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## The Genera of Bees of the Tribe Eucerini in North and Central America (Hymenoptera, Apoidea)

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### INTRODUCTION

The purpose of the present paper is to revise the genera of the North and Central American eucerine bees, to provide a key for their ready identification, and to describe a number of new genera. Two recent papers on the Neotropical eucerine bees (Michener, LaBerge, and Moure, 1955, and Moure and Michener, 1955) should be used in conjunction with this paper.

A total of 17 genera are recognized in the region covered in this report. Eight of these genera are also known from South America, whereas only two are known to occur in the Old World (but not in South America). The Old World fauna contains five and the South American fauna contains 11 additional named genera. Of the eight genera common to North and South America, three are as abundantly represented in North as in South America or more so, four are better represented in South America, and the last (*Martinapis*) is represented by a single species from each of the two regions. The tribe Eucerini accordingly reaches its highest degree of diversification in the Western Hemisphere and particularly in South America. Groupings of genera have been recognized in the New World fauna, and some of these have been described briefly by Moure and Michener (1955). However, a detailed discussion of the

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phylogeny of the group will be left for a future paper after the Old World genera have become more thoroughly understood.

The author has adopted the terminology and systematic method employed by Moure and Michener (1955) in their work on the Neotropical genera. For ready comparison of characters, each description is divided into sections marked by the same letter. Characters that appear in only one genus are listed there and are italicized to emphasize their uniqueness. Characters that appear in two or more genera are listed in all generic descriptions. Moure and Michener (1955) should be referred to for a general discussion of each of the characters used and for methods of measuring certain structures. Certain terminology is defined in the first description below and omitted from subsequent descriptions.

One character, that of the degree of protuberance of the clypeus, is measured in this work in a manner different from that used by Moure and Michener. The protrusion of the clypeus is here measured with the head of the bee in profile along a line vertical to a line at the anterior margin of the eye. The latter line is parallel with the generally straight posterior margin of the eye.

The degree by which the clypeus is produced forward beyond the lower angles of the eyes is also of some importance as a generic character. This is measured in facial view, which is here considered to be that position in which the eyes are in a plane at a right angle to the line of vision of the observer. The production of the clypeus is usually compared with the width of the median ocellus. The degree of elevation of the vertex is also measured in the same facial view and compared with the width of the median ocellus.

The morphological terminology used follows that given by Michener (1944). However, the abdominal terga and sterna are regarded as being metasomal terga and sterna and therefore are numbered in accordance with the scheme generally used by hymenopterists. Accordingly the first metasomal tergum in this paper is the same as the second abdominal tergum of Michener (1944).

Genera that are represented in the Neotropical fauna, hence treated fully by Moure and Michener (1955), are not here redescribed fully. Diagnoses of these genera are presented, together with additions or corrections, comments regarding the species representing the genera in the region covered by this report, and any other information deemed pertinent. Subgenera are not described in this paper but are listed and discussed where appropriate. The Nearctic genera have not been divided into subgenera for the most part, except in recent work by the author (LaBerge, 1956) and by Moure and Michener (1955). Several of the larger genera (*Xenoglossa*, *Xenoglossodes*, and *Tetralonia*) have not

been revised in recent times, and division into subgenera should await such revisions.

Two new species are described in the section on Species Descriptions below. One of these serves as the type species for one of the new genera proposed in this paper.

I am indebted to Dr. Charles D. Michener of the University of Kansas for his sustained interest and advice throughout the study that resulted in this paper. I am grateful to the following persons for the loan of specimens, for allowing me to study type specimens in their care, and for answering questions submitted to them concerning certain specimens: Dr. Mont A. Cazier, the American Museum of Natural History; Mr. Karl V. Krombein, United States National Museum, Washington, D. C.; Dr. Edward S. Ross, the California Academy of Sciences, San Francisco, California; Dr. I. H. H. Yarrow, the British Museum (Natural History), London, England; and Padre J. S. Moure, the University of Paraná, Curitiba, Paraná, Brazil.

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KEY TO THE GENERA OF EUCERINE BEES OF NORTH AND CENTRAL AMERICA

MALES

- 1. Minimum length of malar area greater than minimum width of first flagellar segment; pygidial plate unrecognizable or indicated by weak lateral carinae, mostly covered by long appressed hairs, tergum 7 bidentate apically; lower part of paraocular carina absent; clypeus strongly protuberant; labrum at least three-fourths as long as broad . . . . . *Thygater*
- Minimum length of malar area equal to or less than minimum width of first flagellar segment; pygidial plate prominent, exposed, with short hairs or bare, truncate or rounded apically, often notched laterally near apex; clypeus variable; labrum variable but usually less than three-fourths as long as broad . . . . . 2
- 2(1). Clypeal margin trilobed, median lobe broad and often shallowly emarginate medially; first flagellar segment as long as second segment; sternum 6 with large, laterally directed, lateral teeth . . . *Cemolobus*
- Clypeal margin truncate; first flagellar segment usually shorter than second segment; sternum 6 usually without lateral teeth . . . . . 3
- 3(2). Tergum 7 with gradular tooth or strong angle on each side of pygidial plate (sometimes hidden in dense hair or by tergum 6) . . . . . 4
- Tergum 7 without lateral teeth (occasionally sternum 6 with lateral teeth which can be seen from above and may be confused with tergal teeth). . . . . 6

- 4(3). Pterostigma large, longer than prestigma; maxillary palpus two- or three-segmented; anterior hind coxal carina prominent, curved; inner and outer plates of sternum 7 almost indistinguishably fused, usually hairless . . . . . *Melissoptila*  
 Pterostigma small, usually as short as or shorter than prestigma; maxillary palpus usually four- or five-segmented, rarely three-segmented; anterior hind coxal carina reduced or absent; inner and outer plates of sternum 7 distinct, inner plates variously formed and often hairy . . . . . 5
- 5(4). Sternum 6 with a prominent median eminence; fore femur broadest about one-fourth or one-third of distance from apex; maxillary palpus five-segmented . . . . . *Florilegus*  
 Sternum 6 flat or with an exceedingly shallow, longitudinal, median depression; fore femur broadest basad of middle; maxillary palpus usually three- or four-segmented, rarely five-segmented . . . *Melissodes*
- 6(3). First flagellar segment about twice as long as second flagellar segment; inner margin of mandible with tooth near base . . . . . *Xenoglossa*  
 First flagellar segment no longer than second segment and often much shorter; inner margin of mandible without a tooth near base . . . 7
- 7(6). Tibial spurs weak, middle tibial spur less than half as long as tibia measured from base of spur to anterior tibiofemoral articulation; minimum length of first flagellar segment less than half as long as maximum length of second segment . . . . . 8  
 Tibial spurs strong, middle tibial spur longer than half of length of tibia; length of first flagellar segment variable . . . . . 9
- 8(7). Last flagellar segment mammilliform, with short, pointed apex twisted slightly laterad; hind basitarsus normal; penis valve bidentate apically; gonostylus extremely short, with an extremely short, acuminate apex . . . . . *Agapanthinus*  
 Last flagellar segment not mammilliform, with a rounded apex, slightly compressed (also penultimate segment); hind basitarsus flattened; penis valve not bidentate apically; gonostylus long and blade-like . . . . . *Gaesischia*
- 9(7). Maximum length of first flagellar segment as great as or slightly greater than minimum length of second segment, *if* slightly shorter, *then* last flagellar segment acuminate apically; last segment at least twice as long as broad . . . . . 10  
 Maximum length of first flagellar segment usually much shorter than second segment, *if* about as long, *then* last flagellar segment less than twice as long as broad and rounded apically . . . . . 12
- 10(9). First sternum with a prominent median eminence directed posteriorly and with a small, deep impression on either side near apex; last flagellar segment rounded apically; gonostylus thicker in apical two-thirds than near base, curved inward, with two swellings on dorsolateral angle . . . . . *Syntrichalonia*  
 First sternum relatively flat, without a prominent median eminence; last flagellar segment acuminate apically; gonostyli thinner in apical half than near base, without dorsolateral swellings, usually strongly elbowed . . . . . 11
- 11(10). Vertex of head elevated so that ocelli are on anterior surface in facial

- view; sternum 6 with apicolateral carina transverse or almost so, with dense, short, posteriorly directed hairs in depression apical to carina; maxillary palpus four-segmented . . . . . *Anthedonia*
- Vertex of head not elevated, ocelli dorsal; sternum 6 with apicolateral carina oblique, without dense tuft of hairs posterior to the carina; maxillary palpus five-segmented . . . . . *Martinapis*
- 12(9). Fore tibial spur as long as basitarsus or slightly longer; sternum 5 with shallow lateral emarginations bordered by long, posteriorly directed, hooked hairs overlying shallow, rounded, bare depressions of sternum 6 . . . . . *Idiomelissodes*
- Fore tibial spur shorter than basitarsus; sternum 5 not emarginate laterally and without long, hooked hairs laterally . . . . . 13
- 13(12). Maxillary palpus usually four-segmented, if five-segmented, then tergum 2 with basal pubescent band with at least a few hairs which are basally plumose and apically spatulate; minimum length of first flagellar segment usually moderately long, equal to one-third or more of maximum length of second segment, occasionally as long as second segment . . . . . *Svastra*
- Maxillary palpus five- or six-segmented; tergum 2 never with spatuloplumose hairs in basal pubescent band; first flagellar segment variable but never so long as second segment . . . . . 14
- 14(13). Apical part of galea twice as long as eye or longer; clypeus strongly protuberant; lower part of paraocular carina prominent; antennae long, reaching pterostigma or beyond in repose . . . . . *Loxoptilus*
- Apical part of galea one and one-half times as long as eye or shorter; clypeus variable, often flat; paraocular carina variable, lower part often obsolete; antennae variable in length . . . . . 15
- 15(14). Oculoclypeal distance extremely short, never more than about one-fourth of minimum width of first flagellar segment . . . *Xenoglossodes*
- Oculoclypeal distance short to long, equal to more than one-third of minimum length of first flagellar segment . . . . . 16
- 16(15). Antennae long, reaching pterostigma in repose; sternum 6 with oblique lateral apical carina curved outward and thickened basally, ending in a lateral blunt tooth or obtuse angle of the sternum; gonostylus not elbowed . . . . . *Tetralonia*
- Antennae of moderate length, not reaching pterostigma in repose; sternum 6 with oblique lateral apical carina straight, sternum not toothed or angled laterally; gonostylus elbowed . . . . . *Peponapis*

