris Mocsáry, *In* Friese, 1899: 288.
Centris (*Paremisia*) *similis:* Moure, 1960b:130–131.

This is a common species in northern South America (Trinidad, Guyana, French Guiana) south to Brazil and Peru. There are no previous reports of its presence in Central America. I have seen the following Central American specimens.

NEW RECORDS

COSTA RICA, *PUNTARENAS:* 1♀, 1.8 mi. W Rincón, 4 Mar. 1971 (J.P. Donahue and C.L. Hogue; LACM). *SAN JOSÉ:* 1♀, Pozo Azul, Junction Ríos Parrita and Candelaria, 85 m elev., 9 Dec. 1961 (A. Wille; UKAN). PANAMA. *PANAMÁ:* 2♂♂, 15 km E Chepo, Llano Carti Rd., 18 Jan.



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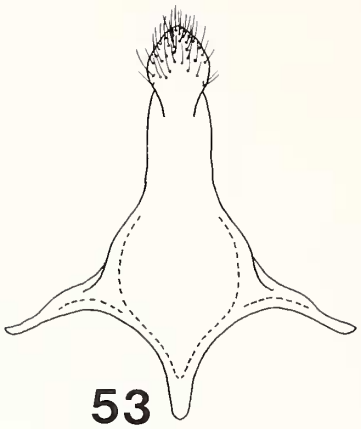

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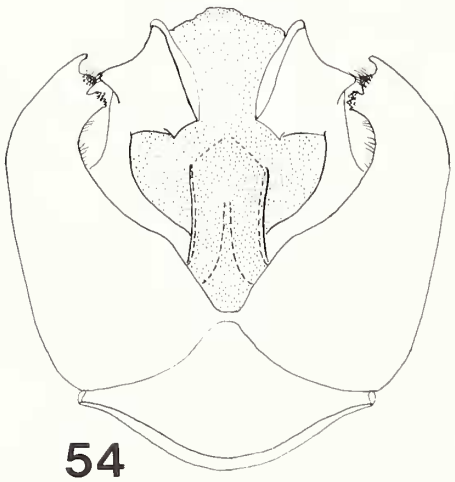

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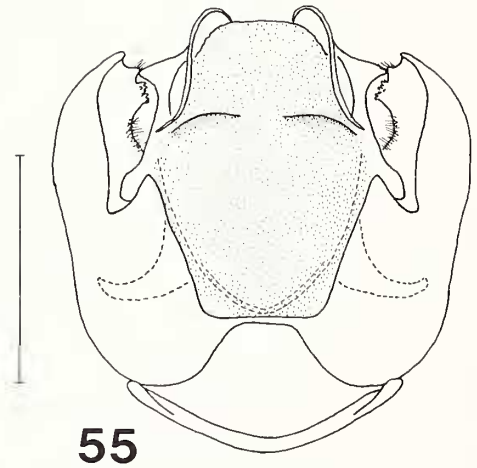

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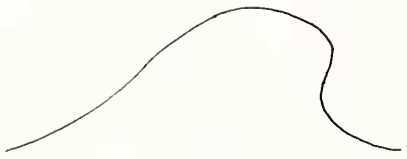

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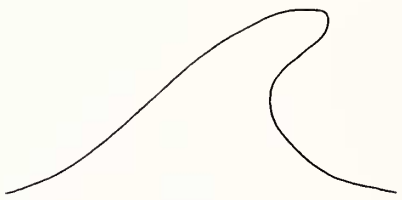

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Figures 52–55. *Centris* (*Trachina*) *xochipillii*, male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm. **Figs. 56–58,** outline of ventral metafemoral process of male: **56,** *C.* (*T.*) *heithausi*; **57,** *C.* (*T.*) *eurypatana*; **58,** *C.* (*T.*) *dentata*.

1980 (D. Roubik, #6; ROUB); 2♀♀, 1♂, 15 km NE Chepo, 19 Dec. 1980 (D. Roubik, #48; ROUB).

Centris (*Trachina*) *vidua* Mocsáry

Centris vidua Mocsáry, 1899:252. ♂.

This species was described from Honduras (San Pedro Sula) and has been reported by Friese (1900b) from Orizaba, Vera Cruz, Mexico. I have seen the following specimens of this uncommon bee.

NEW RECORDS

BELIZE: 1♀, Belize (no further data; LACM). COSTA RICA, *CARTAGO:* 1♂, Turrialba, 18 Oct. 1947 (A. Svihla; LACM). PANAMA, *BOCAS DEL TORO:* 1♀, Almirante, Sept. 1963 (LACM). *COLÓN:* 2♀♀, 1♂, 5 km SW Colón, 30 Jan. 1980 (D. Roubik, #12; ROUB).

Centris (*Trachina*) *xochipillii*, new species

Figures 37, 52–55

DIAGNOSIS

At least first three terga brown, apical segments ferruginous; male ocellocular distance less than ocellar diameter, occipital margin at most weakly convex in frontal view, thoracic pubescence ochreous; female with ochreous thoracic pubescence, posterior margin of secondary plate of basitibial plate overhanging that of primary plate, scopa yellowish.

DESCRIPTION

HOLOTYPE MALE. Measurements (mm). Head width 5.23 (5.13–5.74); head length 3.79 (3.59–4.05); wing length 13.5 (12.0–14.0); total length 15.0 (13.0–17.0).

Head. 1.38 (1.38–1.51) times broader than long; in frontal view, occipital margin flat or slightly convex, ocelli well below margin; inner eye margins strongly convergent above, upper frontal width 0.74 (0.69–0.75) times lower frontal width. Mandible tridentate, inner tooth large, its lower margin slightly concave in outline. Labrum about 1.7 times wider than long, apical margin broadly rounded; disc shiny between subcontiguous, fine to moderate punctures. Clypeus about 1.6 times broader than long; disc dull and densely tessellate at base, shiny and weakly tessellate on about distal one-fourth, median line raised and impunctate, disc otherwise densely to subcontiguously punctate, punctures fine to moderate. Frons and ocellar area closely punctate, except usual nearly impunctate areas near ocelli; postocellar area varying from moderately shiny between minute, dense punctures immediately behind ocelli, to shiny between sparse to close, moderate punctures at posterior margin; gena shiny between sparse to close punctures, minute adjacent to eye and grading to fine over most of area. Interantennal distance 2.30 (2.00–2.56) times antennal socket diameter; antennocular distance 0.85 (0.63–0.88) times antennal socket diameter; scape stout, 1.90 (1.76–2.03) times longer than wide, scape length 0.63 (0.63–0.72) times length of first flagellar segment; first flagellar segment longer than following three segments combined, 5.63 (5.24–6.13) times length of second segment. Interocellar distance 2.15 (1.89–2.11) times diameter of anterior ocellus; ocellocular distance 0.70 (0.57–0.78) times diameter of anterior ocellus; ocelloccipital distance 2.85 (2.50–2.96) times diameter of anterior ocellus.

Thorax. Mesoscutum shiny between dense, fine punctures; dorsal face of scutellum shiny, punctures sparse and minute in center, becoming close and fine laterad, dense and fine on posterior face; metanotum slightly shiny, sharply tessellate between scattered, minute punctures; mesepisternum shiny between dense, fine punctures; metespisternum similar but punctures more crowded toward posterior margin and lower one-third with punctures minute and scattered. Basal area shiny between sparse, fine punctures in middle, becoming dense laterad; side of propodeum similar but punctures scattered to close. Procoxa aspinose; metafemur robust, about 1.8 times longer than thick, ventral process stout; anterior tooth of metatibia acute, moderately stout; metabasitarsus about 3.5 times longer than wide, posterior carina ending at about midlength in slender tooth.

Abdomen. Dorsal face of first tergum moderately shiny and tessellate between sparse, minute punctures; disc of second tergum shiny between sparse, minute punctures which extend across apical zone nearly to margin; disc of third tergum similar, but punctures a little larger and impunctate margin broader; fourth tergum shiny and weakly tessellate between sparse, moderate punctures; fifth and sixth terga similar, but a little more distinctly tessellate.

Terminalia. Seventh sternite (Fig. 52) with distal process longer and more narrowly rounded than in *C. eurypatana* (Fig. 48) and fewer long marginal hairs. Apical swelling of eighth sternite (Fig. 51) shorter than in *C. eurypatana* (Fig. 49), apex less acute. Dorsal process of gonocoxite (Fig. 55) narrower and more acute than in *C. eurypatana*; tubercles at apex of gonostylus visible in dorsal view.

Pilosity. Pubescence generally ochreous, whitish on head, especially on gena; brownish across vertex, anteriorly on mesobasitarsus, externally on metatibia and metabasitarsus; reddish brown on remainder of hind legs; discs of second to fourth terga with hairs simple, blackish and appressed on second, longer and more erect on third, some suberect on fourth; fifth with erect hairs, some plumose, mixed ferruginous and black; sixth and seventh terga with hairs mostly plumose, pale ferruginous, brownish laterad.

Color. Blackish; first three terga, and most of fourth, dark reddish brown; distal margin of fourth, and all of following terga, ferruginous; sternites reddish; legs medium to light reddish brown. The following dull yellow: most of mandible; labrum; narrow median stripe and transverse distal band (broader laterad) on clypeus; paraocular area, constricted above and ending on eye margin at about midlength of antennal socket; linear mark on underside of scape; small basal spot on pro- and mesotibiae. Wings light brown, a little darker apicad; veins and stigma dark brown.

FEMALE. Measurements (mm). Head width 5.79–6.10; head length 4.21–4.36; wing length 11.0–13.0; total length 13.0–17.0.

Head. 1.36–1.42 times broader than long; in frontal view occiput nearly flat and ocelli well anterior to margin; eyes weakly convergent above, upper frontal width 0.88–0.91 times lower frontal width. Mandible tridentate, inner tooth large, subtruncate. Labrum about 1.6 times broader than long, apex broadly rounded; shiny between subcontiguous, moderate punctures, but with distinct, slightly convex basal zone virtually free of punctures. Clypeus about 1.7 times broader than long, otherwise about as described for male, but impunctate median line moderately shiny and moderate-sized punctures clearly dominant. Frons, occipital area, and gena about as described for male. Interantennal distance 2.43–2.77 times antennal socket diameter, antennocular distance 1.47–1.68 times antennal socket diameter; scape robust, scape 1.83–2.06 times longer than broad; scape length 0.70–0.76 times length of first flagellar segment; first flagellar segment longer than following three segments combined, 5.00–5.41 times length of second segment. Interocellar distance 2.06–2.24 times diameter of anterior ocellus; ocellocular distance 1.39–1.48 times diameter of anterior ocellus; ocelloccipital distance 2.50–2.83 times diameter of anterior ocellus.

Thorax. Punctation as described for male. Basitibial plate (Fig. 37) long, apex subacute; posterior margin of secondary plate extending beyond that of primary plate.

Abdomen. First tergum similar to that of male, but with a few moderate punctures across base of dorsal face; second to fifth terga about as described for male. Pygidial plate V-shaped, apex narrowly rounded, secondary plate indistinct.

Pilosity. Generally as described for male, but only first three terga dark reddish brown, last three ferruginous; yellowish marks of face as in male, but scape entirely dark, or with a small, obscure, yellowish blotch.

TYPE MATERIAL (all Oaxaca, MEXICO)

Holotype male, allotype, 2♂♂, 7♀♀ paratypes: Tehuantepec, 18 Feb. 1954 (R.R. Dreisbach), in University of Kansas, Snow Entomological Museum. Additional paratypes: 1♀, 20 mi. W Tehuantepec, 18 Feb. 1954 (R.R. Dreisbach; UKAN): 1♂, 5 mi. W Tehuantepec, 7 Apr. 1953 (E.I. Schlinger; UCB); 8♂♂, 35 mi. N Tehuantepec, 2600 ft. elev., 5 Feb. 1966 (D. Bolinger; ORSU); 1♂, 20 mi. E Juchitan jct., 500 ft. elev., 28 Jan. 1965 (D. Bolinger; ORSU). Two male and two female paratypes in LACM, remainder returned to their respective collections.

ETYMOLOGY

This species is named for the Aztec (Nahuatl) god of Spring and of flowers, *Xochipilli*; in pronoucing the name, the x has an "sh" sound.

DISCUSSION

Aside from the variations in measurements and ratios noted above, the females of this species are all very similar to one another. Even the yellowish face marks appear to be quite stable, but this may be due to the fact that all are from the same locality. Much the same is true of the males. The principal variation involves the extent of the shiny area of the clypeus. In a few males, up to one-half of the discal area is shiny, but generally the shiny portion is less extensive, and may be limited to a very narrow band along the apical margin.

Most males possess a narrow, transverse supraclypeal mark, but in one it is merely a small median spot. Other males, including the holotype, lack a supraclypeal mark. All males seen possess a broad stripe on the underside of the scape which almost attains the apex of the segment. The black laterobasal marks on the clypeus are consistently large.

The combination of pale ochreous pubescence and bicolored abdomen will separate both sexes of *C. xochipillii* from all other species. Males of *C. eurypatana, C. heithausi,* and *C. xochipillii* all have the basal margin of the clypeus more strongly arched upward in the center than at either side; in *C. fuscata* the margin is evenly, very slightly convex between the subantennal sutures; *C. dentata* is intermediate between these two types.

From *C. eurypatana,* males of *C. xochipillii* may be separated by the lack of procoxal spines, the broader clypeus and the reduced yellow areas on the clypeus. In *C. xochipillii* the pubescence is slightly yellowish, the disc of the second tergum is only moderately shiny, and the punctures of the apical zone of the second tergum are not conspicuously finer than those of the disc; these features will separate *C. xochipillii* from *C. heithausi.* Males of *C. dentata* have the punctures of the clypeal disc distinct, rather than obscured by dense tessellation, the disc of the second tergite is densely punctate, and the ventral tooth of the metafemur slender and curved. All of the species differ from *C. xochipillii* in having the abdomen wholly ferruginous.

The female shares with those of *C. dentata, C. heithausi,* and *C. eurypatana* the broad secondary plate on the basitibial plate, thus differing from that of *C. fuscata.* It is separable from all by the bicolored abdomen, from *C. heithausi* by the ochreous rather than whitish pubescence, from *C. dentata* by the immaculate scape and shiny, sparsely punctate disc of the second tergite, and from *C. eurypatana* by the shiny median clypeal line, immaculate scape, and much paler wings.

Subgenus *Hemisiella* Moure

Hemisiella Moure, 1945b:407–408. Type-species: "*Hemisiella lanipes* (Fabricius, 1775)" = *Apis lanipes* Fabricius, 1775; original designation.
Centris subg. *Hemisiella:* Michener, 1951:7–8.

This is a large group, with most of the species occurring in South America, but with one entering the southwestern United States. The distinctions between this subgenus and *Heterocentris* are not great and possibly the two should be merged. A detailed study of the extensive South American fauna might resolve this question, but is beyond the scope of this paper.

In addition to the characters noted in the keys by Michener (1951) and Snelling (1974), *Hemisiella* females may be separated from those of *Heterocentris* by the lack of compressed,

blade-like setae on the fourth and fifth sterna and by the acute apex of the secondary pygidial plate.

KEY TO NORTH AMERICAN *HEMISIELLA*

1a. Male, antenna 13-segmented; abdomen with seven visible terga 2
b. Female, antenna 12-segmented; abdomen with six visible terga 6
2a. Hairs of thoracic dorsum with conspicuous black tips 3
b. Hairs of thoracic dorsum without conspicuous black tips 4
3a. Large species, head width over 5.2 mm; face broad, frontal width greater than clypeocellar distance ..... *vittata* Lepeletier
b. Smaller species, head width less than 4.7 mm; face narrower, frontal width less than clypeocellar distance ..... *dichrootricha* Moure
4a. Midline of clypeus not cariniform; paraocular area with yellow mark; segments 10 and 11 of flagellum dark beneath, contrasting with underside of segments 2–9 5
b. Midline of clypeus low-cariniform; paraocular area without yellow mark; segments 10 and 11 of flagellum beneath not contrasting with color of segments 2–9 ..... *transversa* Pérez
5a. At least two terga, often entire abdomen, ferruginous, apical hairs ferruginous; first flagellar segment less than 3.7 times second ..... *trigonoides* Lepeletier
b. Abdominal terga blackish, apical segments with white hairs; first flagellar segment at least 4.0 times second ..... *nitida* F. Smith
6a. Hairs of thoracic dorsum conspicuously black-tipped 7
b. Hairs of thoracic dorsum not black-tipped 8
7a. Clypeus broadly and deeply depressed across lower part of disc; labrum at least twice wider than long; larger species, head width at least 6.0 mm ..... *vittata* Lepeletier
b. Clypeus protuberant; disc flat or slightly convex; labrum no more than 1.5 times wider than long; smaller species, head width less than 5.5 mm ..... *dichrootricha* Moure
8a. Abdomen and legs blackish; scopa black 9
b. Abdomen and middle and hind legs largely ferruginous; scopa ferruginous ..... *trigonoides* Lepeletier
9a. Fifth tergum usually with long, glistening, white hairs; lower margin of clypeal marks parallel to apical margin of clypeus; smaller species, head width 3.9–4.5 mm ..... *transversa* Pérez
b. Fifth tergum with brown to black hairs only; lower margin of clypeal marks oblique to apical margin of clypeus; larger species, head width 4.8–5.3 mm ..... *nitida* F. Smith

Centris (Hemisiella) dichrootricha (Moure)

Hemisiella dichrootricha Moure, 1945b:408–409. ♀.
Centris (*Hemisiella*) *dichrootricha:* Michener, 1954:143. ♀ ♂ (distr., tax.).

This species was described from the State of Guapore, Brazil; Michener (1954) recorded it from Panama and noted characteristics of the previously undescribed male. I have seen many specimens from Panama and a few from Costa Rica. The species is easily recognized by the characteristics cited in the key.

Centris (*Hemisiella*) *nitida* F. Smith

Centris nitida F. Smith, 1874:368. ♀.
Centris confinis Pérez, 1905:40. ♀. NEW SYNONYMY.

Pérez (1905) described *C. confinis* from "Mexique?" The type specimen, a female, is in the Museum National d'Histoire Naturelle, Paris, and has been examined by me. Although in poor condition, it is unquestionably a specimen of *C. nitida*. The records from southern Arizona cited by Hurd (1979) as *C. confinis* are based on specimens of *C. transversa*.

This is a common species through Central America, extending into northern South America; the type locality is Honduras, without more precise locality. I have seen Central American material of *C. nitida* from Mexico, Belize, Guatemala, Honduras, El Salvador, and Costa Rica. Although I have seen no records from Panama, *C. nitida* must be present there, as it is present in South America (Colombia, Ecuador).

Centris (*Hemisiella*) *transversa* Pérez

Centris transversa Pérez, 1905:39. ♀ ♂.
Hemisiella transversa: Moure, 1945b:408.
Centris (*Melanocentris*) *ruae* Cockerell, 1949:474–475. ♀. NEW SYNONYMY.
Centris (*Hemiesiella*) *transversa:* Snelling, 1966:26–27 (distr.).
Centris (*Hemisiella*) *confinis:* Hurd, 1979:2175 (misidentification).

This primarily Mexican species is found also in Guatemala and Honduras. Although it has been suggested that this is a synonym of *C. nitida* (see Lutz and Cockerell, 1920:560), the two are distinct from one another. In addition to differences noted in the key, females of *C. transversa* have the median impunctate line of the clypeus distinctly raised, the flagellum is uniformly dark, the dorsal thoracic hairs are brownish and the hairs at the sides of the fourth and fifth sternites are whitish. In *C. nitida,* the impunctate median line is not raised or, if a little elevated, the raised area is broadly rounded rather than narrow and sharply defined; the underside of the flagellum is lighter in color than the upper side; the dorsal thoracic hairs are yellowish; the hairs at the sides of the fourth and fifth sternites are uniformly dark.

Males of *C. transversa* possess a somewhat coniform ventral process on the metatrochanter, a prominent ventral process near the base of the metafemur, and the pubescence of the fifth and sixth sternites is mostly pale. The ventral process of the metatrochanter of *C. nitida* is a depressed, narrow apical spine and, in that species, the ventral surface of the metafemur lacks a process and the pubescence of the fourth to sixth sterna is dark.

The type of *C.* (*Melanocentris*) *ruae* is in the USNM (No. 58880) and is from Zamorano, Honduras. I have examined the specimen and it is a normal specimen of *C. transversa,* differing from Mexican specimens only in the reduction in the number of white hairs on the apical terga. In spite of Cockerell's statement to the contrary, the size is normal and the clypeal and labral markings are well within the range for this species. The type agrees with other material from Honduras.

Hurd (1979) reported *C.* (*Hemisiella*) *confinis* from Arizona (Patagonia and Tumacacori) on flowers of *Parkinsonia aculeata.* The specimens on which this report was based are in UCB and I have examined them. They are *C. transversa,* which I had previously (1966) recorded from Arizona. At that time I conjectured that *C. transversa* was possibly adventive in Arizona, a view I no longer hold. Additional material now shows the distribution of *C. transversa* to extend north along the western flanks of the Sierra Madre Occidental through Sonora to southern Arizona.

Centris (*Hemisiella*) *trigonoides* Lepeletier

Centris trigonoides Lepeletier, 1841:167. ♂.
Centris dentipes F. Smith, 1874:366. ♂. NEW SYNONYMY.
Centris hoplopoda Moure, 1943:160. ♂.
Centris rufomaculata Cockerell, 1949:476. ♂. NEW SYNONYMY.
Centris (*Rhodocentris*) *lanipes subtarsata* Cockerell, 1949: 476–477. ♂ ♀. NEW SYNONYMY.
Centris (*Hemisiella*) *hoplopoda:* Michener, 1954:142–143 (distr., tax.).
Centris (*Hemisiella*) *trigonoides subtarsata:* Snelling, 1966: 25–26 (distr., tax.).

Centris trigonoides is a common species, ranging from Mexico to Argentina. Throughout this range it is subject to much variation and some localized phenotypes have been named; presumably there are additional synonyms to be recognized among the many names applied to South American forms of *Hemisiella.* The entire complex of forms in this difficult group will have to be examined.

In an earlier paper (Snelling, 1966), I attempted to justify recognition of *C. lanipes subtarsata* as a Central American subspecies of *C. trigonoides.* Subsequent study of several hundred additional specimens convinced me of the futility of that effort.

The type male of *C. dentipes* (BMNH 17B.919) has been examined and agrees with the current concept of *C. trigonoides.* The type male of *C. rufomaculata* (USNM 58883) is merely an individual with abdomen mostly dark brownish.

Females of *C. trigonoides* consistently have the entire abdomen ferruginous in Central American samples, and cannot be confused with any other species in our area. The abdomen in males varies from wholly ferruginous to dark reddish brown on the basal three or four tergites. The metatrochanter has a prominent, thick, ventral spine, the ventral ridge of the metafemur is high and cariniform, and the ventral pubescence of the abdomen is yellowish to reddish.

Centris (*Hemisiella*) *vittata* Lepeletier

Centris vittata Lepeletier, 1841:168. ♂ ♀.
Centris montezuma Cresson, 1879:213. ♀ ♂.
Centris breviceps Friese, 1899:44. ♂ ♀.
Centris Friesei Crawford, 1906:158. ♀. Preoccupied.
Centris Costaricensis Crawford, 1907:21. New name for *C. friesei* Crawford, 1906, not *C. friesei* Ducke, 1902.
Centris costaricensis var. *erubescens* Friese, 1925:30. ♀. NEW SYNONYMY.

Both sexes of *C. vittata* are easily recognized by the large size (length over 20 mm), black-tipped thoracic hairs, and the transversely depressed clypeal disc. The posteroventral margin of the male metafemur is sharply angled, but is not a cariniform ridge and the ventral spine of the metatrochanter is reduced to an inconspicuous, obtuse tubercle.

This is a widespread species through South America, and in Central America. I have seen specimens from Mexico, Costa Rica, Panama, and Honduras. Friese's *C. costaricensis* var. *erubescens,* described from Costa Rica, is a minor variant, not worthy of recognition.

Subgenus *Heterocentris* Cockerell

Gundlachia Cresson, 1865:195. Type-species: *Centris ? cornuta* Cresson, 1865; type by monotypy. Preoccupied.
Heterocentris Cockerell, 1899:14. Type-species: *Centris ? cornuta* Cresson, 1865; autobasic. New name for *Gundlachia* Cresson, 1865, not *Gundlachia* Pfeiffer, 1850 (Mollusca), not *Gundlachia* Herrich-Schaeffer, 1866 (Insecta, Lepidoptera).
Centris subg. *Rhodocentris* Friese, 1900b: 244. Type-species: *C. difformis* F. Smith, 1854; designated by Sandhouse, 1943.

Since Cresson's generic name *Gundlachia* was preoccupied, Cockerell (1899) proposed *Heterocentris* as a replacement name; the type-species for *Heterocentris* automatically is *C. ? cornuta* which Cockerell (1906) later considered to be the same as *C. difformis.* There is no evidence that he actually saw the type of *C. cornuta,* now in the Gundlach collection of the Academia de Ciéncias in Havana, Cuba. Indeed, there is reason to suppose that he did not, for the original descriptions of *C. cornuta* and *C. difformis* do not agree in several important peculiarities of head structure. Thus, Cresson described the mandible of *C. cornuta* as "very long, narrow and cleft at tip, shining black . . ." as opposed to Smith's ". . . mandibles large, very broad at their base, and *armed above with a stout tooth,* their apex bidentate, having a longitudinal pale testaceus stripe" (italics mine). Of the clypeus, Cresson stated: "clypeus short, very transverse, emarginate on each side, with *a large, very prominent, incurved, subacute tooth on the middle,* pale yellowish white, the anterior and posterior margin and the tooth except its lateral base, black" (italics mine); the labrum is said to possess a "long slender,

porrect, subacute spine." According to Smith, the clypeus of *C. differmis* is "short, transverse, elevated, its anterior portion vertical." There is no mention of processes of any sort on either clypeus or labrum. I think it as unlikely that Cresson would have overlooked the very prominent mandibular process as that Smith would have failed to mention such a conspicuous anomaly (in this genus) as a spinose clypeus. It is my opinion that *C. cornuta* and *C. differmis* are very different entities and that *C. cornuta* must be properly considered to be the type-species of *Heterocentris.*

This possibly has unfortunate ramifications since the identity of *C. cornuta* is problematic. However, since the only forms of *Centris* with unusual modifications of mandible, labrum, and clypeus all belong to the accepted interpretation of *Heterocentris,* the question is probably moot.

Just as the type-species of *Heterocentris* should be clearly restricted to *C. cornuta,* so, too, should the type-species of *Rhodocentris* be restricted to *C. differmis. Rhodocentris* was described as a new subgenus of *Centris,* not as a replacement name for *Gundlachia.* It is clear that Sandhouse considered *C. differmis* to be the proper name for the species which she selected as type. It is unclear why she chose to cite the type-species as "(*Centris cornuta* Cresson, 1865) = *Centris differmis* F. Smith, 1854," unless it was to assure that *Rhodocentris* was an automatic junior synonym of *Heterocentris* through isogenotypy. Both specific names were available, since both were originally included in *Rhodocentris* by Friese. Since it is clear that Sandhouse was of the opinion that *C. differmis* was the correct name for the taxon chosen as type-species I think it best to consider that name to be the type; this would eliminate the ambiguity of having two names involved as possible type-species.

Heterocentris, together with *Hemisiella* and *Trachina,* is part of a complex recognized by possessing three-segmented maxillary palps in both sexes and the male with a carina along the posterior margin of the metabasitarsus; this carina usually terminates in a prominent tooth-like process. Males of *Heterocentris* differ from those of both *Trachina* and *Hemisiella* in the form of the dorsal face of the first abdominal tergite: at the extreme side, the dorsal face is extended caudad (most strongly so in *C. labrosa*) and there is a conspicuous patch of erect, plumose, dark setae at the side of the segment, their apices abruptly bent and flattened. This is a feature unique in the genus. Additionally, the middle mandibular tooth is smaller and nearer to the inner tooth than to the apical tooth.

In females of *Heterocentris* the upper inner mandibular carina is elevated near the base and the labrum is large, with the disc depressed and the apical margin more or less flange-like and with a pair of dentiform submedian processes. In both sexes the apicolateral angle of the clypeus is contiguous with the eyes, or nearly so. Females are additionally characterized by the distinct, abruptly truncate secondary pygidial plate and by the presence of large, flattened, spiniform setae near the apical margins of the fourth and fifth abdominal sterna.

The few Central American *Heterocentris* may be separated by the following key. Since no males of *C. differmis* are known to me, I am unable to include this sex in the key.

KEY TO CENTRAL AMERICAN *HETEROCENTRIS*

1a. Male, antenna 13-segmented and basitibial plate absent 2
b. Female, antenna 12-segmented and basitibial plate present 5
2a. Postgradular area of second tergum about four times as long as pregradular area 3
b. Postgradular area of second tergum shorter than pregradular area ..... *labrosa* Friese
3a. Mandible tridentate 4
b. Mandible bidentate ..... *bicornuta* Mocsáry
4a. Clypeal disc smooth and shiny between punctures; apical margin of labrum transverse or very weakly concave; lower corner of pronotum with a few long, simple, reddish or yellowish setae among plumose hairs ..... *analis* (Fabricius)
b. Clypeal disc roughened and slightly shiny between punctures; apical margin of labrum with distinct median emargination; lower corner of pronotum with plumose hairs only ..... *C.* (*Heterocentris*) species
5a. Clypeus without lateral cornuti; labrum broader than long; mandible tridentate 5
b. Clypeus with pair of long, slender cornuti; labrum longer than broad; mandible bidentate ... *bicornuta* Mocsáry
6a. Clypeus no more than 1.8 times wider than long in middle, with disc flattened; mandible without long subbasal process on outer face 7
b. Clypeus very short, more than twice wider than long, transversely elevated; mandible with large, tooth-like subbasal process on outer face .... *differmis* F. Smith
7a. Lower, lateral angle of pronotum with a cluster of long, yellowish or reddish, simple setae as well as plumose hairs; juncture of anterior and lateral faces of mesepisternum without carina, rounded; hairs of thoracic dorsum rarely dark-tipped ..... *analis* (Fabricius)
b. Lower, lateral angle of pronotum with long, plumose hairs only; juncture of anterior and lateral faces of mesepisternum with a short, lamelliform carina; hairs of thoracic dorsum always dark-tipped ... *labrosa* Friese

Centris (*Heterocentris*) *analis* (Fabricius)

Anthophora analis Fabricius, 1804:375. ♀.
Centris totonaca Cresson, 1879:213. ♀.
Centris otomita Cresson, 1879:214. ♂.
Centris minuta Mocsáry, 1899:254. ♂.
Centris labrosa var. *simplex* Friese, 1899:44. ♀.
Centris (*Melanocentris*) *durantae* Cockerell, 1949:474. ♂.
Centris (*Melanocentris*) *petreae* Cockerell, 1949:475. ♂.
Centris (*Melanocentris*) *petreae* var. *rufopicta* Cockerell, 1949: 475. ♂.
Centris (*Heterocentris*) *totonaca:* Michener, 1954:140 (syn.).
Centris (*Heterocentris*) *analis:* Moure, 1960b:132–133 (syn., notes on type).

Moure (1960b) gives very complete literature citations of this common species which ranges from Mexico to Brazil. The presence of long, simple, ferruginous setae on the lower corner of the pronotum is diagnostic for the female. The male has similar setae, but they are less numerous than in the female and are sometimes difficult to see among the more numerous plumose hairs.

Centris (*Heterocentris*) *bicornuta* Mocsáry

Centris bicornuta Mocsáry, 1899:254. ♀.
Heterocentris bicornuta: Moure, 1945b:502.
Centris (*Heterocentris*) *bicornuta:* Michener, 1951:6, 7.

Although widely distributed, *C. bicornuta* does not appear to be a common species, though males are sometimes locally abundant. The bicornute clypeus of the female is diagnostic for that sex. Males may be easily separated from those of *C. analis* and *C. labrosa* by the bidentate mandible. Since I have seen no males of *C. difformis,* which presumably has bidentate mandibles, I am uncertain how to distinguish that species from *C. bicornuta.* Presumably, however, the males of *C. difformis* will be more than 15 mm long and the hairs of the thoracic dorsum will be black-tipped. Males of *C. bicornuta* are not more than about 10 mm long and the hairs of the thoracic dorsum are not black-tipped.

Specimens of *C. bicornuta* have been seen from Mexico, Guatemala, Costa Rica, and Panama, as well as from South America (Brazil and Guyana). The species was described from Brazil.

Centris (*Heterocentris*) *difformis* F. Smith

Centris difformis F. Smith, 1854:374. ♀.
Centris difformis: Crawford, 1906:158. ♀.
Heterocentris difformis: Moure, 1945b: 402, 403.
Centris (*Heterocentris*) *difformis:* Michener, 1951: 6, 7.

As discussed above, I do not believe that *C. cornuta,* described from Cuba, is a synonym of *C. difformis.* The latter species was originally described from Brazil and seems to be rare in collections. According to Cresson (1879) *C. difformis* occurs in Mexico, but I have seen no specimens from there. Crawford (1906) recorded a female from Pozo Azul, Costa Rica, as *C. difformis.* I have examined the specimen and agree with Crawford's identification.

No males have been seen. Presumably the mandibles are bidentate, as in *C. bicornuta* (Moure, 1945b, noted that *C. minuta* and *C. labrosa* differed from his characterization of *Heterocentris* mandibles as bidentate with the statement that the mandible is falsely tridentate in these two species). Based on the females, males of *C. difformis* should be conspicuously larger than those of *C. bicornuta* and the hairs of the thoracic dorsum should have blackish apices.

NEW RECORDS

PANAMA, *CANAL ZONE:* 3♀♀, Barro Colorado Island, 27 Apr. 1980 (K.E. Steiner; UCD), on *Byrsonima crassifolia.*

Centris (*Heterocentris*) *labrosa* Friese

Centris labrosa Friese, 1899:44. ♀ (not ♂).
Centris tarsata: Schwarz, 1934:13. Misidentification.
Heterocentris labrosa: Moure, 1945b:402.
Centris (*Rhodocentris*) *triangulifera* Cockerell, 1949: 477. ♀. NEW SYNONYMY.
Centris (*Heterocentris*) *labrosa:* Michener, 1954:104 (var., distr.).

This is a moderately common species which ranges from Mexico to Brazil. I have seen specimens from throughout Central America. It should be noted that the specimen recorded by Schwarz (1934) from Barro Colorado Island, Panama, as *C. tarsata* F. Smith, is actually *C. labrosa.* The type of *C. triangulifera,* in the USNM (No. 58885), has been examined and is a normal specimen of *C. labrosa.*

The unusually long pregradular area of the males is immediately diagnostic for this sex of *C. labrosa.* Females are likewise immediately recognizable by the presence of a distinct carina separating the anterior and lateral faces on the lower half of the mesepisternum; in all other species, the juncture of the two surfaces is rounded.

Centris (*Heterocentris*) species

A few males from Panama (Canal Zone and Panamá Province) cannot be assigned to any of the above species. It seems unlikely that they are males of *C. difformis* for they are much smaller (less than 15 mm long) than the one female of *C. difformis* (about 20 mm long) I have seen; the two sexes tend to be approximately equal in size in this genus.

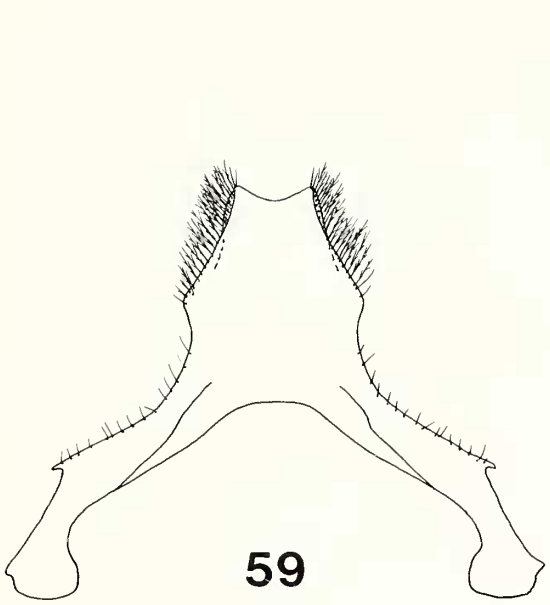
They are very similar to males of *C. analis,* but lack the simple setae on the lower lateral angle of the pronotum, the clypeus is distinctly dull and roughened between the punctures, and the mandible and scape are immaculate or with traces of yellowish markings. Possibly these represent an undescribed species, but the available material is too limited for any decision as to their identity.