## FEMALES

1. Gradulus of sternum 2 weakly biconvex; mandible with lower outer carina expanded forward, at least as salient as and usually more salient than inferolateral carina; gradulus of tergum 6 without lateral parts; labrum two-thirds as long as broad or longer . . . . . *Thygater*
- Gradulus of sternum 2 strongly biconvex, forming angle of 140 degrees or less between two convexities; mandible normal, with lower outer carina less salient than inferolateral one; gradulus of tergum 6 usually with lateral parts; labrum usually less than two-thirds as long as broad . . . . . 2

- 2(1). Clypeus strongly protuberant; apical clypeal margin trilobed, median lobe short, broad, and often slightly emarginate . . . . . *Cemolobus*  
 Clypeus weakly to strongly protuberant; apical clypeal margin truncate . . . . . 3
- 3(2). Inner margin of mandible with tooth near base; clypeus strongly protuberant . . . . . *Xenoglossa*  
 Inner margin of mandible without basal tooth; clypeus weakly or strongly protuberant . . . . . 4
- 4(3). Posterior basitarsus with hairs of inner surface sparse except for a narrow band of dense hairs near posterior margin; clypeus strongly protuberant; scopal hairs plumose . . . . . *Peponapis*  
 Posterior basitarsus with inner surface uniformly densely hairy; clypeus weakly or strongly protuberant; scopal hairs simple to profusely branched . . . . . 5
- 5(4). Scopal hairs simple or with minute barbs . . . . . 6  
 Scopal hairs with branches . . . . . 10
- 6(5). Tegula narrowed anteriorly, lateral margin usually slightly concave in anterior half or less; maxillary palpus usually four-segmented (rarely three- or five-segmented) . . . . . *Melissodes*  
 Tegula not narrowed anteriorly, lateral margin convex in anterior half; maxillary palpus four- to six-segmented . . . . . 7
- 7(6). Pale pubescent bands of metasoma with abundant, basally plumose, apically spatulate hairs; malar area exceedingly short; maxillary palpus four-segmented . . . . . *Anthedonia*  
 Pale pubescent bands of metasoma without spatuloplumose hairs; malar area short to long; maxillary palpus five- or six-segmented . . . . . 8
- 8(7). Minimum oculoclypeal distance greater than minimum width of first flagellar segment; clypeus strongly protuberant; stipes with band of dense, long, barbed, apically hooked hairs near dorsal and posterior margins, medially with hairs hooked but sparse . . . . . *Loxoptilus*  
 Minimum oculoclypeal distance equal to no more and usually less than minimum flagellar width; clypeus variable; stipes without band of dense, hooked hairs near dorsal and posterior margins but with long, normally barbed hairs most abundant near posteroventral angle . . . . . 9
- 9(8). Apical part of galea longer than eye; minimum oculoclypeal distance usually equal to minimum width of first flagellar segment or only slightly less; clypeus somewhat protuberant . . . . . *Tetralonia*  
 Apical part of galea shorter or no longer than eye; minimum oculoclypeal distance usually equal to less than minimum width of first flagellar segment; clypeus flat to slightly protuberant . . . . . *Xenoglossodes*
- 10(5). Tegula narrowed anteriorly, lateral margin slightly concave in anterior half or less; maxillary palpus usually four-segmented, rarely three- or five-segmented . . . . . *Melissodes*  
 Tegula not narrowed anteriorly, lateral margin convex in anterior half; maxillary palpus three- to six-segmented . . . . . 11
- 11(10). Apical flagellar segment about twice as long as broad; vertex of head not elevated behind ocelli which are therefore dorsal; gradulus of tergum 6 with lateral parts cariniform; maxillary palpus five-segmented . . . . . *Martinapis*

- Apical flagellar segment never twice as long as broad, usually one and one-half times as long as broad; vertex of head variable, usually weakly elevated to strongly elevated so that at least median ocellus is anterior rather than dorsal; gradulus with lateral parts usually laminate; maxillary palpus three- to six-segmented . . . . . 12
- 12(11). Vertex of head strongly elevated, median ocellus separated from apex by at least its own length in facial view; gradulus of tergum 6 with lateral parts cariniform; scopal hairs with abundant, uniform, short branches, mostly with 10 or more branches on each side of rachis and often with as many as 15, apical part of rachis extending beyond last branch usually shorter than average length of branches . . . . .  
*Syntrichalonia*
- Vertex of head weakly elevated if at all, median ocellus separated from apex by less than its own length in facial view; gradulus of tergum 6 with lateral parts cariniform or lamellate; scopal hairs with long, relatively sparse hairs, mostly with six to eight branches on each side of rachis, rarely with as many as 10, apical part of rachis long, extending beyond last branch by at least average length of branches . . . . . 13
- 13(12). Tibial spurs weak, middle tibial spur less than half as long as tibia measured from base of spur to anterior tibiofemoral articulation; lateral arm of hypostomal carina prominent, sublamelliform; metasomal terga 2 and 3 with short, dense, white pubescence in broad basal bands, with short, relatively simple, dark, appressed hairs from basal band almost to apices of terga . . . . . *Agapanthinus*
- Tibial spurs strong, middle tibial spur more than half as long as tibia; lateral arm of hypostomal carina weak, cariniform; tergum 3 and usually tergum 2 without basal pale pubescent band, or with distal pale band in addition, or entirely covered by pale pubescence . . . . 14
- 14(13). Prestigma shorter than pterostigma; anterior hind coxal carina sharp, bent sharply inward basally to form a rounded angle of almost 90 degrees; maxillary palpus two- or three-segmented . . . *Melissoptila*
- Prestigma as long as or longer than pterostigma; anterior hind coxal carina absent or reduced to short apical portion, straight or only slightly curved inward; maxillary palpus four- to six-segmented . . . 15
- 15(14). Middle tibial spur hooked near tip; lateral arms of gradulus of metasomal tergum 6 short, cariniform; maxillary palpus four-segmented . . . . . *Idiomelissodes*
- Middle tibial spur not hooked near tip, straight or slightly curved; lateral arms of gradulus of tergum 6 variable; maxillary palpus four- to six-segmented . . . . . 16
- 16(15). Maxillary palpus usually four-segmented, *if* five-segmented, *then* basal pubescent band of tergum 2 with at least a few spatuloplumose hairs; lateral arms of gradulus of tergum 6 lamelliform, often with a small tooth . . . . . *Svastra*
- Maxillary palpus five- or six-segmented; basal pubescent band of tergum 2 without spatuloplumose hairs; lateral arms of gradulus of tergum 6 cariniform to lamelliform . . . . . 17
- 17(16). Basitibial plate with margin entirely exposed, surface often bare; tergum 6 with lateral parts of gradulus lamelliform and ending in

strong tooth; in North American species hairs of maxilla and mentum hooked (not so in one Central American species) . . . . *Florilegus*  
 Basitibial plate with margin hidden, at least anteriorly and often below, surface usually hairy; tergum 6 with lateral parts of gradulus cariniform, if sublamelliform, never toothed . . . . *Xenoglossodes*

## GENERIC DESCRIPTIONS

### GENUS *TETRALONIA* SPINOLA

*Macrocera* LATREILLE, 1810, *Considérations générales . . . des insectes*, p. 339 (preoccupied). Type species: (*Eucera antennata* Fabricius) = *Apis malvae* Rossi, designated by Latreille, 1810.

*Tetralonia* SPINOLA, 1838, *Ann. Soc. Ent. France*, vol. 7, p. 538 (*nomen novum* for *Macrocera* Latreille, 1810, *nec* Meigen, 1803).

*Synhalonia* PATTON, 1879, *Bull. U. S. Geol. and Geogr. Surv. west of the 100th meridian*, vol. 5, p. 473. Type species: *Melissodes fulvitarisus* Cresson, 1878, by original designation.

*Eusynhalonia* ASHMEAD, 1899, *Trans. Amer. Ent. Soc.*, vol. 26, p. 63. Type species: *Melissodes edwardsii* Cresson, 1878, monobasic and original designation.

*Synalonia* ROBERTSON, 1905, *Trans. Amer. Ent. Soc.*, vol. 31, p. 365 (emendation of *Synhalonia* Patton).