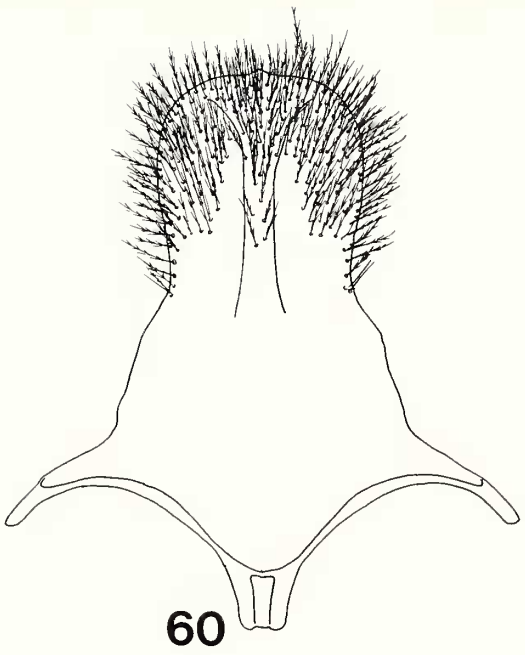
Genus *Ptilotopus* Klug

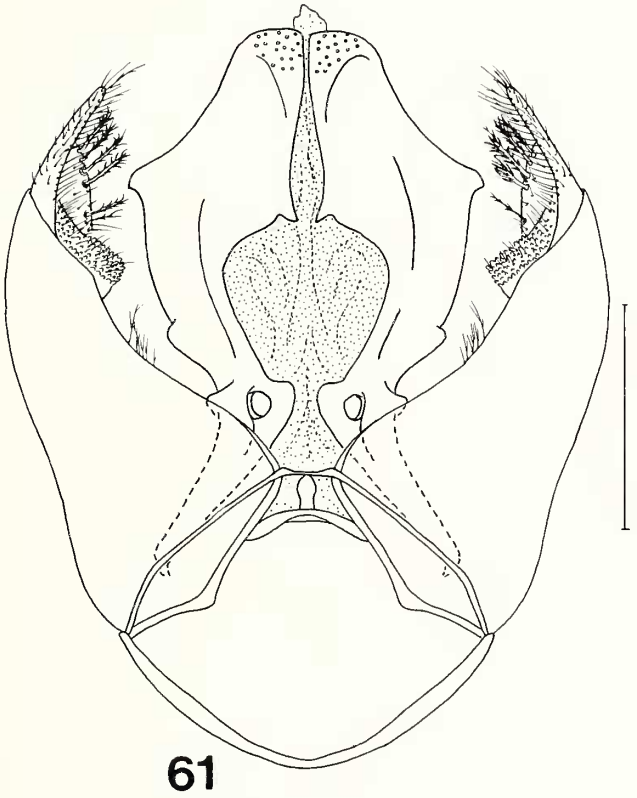
Ptilotopus Klug, 1810:31. Type-species: *Ptilotopus americanus* Klug, 1810; monobasic.
Centris subg. *Ptilotopus:* Michener, 1951:10. Snelling, 1974: 2, 3.

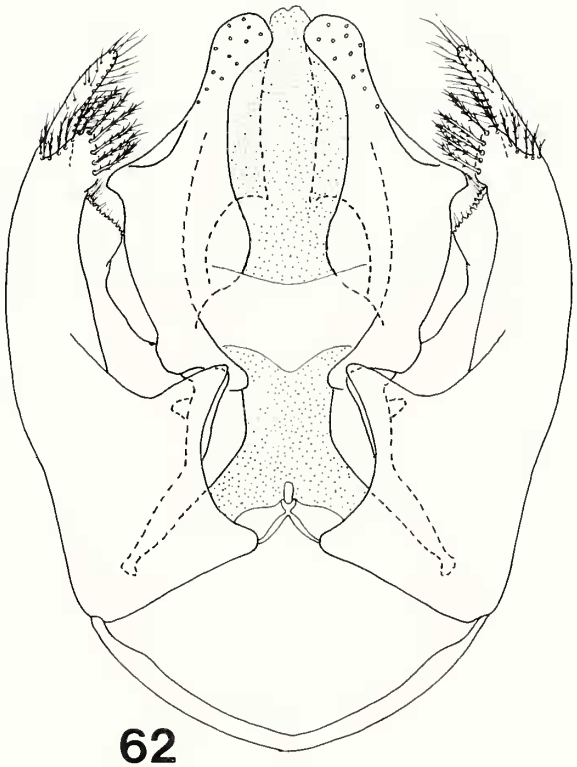
In recent years *Ptilotopus* has usually been treated as a subgenus of *Centris* characterized by the bilobate scutellum with defined bare areas, the prominent hypoepimeral tubercle, the lack of a secondary basitibial plate in the female and the male genitalia without giant branched setae (Michener, 1951; Snelling, 1974). The largest and most spectacular centridines are included in *Ptilotopus.*

Although in general habitus the species of *Ptilotopus* are similar to those of *Centris* and have *Centris*-like wing venation, I am now of the opinion that *Ptilotopus* should be removed from *Centris.* There are a number of features which are not shared with any of the groups presently assigned to *Centris.* Both sexes of *Ptilotopus* possess long, black flagelliform setae on the occipital margin; these setae project well beyond the occipital hair fringe, although they are not as spectacularly developed as in many *Epicharis.*









Figures 59–62. *Ptilotopus zonatus,* male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm.

The metatibia of *Ptilotopus* females has a well-defined basitibial plate. There is, however, no secondary plate; instead, the disc of the basitibial plate is moderately depressed, the depression filled with a dense mat of short, fine, subappressed hairs. In *Centris* and *Epicharis* females, a secondary plate is present and usually well defined. When it is not distinct the plate has a discal convexity and is glabrous.

Females of *Ptilotopus* have a distinct tubercle on either side of the midline of the mesosternum, anterior to the mesocoxa. As a rule the tubercles are hidden in an exceptionally dense tuft of short, stiff hairs. Although mesosternal tubercles are known for some *Epicharis* males, they are not known to be present in the females of either *Centris* or *Epicharis*.

A particularly unusual feature is to be seen in the structure of the basal areas of the second and third abdominal tergites of the females. In both *Centris* and *Epicharis* the gradulus of each segment marks off a very narrow basal area across most of the breadth of the segment; laterad, it is either evanescent or deflected distad. In *Ptilotopus* females the gradulus of the second and third tergites is strong and, in the middle, is directed distad as a more or less triangular incursion onto the disc of the segment. The area on either side of this triangular extension is depressed and filled with a compact mat of very short, erect, plumose hairs. This unusual feature is not known to occur in *Centris* and in *Epicharis* is known only in the subgenus *Epicharitides*.

Thus, although *Ptilotopus* is *Centris*-like in many features, particularly in general body form and wing venation, there are features, such as the presence of the flagelliform occipital setae, presence of mesosternal tubercles in the female and the modified structure of the female second and third abdominal terga, which will readily separate *Ptilotopus* from *Centris*. The short marginal cell of the forewing will readily separate *Ptilotopus* from *Epicharis*, as will the mesosternal tubercles and lack of a secondary basitibial plate in the female. Additionally, in *Ptilotopus*, the hypoepimeron has a prominent tubercle and the scutellum has a conspicuous, flattened, bare lobe on either side of the middle. The genitalic structures of *Ptilotopus* are very distinctly *Centris*-like, without the unusual modifications seen in *Epicharis*.

Ptilotopus zonata (Mocsáry)

Figures 59–62

Centris zonata Mocsáry, 1899:251. ♀.

Centris pandora Friese, 1900b:241, 269 (new name for *C. zonata* Mocsáry, not *C. zonata* F. Smith, 1854, now placed in *Epicharis*).

This species, the only known North American *Ptilotopus*, was described from Chiriquí Province, Panama; no additional material has been recorded since the original description.

The females have the pubescence of the head, thorax, and legs bright ferruginous. Except for a broad band of short, erect yellow pubescence across the second tergite, the abdomen is black pubescent. The male pubescence is all black, except for a yellow band across the second tergite.

NEW RECORDS

PANAMA, *PANAMÁ:* 14♀♀, Arraijan, 16 Oct. 1980 (D. Roubik; LACM, ROUB). *VERAGUAS:* 1♂, El Maria, Coibu Island, 22 Oct. 1979 (D. Roubik; LACM). *CANAL ZONE:* 1♀, Gatun, 3 Nov. 1977 (K.E. Steiner; UCD), on *Stigmaphyllon hypargyreum*.

Genus *Epicharis* Klug

Epicharis is an exclusively Neotropical genus of medium- to large-sized bees, often quite colorful, allied to *Centris*. Friese (1900b) monographed these bees, as a subgenus of *Centris*, but most subsequent authors have treated *Epicharis* as a separate genus. Since Friese's monograph most work in this genus has consisted of descriptions of new species and variant forms. Moure (1945a), however, divided *Epicharis* into nine genera, for which he proposed the subtribe Epicharitina within in within the Centridini. Michener (1954) recognized Moure's genera as subgenera within the single genus *Epicharis* and subsequent authors have been in accord with this interpretation.

Epicharis was described by Klug (1807), but a type-species was not designated until Latreille (1810) fixed *Apis rustica* Olivier, 1789, as the type-species; *A. rustica* was not one of the originally included species and, hence, is not available. Lutz and Cockerell (1920) selected *Centris umbraculata* Fabricius, 1804, one of the originally included species, as the type-species. Moure (1945a, 1960b) held that the designation made by Latreille is valid since *Apis hirtipes* Fabricius, 1793, one of the originally included names, is a synonym of *A. rustica*.

Sandhouse (1943) accepted the designation of Lutz and Cockerell, as did Michener (1954) when he named *Epicharana* to replace *Epicharis* (s.s.) of Moure (1945a) and placed *Xanthepicharis* Moure in synonymy with true *Epicharis* (s.s.). It is my understanding of the ICZN Code that even though *A. hirtipes* ultimately proved to be a synonym of *A. rustica*, this does not validate the designation made by Latreille, since Latreille was not aware that the two names applied to the same species. There is, additionally, the fact that *A. hirtipes* can never be anything other than a *subjective* synonym of *A. rustica*; the synonym is a generally accepted opinion which has the potential for being incorrect. Stability would be best served by accepting the security of the designation of Lutz and Cockerell.

Of the nine subgenera recognized by Moure (1945a), five are known to be present in North America: *Hoplepicharis* Moure, 1945a; *Epicharana* Michener, 1945 (="*Epicharis*" of Moure, 1945a); *Epicharoides* Radoszkowski, 1884; *Parepicharis* Moure, 1945a; and *Epicharitides* Moure, 1945a. The remaining four subgenera, including *Epicharis* proper (=*Xanthepicharis* Moure, 1945a), are limited to South America: *Anepicharis, Triepicharis,* and *Cyphepicharis,* all Moure, 1945a.

The taxonomy of *Epicharis* is difficult. These bees are generally black or blackish and both sexes usually have conspicuous patterns of white or yellow and/or ferruginous markings on various parts of the body. The species within a subgenus tend to be morphologically very similar and differences often are subtle. Previous descriptive work has tended to emphasize differences in maculations. This, coupled with a scarcity of specimens, has resulted in a confused situation. I expect a reduction in the number of species of *Epicharis* as more material becomes available and the species better known. I have proposed some new synonymy below and pointed out cases where I suspect further synonymy will be in order. Two new species are described, based on morphological characteristics.

The following key to the subgenera of *Epicharis* is modified from that of Moure (1945a).

KEY TO SUBGENERA OF *EPICHARIS*

1a. Female with secondary basitibial plate; male with pygidial plate obsolete, its margins more or less coextensive with margins of seventh tergite, apex thin and bilobate or bidentate 2

b. Female without secondary basitibial plate; male with distinct, sharply marginate pygidial plate, no more than one-half as wide as seventh tergite, its apex narrowly truncate or rounded 4

2a. Lateral margins of female pygidial plate distinctly concave in dorsal view, apex broadly truncate (Fig. 63); female metatibia no longer than metabasitarsus; male without scopa-like hairs on hind legs and metabasitarsus with longitudinal keel on anterior margin which terminates in spiniform process at apex, or without keel.. 3

b. Lateral margins of female pygidial plate nearly straight, apex narrowly truncate (Fig. 64); female metatibia longer than metabasitarsus; hind legs of male with long, scopa-like hairs and metabasitarsus with prominent tooth at basal one-third ..... *Hoplepicharis*

3a. *Female:* frontal carina ending more than diameter of anterior ocellus in front of that ocellus; pygidial truncation narrower than diameter of anterior ocellus; disc of fifth tergite with very short hairs mostly simple or barbulate. *Male:* mesosternal tubercles absent; metabasitarsus without carinate ridge on anterior margin; metatrochanter and metafemur without ventral patch of short, dark plumose setae ..... *Epicharis,* s.s.

b. *Female:* distance between frontal carina and anterior ocellus less than diameter of anterior ocellus; pygidial truncation broader than diameter of anterior ocellus; disc of fifth tergite with very short hairs distinctly plumose. *Male:* mesosternal tubercles present; metabasitarsus with carinate ridge on anterior margin, terminating in tooth-like process (Fig. 65); metatrochanter and metafemur with ventral patch of short, dark, plumose setae ..... *Epicharana*

4a. First flagellar segment short, in female usually no longer than combined second and third but always shorter than following three combined, and in male shorter than scape; posterior margin of dorsal face of scutellum not, or weakly, impressed in middle (if deeply impressed, maxillary palp three-segmented) 5

b. First flagellar segment of female equal to length of next three segments combined, of male longer than scape and longer than following two segments combined; posterior margin of dorsal face of scutellum deeply impressed in middle; maxillary palp two-segmented ...*Parepicharis*

5a. Lateral ridges of clypeal disc absent or weakly evident only on basal one-half or less; male metabasitarsus with carinate ridge on anterior margin, terminating in large tooth at about midlength 6

b. Lateral ridges of clypeal disc strong and sharply defined to near apical margin; male metabasitarsus without carinate ridge or tooth on anterior margin 7

6a. Maxillary palp two-segmented; flagelliform occipital setae distinct and extending beyond anterior margin of mesoscutum; ocellocular distance of male less than diameter of *lateral* ocellus in dorsal view .. *Anepicharis*

b. Maxillary palp three-segmented; flagelliform occipital setae short, not projecting beyond occipital hairs and not reaching anterior margin of mesoscutum; ocellocular distance of male equal to diameter of *lateral* ocellus in dorsal view ..... *Triepicharis*

7a. Dorsal face of scutellum flat; prepygidial fimbria of female preceded by a shiny, nearly glabrous area 8

b. Dorsal face of scutellum bigibbous; female without shiny, glabrous area anterior to prepygidial fimbria ..... *Cyphepicharis*

8a. Jugal lobe of posterior wing about half as long as vannal lobe and nearly attaining apex of cubital cell; female metabasitarsus about twice longer than broad, posterior margin nearly straight; male pygidial plate broad, covering most of seventh tergum ..... *Epicharoides*

b. Jugal lobe of posterior wing about one-third as long as vannal lobe, its apex well short of that of cubital cell; female metabasitarsus about one-third longer than broad, posterior margin strongly curved; male pygidial plate narrow, covering less than one-half of seventh tergum ..... *Epicharitides*

Subgenus *Epicharana* Michener

Epicharis: Moure, 1945a:294–295. Type-species: "*Epicharis rustica* Olivier, 1789" = *Apis rustica* Olivier, 1789. Not *Epicharis* Klug, 1807.

Epicharis subg. *Epicharana* Michener, 1954:144. Type-species: *Apis rustica* Olivier, 1789; original designation.

DESCRIPTION

Maxillary palp three-segmented, third segment a little shorter, and much narrower, than second; lateral ridge of clypeal disc strong; malar area about as long as minimum thickness of first flagellar segment; occipital margin rounded; occipital flagelliform setae long, extending beyond anterior margin of tegula; metanotum bifaced, dorsal face about as long as posterior face, juncture angular or crested; jugal lobe of posterior wing shorter than cubital cell and less than half as long as vannal lobe.

Female. Labrum with low, median longitudinal ridge; outer face of mesobasitarsus, on anterior one-third with mixed long, coarse, simple setae and shorter, fine, plumose hairs, posterior two-thirds with sparse longer, coarse, simple setae and sparse, short, fine, plumose hairs; basitibial plate with secondary plate; metatibia no longer than metabasitarsus; third and fourth terga without basal specialized areas; in dorsal view, margins of pygidial plate concave, apex broadly truncate.

Male. Labrum without median ridge; first flagellar segment shorter than scape, longer than second segment, much shorter then second and third combined; ocellocular distance greater than ocellar diameter; procoxa with flattened distal process; mesosternum with prominent process on each side of midline, anterior to mesocoxa; metatrochanter and base of metafemur with ventral mat of short blackish setae; metatibia with carinate posteroventral ridge; metabasitarsus carinate along anterior margin, ending in prominent tooth-like process at apex of segment; pygidial plate broad, its margins confluent with those of segment, apex bidentate.

This is the group that Moure (1945a) incorrectly interpreted as *Epicharis* s.s., as discussed above. Five species occur in Central America, with a few more in South America.