COMMON CHARACTERS: a. Face very broad (minimum width greater than eye length) or broad (minimum width about equal to eye length) in female, broad to narrow (minimum width less than eye length) in male; inner margins of eyes usually parallel or diverging towards vertex in male; lower part of paraocular carina usually absent, if present, only rarely leaving eye margin to associate with lateroclypeal carina (the latter occurs in only one species seen by the author); malar area one-fifth to one-seventh as long as wide, longer in female; oculoclypeal distance in male equals one-third to two-thirds of minimum width of first flagellar segment or very slightly less; vertex not at all or weakly elevated, in facial view length of vertex above median ocellus equal to one-half or less of width of median ocellus.

b. Clypeus strongly to very strongly protruding (0.50 to 0.75 times eye width) beyond eye in profile; produced beyond lower angles of eyes in facial view by slightly less to more than width of median ocellus; lateral angle weakly to moderately reflexed before lateroclypeal carina.

c. Anterior mandibular articulation farther from eye than posterior one; lower outer carina less salient than inferolateral one.

d. Distal part of galea 1.25 to 1.50 times eye length. Maxillary palpus six-segmented. Second segment of labial palpus about three-eighths of length of first segment.

e. Scutellum convex, anterior median longitudinal line absent or extremely short.



f. Marginal cell 3.5 to 5.0 times as long as broad, slightly shorter to slightly longer than distance from its apex to wing tip, basal part subequal to free part; first submarginal cell slightly longer to slightly shorter than third, second shortest, with first m-cu in last third; second r-m sharply angled, angle of 90 degrees or less, usually not appendiculate; first media usually distinctly petiolate, in length equal to or slightly shorter than marginal cell. Hamuli 10 to 15, cu-v half as long and often less than one-third as long as second abscissa of M+Cu; jugal lobe shorter than cubital cell.

g. Middle basitarsus subequal in length to tibia; tibial spurs normal, middle spur longer than half of distance from its base to anterior tibiofemoral articulation, occasionally middle and hind spurs sharply hooked at apex, usually straight or gently curved near apex; arolia present.

h. Propodeum without distinct dorsal surface medially, completely declivous from metanotum or evenly rounded medially; triangular area dulled by fine sculpturing; usually with carinae between lateral and posterior surface, at least below.

i. Metasoma not metallic; in female pubescence at extreme bases of terga 2 to 4 black or brown, usually so in males; with or without apical bands of pale pubescence, terga never covered by diffuse pale pubescence; without spatuloplumose hairs.

FEMALE: j. Scape subcylindrical, about as long as interantennal distance or slightly less; flagellum with basal segment shorter than scape, equal to twice second segment or less, second segment subcylindrical, subequal to third, segments 3 to 9 distinctly longer than broad, width greater than median ocellar width, last segment less than twice as long as wide.

k. Mandible with apex weakly bidentate.

l. Anterior coxa not spined; basitibial plate defined at least posteriorly; scopal hairs dense, simple; posterior claws symmetrical or with inner claw slightly longer and heavier.

m. Gradulus of tergum 6 with lateral parts absent or cariniform and extremely short; pygidial plate V-shaped, with more or less rounded apex, 0.7 to 1.0 times as broad at base as length.

n. Gradulus of sternum 2 strongly biconvex. Sternum 6 with apex slightly emarginate.

MALE: o. Antenna extremely long, extending beyond pterostigma in repose, usually black; scape thicker than median ocellar width, slightly shorter than interantennal distance; first flagellar segment one-eighth to one-third of length of second, much shorter than scape, remaining seg-

ments long, subcylindrical, slightly thicker than median ocellar width, last segment normal.

p. Clypeus and labrum yellow, labrum occasionally bordered by black.

q. Mandible weakly bidentate apically or simple.

r. Anterior and middle femora normal; hind legs unmodified; middle and *hind basitarsi slender, six times as long as broad or longer*; claws symmetrical to slightly asymmetrical.

s. Tergum 6 with or without gradular teeth laterally; tergum 7 without gradular teeth, lateral parts of gradulus cariniform; pygidial plate truncate, from twice to less than one and a half times as long as broad, narrowed slightly at extreme base, notched laterally near apex.

t. Sternum 6 with weak, lateral, oblique carinae which curve laterally and thicken towards the base and terminate basolaterally in thickened lateral angles or in prominent blunt lateral teeth, with extremely shallow, glabrous depressions anteromesad of lateral angles, apex truncate or rounded, with or without shallow emargination medially.

u. Sternum 7 (fig. 1) with lateral plate large, piceous, usually with small recurved process at apex; median plate relatively small, bare or with long hairs; apodemes extremely broad basally, triangular; without median projection between median plates. Sternum 8 (fig. 2) with prominent, transverse, often bidentate tubercle on ventral surface; *apex truncate, often with apicolateral angles produced laterally or posterolaterally so that sternum is narrowest near middle, waisted; strongly infuscated and piceous near apex.*

v. Gonocoxite with distal part short, apicodorsal process long; gonostylus long, straight or slightly curved, not elbowed, with apex turned inward; spatha three times as broad as long or broader; penis valve normal (figs. 3 and 4).

The most difficult problem in recognizing this genus is to separate the females from those of *Xenoglossodes*. Some females of the latter genus have simple scopal hairs. However, the clypeus is always less produced and less protruding, and the mouth parts are usually shorter, than in *Tetralonia*.

#### SYNTRICHALONIA, NEW GENUS

TYPE SPECIES: *Melissodes exquisita* Cresson, 1878 (= *Melissodes herricki* Cockerell, 1905).

COMMON CHARACTERS: a. Face broad in female, narrow in male; inner margins of eyes in female parallel or slightly diverging towards mandibles, in male narrowest at level of basal margin of clypeus and diverging

towards vertex and slightly towards mandibles; lower part of paraocular carina absent or weak, associated with lateroclypeal carina when visible; malar area linear; oculoclypeal distance scarcely measurable in male, equal to about two-thirds of minimum width of first flagellar segment in female; vertex strongly elevated so that ocelli anterior rather than dorsal, in facial view length of vertex above median ocellus equal to or greater than width of median ocellus.

b. Clypeus weakly protruding (0.33 to 0.45 times eye width) beyond eye in profile; produced beyond lower angles of eyes by more than width of median ocellus (less produced in male than in female); lateral angle of clypeus not reflexed, curving smoothly to lateroclypeal carina.

c. Anterior mandibular articulation scarcely farther from eye than posterior one; lower outer carina less salient than inferolateral one.

d. Distal part of galea slightly shorter than eye. Maxillary palpus five-segmented, last segment minute. Second segment of labial palpus about half of length of first segment.

e. Scutellum convex, anterior median line visible as an impunctate line broadened anteriorly, half as long as scutellum or longer.

f. Marginal cell about five times as long as broad, distinctly longer than from its apex to apex of wing, basal part about equal to apical free part (except in one aberrant specimen in which an extra outer vein connects veins second r-m and Rs); first submarginal cell equal to or slightly shorter than third, second shortest, with first m-cu in last two-fifths to one-third; second r-m sharply angled, angle of 90 degrees or less and often minutely appendiculate; first media petiolate or not, shorter than marginal cell. Hamuli 15 to 20; cu-v about one-third as long as second abscissa of M+Cu; jugal lobe shorter than cubital cell.

g. Middle basitarsus subequal in length to tibia; tibial spurs normal, middle spur longer than half of distance from its base to anterior tibio-femoral articulation; arolia present.

h. Propodeum with a dorsal face about twice as long medially as metanotum, triangular area moderately shiny, sculptured, *posterior surface often appears impressed* owing to the prominent lateral carinae which extend to the dorsal surface and turn slightly inward dorsally.

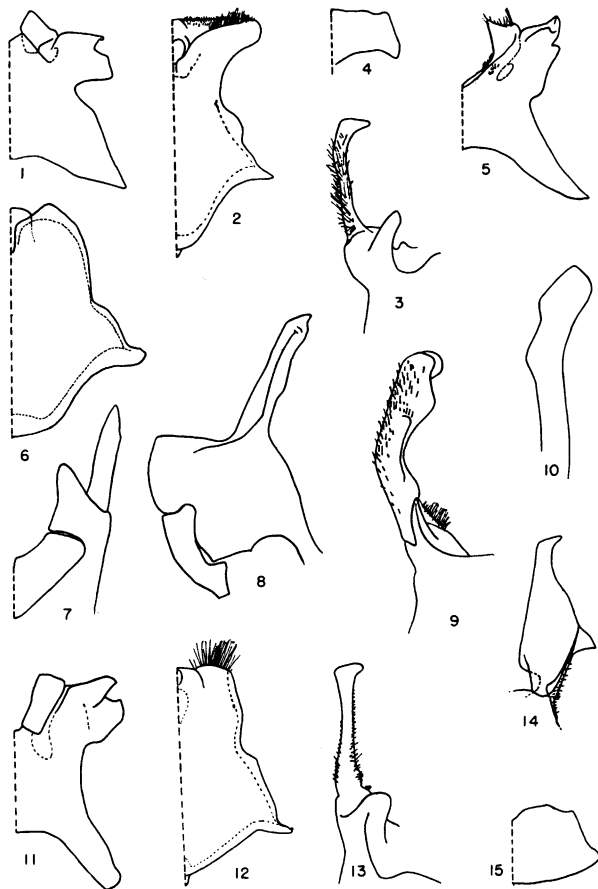
i. Metasoma not metallic, pale pubescence evenly covering terga, on terga 2 to 4 appressed at extreme bases, erect in interband zones and recumbent in apical areas (in female recumbent and apically erect in apical areas); pubescence all of about same length.

FEMALE: j. Scape slender, subcylindrical, slightly longer than inter-antennal distance; flagellum with basal segment shorter than scape, equal to less than twice second segment which is obconic, subequal to third,

segments 3 to 9 distinctly longer than wide, slightly broader than median ocellar width, last segment less than twice as long as broad.

k. Mandible extremely weakly bidentate apically.