KEY TO CENTRAL AMERICAN *EPICHARANA*

1a. Abdominal terga blackish and immaculate (except male of one species with dorsal fascia on first and lateral spot on second) or ferruginous and immaculate; male clypeus black 2

b. Abdominal terga reddish brown to ferruginous *and* dorsal face of first segment with narrowly interrupted transverse yellow fascia (sometimes obscure); male clypeus yellow ..... *elegans* F. Smith

2a. Dorsal segments of abdomen black, first tergite with or without transverse yellow fascia on dorsum; male metatibia moderately convex in middle of anterior margin (Fig. 66); disc of female clypeus, in basal one-third or more, with more or less distinct, weakly depressed, median impunctate line 3

b. Dorsal segments of abdomen bright ferruginous and immaculate; male metatibia strongly, obtusely convex in middle of anterior margin (Fig. 65); disc of female clypeus uniformly, subcontiguously punctate in basal one-third ..... *bova,* new species

3a. *Female:* scutellum shinier than mesoscutum, punctures of disc both less distinct and more separated than those of mesoscutum; larger punctures of parapsis sparse, separated by more than twice a puncture diameter. *Male:* first tergum without dorsal transverse yellow fascia, mesosternal tubercles nearly prostrate, their inner margins rounded (Fig. 67) ..... *rustica* (Olivier)

b. *Female:* scutellum no shinier than mesoscutum, micropunctures of disc as sharp and dense as those of mesoscutum; larger punctures of parapsis dense, separated by about a puncture diameter or less. *Male:* first tergite with narrowly interrupted yellow fascia on dorsal face; mesosternal tubercles erect, obtuse, inner margin sharply carinate (Fig. 68) ..... *angulosa,* new species

Epicharis (*Epicharana*) *angulosa,* new species

Figures 66, 68, 69–72

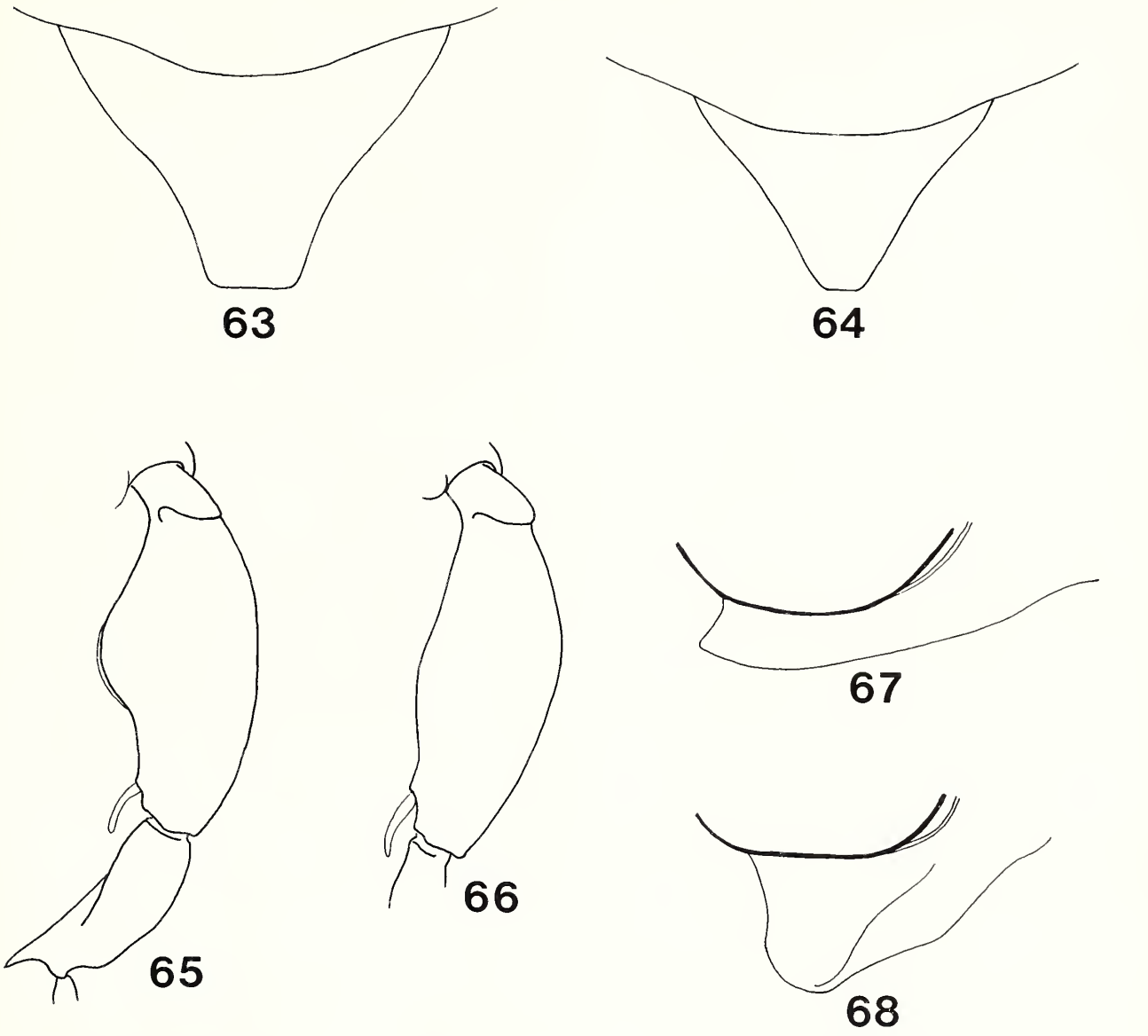
DIAGNOSIS

Separable from other species of *Epicharana* by the following unique combination of features: pubescence, except of hind legs, black; abdomen black, except dorsally on first tergum and laterally on second tergum of male. *Male:* mesosternal tubercles angulate along inner margin, high, long and obtuse in profile; metatibia moderately swollen (Fig. 66), posterior ventral carina low, abruptly reduced beyond midlength. *Female:* shiny area at base of clypeal disc no greater in area than triangular supraclypeal area and basal one-half of disc densely and coarsely punctate, without definite impunctate median line.

DESCRIPTION

HOLOTYPE MALE. Measurements (mm). Head width 5.95 (5.64–5.90); head length 4.00 (3.90–4.00); wing length 17.0 (15.0–16.5); total length 21.0 (20.0–22.0).

Head. 1.48 (1.45–1.49) times broader than long; in frontal view, occipital margin nearly straight (except ocellar elevation) and slightly below level of tops of eyes; inner eye margins moderately convergent above, upper frontal width 0.77 (0.76–0.79) times lower frontal width. Mandible slender beyond middle, inner tooth large, blunt. Labrum quadrate, slightly broader than long, apical margin transverse, disc shiny and weakly tessellate between sparse to close punctures varying from fine to coarse. Clypeus about 1.7 times broader than long, apicolateral angle removed from eye by slightly less than diameter of antennal socket; disc moderately shiny between dense, coarse punctures except near apical margin where punctures are sparse and fine and integument is more or less "wrinkled," median impunctate line absent; discal carinae moderately convergent above, distance between them at lower end about 1.7 times that at upper end; side slightly shiny and distinctly roughened between variably sparse to subcontiguous, fine to coarse punctures. Frons moderately shiny and distinctly tessellate between dense, mixed fine and moderate punctures; preocellar area slightly bulging on either side, smooth, shiny, and impunctate; ocellocular area dull and densely tessellate, subcontiguously micropunctate and with scattered minute punctures; preocciput moderately shiny between dense, fine punctures; gena moderately shiny to shiny between close to dense punctures, minute near eye, becoming fine near margin. Interantennal distance 1.86 (1.88–2.05) times antennal socket diameter; antennocular distance 0.59 (0.63–0.71) times antennal socket diameter; scape robust, 1.50 (1.50–1.64) times longer than broad, scape length 1.57 (1.53–1.61) times length of first flagellar segment; first flagellar segment 1.31 (1.22–1.32) times longer than broad, much shorter than following three segments combined, 1.15 (1.08–1.13) times longer than second. Interocellar distance 1.70 (1.44–1.64) times diameter of anterior ocellus; ocellocular

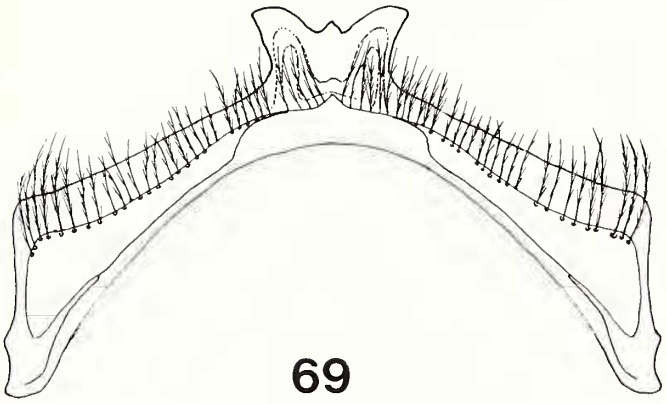


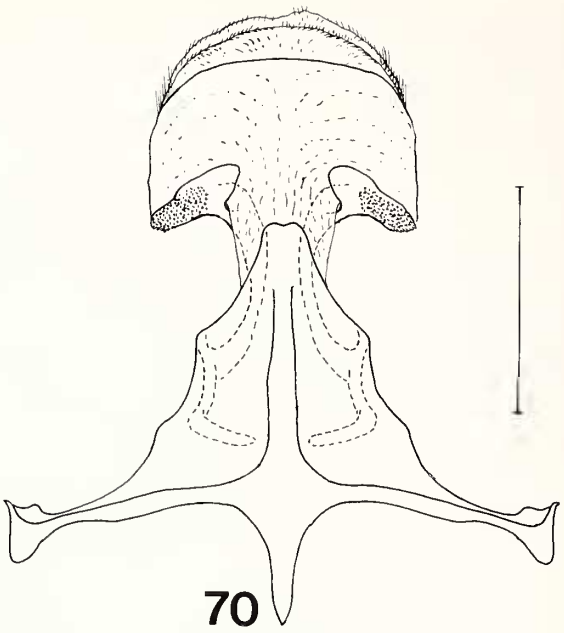
Figures 63–64, pygidial plate of female: **63,** *Epicharis* (*Epicharana*) *rustica*; **64,** *E.* (*Hoplepicharis*) *lunulata*. **Figs. 65–66,** metatibia of male: **65,** *E.* (*Epicharana*) *bova*; **66,** *E.* (*Epicharana*) *angulosa*. **Figs. 67–68,** profile of right mesosternal process of male: **67,** *E.* (*Epicharana*) *rustica*; **68,** *E.* (*Epicharana*) *angulosa*.

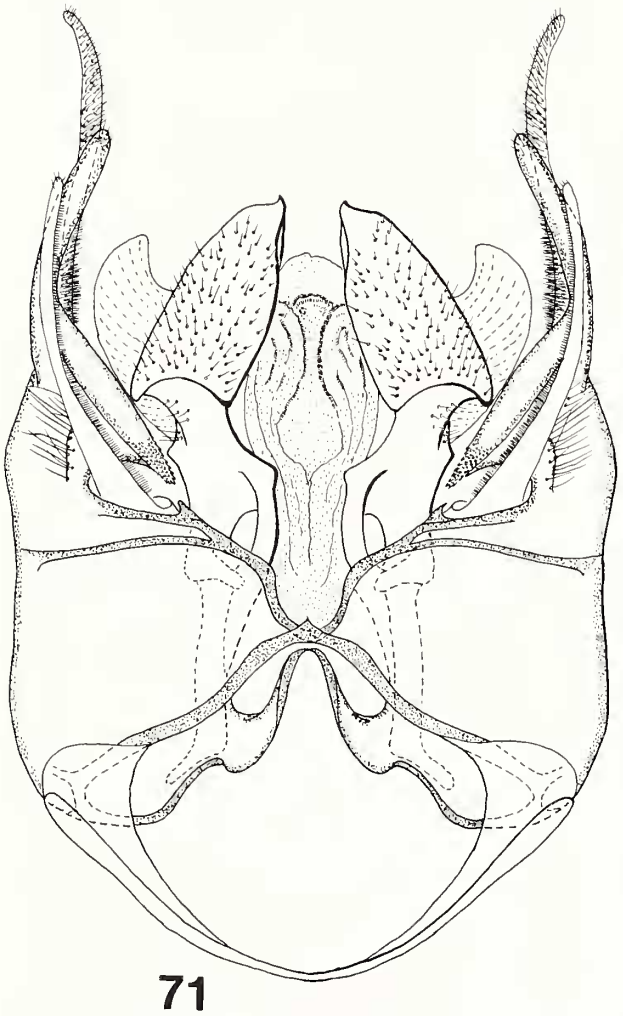
distance 1.96 (1.89–1.93) times diameter of anterior ocellus; ocelloccipital distance 1.70 (1.50–1.67) times diameter of anterior ocellus.

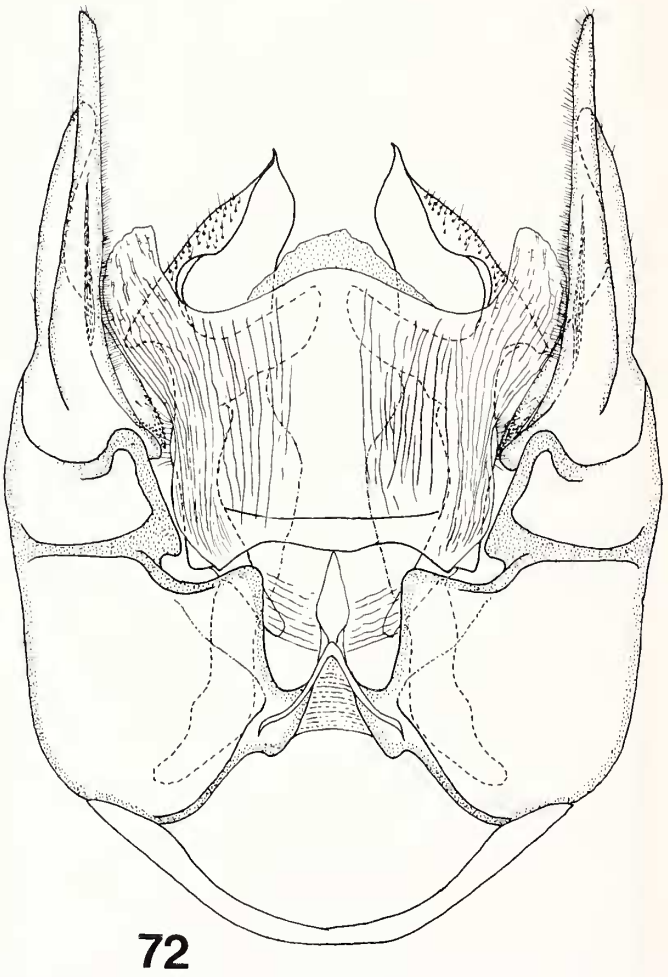
Thorax. Mesoscutum slightly shiny, uniformly densely, finely punctate and with sparse moderate punctures which become scattered distad; dorsal face of scutellum broadly depressed in middle, punctation as scutum, but fine punctures scattered; metanotum moderately shiny in median area, dull elsewhere, roughened and tessellate, with minute obscure punctures. Mesepisternum moderately shiny and tessellate between sparse, shallow, fine punctures; metepisternum moderately shiny between subcontiguous, minute punctures (appearing finely reticulopunctate at certain angles). Mesosternal process, in profile, suberect and obtusely triangular (Fig. 68); in ventral view, inner margin carinate. Propodeum moderately shiny, minutely reticulopunctate and with sparse to scattered fine punctures. Procoxal process broadly elliptical, with acute apex; mesofemur stout, twice longer than thick, greatest thickness a little basad of midlength; anterobasal ventral depression of metafemur subcarinate along its posterior margin; anterior edge of metatibia evenly curved (Fig. 66), posterior carina low throughout, abruptly reduced distad of middle.

Abdomen. Tergal discs moderately shiny between minute









Figures 69–72. *Epicharis* (*Epicharana*) *angulosa,* male seventh and eight sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm.

punctures which are dense on basal segments, becoming progressively coarser and less close on succeeding segments; discs also with scattered fine punctures on basal segments, becoming progressively coarser (but still fine) on succeeding segments. Seventh tergite weakly raised in middle (broader basad) to form a weakly differentiated median plate; apex bidentate, teeth long, slender, acute, emargination longer than a semicircle.

Terminalia. Apical margin of distal lobe of seventh sternite (Fig. 69) broadly, shallowly concave; setae long, some conspicuously plumose. Shoulders of disc of eighth sternite (Fig. 70) angular and sides of apical lobe of disc strongly convergent. Genitalia as in Figs. 71 and 72.

Pilosity. Generally blackish brown; sides of pronotal collar, pronotal lobe, mesoscutum (especially anteriorly and at side) with admixed very pale brown hairs; hairs on side of tergites and on abdominal venter mixed medium and light brown. Hairs mostly long, erect, plumose and dense, but labrum nearly bare. Metatibia and metabasitarsus with long yellowish hairs. Abdominal terga, beyond first, with sparse discal hairs which are short, simple and suberect on second segment, becoming progressively longer and more abundant caudad; terga also with abundant minute, appressed, scale-like hairs (arising from minute punctures) which become progressively longer on succeeding segments.

Color. Blackish brown. The following pale yellow: oblique, linear mark near base of mandible; labrum; oblique, linear mark from clypeal margin, at tentorial pit, to malar area; triangular supraclypeal mark; underside of scape; spot on procoxal process; anterodistal spot on pro- and mesofemora; large distal spot on metafemur; stripe on anterior margin of protibia nearly to apex; broad stripe on anterior margin of mesotibia nearly to apex, constricted in middle; anterior and outer face of metabasitarsus; large, anterior spots on dorsal face of first tergum, narrowly separated in middle; small laterobasal spot on second tergum. Underside of flagellum light brown; apical tarsal segments reddish. Wings uniformly dark brown, veins and stigma blackish.

FEMALE. Measurements (mm). Head width 6.31; head length 4.15; wing length 16.5; total length 23.0.

Head. 1.52 times broader than long; in frontal view, occipital margin straight, except ocellar elevation; inner eye margins moderately convergent above, upper frontal width 0.84 times lower frontal width. Mandible stout, tridentate, inner teeth obtuse and margin between them broadly concave. Labrum about 1.1 times longer than broad, apex subangularly rounded in middle; disc moderately shiny, roughened and tessellate between dense to subcontiguous, mixed fine and coarse punctures, median line slightly raised. Clypeus about 1.6 times broader than long, apicolateral angle separated from eye by 0.5 times diameter of antennal socket; discal carinae moderately convergent basad, intercarinal distance at base about 0.66 times that at their distal end; sculpture as described for male, but with shiny basal area which is no greater than supraclypeal area. Punctation of frons, preoccipital area, and gena as in male. Interantennal distance 2.20 times antennal socket diameter; antennocular distance 0.88 times antennal socket diameter; scape robust, 1.91 times longer than wide, scape length 1.05 times length of first flagellar segment; first flagellar segment shorter than following three combined, 3.81 times longer than second. Interocellar distance 1.44 times diameter of anterior ocellus; ocellocular distance 1.78 times diameter of anterior ocellus; ocelloccipital distance 1.56 times diameter of anterior ocellus.

Thorax. Punctation as in male. Metanotum with horizontal basal face separated from vertical posterior face by a cariniform ridge on either side of middle. Apex of basitibial plate acute; secondary plate about twice longer than wide.

Abdomen. Punctation as described for male. Disc of pygidial plate not visible.

Pilosity. About as described for male, but pronotal collar and lobe without pale hairs; bristles of thoracic venter with pale tips; scale-like hairs of fifth tergum becoming longer, more erect and plumose toward prepygidial fringe; hairs of prepygidial fringe reddish brown and pale tips; scopal hairs pale yellowish.

Color. Generally blackish brown; mandible (except golden apical blotch), underside of flagellum, apical segments, reddish brown; paraocular area with small, obscure yellowish blotch near clypeal margin, below level of tentorial pit (larger and more distinct on left side). Wings as in male.

TYPE MATERIAL

Holotype male, allotype, and one male paratype: Monteverde, 1500 m elev., Puntarenas Prov., COSTA RICA, 12 Sept. 1978 (G.W. Frankie), in LACM. Paratypes: 1♂, same locality, 19 Aug. 1974 (D. Janzen; UKAN); 2♂♂, 4 km E San Ignacio de Acosta, 4000 ft. elev., San José Prov., COSTA RICA, 8 July 1963 (C.D. Michener et al.; UKAN).

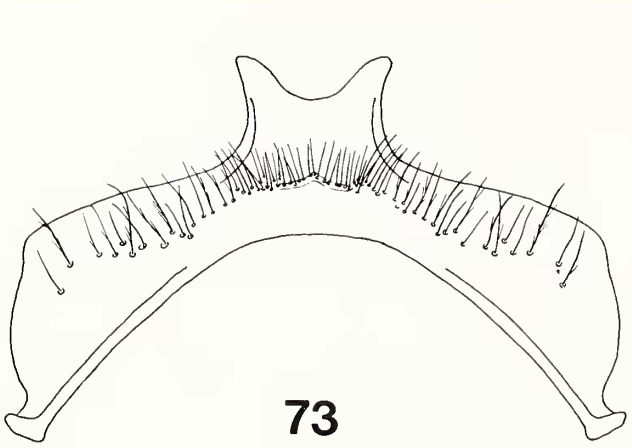
ETYMOLOGY

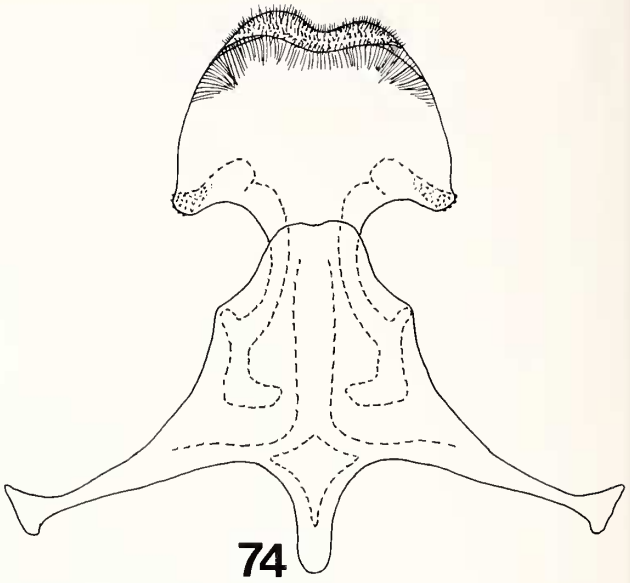
The specific epithet is a Latin word meaning with corners, referring to the angulate mesosternal processes of the male.

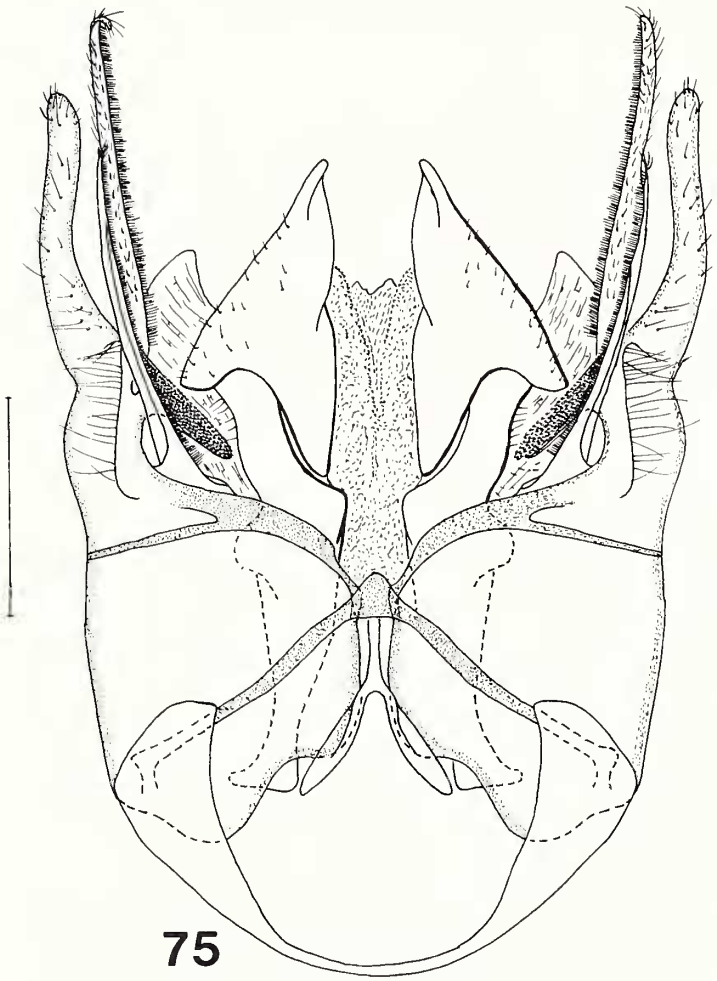
DISCUSSION

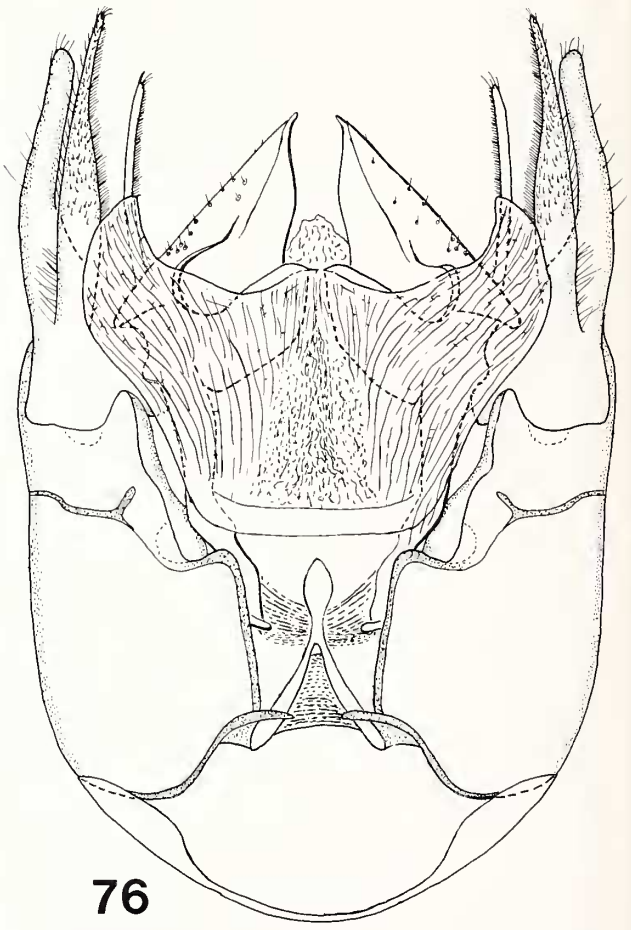
Aside from the variations noted above in the measurements and proportions, the males available are very similar to one another. The laterobasal spot on the second tergite may extend mesad as a narrow line and/or a short distance distad. The procoxal process is immaculate in three paratypes and in these specimens the mesotibial stripe is divided into a basal spot and two narrowly separated stripes along the segment. One male has a narrow yellow stripe on the anterior face of the metadistitarsus and yellow blotches on the outer face of the metamediotarsi.

Males of this species are easily recognized by the combination of black abdomen with contrasting pale marks, suberect and internally carinate mesosternal tubercles and black labrum. Females are considerably less distinctive, but differ from such species as *E. elegans, E. rustica,* and *E. bova* in possessing an immaculate abdomen and largely black thoracic pubescence. The lack of a median impunctate line on









Figures 73–76. *Epicharis* (*Epicharana*) *bova,* male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm.

the clypeal disc will also separate *E. angulosa* from *E. elegans* and *E. rustica*.

Epicharis (*Epicharana*) *bova*, new species

Figures 65, 73–76

DIAGNOSIS

Separable from all other species of *Epicharana* by the following unique combination of characters. Abdomen ferruginous, immaculate; pubescence of head and thorax medium brown to blackish brown, mesoscutum without pale hairs; clypeus black. *Male:* mesosternal processes, in profile, suberect but low and rounded, not carinate on inner margin; anterior margin of metatibia strongly produced (Fig. 65). *Female:* clypeal disc subcontiguously to densely punctate, without median impunctate line.

DESCRIPTION

HOLOTYPE MALE. Measurements (mm). Head width 5.95; head length 4.15; wing length 16.0; total length 25.0.

Head. 1.43 times broader than long; in frontal view, occipital margin very weakly concave, except for ocellar elevation; ocelli on occipital margin; upper frontal width 0.71 times lower frontal width. Mandible slender, inner tooth small, obtuse. Labrum about 1.2 times broader than long, apical margin broadly rounded; disc moderately shiny, weakly tessellate between irregularly spaced (mostly sparse), fine and coarse punctures. Clypeus about 1.5 times broader than long, apicolateral angle separated from inner eye margin by about 0.8 times diameter of antennal socket; clypeus shiny and very weakly tessellate between subcontiguous to dense, coarse punctures which become moderate distad, median impunctate line absent; discal carinae about twice as far apart distad as at base; side shiny between dense, moderate to coarse, elongate (especially distad) punctures. Frons moderately shiny and distinctly tessellate between dense, mixed fine and moderate punctures; preocellar area slightly protuberant on either side, shiny and nearly impunctate; ocellocular area dull and densely tessellate, subcontiguously, shallowly micropunctate and with scattered minute punctures; preocciput moderately shiny to shiny between close to dense punctures, minute near eye, becoming fine near margin. Interantennal distance 2.00 times antennal socket diameter; antennocular distance 0.63 times antennal socket diameter; scape robust, 1.74 times longer than wide, scape length 1.52 times length of first flagellar segment; first flagellar segment shorter than following three segments combined, 1.37 times longer than second segment. Interocellar distance 1.61 times diameter of anterior ocellus; ocellocular distance 1.96 times diameter of anterior ocellus; ocelloccipital distance 1.61 times diameter of anterior ocellus.

Thorax. Mesoscutum slightly shiny, uniformly densely, finely punctate, and with sparse, moderate punctures which become scattered distad; dorsal face of scutellum broadly depressed in middle, punctures as on mesoscutum, but fine punctures scattered; dorsal face of metanotum moderately shiny and distinctly tessellate between dense, fine punctures, posterior face dull, densely tessellate and with scattered fine punctures. Mesepisternum moderately shiny and tessellate between sparse, fine punctures; metepisternum moderately shiny between subcontiguous, minute punctures. Mesosternal process suberect in profile, its apex narrowly rounded; in ventral view, inner margin rounded. Propodeum moderately shiny, subcontiguously micropunctate between sparse to scattered, fine punctures. Procoxal process subcircular, apex not produced; mesofemur stout, about twice longer than thick, greatest thickness a little basad of midlength; anterobasal ventral depression of metafemur subcarinate along its posterior margin; anterior margin of metatibia abruptly convex at about midlength and anterior carina plainly visible (Fig. 65), posterior earina low throughout, highest distad of middle and abruptly reduced beyond highest point.

Abdomen. Tergal discs moderately shiny between minute punctures which are dense on basal segments, becoming progressively coarser and less close on succeeding segments; discs also with scattered fine punctures on basal segments, becoming progressively coarser (but still fine) on succeeding segments. Seventh tergite with very weakly differentiated pygidial plate which is depressed along midline; apex bidentate, teeth stout and acute, emargination between them semicircular.

Terminalia. Apical margin of distal lobe of seventh sternite (Fig. 73) deeply, angularly incised; setae long, widely spaced, mostly simple. Shoulders of disc of eighth sternite (Fig. 74) obtuse and sides of apical lobe of disc weakly convergent distad. Genitalia as in Figs. 75 and 76.

Pilosity. Generally blackish brown on head, thorax, and legs, but yellowish on metatibia and metabasitarsus; suberect hairs and appressed scaliform hairs of terga two to six golden brown, but fringes of fifth and sixth segments brown and a few brown, simple, suberect hairs scattered on discs. Scale-like hairs very short basad, becoming longer and more erect on succeeding segments. Hairs of abdominal sterna golden brown to blackish brown.

Color. Head, thorax, and legs blackish brown; abdominal terga ferruginous, sterna light brown. The following yellowish: large triangular mark near base of mandible; labrum; narrow, oblique stripe on side of face, from tentorial pit to malar area; small, triangular supraclypeal spot; small spot on underside of scape; basal spot on protibia; dorsal, apical spot on metafemur; outer face of metatibia and metabasitarsus (metatibia black at base). Inner leg surfaces dark ferruginous; tarsi ferruginous. Wings blackish brown, veins and stigma black.

FEMALE. Measurements (mm). Head width 6.41; head length 4.26–4.31; wing length 16.5; total length 24.0–27.0.

Head. 1.49–1.51 times broader than long; in frontal view, occipital margin nearly straight, ocellar elevation anterior to margin; upper frontal width 0.79–0.81 times lower frontal width. Mandible stout, tridentate, inner teeth obtuse, margin between them broadly concave. Labrum about 1.1 times longer than broad, apex subangularly rounded in middle; disc moderately shiny, roughened, and tessellate between dense to subcontiguous, mixed fine and coarse punctures, median line slightly raised. Clypeus about 1.4 times broader than

long, apicolateral angle separated from inner eye margin by about 0.75 times antennal socket diameter; intercarinal distance at base about 0.36 times that at their distal end; sculpture as described for male. Remaining cephalic sculpture as described for male. Interantennal distance 2.28–2.37 times antennal socket diameter; antennocular distance 0.92–0.95 times antennal socket diameter; scape robust, 1.86–1.91 times longer than broad, scape length 1.04–1.08 times length of first flagellar segment; first flagellar segment shorter than following three segments combined, 3.45–3.85 times length of second segment.

Thorax. Punctation as in male. Dorsal and posterior faces of metanotum separated on either side of middle by short, convex, cariniform ridge. Basitibial plate subacute at apex, secondary plate about 2.8 times longer than wide.

Abdomen. Punctation as in male. Pygidial plate broadly truncate at apex, secondary plate very weak.

Pilosity. About as described for male, with following differences: discs of third, fourth, and fifth terga with some suberect to erect dark brown, bristle-like hairs, longer and more abundant on succeeding segments; prepygidial fringe golden brown. Scopa of metatibia and metabasitarsus yellowish.

Color. As described for male, but wholly without yellowish markings and pronotum and propodeum reddish brown.

TYPE MATERIAL

Holotype male: Cerro Campana, Panamá Prov., PANAMA, 4 May 1960 (W.J. Hanson), in Snow Entomological Museum, University of Kansas. Allotype: 4 mi. S San Vito de Java, Puntarenas Prov., COSTA RICA, 15 Aug. 1967 (R.W. McDiarmid; LACM). Paratypes: 1♀, N of El Vallé de Anton, Coclé Prov., PANAMA, 12–13 Sept. 1964 (R.L. Dressler; UKAN); 1♀, O.T.S. Field Station, Finca La Selva, Heredia Prov., COSTA RICA, mid Aug. 1980 (J.M. MacDougal; LACM), on *Passiflora lobata,* 0900.

ETYMOLOGY

The specific epithet is a Latin word for a swelling of the legs and alludes to the swollen metatibia of the male.

DISCUSSION

Both sexes are easily separated from others in the subgenus *Epicharana* by the features listed above in the Diagnosis. The male is especially distinctive in the shape of the metatibia, the anterior margin of which is conspicuously and abruptly convex at about midlength. The low posterior carina of the metatibia is like that of *E. angulosa,* as is the posteriorly subcarinate anterobasal depression on the underside of the metafemur. The abdomen of *E. angulosa* is black and the mesosternal tubercles are acute at their apices and sharply carinate on their inner margins.

The only other species with a reddish abdomen is *E. elegans,* in both sexes of which the abdomen is distinctly yellowish red and the first tergum is yellowish maculate on the disc. In males of *E. elegans,* and those of *E. flava* and *E. rustica,* the clypeus is pale, the metatibia is regularly convex along its anterior margin, there is no inner, anterior metatibial carina, and the inner posterior metatibial carina is expanded beyond midlength and folded mesad. In both sexes of these species, *E. elegans, E. flava,* and *E. rustica,* there is considerable pale pubescence intermixed with blackish on the thoracic dorsum. Females of these three species have a definite median impunctate line on the clypeus and the minute punctures of the scutellum are usually coarser and less distinct than those of the mesoscutum.

Epicharis (*Epicharana*) *elegans* F. Smith

Epicharis elegans F. Smith, 1861:152. ♀ ♂.
Epicharis elegans: Moure, 1945a:296 (tax.).
Epicharis salazari Cockerell, 1949:480–481. ♀. NEW SYNONYMY.