1. Anterior coxa not spined; basitibial plate defined posteriorly; *scopal hairs dense, highly plumose, with at least 10 branches on each side of rachis and often 15 or more, with rachis extending beyond last branch*



FIGS. 1-4. *Tetralonia* sp. 1, 2. Sterna 7 and 8, ventral view. 3. Left gonostylus and apex of gonocoxite, dorsal view. 4. Spatha.

FIGS. 5-10. *Syntrichalonia exquisita* (Cresson). 5, 6. Sterna 7 and 8, ventral view. 7, 8. Dorsal and lateral views of right penis valve and right half of spatha. 9, 10. Dorsal and lateral views of left gonostylus (hairs omitted in fig. 10).

FIGS. 11-15. *Xenoglossa strenua* Cresson. 11, 12. Sterna 7 and 8, ventral view. 13. Gonostylus, dorsal view. 14. Penis valve, dorsal view. 15. Spatha.

by less than average length of branches, branches short, and mostly S-shaped; posterior claws symmetrical.

m. Gradulus of tergum 6 with lateral parts absent; pygidial plate broadly V-shaped, slightly longer than breadth at base (about 30/26).

n. Gradulus of sternum 2 strongly biconvex. Sternum 6 slightly emarginate apically.

MALE: o. Antennae of moderate length, in repose extending back beyond tegulae by about length of last flagellar segment, black; scape scarcely thicker than median ocellar width, subequal to interantennal distance; first flagellar segment about equal in length to scape, equal to or very slightly shorter than second segment which is slightly longer than third, segments 3 to 10 slightly shorter than twice width, slightly narrower than median ocellar width, last segment about twice as long as broad, apex normal.

p. Clypeus and labrum yellow, mandibles without yellow spots.

q. Mandible with apex simple.

r. Anterior and middle femora normal; hind legs unmodified; middle and hind basitarsi slender, about nine times as long as broad; claws asymmetrical.

s. Tergum 6 with small, blunt, gradular teeth laterally; tergum 7 without lateral gradular teeth, lateral parts of gradulus cariniform; pygidial plate broadly V-shaped but truncate, broader at base than median length, not narrowed at base, with small notches very near apex (observed when worn).

t. *Sternum 1 with prominent median eminence with abrupt posterior declivity, with tuft of long barbed hairs directed posteriorly and with small lateral depressions near posterior declivity of eminence; sternum 6 with weak, short, oblique, apical carinae, with a glabrous, broad, median sulcus between, apical to lateral carina a tuft of short, barbed hairs, sternum triangular, without prominent lateral angles, rounded at apex.*

u. Sternum 7 (fig. 5) with small lateral plates with large apical process directed somewhat ventrally; median plates small, weakly haired; membranous area between plates small, oval; apodeme broad, subtriangular. Sternum 8 (fig. 6) with prominent dorsal protuberance which extends slightly beyond apex; without ventral protuberance, or this has become apical in position and cariniform; apex deeply emarginate medially, lateral angles rounded; broadest at apodemes, not waisted; not piceous apically.

v. Gonocoxite short, with apicodorsal process short and pointed; *gonostylus long, broad, curved inward at about lower third, with two prominent laterodorsal swellings, thicker apically than at base; spatha*

about twice as broad as long or less, *V-shaped*; *penis valve thin, without lateral process, directed strongly ventrally, with large dorsal wing curving upward and inward* from laterodorsal margin near base, wing about two-thirds of length of apical part of valve measured laterally and abuts on apical margin of spatha posteriorly (figs. 7 to 10).

This genus includes a single species, *Syntrichalonia exquisita* (Cresson). It is perhaps more closely allied to *Tetralonia* than to any other genus of the Western Hemisphere. It can be easily recognized by the peculiar male terminalia, the short male antennae, the female scopal hairs, the divergence below of the eyes, the elevated vertex, and by several other peculiarities italicized in the foregoing description.

#### GENUS *XENOGLOSSA* SMITH

*Xenoglossa* SMITH, 1854, Catalogue of hymenopterous insects in the . . . British Museum, pt. 2, p. 315. Type species: *Xenoglossa fulva* Smith, monobasic.

COMMON CHARACTERS: a. Face broad to narrow; inner margins of eyes diverging towards mandibles, often strongly so; lower part of paraocular carina absent or weak, not associated with lateroclypeal carina; malar area 3.7 to 9.7 (in male) and 5.7 to 12.5 (in female) times as long as broad; ocluclypeal distance equals eight-tenths to one and one-third of minimum width of first flagellar segment; vertex weakly elevated, in facial view length above median ocellus equals one-half of to slightly more than ocellar width.

b. Clypeus strongly to very strongly protruding (0.67 to 1.2 times eye width) beyond eye in profile; produced beyond lower angles of eyes in facial view by about one-half of to one times ocellar width; lateral angles of clypeus strongly reflexed before lateroclypeal carina, often lateral part of clypeus forms a 90-degree angle with declivous part of clypeus immediately mesad.

c. Anterior mandibular articulation farther from eye than posterior one; lower outer carina less salient than inferolateral one.

d. Distal part of galea 1.33 to 1.60 times eye length. Maxillary palpus five-segmented. Second segment of labial palpus slightly more than six-tenths of length of first segment.

e. Scutellum convex, anterior median line distinct, half as long as scutellum or longer, cariniform posteriorly.

f. Marginal cell 5.0 to 6.7 times as long as broad, distinctly longer than distance from its apex to wing tip, basal part subequal to or longer than apical free part; first submarginal cell slightly longer to slightly shorter than third, second shortest, with m-cu near middle or slightly

beyond; second r-m sharply angled, but usually angle greater than 90 degrees and not appendiculate; first media petiolate or not, in length from 0.6 to 0.8 times marginal cell. Hamuli rarely less than 14 or more than 20; cu-v less than half as long and often as little as one-third as long as second abscissa of M+Cu; jugal lobe shorter than cubital cell.

g. Middle basitarsus slightly shorter than tibia; tibial spurs normal, middle spur longer than half of distance from its base to anterior tibio-femoral articulation, not hooked; arolia present.

h. Propodeum without distinct dorsal surface, curved evenly from metanotum, triangular area sculptured.

i. Metasoma not metallic, in females pubescence sparse, short, with pale basal bands and pale distal bands sometime broken on terga 2 to 4; without spatuloplumose hairs.

FEMALE: j. Scape obconic, distinctly shorter than interantennal distance; flagellum with basal segment slightly shorter than to subequal to scape in length, equal to twice second segment or less, second segment subcylindrical, broader than long to longer than broad, slightly shorter than third, segments 3 to 9 longer than broad, width usually subequal to ocellar width but much narrower in species with large ocelli, last segment less than twice as long as wide.

k. *Mandible* with apex simple to weakly bidentate; *with strong basal tooth on inner upper margin.*

l. Anterior coxa not spined; basitibial plate defined posteriorly and below; scopal hairs weak, weakly branched (one to three branches on each side of rachis); posterior claws symmetrical; hind basitarsus with hairs of inner surface sparse except for dense band along anterior margin occupying less than half of width.

m. Gradulus of tergum 6 with lateral parts cariniform; pygidial plate V-shaped, as broad to three-fourths as broad at base as long.

n. Gradulus of sternum 2 strongly biconvex. Sternum 6 with apex emarginate.

MALE: o. *Antenna short, female-like*, not extending beyond tegula in repose; scape about as thick as median ocellar width or much thinner in forms with inflated ocelli, shorter than interantennal distance; *first flagellar segment almost twice as long as second segment* which is shorter than third, segments 3 to 10 distinctly longer than broad, subequal to or slightly less than ocellar width, last segment no more than twice as long as broad, rounded apically.

p. Clypeus partially to wholly yellow, labrum and base of mandible yellow.

q. *Mandible* very weakly bidentate or simple apically; *with basal tooth on inner upper margin.*

r. Anterior and middle femora normal; hind legs unmodified; middle and hind basitarsi normal, less than five times as long as broad; claws subsymmetrical.

s. Tergum 6 with large gradular teeth laterally; tergum 7 without gradular teeth, lateral parts of gradulus cariniform, short; pygidial plate truncate, at least apically almost parallel-sided, broadened basally, from slightly broader to twice as broad at base than near apex, with small lateral notches near apex.

t. Sternum 6 with strong, lateral oblique carinae, in at least one species with lateral angles near end of carina and with two blunt teeth formed from thickened apices of carinae.

u. Sternum 7 (fig. 11) with lateral plate large, piceous, emarginate laterally; median plate small, bare; apodemes thick, almost parallel-sided, blunt; without median projection between plates. Sternum 8 (fig. 12) with prominent dorsal tubercle not reaching apex; with prominent, transverse, rounded, ventral, carinate tubercle reaching apex; truncate, weakly infuscated apically; broadest at apodemes, scarcely waisted.

v. Gonocoxite with distal part short, apicodorsal process long, blunt; gonostylus long, curved downward in lower third but not elbowed, capitate; spatha twice as broad as long or more; penis valve normal (figs. 13 to 15).

*Xenoglossa* is a relatively small genus consisting of about eight species and is restricted to North and Central America. The female-like male antennae, the strongly protruding clypeus with reflexed lateral parts, the basal mandibular tooth, and several other characters make the genus one of the most easily recognized of the eucerine bees. As far as is known, all species are oligoleges on flowers of cucurbits, although males are occasionally taken on flowers of other plants such as *Ipomoea* and *Asclepias*.

#### GENUS *CEMOLOBUS* ROBERTSON

*Cemolobus* ROBERTSON, 1902, Canadian Ent., vol. 34, p. 324. Type species: *Xenoglossa ipomoeae* Robertson, 1891, monobasic and by original designation.