This is a common black and red species in Mexico and ranges south to Costa Rica. Specimens from southern Mexico (Chiapas and Yucatán), Guatemala, El Salvador, and Costa Rica have the abdomen more brownish and correspond to *E. salazari,* described from El Salvador. These are minor variants and not worthy of separation from *E. elegans.*

NEW RECORDS

MEXICO, *CHIAPAS:* 4♀♀, La Revancha, 20 Aug. 1972 (T.W. Taylor; LACM). *GUERRERO:* 6♀♀, 12.7 mi. N Iguala, 5200 ft. elev., 1 Aug. 1969 (Univ. Kans. Mex. Exped.; UKAN); 1♀, 23 mi. N Taxco, 1700 ft. elev., 8 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN); 1♀, 3.7 mi. W Río Balsas, 5 Aug. 1965 (G.W. Byers and party; UKAN); 2♂♂, Iguala, 2400 ft. elev., 8 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN). *JALISCO:* 1♂, Guadalajara, no date (Crawford; LACM); 3♀♀, Cocula, 4450 ft. elev., 27 Sept. 1957 (H.A. Scullen; ORSU); 2♀♀, Puente Grande, 5000 ft. elev., 20 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN). *MORELOS:* 5♀♀, 8♂♂, Lake Tequisquetengo, 5000 ft. elev., 13 Sept. 1957 (H.A. Scullen; ORSU); 1♂, Rancho Tetela, Cuernavaca, 24 June 1974 (K.E. Donahue and S. Adams; LACM); 1♀, 1♂, Cuernavaca, no date (Crawford; LACM); 2♂♂, Alpuyeca, 27 June and 3 July 1951 (P.D. Hurd; UCB); 1♀, 7.3 mi. S Yautepec, 3000 ft. elev., 16 Aug. 1962 (Ordway and Naumann; UKAN); 3♀♀, 4 mi. SW Yautepec, 3800 ft. elev., 2 July 1961 (C.D. Michener; UKAN), on *Cassia* sp.; 2♀♀, 4.3 mi. W Yautepec, 4000 ft. elev., 17 Aug. 1962 (Ordway and Marston; UKAN); 1♂, 7 mi. NE Yautepec, 4000 ft. elev., 18 Aug. 1962 (Univ. Kans. Mex. Exped.; UKAN); 1♂, 14 mi. S Yautepec, 16 Aug. 1962 (Marston and Roberts; UKAN). *OAXACA:* 1♀, 25 mi. SE Oaxaca, 5600 ft. elev., 27 June 1963 (Scullen and Bolinger; ORSU); 1♀, 1♂, 47 mi. SE Oaxaca, 13 July 1952 (E.E. Gilbert and C.D. MacNeil; UCB); 2 ♀♀, 5 mi. NW Totolapan, 4000 ft. elev., 29 July 1970 (E.M. Fisher and P. Sullivan; LACM); 47♀♀, 5 mi. NW Totolapan, 3800 ft. elev., 6 July 1953 (Univ. Kans. Mex. Exped.; UKAN), on *Malpighia mexicana*; 1♀, Salina Cruz, no date (F.K. Knab; USNM); 2♀♀, Mixtla, 5600 ft. elev., 22 Aug. 1963 (Scullen and Bolonger; ORSU); 4♂♂, Monte Alban, 6000 ft. elev., 27 June 1961 (Univ. Kans. Mex.

Exped.; UKAN); 1♂, same, except 15 July 1955; 1♀, Tamazulapan, 6000 ft. elev., 28 June 1961 (Univ. Kans. Mex. Exped.; UKAN); 1♀, 2 mi. NW Tamazulapan, 6000 ft. elev., 28 June 1961 (Univ. Kans. Mex. Exped.; UKAN). *PUEBLA:* 9♀♀, 22 km NW Izúcar de Matamoros, 1158 m elev., 21 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Cassia laevigata*; 16♀♀, 16.1 km NW Izúcar de Metamoros, 1280 m elev., 17 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Caesalpinia cacalaco*; 9♀♀, 7♂♂, 6.9 km S Izúcar de Matamoros, 1250 m elev., 17 Sept. 1976 (C.D. George and R.R. Snelling; LACM), on *Solanum rostratum* (♀♀) and *Martynia annua* (♂♂); 3♀♀, 3♂♂, Atlixco, 9 July 1970 (R.E. Beer and party; UKAN); 2♀♀, 3 mi. NW Petlalcingo, 4600 ft. elev., 29 Aug. and 5 Sept. 1972 (Byers and Thornhill; UKAN); 1♀, 12 mi. NW Tehuitzingo, 4050 ft. elev., 29 June 1961 (Univ. Kans. Mex. Exped.; UKAN); on *Cassia* sp.; 1♀, 10 mi. SE Tehuitzingo, 3900 ft. elev., 3 July 1953 (Univ. Kans. Mex. Exped.; UKAN). *SAN LUIS POTOSÍ:* 6♂♂, El Salto, 1600 ft. elev., 24 Aug. 1954 (Univ. Kans. Mex. Exped.; UKAN). *TAMAULIPAS:* 1♀, 38 mi. N El Mante, 1050 ft. elev., 11 Oct. 1957 (H.A. Scullen; ORSU). *YUCATÁN:* 5♀♀, Pisté, 24 June 1967 (E.C. Welling; LACM). GUATEMALA: 2♀♀, "1923 F.4696" (UKAN); 1♀, "env. de Guatemala" (R. Guerin; MNHN). EL SALVADOR: 1♀, Dept. Santa Tecla, Feb. 1947 (M. Salazar; USNM; type of *E. salazari*); 4♀♀, Santa Tecla, 900 m elev., 25 Apr.–6 May 1972 (S. and L. Steinhaus; DPIF). COSTA RICA, *GUANACASTE:* 1♀, Comelco, 8 km NW Bagaces, 31 March 1971 (P.S. Opler; UCB), on *Tabebuia rosea*; 1♀, same, except 25 Nov. 1972; 1♂, same, except 5 Mar. 1971; 1♂, La Pacifica, 4 km NW Cañas, 14 Mar. 1972 (P.A. Opler; UCB), on *Inga vera*; 1♂, Hacienda Comelco, 24 km NW Cañas, 21 Mar. 1971 (E.R. Heithaus; LACM), on *Stachytarpheta jamaicense,* 0815; 1♂, same locality, 13 Mar. 1971 (E.R. Heithaus; LACM), on *Centrosoma pubescens,* 0750.

Epicharis (*Epicharana*) *rustica* (Olivier)

Figures 63, 67

Apis rustica Olivier, 1789:64.
Apis hirtipes Fabricius, 1793:325. ♀.
Epicharis rustica: F. Smith, 1854:368.
Centris (*Epicharis*) *rustica:* Friese, 1900b:253. ♀ ♂.
Centris (*Epicharis*) *rustica* var. *flava* Friese, 1900b:254. ♂. NEW SYNONYMY.
Epicharis rustica: Moure, 1945a:295–296. ♂ ♀ (syn.).
Epicharis (*Epicharana*) *rustica:* Michener, 1954:144 (distr.).
Epicharis (*Epicharis*) *rustica:* Moure, 1960b:119–120 (syn.).
Epicharis (*Epicharis*) *flava:* Moure, 1960b:120 (status).

Moure (1960b) reexamined the type female of *Apis hirtipes* and reaffirmed its traditional place in the synonymy of *E. rustica.* He concluded ". . . that with this discovery, the true meaning of *Epicharis* is to be restored as in my revision of *Epicharis* (1945) and *Epicharana* Michener, 1954, with the same type species is to be considered a synonym." I have already alluded to be unavailability of *Apis rustica* to be the type-species of *Epicharis.*

In point of fact, Moure's determination is inconclusive. Moure synonymized *A. hirtipes* under ". . . *Epicharis rustica* as interpreted by older authors and Friese in his Monographie der Bienengattung *Centris* (s. lat.)." This is by no means the same as placing *A. hirtipes* in synonymy with Olivier's species. Moure admitted that he had been unable to find Olivier's type. In truth the identity of *E. rustica* is unknown and the current interpretation of this species rests upon the very insecure foundation of assumptions made over a century ago by workers whose concepts of species were different from those of the present and who may not actually have seen the relevant specimens.

For the present, it would seem best to continue to accept the traditional interpretation of *E. rustica* and its appended synonymy, as published by Moure (1960b). The alternative would be to regard Olivier's speeies as unidentifiable and to use the next available name (*A. hirtipes*), suffering the resultant nomenclatural confusion. I adhere to the traditional understanding, which includes the unavailability of *E. rustica* as the type species for this genus.

This is a common bee, ranging from Costa Rica and Panama to Brazil and Peru. Friese's var. *flava,* with whitish cinereous pubescence on the thorax, was thought by Moure (1960b) to be probably a good species. In general, specimens from northeastern South America have almost entirely black thoracic pubescence and would correspond to the "typical" form of *E. rustica.* Similar dark specimens are also found in Costa Rica, but most populations have considerable pale pubescence on the dorsum and sides of the thorax. There are, however, many variants, the most eommon being a form with dark mesepisternal hairs, those of the mesoscutum and scutellum pale, or largely so. These specimens of an intermediate character occupy geographical areas between the two extremes, as would be expected if *E. rustica* and *E. flava* were conspecific, which I believe to be the case.

NEW RECORDS

COSTA RICA, *GUANACASTE:* 1♀ [Hacienda] Comelco, 5 Mar. 1971 (P.A. Opler; UCB), on *Tabebuia rosea. HEREDIA:* 1♀, Finca La Selva, 500 m elev., 23 June 1979 (D.R. Perry; LACM). *PUNTARENAS:* 1♀, Monteverde, 1400 m elev., 17 Sept. 1982 (C.D. Nagano and M. Hayes; LACM). PANAMA, *CANAL ZONE:* 1♀, Barro Colorado Island, 15 July 1980 (H. Wolda; ROUB); 1♀, same, except 1 Aug. 1980. *CHIRIQUÍ:* 3♀♀; 1♂, Dolega, 15 Mar. 1980 (D.W. Inouye; ROUB). *PANAMÁ:* 3♀♀, Arraijan, 16 Oct. 1980 (D. Roubik; ROUB); 4♀♀, Chilibre Cave, 26 July 1966 (R.D. Sage; UCB); 1♂, San Miguelito, 16 May 1974 (M. Gonzalez; LACM).

Subgenus *Parepicharis* Moure

Parepicharis Moure, 1945a:307–308. Type-species: "*Parepicharis zonata* (Smith, 1854)" = *Epicharis zonata* F. Smith, 1854; monobasic and original designation.

DESCRIPTION

Maxillary palp two-segmented, second segment much longer than first, more than five times longer than wide, gradually

narrower distad; lateral ridges of clypeal dise weak; malar space linear, eye margin nearly contiguous with mandible base; frontal carina ending before attaining anterior ocellus; occipital margin abruptly rounded; flagelliform occipital setae reaching about to level of anterior margin of tegula; posterior margin of dorsal face of scutellum impressed; metanotum vertical; jugal lobe of posterior wing about as long as cubital cell and one-half as long as vannal lobe.

Female. Labrum with median ridge weak or absent; outer face of mesobasitarsus with mixed long, coarse plumose setae and long, fine plumose hairs on anterior half, posterior half with long, coarse plumose setae only; basitibial plate without secondary plate; metatibia no longer than metabasitarsus; third and fourth terga without specialized basal areas; margins of pygidial plate, in dorsal view, nearly straight, apex broadly truncate.

Male. Labrum without median ridge; first flagellar segment longer than scape and longer than following two segments combined; ocellocular distance less than ocellar diameter; procoxa without apicoventral process; mesosternal protuberances absent; metatrochanter and metafemur without ventral seta patch; metatibia without carinate posteroventral ridge; metabasitarsus with or without anterior carina-like ridge, when present terminating in tooth a little beyond mid-length; pygidial plate narrower than seventh tergite, margins cariniform, apex narrow, rounded or truncate.

Parepicharis was proposed as a monotypic genus for *Epicharis zonata*. Subsequently, Moure and Seabra (1959) added *E. metatarsalis* to *Parepicharis*. Of the two species, only *E. metatarsalis* is found in Central America. I have seen material of *E. zonata* from Guyana, Brazil, and Bolivia and there are records of the species from Peru and Trinidad.

KEY TO SPECIES OF *PAREPICHARIS*

1a. Male, antenna 13-segmented and ocellocular distance less than diameter of anterior ocellus 2
b. Female, antenna 12-segmented and ocellocular distance greater than diameter of anterior ocellus 3
2a. Metabasitarsus about twice as long as broad and with distinct tooth on anterior margin .. *metatarsalis* Friese
b. Metabasitarsus about six times longer than broad and without tooth on anterior margin .... *zonata* F. Smith
3a. First abdominal segment blackish, remaining segments dull ferruginous, immaculate; prepygidial fimbria consisting of long, closely ranked, plumose hairs .... *metatarsalis* Friese
b. Abdomen brown, with conspicuous yellow maculations on at least first three terga; prepygidial fimbria weak, consisting of short, discretely separated, short-plumose hairs which do not conceal underlying surface .... *zonata* F. Smith

Epicharis (*Parepicharis*) *metatarsalis* Friese

Epicharis metatarsalis Friese, 1899:40. ♂.
Epicharis phenacura Cockerell, 1917:200. ♂. NEW SYNONYMY.
Epicharis conura Cockerell, 1917:200. ♀. NEW SYNONYMY.
Epicharis (*Parepicharis*) *metatarsalis:* Moure and Seabra, 1959:126 (distr., tax.).

The male of *E. metatarsalis* differs from that of *E. zonata* most obviously by the metabasitarsus, which is only twice as long as broad and with a distinct tooth on the anterior margin beyond the middle. Males of *E. zonata* lack a tooth on the metabasitarsus and the segment is about six times longer than broad. Females of *E. metatarsalis* have the first tergite blackish and the remaining segments dull yellowish red; in *E. zonata* there are yellow maculae, of variable extent, on the first three tergites which usually are dark brown to blackish. Both sexes of *E. metatarsalis* are larger (25–27 mm versus 20–23 mm).

Friese (1900b) recorded males of this species from St. Parime, Venezuela (type locality), and "Darien (=Colombia)," now in Panama. Another male was reported by Moure and Seabra (1959) from San José, Costa Rica. San Carlos, Costa Rica is the type locality for both *E. phenacura* and *E. conura*. The material now available indicates that *E. phenacura* and *E. conura* are the opposite sexes of one species and that the males are inseparable from *E. metatarsalis*.

NEW RECORDS

COSTA RICA, *HEREDIA:* 23♀♀, 6♂♂, Finca La Selva, near Puerto Viejo, 5 June–24 July (D.R. Perry; LACM), on *Hymenolobium* sp. (8♀♀, 2♂♂), *Dipteryx panamensis* (11♀♀, 2♂♂), *Tabebuia* sp. (1♂), *Dussia* sp. (1♂), and *Byrsonima* sp. (4♀♀).

Subgenus *Hoplepicharis* Moure

Hoplepicharis Moure, 1945a:300–301. Type-species: "*Hoplepicharis fasciata* (Lepeletier & Serville, 1828)" = *Epicharis fasciata* Lepeletier and Serville, 1828; original designation.
Epicharis subg. *Hoplepicharis:* Michener, 1954:145.

DESCRIPTION

Maxillary palp two-segmented, second segment shorter than first, flattened; lateral ridges of clypeal disc strong; malar space distinct, slightly longer than minimum thickness of first flagellar segment; frontal carina sharp but ending well in front of anterior ocellus; occipital margin abruptly rounded; flagelliform occipital setae extending nearly to level of posterior tegular margin; posterior margin of dorsal face of scutellum not impressed; metanotum bifaced, juncture sharply angulate to crested; jugal lobe of posterior wing about as long as cubital cell and about one-half as long as vannal lobe.

Female. Labrum with weak median ridge; outer face of mesobasitarsus, on anterior half, with long, coarse, simple setae and shorter, fine, plumose hairs, posterior half with sparse long, coarse, simple setae and scattered short, fine, plumose hairs; secondary basitibial plate present; metatibia a little longer than metabasitarsus; third and fourth terga without specialized basal areas; margins of pygidial plate

nearly straight and strongly convergent to narrowly truncate apex.

Male. Labrum without median ridge; first flagellar segment shorter than either scape or second flagellar segment; ocellocular distance greater than diameter of anterior ocellus; procoxa with short, inconspicuous apicoventral process; mesosternum without tubercles; metatrochanter and metafemur without ventral seta patch; metatibia without posteroventral ridge; metabasitarsus with anterior carinate ridge terminating in sharp tooth basad of midlength; pygidial plate broad and indistinct, weakly bilobate at apex.

This is a small group, with two species known from South America and two in Central America.

KEY TO CENTRAL AMERICAN *HOPLEPICHARIS*

a. Second abdominal tergite with basal yellow band, narrowed across middle, followed by narrow blackish brown band; most of remainder of this segment, and all of following segments, ferruginous (except short, yellow longitudinal stripe at side of third segment) ..... *lunulata* Mocsáry

b. Similar, but second tergite, beyond yellow basal band, and all of following segments, blackish (except short, yellow longitudinal stripe at side of third segment) ..... *monozona* Mocsáry

Epicharis (*Hoplepicharis*) *lunulata* Mocsáry

Figure 64

Epicharis lunulata Mocsáry, 1898:499. ♂ ♀.
Hoplepicharis lunulata: Moure, 1945a:302 (distr., syn.).
Epicharis (*Hoplepicharis*) *lunulata:* Michener, 1954:145 (distr.).

This attractive Central American species appears to be less common than the superficially similar *E. elegans.* Its range extends from Mexico to Panama.

NEW RECORDS

MEXICO, *CHIAPAS:* 1♀, Simojovel, 18–31 July 1958 (J.A. Chemsak; UCB). *JALISCO:* 1♀, Estación Biologia UNAM, Chamela, 11 Sept. 1981 (S.H. Bullock; LACM), on *Psidium sartorianum. NAYARIT:* 2♀♀, 16 mi. NW Tepic, 19 July 1953 (Univ. Kans. Mex. Exped.; UKAN). *OAXACA:* 1♀, 6 mi. W Zanatepec, 150 ft. elev., 9 July 1953 (Univ. Kans. Mex. Exped.; UKAN), on *Malpighia mexicana*; 2♀♀, 5 mi. NW Totolapan, 3800 ft. elev., 6 July 1953 (Univ. Kans. Mex. Exped.; UKAN), on *Malpighia mexicana. VERA CRUZ:* 1♀, 1♂, Cordóba, 1–10 Sept. (♀), 1 Oct. 1964 (♂) (LACM). GUATEMALA: 1♀, Cayuga, Nov. (Schaus and Barnes; USNM); 1♀, "F.4694" (UKAN). HONDURAS: 1♂, Tegucigalpa, 12 May 1981 (F.J. Dyer; USNM). COSTA RICA, *GUANACASTE:* 4♀♀, 1♂, Hacienda Comelco, 8 km NW Bagaces and 24 km NW Cañas, dates between 7 Mar. and 14 Oct. (E.R. Heithaus [1♀], P.A. Opler [3♀♀, 1♂]; LACM, UCB), on *Byrsonima* sp. (1♀), *Stachytarphe frantzii* (1♀), *Petastoma patelliferum* (♂) and Bignonaceae, 0700 (1♀); 1♀, near Turin (10°20′N, 84°50′W), 1 Feb. 1960 (C.W. Palmer; UKAN). *PUNTARENAS:* 1♀, 1 mi. ESE jct. Río Cañas and Hwy 2, 1000 ft. elev., 23 July 1965 (R.D. Sage and S.J. Arnold; UCB), on *Bixa orellana,* 1000–1100. *SAN JOSÉ:* 1♂, 4 km E San Ignacio de Acosta, 4000 ft. elev., 8 July 1963 (C.D. Michener et al.; UKAN); 1♀, Playón, 8 km N Parrita, 30 ft. elev., 14–19 Aug. 1962 (C.D. Michener and A. Wille; UKAN); 1♂, San José, 25 July 1913 (UKAN).