COMMON CHARACTERS: a. Face broad; inner margins of eyes diverging towards mandibles; lower part of paraocular carina absent; malar area one-fifth (in male) to one-seventh or less (in female) as long as broad; oculo-clypeal distance subequal to minimum width of first flagellar segment; vertex weakly elevated, in facial view above median ocellus, two-thirds or less of ocellar width.

b. *Clypeus* very strongly protruding (subequal to eye width) beyond eye in profile; produced beyond lower angles of eyes in facial view by at least median ocellar width (not produced so much medially, as median



clypeal lobe is considerably shorter than lateral lobes) ; lateral parts moderately reflexed before lateroclypeal carina; *apical margin trilobed, with median lobe short, broad, and often slightly emarginate medially.*

c. Anterior mandibular articulation farther from eye than posterior one; lower outer carina less salient than inferolateral one; outer surface with sharp angle or tooth medially.

d. Distal part of galea at least 1.4 times eye length. Maxillary palpus five-segmented. Second segment of labial palpus about one-third of length of first segment.

e. Scutellum convex, anterior median line indistinct owing to dense sculpturing.

f. Marginal cell about 4.5 times as long as broad, distinctly longer than from its apex to wing tip, basal part longer than free part; first submarginal cell shorter than third, subequal or slightly longer than second, the latter with first m-cu in last third; second r-m sharply angled, angle slightly greater than 90 degrees, minutely appendiculate; first media distinctly petiolate, shorter than marginal cell. Hamuli 16 to 20; cu-v less than half as long as second abscissa of M+Cu; jugal lobe shorter than cubital cell.

g. Middle basitarsus shorter than tibia; tibial spurs normal, middle spur longer than half of distance from its base to anterior tibiofemoral articulation, hooked at tip; arolia present.

h. Propodeum evenly curved from metanotum, without distinct dorsal surface; lateral carina absent; triangular area sculptured.

i. Metasoma not metallic, in female pubescence extremely short, abundant pale pubescence basally on terga 2 to 5 and distally on terga 3 and 4, without well-defined bands.

FEMALE: j. Scape subcylindrical, three-fourths as long as interantennal distance or slightly longer; flagellum with basal segment shorter than scape, equal to more than twice length of second segment which is subequal to third; segments 3 to 9 slightly longer than broad, subequal to ocellar width, last segment less than twice as long as wide.

k. Mandible with apex bidentate.

l. Anterior coxa not spined; basitibial plate well defined, scopal hairs sparse, with abundant short branches, with rachis extending beyond last branch by more than length of longest branch; hind basitarsus with hairs of inner surface sparse except in narrow band near anterior margin; posterior claws symmetrical; middle leg with one or two small, slender, black, apical spurs on tarsi 1 and 2.

m. Gradulus of tergum 6 with lateral parts present, cariniform to sublamelliform; pygidial plate V-shaped, slightly longer than width at base.

n. Gradulus of sternum 2 strongly biconvex. Sternum 6 with apex slightly emarginate.

MALE: o. Antenna short, in repose extending to posterior margin of tegula or slightly beyond; scape broader than median ocellar width, subcylindrical, subequal to interantennal distance; first flagellar segment subcylindrical or obconic, shorter than scape, subequal to second segment, segments 3 to 9 progressively shorter, narrower than ocellar width, tenth segment equal to ninth, last segment longer than tenth, more than twice as long as broad, with rounded apex, segments 7 to 10 somewhat nodose beneath.

p. Clypeus half or more black posteriorly, labrum yellow except margin, mandible yellow at base.

q. Mandible bidentate apically.

r. Anterior and middle femora normal; hind tarsal segments somewhat flattened, basitarsus curved and acuminate apically; middle and hind basitarsus less than five times as long as broad; claws symmetrical, hind claws female-like, with inner rami extremely short.

s. Tergum 6 with weak gradular teeth laterally; tergum 7 with weak gradular teeth or angled laterally; pygidial plate truncate, about as long as breadth at base, without lateral notches near apex.

t. Sternum 2 with gradulus weakly biconvex, angle between two convexities greater than 140 degrees; *sterna 1 to 4 emarginate medially; sternum 6 with large, lateral, obtusely pointed lobes, with truncate median lobe.*

u. Sternum 7 (fig. 16) with lateral plate large, piceous apically, with thickened apical process directed laterally posterior to small emargination; median plate small, bare; without median projection between plates; with large membranous area between median and lateral plates; apodeme large, triangular. Sternum 8 (fig. 17) with prominent, rounded, dorsal tubercle well separated from apex; with longitudinal ventral apical carina; truncate apically, with two angles on either side of slit-like emargination; broadest at apodemes, not waisted.

v. Gonocoxite with distal part long, sharply angled laterally, with short, blunt, apicolateral process; *gonostylus elbowed, with long, anteriorly directed spur from bend*, with apex turned inward; spatha almost as long as broad; penis valve normal (fig. 18).

This is a distinctive, monotypic genus, including only *C. ipomoeae* (Robertson) which is an oligolectic species depending on plants of the genus *Ipomoea* (Convolvulaceae) for pollen. The several unique features that are italicized in the foregoing description will serve to distinguish this genus from any other eucerine genus. *Cemolobus* is restricted to the eastern parts of the United States, as far as is now known.

GENUS *ANTHEDONIA* MICHENER

*Anthedon* ROBERTSON, 1900, Trans. Acad. Sci. St. Louis, vol. 10, p. 53. Type species: *Melissodes compta* Cresson, 1878, monobasic and by original designation.

*Anthedonia* MICHENER, 1942, Jour. New York Ent. Soc., vol. 50, p. 282 (*nomen novum* for *Anthedon* Robertson, 1900, *non* Agassiz, 1846).

*Abda* SANDHOUSE, 1943, Proc. U. S. Natl. Mus., vol. 92, p. 521 (*nomen novum* for *Anthedon* Robertson, 1900, *non* Agassiz, 1846).

COMMON CHARACTERS: a. Face narrow; inner margins of eyes diverging towards vertex; lower paraocular carina absent or weak; malar area linear or nearly so; oculoclypeal distance less than one-third of minimum width of first flagellar segment; vertex weakly elevated (by less than half of ocellar width).

b. Clypeus moderately protruding (by less than half of width of eye) in profile beyond eye; produced beyond lower angles of eyes in facial view by less than half of ocellar width; lateral part not reflexed before lateroclypeal margin.

c. Mandibular articulations equidistant from eye or nearly so; lower outer carina less salient than inferolateral one.

d. Distal part of galea subequal to eye in length or slightly shorter. Maxillary palpus four-segmented. Second segment of labial palpus about half as long as first segment.

e. Scutellum convex, anterior median line absent or extremely short.

f. Marginal cell 5.5 to 6.5 times as long as broad, longer than distance from its apex to wing tip, basal part subequal to free part; first submarginal cell subequal to third, second half or slightly more as long as third, with m-cu in outer two-fifths; second r-m sharply angled, angle less than 90 degrees, not appendiculate; first media petiolate, shorter than marginal cell. Hamuli 16 to 22; cu-v about one-third of second abscissa of M+Cu; jugal lobe shorter than cubital cell.

g. Middle basitarsus subequal to tibia in length; tibial spurs normal, middle spur longer than half of length from its base to anterior tibiofemoral articulation, not hooked; arolia present.

h. Propodeum with distinct dorsal surface, triangular area finely sculptured.

i. Metasoma not metallic, pale pubescence in discrete basal and distal bands; basal and distal pale bands of terga 2 to 4 with spatuloplumose hairs.

FEMALE: j. Scape subcylindrical, longer than interantennal distance, broader than ocellar width; flagellum with basal segment slightly shorter than scape, equal to twice second segment or more, second segment ob-

conic, slightly shorter than third, segments 3 to 9 longer than broad, width greater than ocellar width, last segment less than twice as long as wide.

k. Mandible with apex weakly bidentate or simple.

l. Anterior coxa not spined; basitibial plate defined at least posteriorly; scopal hairs dense, simple; posterior claws with outer claw slightly longer and inner slightly thicker.

m. Gradulus of sternum 6 with lateral parts lamellate and often weakly toothed; pygidial plate V-shaped, rounded at apex, about four-fifths as broad at base as long.

n. Gradulus of sternum 2 strongly biconvex. Sternum 6 with apex emarginate.

MALE: o. Antenna short, in repose reaching just beyond tegula, black; scape thicker than ocellar width, longer than interantennal distance; *first flagellar segment* shorter than scape, *subequal to second*, segments 2 to 8 progressively shorter, eighth longer than wide, width greater than ocellar width, ninth longer than eighth, *tenth twice as long as eighth, acuminate, and curved.*

p. Clypeus, labrum, and base of mandible yellow.

q. Mandible weakly bidentate or simple apically.