Epicharis (*Hoplepicharis*) *monozona* Mocsáry

Epicharis monozona Mocsáry, 1898:498. ♀.
Hoplepicharis monozona: Moure, 1945a:392 (distr., tax.).
Epicharis (*Hoplepicharis*) *monozona:* Michener, 1954:145 (distr.).

This species was based on a female from an unspecified Panamanian locality. Moure (1945a) recorded another female from Muzo, Río Cantinero, Colombia, and Michener (1954) reported two additional Panamanian specimens, both from the Canal Zone: Las Cruces trail, near Corozal, and Fort Clayton.

The male of *E. monozona* has not been previously reported. It is separable from that of *E. lunulata* by the black, rather than ferruginous, abdomen. Aside from the differences in color, *E. monozona* and *E. lunulata* appear to be identical and I suspect they will ultimately be found to be conspecific.

NEW RECORDS

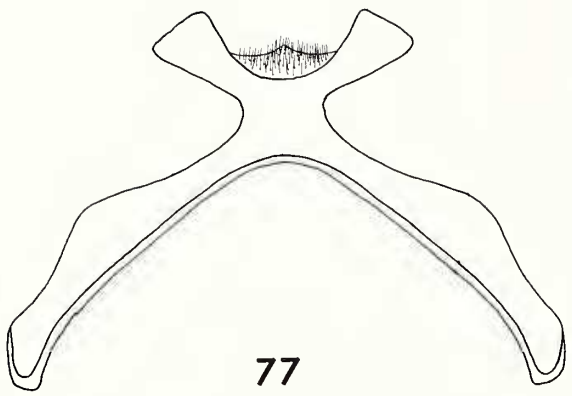
PANAMA, *PANAMÁ:* 3♀♀, Arraijan, 16 Oct. 1980 (D. Roubik; LACM, ROUB); 1♀, Chepo, 15 km E Carti, 8 June (D. Roubik; ROUB); 1♂, Cerro Campana, 13 Apr. 1960 (W.J. Hanson; UKAN); 1♀, Cerro Azul, N of Tocumen, 15 June 1958 (W.J. Hanson; UKAN). *CANAL ZONE:* 1♀, Pipeline Road, Gamboa, 12 Jan. 1980 (D. Roubik; ROUB); 1♀, same, except 10 June 1980; 1♀, 7♂♂, Pipeline Road, 20 Sept., 6 Oct. 1979 (K. Steiner; UCD), on *Drymonia serrulata*; 5♀♀, 1♂, Gamboa, 28 Sept. 1979, same collector and host; 1♂, Barro Colorado Island, 15 July 1958 (W.J. Hanson; UKAN); 3♂♂, same locality, 15 Sept., 12 Oct., 28 Oct. 1979 (K. Steiner; UCD), on *D. serrulata. COLÓN:* 1♀, Portobello, 30 Sept. 1979 (K. Steiner; UCD), on *D. serrulata.*

Subgenus *Epicharoides* Radoszkowski

Epicharoides Radoszkowski, 1884:20. Type-species: (*Epicharoides bipunctatus* Radoszkowski, 1884) = *Epicharis maculata* F. Smith, 1874; monobasic and original designation.
Epicharoides: Moure, 1945a:309–310.
Epicharis subg. *Epicharoides:* Michener, 1954:144.

DESCRIPTION

Maxillary palp three-segmented, second segment longer than first, third segment narrower and shorter than second; lateral ridges of clypeal disc strong; malar space distinct, about as long as minimum thickness of first flagellar segment; frontal carina sharp, nearly reaching anterior ocellus; occipital margin slightly compressed but not ridge-like; flagelliform oc-



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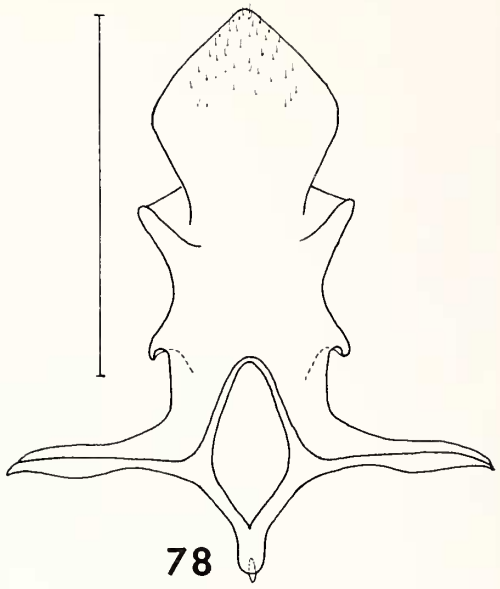

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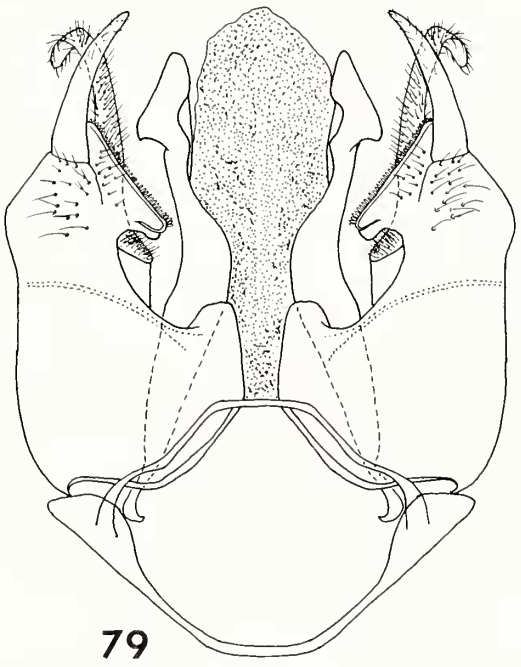

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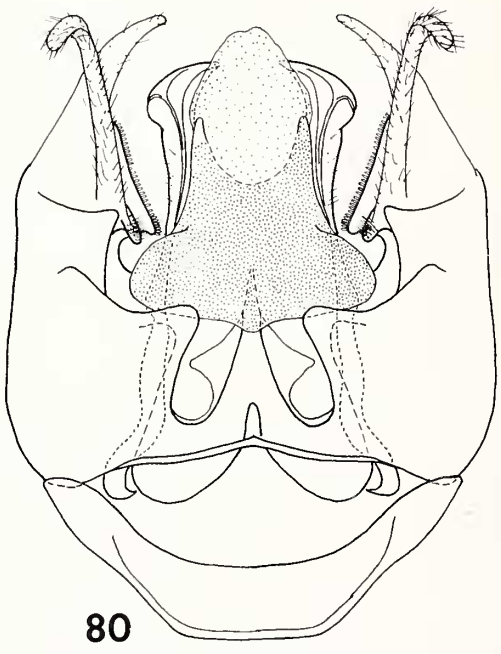

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Figures 77–80. *Epicharis* (*Epicharoides*) *albofasciata,* male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm.

cipital setae short and curved laterad, not extending beyond anterior margin of mesoscutum; posterior margin of dorsal face of scutellum not impressed; metanotum wholly vertical; jugal lobe of posterior wing about as long as cubital cell and about one-half as long as vannal lobe.

Female. Labrum without median ridge; mesobasitarsis externally with evenly distributed long coarse setae (some plumose) and short, fine, long-plumose hairs; secondary basitibial plate absent; metatibia no longer than metabasitarsus; third and fourth terga without specialized basal areas; mar-

gins of pygidial plate, in dorsal view, slightly concave, apex narrowly truncate, disc depressed.

Male. Labrum without median ridge; scape unusually robust, slightly longer than wide, first flagellar segment shorter than either scape or second flagellar segment; ocellocular distance greater than diameter of anterior ocellus; procoxa without apicoventral process; mesosternal tubercles absent; metatrochanter and metafemur without ventral seta patch; metatibia without posteroventral ridge; metabasitarsus without carinate anterior ridge; pygidial plate about one-half as broad as seventh tergite, sharply margined, apex narrowly rounded.

Moure (1945a) recognized three species in this subgenus, and a fourth was added by Moure and Seabra (1959). Two of these species are present in Central America and two are confined to South America. The two Central American species are black, with abundant, very variable yellow markings.

KEY TO CENTRAL AMERICAN *EPICHAROIDES*

a. Male clypeus with irregular black blotch on disc; female with basal yellow band of second tergite broadly interrupted, but if complete, it is much shorter in middle than black band following it and basal bands of following terga are broadly interrupted ..... *albofasciata* F. Smith

b. Male clypeus without black blotch on disc; female with basal yellow band of second tergum as long in middle as black band following it or, if a little shorter, third and fourth terga with complete transverse yellow fasciae ... . *maculata* F. Smith

Epicharis (*Epicharoides*) *albofasciata* F. Smith

Figures 77–80

Epicharis albofasciata F. Smith, 1874:321. ♂.
Epicharis maculata var. *nigroclypeata* Friese, 1899:40.
Epicharoides albofasciata: Moure, 1945a:310 (syn., distr.).
Epicharis (*Epicharoides*) *maculata:* Michener, 1954:145 (in part).

This speeies and *E. maculata* are so similar as to be virtually inseparable and records from the literature under either name must be treated with caution. There are, however, consistent differences in the male terminalia (compare Figs. 77–80 with Figs. 81–84).

Females of the two species are especially difficult to separate. Those of *E. albofasciata* have either lateral spots on the second tergite or a subbasal fascia which is shorter than the black area following the band; the third and fourth tergites apparently never possess entire transverse subbasal bands, though the margins of the segments may be broadly ferruginous. On the other hand, females of *E. maculata* possess a subbasal band on the second segment which is usually, though not always, at least as long as the dark band following it; a shorter transverse band, often attenuated in the middle, is present on the third tergite; a transverse band is also present on the fourth segment, usually longer than that of the third.

Aside from the differences in genitalic structures, males of *E. albofasciata* are recognizable by the presence of a black blotch on the the elypeal disc, the very short fasciae of the second to fourth tergites (evanescent or absent on third and often on fourth as well) and the pronotum black, except two widely separated spots on the collar.

From Central America, I have seen material of *E. albofasciata* only from Costa Rica and Panama. At least some of the specimens from Panama recorded by Michener (1954) as *E. maculata* are this species; his figures 141–143 are based on *E. albofasciata.*

NEW RECORDS

COSTA RICA, *GUANACASTE:* 2♀♀, Hacienda Comelco, 24 km NW Cañas, 6–13 Mar. 1972 (E.R. Heithaus; LACM), 1 on *Securidaca tenuifolia*; 1♀, Hacienda Comelco, 8 km NW Bagaces, 5 Mar. 1971 (P.A. Opler; UCB), on *Delbergia reteusa*; 1♂, same locality, 28–31 Jan. 1972 (P.A. Opler; UCB), on *Securidaca sylvestris*; 1♂, Finca La Pacifica, 4 mi. NW Cañas, 10 July 1971 (P.A. Opler; UCB), on *Petastoma patelliferum*; 1♀, Liberia, 15–16 Feb. 1972 (P.A. Opler; UCB), on *Andira inermis. HEREDIA:* 5♀♀, 16♂♂, Finca La Selva, near Puerto Viejo, 6 May to 18 June (D.R. Perry; LACM), on *Dipteryx panamensis* (3♀♀, 8♂♂), *Vochysia* sp. (1♂), *Byrsonima* sp. (1♀), *Dussia* sp. (6♂♂), and *Hymenolobium* sp. (1♂). PANAMA, PANAMÁ: 1♀, 24 Mar. 1980 (D. Roubik; ROUB); 4♀♀, same, except 2 Apr. 1980; 2♀♀, same except 13 Apr. 1980; 1♀, Curundu, 31 Mar. 1981 (D. Roubik; ROUB). *CANAL ZONE:* 1♀, Barro Colorado Island, 2 June 1981 (H. Wolda; ROUB).

Epicharis (*Epicharoides*) *maculata* F. Smith

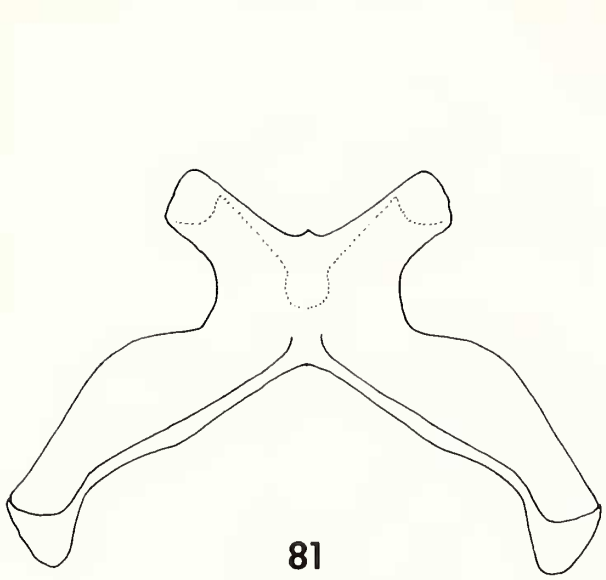
Figures 81–84

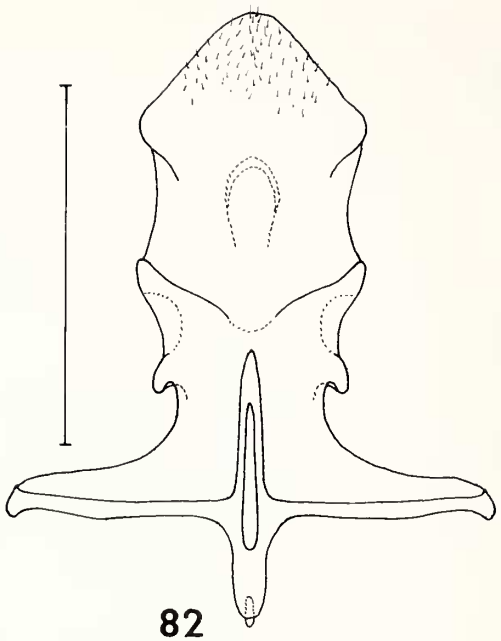
Epicharis maculata F. Smith, 1874:320. ♀.
Epicharoides bipunctatus Radoszkowski, 1884:20.
Centris (*Epicharis*) *variabilis* Friese, 1900b:351. (New name for *C. maculata* F. Smith, not *C. maculata* (Lepeletier.)
Epicharoides maculata: Moure, 1945a:310 (syn., distr.).
Epicharis (*Epicharoides*) *maculata:* Michener, 1954:145 (syn., distr.) (in part).

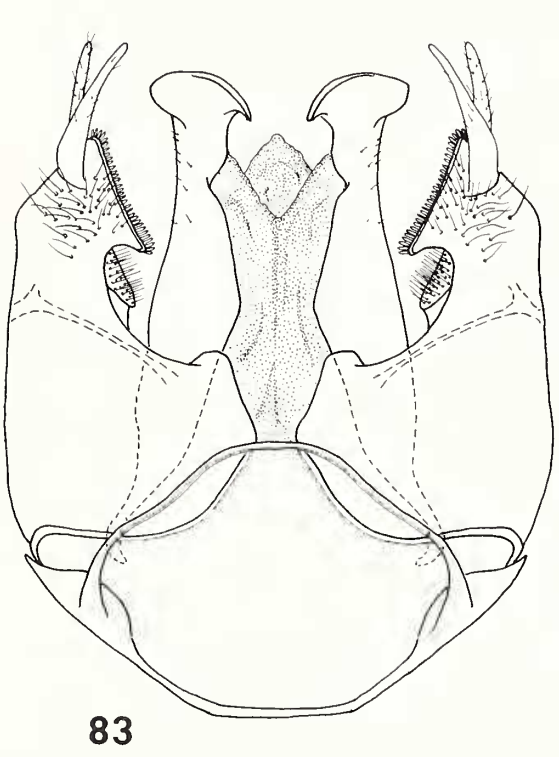
This species was described from Oaxaca, Mexico, and ranges south to Venezuela and Colombia. In Central America it is much more common than *E. albofasciata,* a primarily South American species.

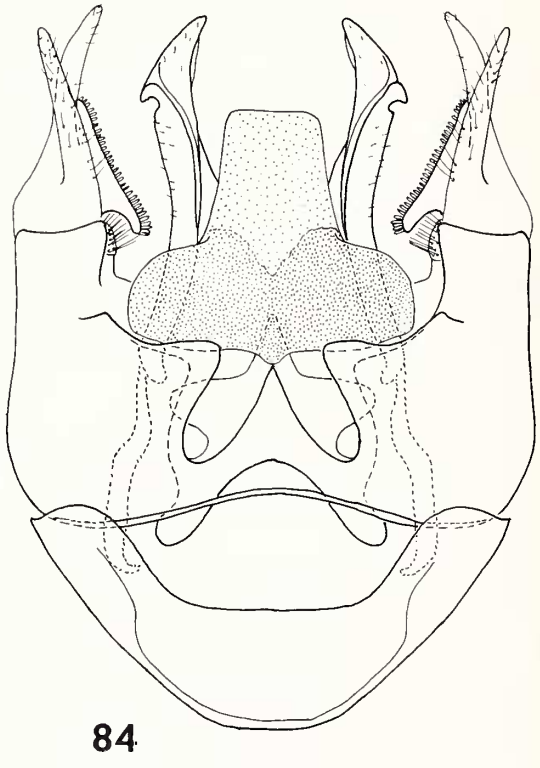
NEW RECORDS

GUATEMALA: 1♀, Secanquim, June 1984 (USNM); 1♀, Quirigua, Aug. (Schaus and Barnes; USNM). MEXICO, *OAXACA:* 2♀♀, Salina Cruz, 10 Aug. 1964 (E. Fisher and D. Verity; LACM). *QUINTANA ROO:* 1♀, 3♂♂, 8–14 May 1963 (E.C. Welling; LACM). *SINALOA:* 1♀, 5 mi. N Mazatlan, 29 July 1973 (J.A. Chemsak, E.G. Linsley, A.E. and M.M. Michelbacher; UCB), on *Turnera diffusa. VERA CRUZ:* 5♀♀, Tecolutla, 19 June 1951 (P.D. Hurd; UCB). *YUCATÁN:* 1♀, Piste, July 1967 (E.C. Welling; LACM). COSTA RICA, *GUANACASTE:* 1♀, Liberia, 15–16 Feb. 1972 (P.A. Opler; UCB), on *Andira inermis*; 2♀♀, Finca La Pacifica, 4 km NW Cañas, 17–20 Nov. 1972 (P.A. Opler; UCB), on "pink malp.