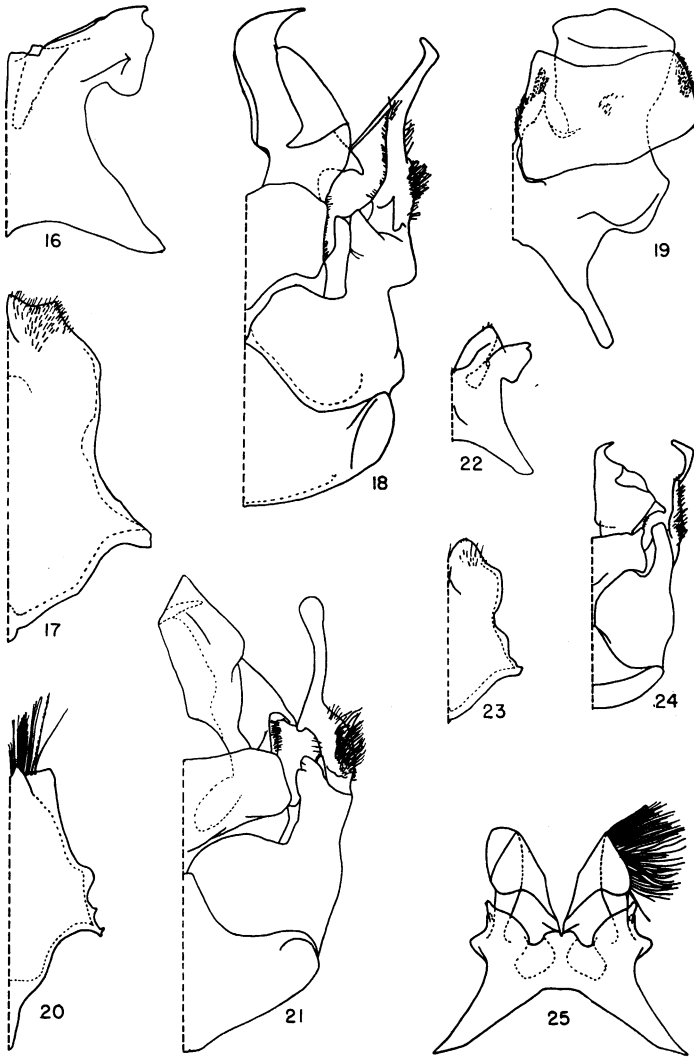
r. Anterior and middle femora normal; hind legs unmodified; middle and hind basitarsi 4.0 to 4.5 times as long as wide; claws symmetrical or nearly so.

s. Tergum 6 with prominent gradular teeth; tergum 7 without gradular teeth, lateral parts of gradulus cariniform; pygidial plate truncate, slightly longer than broad at base, often with lateral notches near apex.

t. Sternum 6 with weak, curved, transverse carinae near apex, with abundant, short, barbed hairs in tuft apical to carinae, bare basad of carinae and abundantly haired at extreme base.

u. *Sternum 7* (fig. 19) *with lateral plate as large as remainder of tergum or larger, expanded distally from apical margin, broadly emarginate laterally, thickened along apical margin, not deeply infusate; median plate small, hairy; membranous area between plates greatly expanded ventrally into a large, subrectangular, flat pad covered with minute hairs; apodeme moderately long, slender, truncate. Sternum 8* (fig. 20) *truncate, with bidentate transverse carina or tubercle ventrally at apex; without dorsal tubercle; not waisted.*

v. Gonocoxite with apical part short, with prominent, bluntly bidentate, apicodorsal process; gonostylus long, elbowed or strongly S-shaped; penis valve normal; spatha somewhat more than twice as long as broad (fig. 21).



FIGS. 16-18. *Cemolobus ipomoeae* (Robertson). 16, 17. Sterna 7 and 8, ventral view. 18. Genital capsule, dorsal view.

FIGS. 19-21. *Anthedonia compta* (Cresson). 19, 20. Sterna 7 and 8, ventral view. 21. Genital capsule, dorsal view. The minute hairs covering the ventral lobe of sternum 7 (fig. 19) are omitted except a few medially and laterally.

FIGS. 22-24. *Xenoglossodes spissa* (Cresson). 22, 23. Sterna 7 and 8, ventral view. 24. Genital capsule, dorsal view.

FIG. 25. *Florilegus condignus* (Cresson). Sternum 7, ventral view, hairs omitted from right median lobe.

This genus is closely allied to *Svastra* Holmberg. It consists of two species from the southern two-thirds of the United States and northern Mexico. The genus is an oligolege on plants of the genus *Oenothera*. The species have been recently treated by LaBerge (1955).

#### GENUS *SVASTRA* HOLMBERG

*Svastra* HOLMBERG, 1884, Actas Acad. Nac. Cien. Córdoba, Argentina, vol. 5, p. 127. Type species: *Svastra bombilans* Holmberg, 1884, designated by Sandhouse, 1943.

DIAGNOSTIC CHARACTERS: Face usually narrowed below; vertex not elevated; lower part of paraocular carina weak or absent; malar area linear or nearly so; clypeus moderately protuberant, closely approaching eye, not produced beyond lower angles of eyes by more than median ocellar width; mandibular articulations equidistant or anterior one slightly farther from eye than posterior one. Galea subequal to eye in length or slightly longer; maxillary palpus four- or five-segmented. Mandible with apex simple or weakly bidentate. Marginal cell four times as long as broad; propodeum with a distinct dorsal surface. Second and third metasomal terga with basal bands of pale pubescence usually present, with at least some hairs (only on tergum 2) spatuloplumose. Female with scopal hairs plumose; gradulus or tergum 6 with lateral parts lamellate, ending in a weak tooth. Male with antennae short to moderately long; with strong gradular teeth on tergum 6 but absent on seventh; sternum 7 with median plate small, lateral plate larger and emarginate laterally, not heavily infuscated; sternum 8 truncate apically, with ventral tubercle or carina near apex but without dorsal tubercle; gonocoxite with apicodorsal process large, blunt, with brush of blunt spicules at apex on inner surface; gonostylus long; spatha three or more times as broad as long.

The brief diagnosis given above is considered sufficient, as Moure and Michener (1955) have recently described this genus in detail. *Svastra* is closely allied to the preceding genus (*Anthedonia*). The characters of *Anthedonia* in paragraphs lettered a, b, c, e, g, h, j, k, n, q, r, and s are the same for *Svastra*. The remaining paragraphs contain characters in which *Svastra* differs from *Anthedonia*.

*Svastra* is represented in South America by the nominate subgenus which includes three species from Chile and Argentina. In North and Central America it is represented by two subgenera—*Epimelissodes* Ashmead and *Brachymelissodes* LaBerge. These two subgenera have recently been revised by LaBerge (1956). *Epimelissodes* includes 11 species, several of which are polytypic, distributed from southernmost Can-

ada to central Mexico. *Brachymelissodes* includes two species from the southwestern United States and northern Mexico.

GENUS *IDIOMELISSODES* LABERGE

*Idiomelissodes* LABERGE, 1956, Univ. Kansas Sci. Bull., vol. 37, p. 1027. Type species: *Melissodes duplocincta* Cockerell, 1905, monobasic and by original designation.

COMMON CHARACTERS: a. Face broad in female, narrow in male; inner margins of eyes diverging towards vertex; lower part of paraocular carina absent; malar area linear or nearly so; oculoclypeal distance slightly less than minimum width of first flagellar segment in female to slightly less than one-third of this width in male; vertex weakly elevated.

b. Clypeus strongly protruding beyond eye, but owing to great width of eye (more than half as wide as long in profile) protruding less than half of width of eye in profile; scarcely if at all produced beyond lower angles of eyes in facial view; lateral angle not reflexed before lateroclypeal carina.

c. Mandibular carinae equidistant from margin of eye or nearly so; lower outer carina less salient than inferolateral one.

d. Distal part of galea as long as eye or slightly longer. Maxillary palpus four-segmented. Second labial palpus slightly more than one-third of first segment.

e. Scutellum convex, median anterior line indicated only by small punctures.

f. Marginal cell 4.3 to 4.5 times as long as broad, subequal to distance from its apex to wing tip, basal part subequal to free part; first submarginal cell shorter than third, second shortest, half of length of third or less, almost square, with first m-cu in last fifth; second r-m angled, angle almost 90 degrees, rounded, not appendiculate; first media petiolate, shorter than marginal cell. Hamuli 10 to 14; cu-v about half as long as second abscissa of M+Cu; jugal lobe subequal to cubital cell in length.

g. Middle basitarsus subequal in length to tibia; *middle tibial spur* longer than half of distance from its base to anterior tibiofemoral articulation, *sharply hooked at tip*; hind spurs normal; arolia present.

h. Propodeum with distinct dorsal surface, triangular area finely sculptured.

i. Metasoma not metallic, with distal pale pubescent bands of terga apical or almost so, subequal in width to each other and of about same width across each tergum, basal band of tergum 2 with spatuloplumose hairs.

FEMALE: j. Scape subcylindrical, longer than interantennal distance,

narrower than ocellar width; flagellum with basal segment half of length of scape, twice length of second segment which is shorter than third segment, segments 3 to 9 longer than broad, narrower than ocellar width, last segment less than twice as long as broad.

k. Mandible with apex simple.

l. Anterior coxa not spined; basitibial plate defined posteriorly; scopal hairs dense, weakly branched, with a strong rachis extending beyond last branch; posterior claws with outer claw longer and thicker than inner; hairs of inner surfaces of basitarsi not much denser near anterior margin than elsewhere.

m. Gradulus of tergum 6 with lateral parts cariniform; pygidial plate V-shaped with rounded apex, as broad at base as long.

n. Gradulus of sternum 2 strongly biconvex. Sternum 6 with apex emarginate.

MALE: o. Antenna long, in repose reaching pterostigma or slightly beyond; scape much thicker than median ocellus, longer than interantennal distance; first flagellar segment about one-fourth of length of second which is longer than scape or third flagellar segment, segments 3 to 10 twice to thrice as long as broad, progressively shorter, narrower than ocellar width, last segment normal.

p. Clypeus partially, labrum, and base of mandible yellow.

q. Mandible with simple apex.

r. Anterior and middle femora normal; hind legs unmodified; middle and hind basitarsi normal (about 4.5 times as long as broad); fore tibial spur subequal in total length to basitarsus; hind claws with outer claw longer and thicker than inner claw.

s. Tergum 6 with strong gradular teeth laterally; tergum 7 without gradular teeth, lateral parts of gradulus cariniform; pygidial plate truncate, narrowed at extreme base, almost as broad as long, with distinct lateral notches near apex.

t. *Sternum 5 with shallow, lateral emarginations bordered by long, hooked hairs directed apically and overlying shallow, bare, laterobasal depressions of sternum 6* which has weak, lateral, oblique carinae, many long, apically directed hairs in position of oblique carinae and along shallow, median, bare sulcus.

u. *Sternum 7 with lateral plate large, with strong, apically directed, finger-like, apical process, piceous; with small, bare, median plate; with small translucent plate slightly larger than median plate between median and lateral plates; without membranous area of medial projection; apodeme slender. Sternum 8 with apex acuminate; longitudinal, ventral, carinate tubercle present; dorsal tubercle absent; not waisted.*



v. Gonocoxite with apical part short, with very large apicodorsal process blunt apically and turned inward; *gonostylus* extremely slender, long, weakly curved; penis valve greatly enlarged, as large as half of genital capsule, with oval, dorsal, soft, transversely striate pad at apex above apical process, with several longitudinal folds dorsally and ventrally; spatha about as long as wide, constricted medially.

*Idiomelissodes* was proposed by LaBerge (1956) as a subgenus of *Melissodes* related to the subgenus *Epimelissodes*. It was recognized at that time that the three subgenera *Epimelissodes*, *Brachymelissodes*, and *Idiomelissodes* formed a natural group which should be removed from the genus *Melissodes*. This was not done because the South American genera had not yet been studied by the author. It was also recognized by LaBerge that *Idiomelissodes* should perhaps constitute a separate, monotypic genus. It seems best at this time to give generic status to this form.

*Idiomelissodes* is closely related to *Svastra* and *Anthedonia* but can be recognized by the several peculiarities described above. It consists of a single species which, as far as is now known, is relatively polylectic in its flower preferences and occurs in the desert regions of southwestern United States and northern Mexico.

#### GENUS *XENOGLOSSODES* ASHMEAD

*Xenoglossodes* ASHMEAD, 1899, Trans. Amer. Ent. Soc., vol. 26, p. 63. Type species: *Melissodes albata* Cresson, 1872, monobasic and by original designation.

COMMON CHARACTERS: a. Face broad to very broad in female, broad to narrow in male; inner margins of eyes usually diverging slightly towards vertex, occasionally parallel; lower part of paraocular carina usually present and associated with lateroclypeal carina; malar area usually linear, occasionally minimum length as long as one-seventh of width (especially in female); oculoclypeal distance usually equal to half of minimum flagellar width or less, in at least one species equal to minimum flagellar width; vertex weakly elevated in facial view.

b. Clypeus flat to moderately protruding (by less than half and usually less than one-third of eye width) beyond eye in profile; produced beyond lower angles of eyes in facial view by less than width of median ocellus; lateral part not or weakly reflexed before lateroclypeal carina.

c. Mandibular articulations usually equidistant, occasionally anterior one farther from eye margin than posterior one; lower outer carina less salient than inferolateral one.

d. Distal part of galea subequal or shorter than eye in length. Maxillary palpus five- or six-segmented. Second segment of labial palpus half (and usually more) as long as first segment.

e. Scutellum convex or somewhat flattened posteromedially, anterior median line usually visible.

f. Marginal cell 2.7 to 5.0 times as long as broad, slightly shorter to longer than from its tip to wing tip, basal part subequal to free apical part, occasionally slightly longer or shorter; first submarginal cell usually subequal to or shorter than third, rarely slightly longer, second shortest, with m-cu usually in last third, occasionally nearer center; second r-m sharply angled, angle greater than 90 degrees, rarely minutely appendiculate; first media petiolate, shorter than marginal cell. Hamuli 9 to 18; cu-v one-third to one-half as long as second abscissa of M+Cu; jugal lobe shorter than or subequal to cubital cell.

g. Middle basitarsus subequal in length to tibia; tibial spurs normal, middle spur not hooked, longer than half of distance from its base to anterior tibiofemoral articulation; arolia present.

h. Propodeum with distinct dorsal surface medially; triangular area usually dulled by fine sculpturing; usually without carinae between posterior and lateral surfaces.

i. Metasoma not metallic, in female pubescence at extreme base of tergum 2 usually white (black in two species seen by the author), with distal pale pubescent bands; without spatuloplumose hairs.

FEMALE: j. Scape subcylindrical, slightly shorter to longer than interantennal distance, subequal to or narrower than median ocellus; flagellum with basal segment equal to two-thirds of scape or less, equal to twice or less second segment which is subequal or shorter than third, segments 3 to 9 longer than broad, subequal to or narrower than median ocellus, last segment less than twice as long as broad.

k. Mandible with apex simple.

l. Anterior coxa not spined; basitibial plate defined posteriorly; scopal hairs dense, simple to highly plumose; posterior claws symmetrical or nearly so.

m. Gradulus of tergum 6 with lateral parts cariniform; pygidial plate about as broad at base as length or slightly narrower.

n. Gradulus of sternum 2 strongly biconvex. Sternum 6 with apex emarginate.

MALE: o. Antenna usually very long, in repose extending beyond pterostigma (in two species extending only beyond tegula by last two flagellar segments); scape thicker than ocellar width, shorter than interantennal distance; first flagellar segment half of length of second and usually much shorter, second segment longer than scape, remaining segments long, subcylindrical or compressed slightly, subequal to or thicker than ocellar width, last segment normal.

p. Clypeus, labrum, and base of mandible usually yellow, occasionally clypeus half black (in one species all black).

q. Mandible with apex simple.

r. Anterior and middle femora normal; hind legs unmodified; middle and hind basitarsi normal to slender, 4.5 to 6.0 times as long as broad; claws symmetrical or nearly so.

s. Tergum 6 with strong gradular teeth laterally; tergum 7 without gradular teeth, lateral parts of gradulus cariniform; pygidial plate truncate, at base from slightly broader than, to eight-tenths as broad as, long, with or without lateral notches near apex.

t. Sternum 6 with strong to weak oblique carinae, without strong tufts of hairs apical to carinae, in a few species with strong lateral angles or teeth present.

u. Sternum 7 with small lateral plate with weak apicolateral process, piceous; with small median plate no larger and usually smaller than lateral plate, bare or with few hairs; membranous area between plates small; median projection absent; apodeme thick, subtriangular. Sternum 8 emarginate medially at apex, rounded on either side of emargination; with strong median, rounded, dorsal tubercle; with prominent, bidentate, carinate tubercle ventrally removed from apical margin; slightly waisted.

v. Gonocoxite short, with strong, blunt, apicodorsal process; gonostylus long, thin, elbowed, with apex turned inward; penis valve normal; spatha three times as broad as long or almost so.

*Xenoglossodes* is difficult to distinguish from *Tetralonia*, particularly in the female sex. Apparently considerable parallel evolution has occurred, so that most of the female characters of the two genera overlap to some extent. Other species of *Xenoglossodes* superficially resemble certain subgenera of *Melissodes*. Still others superficially resemble small *Diadasia*. Several of these groups of species should be recognized as subgenera, but this action must await a comprehensive revision of the species of the genus.

*Xenoglossodes* is a moderate-sized genus. Eighteen species or subspecies are listed in the "Hymenoptera of America north of Mexico" (Muesebeck *et al.*, 1951), and several species from Mexico could be added to this list. LaBerge (1956) in his revision of the genus *Melissodes* moves several names from the latter genus to *Xenoglossodes*. At least some of the Old World species of *Tetraloniella* are actually species of *Xenoglossodes*.

**LOXOPTILUS, NEW GENUS**

TYPE SPECIES: *Loxoptilus longifellator*, new species (see p. 39).

COMMON CHARACTERS: a. Face broad in female, narrow in male; orbits parallel or diverging towards vertex in male and towards mandibles in female; lower part of paraocular carina prominent, shiny, associated with lateroclypeal carina; malar area one-fifth to one-seventh as long as wide; oculoclypeal distance in male equal to three- or four-fifths of minimum width of first flagellar segment, in female equal to one and one-third or more times minimum width of first flagellar segment; vertex weakly to strongly elevated, length above median ocellus equals one-half or more of ocellar width, but no more than one ocellar width.

b. Clypeus very strongly protruding (0.70 to 0.80 times width of eye in female and almost by as much as width of eye in male) beyond eye in profile; produced beyond lower angles of eyes by as much as ocellar width or slightly more; lateral angles not reflexed but clypeus evenly rounded from one lateroclypeal carina to the other.

c. Anterior mandibular articulation much farther from margin of eye than posterior one; lower outer carina less salient than inferolateral one.

d. Distal part of galea slightly longer than eye to twice as long as eye. Maxillary palpus five-segmented. Second segment of labial palpus about one-third of length of first segment; *female with abundant hooked hairs on stipes, these sparse anteroventrally and concentrated in a band near dorsal and posterior margins.*

e. Scutellum convex, anterior median line distinct, long, often slightly raised.

f. Marginal cell 3.8 to 4.1 times as long as broad, subequal to distance from its tip to wing tip, basal part subequal to free part; first submarginal cell slightly shorter than third, second cell shortest, with m-cu in last third; second r-m sharply angled, angle of about 90 degrees, rounded, not appendiculate; first media petiolate, subequal to or shorter than marginal cell. Hamuli 10 to 13; cu-v half or slightly less as long as second abscissa of M+Cu; jugal lobe slightly shorter than cubital cell.

g. Middle basitarsus slightly shorter than tibia; tibial spurs normal; middle spur longer than half of distance from its base to anterior tibio-femoral articulation, not hooked; arolia present.

h. Propodeum with distinct dorsal surface; triangular area finely sculptured; without carinae between posterior and lateral surfaces.

i. Metasoma not metallic; with pale pubescence at base of tergum 2 and in apical bands on terga 2 to 4; without spatuloplumose hairs.