Figures 81–84. *Epicharis* (*Epicharoides*) *maculata,* male seventh and eighth sternites and genitalia (ventral and dorsal views). Scale line = 1.00 mm.

vine"; 1♀, same except 30 Nov. 1972, on *Bixa orellana*; 11♂♂, Hacienda Comelco, 24 km NW Cañas, 13–14 Mar. 1971 (E.R. Heithaus; LACM), on *Securidaca tenuifolia*; 3♂♂, Hacienda Comelco, 8 km NW Bagaces, 28–31 Jan., 6 Mar. 1971 (P.A. Opler; UCB), on *Secridaca sylvestris. HEREDIA:* 10♀♀, 71♂♂, Finca La Selva, near Puerto Viejo, 25 Apr. to 19 June (D.R. Perry; LACM), on *Vochysia* sp. (5♂♂), *Byrsonima* sp. (5♀♀), *Dipteryx panamensis* (5♀♀, 60♂♂), *Dussia* sp. (3♂♂), and

Hymenolobium sp. (1♂). PANAMA, *PANAMÁ:* 2♂♂, Capira, Cerro Campana, 12 Aug. 1980 (D. Roubik; ROUB); 1♂, 15 km E Chepo, Llano Carti Rd., 22 Feb. 1980 (D. Roubik; ROUB).

Subgenus *Epicharitides* Moure

Epicharitides Moure, 1945a: 311. Type-species: "*Epicharitides cockerelli* (Friese, 1900)" = *Epicharis cockerelli* Friese, 1900a; original designation.

DESCRIPTION

Maxillary palp three-segmented, second segment broad, longer than first, third segment narrower and a little shorter than second; lateral ridges of clypeal disc strong; malar space distinct, but shorter than minimum thickness of first flagellar segment; frontal carina sharp but short, ending in front of anterior ocellus by much more than diameter of anterior ocellus; occipital margin compressed and ridge-like or crested; flagelliform occipital setae short and curved laterad before reaching anterior margin of mesoscutum; posterior margin of dorsal face of scutellum not impressed; metanotum wholly vertical, jugal lobe of posterior wing shorter than cubital cell and less than one-half as long as vannal lobe.

Female. Labrum without median ridge; outer face of mesobasitarus with mixed long, coarse, simple setae and short, fine, long-plumose hairs on anterior half, posterior half with sparse long, coarse, simple setae only; secondary basitibial plate absen; metatibia no longer than metabasitarsus; gradulus of third and fourth terga, in middle, broadly deflected apicad and area on either side depressed and covered with dense mat of very short, plumose hairs; margins of pygidial plate, in dorsal view, nearly straight, apex narrowly truncate, disc depressed.

Male. Labrum without median ridge; first flagellar segment shorter than either scape or second flagellar segment; ocellocular distance greater than diameter of anterior ocellus; procoxa without apicoventral process; mesosternal tubercles absent; metatrochanter and metafemur without ventral seta patch; metatibia without posteroventral ridge; metabasitarsus without carinate ridge on anterior margin; pygidial plate less than one-half as wide as seventh tergite, margins sharp, apex narrowly truncate.

Moure (1945b) recognized five species in this subgenus and gave a key for their separation. Two additional species were described from Brazil by Moure and Seabra (1959). All the included species were known, at that time, only from South America, especially Brazil. One species is now known to occur in Central America.

Epicharis (*Epicharitides*) species

Two females from Cerro Campana, Panamá Province, Panama, 9 June 1960 (W.J. Hanson; UKAN) possibly represent an undescribed species. In the key to species of *Epicharitides* by Moure (1945b) they fail at couplet 7, failing to agree with the characteristics cited for either *E. obscura* Friese or *E. duckei* Friese. The abdomen is black ventrally as well as dorsally, there is a narrow transverse lateral stripe on each side of the dorsal face of the first tergum and the second tergum has a broad basal yellow band, slightly expanded on either side. The distal margin of this band is broadly curved inward, but in the middle of the segment, the band is one-half as long as the segment. The face is wholly black except for the yellow basal portion of the labrum and a minute median spot on the lower paraocular area.

These specimens may represent a previously undescribed species, but in the absence of associated males, no nomenclatural action is possible at this time.

These specimens differ from *E. duckei* in the color pattern of the abdominal terga. The first tergite bears a short, sublateral yellow stripe and the second is yellow across the entire base, with the distal one-third blackish, the yellow band a little shorter in the middle one-half. The remainder of the abdomen is blackish. Pubescence is wholly dark, except the pale scopa and some pale hairs around the pronotal lobe. Females of *E. obscura* agree with the Panamanian specimens in having the pubescence largely dark, but the first tergum is immaculate and the second to fourth or fifth terga are maculate only at the sides.

Superficially, these females resemble unusually dark individuals of *E. maculata,* but may be readily separated by the shorter jugal lobe of the hind wing, by the characteristic shape of the metabasitarsus and by the presence of the modified areas on the abdominal terga. These differences will also distinguish this bee from *E. albofasciata.*

SYNONYMIC LIST OF NORTH AND CENTRAL AMERICAN CENTRIDINI

Centris Fabricius

Subgenus *Xerocentris* Snelling, 1974. Type-species: *C. californica* Timberlake, 1940.

01. *californica* Timberlake, 1940. Calif., Nev.
02. *griseola* Snelling, n. sp. Mexico (Guerrero).
03. *hoffmanseggiae* Cockerell, 1897. N. Mex., Ariz., Calif.
    = davidsoni Cockerell, 1904.
04. *pallida* W. Fox, 1899. Southwestern U.S., northwestern Mexico.
    = callognatha Cockerell, 1923.
    = trichosoma Cockerell, 1923.
05. *rhodomelas* Timberlake, 1940. Calif.
06. *tiburonensis* Cockerell, 1923. Calif., Ariz., Son., B. Calif.
07. *vanduzeei* Cockerell, 1923. Mexico (B. Calif., B. Calif. Sur).

Subgenus *Paracentris* Cameron, 1902. Type-species: *C. fulvohirta* (Cameron, 1902).
    = Penthemisia Moure, 1950. Type-species: *C. chilensis* Spinola, 1851.
    = Trichocentris Snelling, 1956. Type-species: *C. rhodoleuca* Cockerell, 1923.

08. *angustifrons* Snelling, 1966. Ariz., Son.
09. *aterrima* F. Smith, 1854. Ariz. to central Mexico.
10. *atripes* Mocsáry, 1899. Southwestern U.S. to Costa Rica.
    = atriventris W. Fox, 1899.

= limbata Friese, 1899. N. SYN.
= Foxi Friese, 1900b.

11. *caesalpiniae* Cockerell, 1897. Tex. to Ariz., northern Mexico.
= morsei Cockerell, 1897.
= marginata W. Fox, 1899.
12. *cockerelli* W. Fox, 1899. Southwestern U.S., northern Mexico.
= resoluta Cockerell, 1923. N. SYN.
13. *ectypha* Snelling, 1974. B. Calif.
14. *ferrisi* Cockerell, 1924. B. Calif. Sur.
15. *fisheri* Snelling, 1974. B. Calif., B. Calif. Sur.
16. *harbisoni* Snelling, 1974. B. Calif.
17. *laevibullata* Snelling, 1966. Central Mexico.
18. *lanosa* Cresson, 1872. Fla. to Tex., Okla., Kans.
= subhyalina W. Fox, 1899.
= birkmanii Friese, 1900a.
19. *mexicana* F. Smith, 1854. Texas to Ariz., south to Oaxaca, Mexico.
20. *nigrocaerulea* F. Smith, 1874. Central Mexico to Panama.
= clypeata Friese, 1899. Preoccupied. N. SYN.
= anthracina Snelling, 1966. N. SYN.
21. *rhodopus* Cockerell, 1897. Southwestern U.S., northern Mexico.
= pulchrior Cockerell, 1900.
= rhodoleuca Cockerell, 1923.
22. *zacateca* Snelling, 1966. Ariz., N. Mex., central Mexico.

Subgenus *Xanthemisia* Moure, 1945b. Type-species: *C. bicolor* Lepeletier, 1841.

23. *carolae* Snelling, 1966. Mexico to Costa Rica.
24. *lutea* Friese, 1899. Central Mexico to Panama; South America.
25. *rubella* F. Smith, 1854. Panama; South America.

Subgenus *Exallocentris* Snelling, 1974. Type-species: *C. anomala* Snelling, 1966.

26. *anomala* Snelling, 1966. Central Mexico.

Subgenus *Acritocentris* Snelling, 1974. Type-species: *C. ruthannae* Snelling, 1966.

27. *agameta* Snelling, 1974. Northeastern and central Mexico.
28. *albiceps* Friese, 1899. Northeastern and central Mexico.
= strawi Snelling, 1966. N. SYN.
29. *ruthannae* Snelling, 1966. Ariz., Son.
30. *satana* Snelling, n. sp. Southern Arizona to central Mexico.

Subgenus *Centris* Fabricius, 1804. Type-species: *C. haemorrhoidalis* (Fabricius, 1775).
= Hemisia Klug, 1807. Type-species: *C. haemorrhoidalis* (Fabricius, 1775).
= Cyanocentris Friese, 1900b. Type-species: *C. versicolor* (Fabricius, 1775).
= Poecilocentris Friese, 1900b. Type-species: *C. fasciatella* Friese, 1900b.

31. *adanae* Cockerell, 1949. Southern Mexico to Panama.
32. *aethiocesta,* Snelling, n. sp. El Salvador to Panama.
33. *aethyctera* Snelling, 1974. Southern Mexico to Panama.
34. *decolorata* Lepeletier, 1841. Texas to Panama; Caribbean; northern South America.
= obscuriventris Friese, 1899?
35. *eisenii* W. Fox, 1899. Arizona to Panama.
36. *errans* W. Fox, 1899. Florida.
37. *flavifrons* (Fabricius, 1775) Central America; South America.
= brasiliana Christ, 1791.
= citrotaeniata Gribodo, 1894. N. SYN.
= nigritula Friese, 1899. N. SYN.
= rufescens Friese, 1899. N. SYN.
38. *flavofasciata* Friese, 1900a. Central America, northern South America.
39. *inermis* Friese, 1899. Central America, northern South America.
= segregata Crawford, 1906. N. SYN.
= gualanensis Cockerell, 1912.
= robusta Cockerell, 1949. N. SYN.
= pallidifrons Cockerell, 1949.
40. *meaculpa* Snelling, n. name. Eastern Mexico.
= erubescens Snelling, 1974. Preoccupied.
41. *obscurior* Michener, 1954. Southern Mexico to Panama.

Subgenus *Ptilocentris* Snelling, n. subg. Type-species: *C. festiva* F. Smith, 1854.

42. *festiva* F. Smith, 1854. Costa Rica to Venezuela and Peru.
= chlorura Cockerell, 1919. N. SYN.

Subgenus *Melanocentris* Friese, 1900b. Type-species: *C. atra* Friese, 1899.

43. *agilis* F. Smith, 1874. Mexico to Honduras.
= ignita F. Smith, 1874. N. SYN.
= bakeri Friese, 1912. N. SYN.
= bakerella Friese, 1913. N. SYN.
= Epicharis cisnerosi Cockerell, 1949. N. SYN.
44. *agiloides* Snelling, n. sp. Mexico to Costa Rica.
45. *flavilabris* Mocsáry, 1899. Costa Rica to South America.
= boliviensis Mocsáry, 1899.
46. *fusciventris* Mocsáry, 1899. Costa Rica to South America.
= scutellata Friese, 1900b. N. SYN.
47. *gelida* Snelling, n. sp. Mexico, Guatemala.
48. *obsoleta* Lepeletier, 1841. Mexico to South America.
= melanochlaena F. Smith, 1874. N. SYN.
= Epicharis zamoranensis Cockerell, 1949. N. SYN.
49. *plumipes* F. Smith, 1854. Costa Rica to South America.
50. *sericea* Friese, 1899. Central Mexico.

Subgenus *Trachina* Klug, 1810. Type-species: *C. longimana* Fabricius, 1804.
= Paremisia Moure, 1945b. Type-species: *C. lineolata* Lepeletier, 1841.

51. *dentata* F. Smith, 1854. Southern Mexico to South America.
= proxima Friese, 1900a.
52. *eurypatana* Snelling, n. sp. Mexico (Jalisco).
53. *fuscata* Lepeletier, 1841. Southern Mexico to South America.

54. *heithausi* Snelling, 1974. Guatemala to Costa Rica.
55. *labiata* Friese, 1904. Mexico to Costa Rica.
    = schwarzi Cockerell, 1919. N. SYN.
56. *longimana* Fabricius, 1804. Nicaragua to South America.
    = personata F. Smith, 1874.
57. *similis* (Fabricius, 1804). Costa Rica to northern South America.
    = lineolata Lepeletier, 1841.
58. *vidua* Mocsáry, 1899. Belize to Panama.
59. *xochipillii* Snelling, n. sp. Mexico (Oaxaca).

Subgenus *Hemisiella* Moure, 1945b. Type-species: *C. lanipes* (Fabricius, 1775).
60. *dichrootricha* Moure, 1945b. Panama; South America.
61. *nitida* F. Smith, 1874. Mexico to Panama; northern South America.
    = confinis Pérez, 1905. N. SYN.
62. *transversa* Pérez, 1905.
    = ruae Cockerell, 1949. N. SYN.
63. *trigonoides* Lepeletier, 1841. Southern Mexico to South America.
    = dentipes F. Smith, 1874. N. SYN.
    = hoplopoda Moure, 1943.
    = rufomaculata Cockerell, 1949. N. SYN.
    = subtarsata Cockerell, 1949. N. SYN.
64. *vittata* Lepeletier, 1841. Mexico to South America.
    = montezuma Cresson, 1879.
    = breviceps Friese, 1899.
    = friesei Crawford, 1906. Preoccupied.
    = costaricensis Crawford, 1907.
    = erubescens Friese, 1925. N. SYN.

Subgenus *Heterocentris* Cockerell, 1899. Type-species: *C. cornuta* Cresson, 1865.
65. *analis* (Fabricius, 1804). Mexico to South America.
    = totonaca Cresson, 1879.
    = otomita Cresson, 1879.
    = minuta Mocsáry, 1899.
    = simplex Friese, 1899.
    = durantae Cockerell, 1949.
    = petreae Cockerell, 1949.
    = petreae var. rufopicta Cockerell, 1949.
66. *bicornuta* Mocsáry, 1899. Mexico to South America.
67. *difformis* F. Smith, 1854. Costa Rica; South America.
68. *labrosa* Friese, 1899. Costa Rica to South America.
    = triangulifera Cockerell, 1949. N. SYN.

Ptilotopus Klug

Ptilotopus Klug, 1810. Type-species: *P. americanus* Klug, 1810.
69. *zonatus* Mocsáry, 1899. Panama.
    = pandora Friese, 1900b.

Epicharis Klug

Subgenus *Epicharana* Michener, 1954. Type-species: *E. rustica* (Olivier, 1789).
70. *angulosa* Snelling, n. sp. Costa Rica.
71. *bova* Snelling, n. sp. Costa Rica, Panama.
72. *elegans* F. Smith, 1861. Mexico to Costa Rica.
    = salazari Cockerell, 1949. N. SYN.
73. *rustica* (Olivier, 1789). Costa Rica to South America.
    = flava Friese, 1900b. N. SYN.

Subgenus *Hoplepicharis* Moure, 1945a. Type-species: *E. fasciata* Lepeletier and Serville, 1828.
74. *lunulata* Mocsáry, 1899. Mexico to Panama.
75. *monozona* Mocsáry, 1899. Panama.

Subgenus *Parepicharis* Moure, 1945a. Type-species: *E. zonata* F. Smith, 1854.
76. *metatarsalis* Friese, 1899. Costa Rica to Venezuela.
    = phenacura Cockerell, 1917. N. SYN.
    = conura Cockerell, 1917. N. SYN.

Subgenus *Epicharoides* Radoszkowski, 1884. Type-species: *E. maculata* F. Smith, 1874.
77. *albofasciata* F. Smith, 1874. Costa Rica to South America.
    = nigroclypeata Friese, 1899.
78. *maculata* F. Smith, 1874. Mexico to northern South America.
    = bipunctatus Radoszkowski, 1884.
    = variabilis Friese, 1900b.

Subgenus *Epicharitides* Moure, 1945a. Type-species: *E. cockerelli* Friese, 1900a.
79. undetermined species near *obscura* Friese. Panama.

ACKNOWLEDGMENTS

For the use of material cited in this study I am indebted to: P.H. Arnaud, Jr., and W.J. Pulawski (CAS), R.W. Brooks (RWB), R.E. Coville, G.R. Frankie, E.G. Linsley, and J.A. Powell (UCB), G.C. Eickwort (CORN), H.E. Evans (MCZ), M. Favreau and J.G. Rozen, Jr. (AMNH), S.S. Gingras and the late P.D. Hurd, Jr. (USNM), C.D. Michener (UKAN), A.R. Moldenke (ORSU), J.L. Neff (NEFF), D. Roubik (ROUB), R.O. Schuster, L.S. Kimsey, and K.E. Steiner (UCD), L.A. Stange (DPIF), and T.J. Zavortink (TJZ).

In particular, I wish to express my gratitude to G.R. Else, S.S. Gingras, and S. Kelner-Pillault for making available critical type material from the British Museum (Natural History), U.S. National Museum of Natural History, and the Museum d'Histoire Naturelle, respectively. Special thanks also, to R.W. Brooks for important notes on Friese types at the Berlin Museum.

For critically reading the manuscript and offering helpful suggestions I am indebted to C.L. Hogue and to the various reviewers.

Finally, I wish to express my thanks to Beatriz Larrain for providing the Spanish Resumen for this paper.

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Submitted 18 April 1983; accepted 31 August 1983.