FEMALE: j. Scape subcylindrical, equal to or shorter than interantennal

distance, subequal in width to median ocellus; flagellum with basal segment shorter than scape, second segment half or less of first and subequal to third, segments 3 to 9 longer than broad and subequal in width to median ocellus, last segment less than twice as long as broad.

k. Mandible with apex simple.

l. Anterior coxa not spined; basitibial plate defined posteriorly; scopal hairs dense, simple; posterior claws symmetrical; hind basitarsus with hairs of inner surface dense.

m. Gradulus of tergum 6 without lateral parts; pygidial plate with apex broadly rounded, as broad at base as long or slightly longer.

n. Gradulus of sternum 2 strongly biconvex. Sternum 6 emarginate apically.

MALE: o. Antenna very long, in repose extending beyond pterostigma (beyond marginal cell in one species); scape much thicker than median ocellus, shorter than interantennal distance; first flagellar segment one-seventh to one-ninth of length of second which is almost twice as long as scape and longer than third, segments 3 to 10 slightly compressed, broader than ocellar width, last segment normal.

p. Clypeus at least partly yellow, labrum and base of mandible yellow or black.

q. Mandible with apex simple.

r. Anterior and middle femora normal; hind legs unmodified; middle and hind basitarsi normal, less than five times as long as broad; claws symmetrical or nearly so.

s. Tergum 6 with weaker gradular teeth laterally; tergum 7 with lateral parts of gradulus cariniform, not toothed; pygidial plate truncate apically, as broad at base as long or slightly longer, usually with lateral notches near apex.

t. Sternum 6 with strong, lateral, oblique carinae near apical margin, rounded apically, without lateral angles or teeth.

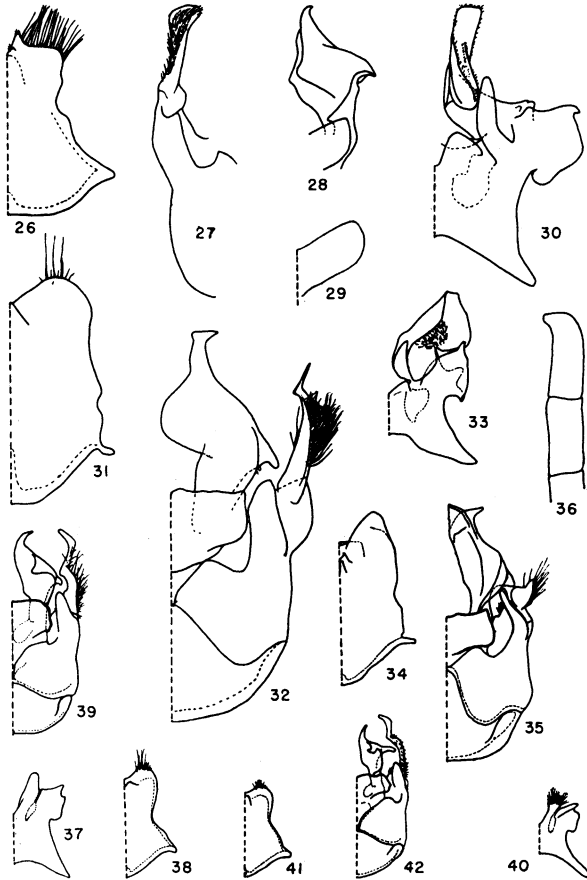
u. Sterna 7 and 8 as in *Xenoglossodes*, with the following differences: sternum 7 with apicolateral process of lateral plate thick, with median plate hairy; sternum 8 with dorsal tubercle vestigial or absent.

v. Genital capsule as in *Xenoglossodes* (see figs. 37 to 42).

*Loxoptilus* includes two new species from Mexico which are described below. No data are available concerning the flower preferences; however, the extremely long tongue of *L. longifellator* suggests that it is probably oligolectic on some long-tubed flower.

This genus is closely allied to *Xenoglossodes* and to *Peponapis*. The greatly protruding clypeus will serve to separate *Loxoptilus* from *Xenoglossodes*, and the non-reflexed lateral parts of the clypeus, the long

male antennae, and the simple scopal hairs, from *Peponapis*. The hooked hairs concentrated in a band along upper and posterior margins of stipes of the female are a unique character among eucerine bees.



FIGS. 26-29. *Florilegus condignus* (Cresson). 26. Sternum 8, ventral view. 27. Gonostylus and apex of gonocoxite, ventral view. 28. Penis valve, dorsal view. 29. Spatha.

FIGS. 30-32. *Martinapis luteicornis* (Cockerell). 30, 31. Sterna 7 and 8, ventral view. 32. Genital capsule, dorsal view.

FIGS. 33-36. *Agapanthinus callophila* (Cockerell). 33, 34. Sterna 7 and 8, ventral view. 35. Genital capsule, dorsal view. 36. Tip of flagellum of male, ventrolateral view.

FIGS. 37-39. *Loxoptilus longifellator*, new species. 37, 38. Sterna 7 and 8, ventral view. 39. Genital capsule, dorsal view.

FIGS. 40-42. *Loxoptilus brevifellator*, new species. 40, 41. Sterna 7 and 8, ventral view. 42. Genital capsule, dorsal view.

GENUS *PEPONAPIS* ROBERTSON

*Peponapis* ROBERTSON, 1902, Canadian Ent., vol. 34, p. 324. Type species: *Macrocera pruinos*a Say, 1836, monobasic and by original designation.

DIAGNOSTIC CHARACTERS: Face very broad, orbit subparallel; lower part of paraocular carina strong below, connected to lateroclypeal carina; malar area linear posteriorly and broad anteriorly; clypeus very strongly protruding, with lateral angles strongly reflexed before lateroclypeal carina; anterior mandibular articulation twice as far from eye as posterior one; maxillary palpus five-segmented. Legs and tibial spurs normal. Female with mandible bidentate apically; inner surface of hind basitarsus with hairs sparse except for narrow band near lower margin; gradulus of sternum 6 with lateral parts weakly cariniform; pygidial plate broad. Male with antenna moderately long, not extending beyond pterostigma in repose, with first flagellar segment one-sixth to one-third as long as second, last segment normal; mandible with apex bidentate and inner tooth present; gonostylus elbowed.

Moure and Michener (1955) describe this genus in detail. *Peponapis* is represented in South America by two subgenera. *Peponapis, sensu stricto*, is known from two species from Chile and Ecuador, whereas subgenus *Colocynthophila* Moure is represented by two species from Argentina, Paraguay, and southern Brazil. The two species of *Peponapis, sensu stricto*, from Chile and from Peru (the latter is *Tetralonia peponis* Friese) may belong to the foregoing genus (*Loxoptilus*). They are distinguished by having moderately long antennae with the first flagellar segment short in the male sex.

In North and Central America *Peponapis* is represented only by the nominate subgenus which includes three species from the United States and an undetermined (but few) number from Mexico and Central America. The genus is an oligolege of Cucurbitaceae, although the males are occasionally collected on other flowers, such as *Ipomoea* and *Asclepias*.

GENUS *MELISSODES* LATREILLE

*Melissodes* LATREILLE, 1829, in Cuvier, Le règne animal, ed. 2, vol. 5, p. 354 (no species included). Type species: *Melissodes leprieuri* Blanchard, 1849, first recognizable included species (*M. fonscolombi* Romand, 1841, is excluded from consideration as type of *Melissodes*, because it is a *nomen dubium*, and the male and female probably were both males of two different genera, one of which may have been a *Melissodes*; see LaBerge, 1956).

DIAGNOSTIC CHARACTERS: Face broad to very broad in female, broad to narrow in male; orbits parallel or diverging towards vertex; lower

part of paraocular carina vestigial or distinct, not associated with lateroclypeal carina; malar area linear; clypeus weakly to moderately protuberant (protruding beyond clypeus in profile by width of eye in a few species, usually by less than half of width of eye); maxillary palpus usually four-, rarely three- or five-segmented. Legs normal; middle tibial spur not hooked, longer than half of distance from its base to anterior tibiofemoral articulation. *Tegula narrowed anteriorly, lateral margin usually slightly concave in apical half or third.* Female with scape slender, longer than interantennal distance; mandible simple; gradulus of tergum 6 with lateral parts cariniform. Male with antenna short to long, first flagellar segment usually shorter than second (subequal in subgenus *Psilomelissodes*), last segment normal; mandible simple; terga 6 and 7 with strong gradular teeth laterally; sternum 6 without or with weak carinae; sternum 7 with lateral plate variable, elongate in subgenera *Melissodes* and *Ecplectica*, with sharp apicolateral process and more nearly oval or round in remaining subgenera, with median plate very small and hairless to very large and hairy; sternum 8 with strong, longitudinal ridge or tubercle ventrally, tubercle absent on dorsal surface; gonocoxite without definite apicodorsal process; gonostylus short, not elbowed or attenuate apically.

The diagnosis given above differs in certain characters from the more complete description presented by Moure and Michener (1955). The latter authors were concerned primarily with the subgenera *Melissodes* and *Ecplectica* which occur in South America and hence did not include certain variations in their description. Most important was their omission of mention of the shape of the tegulae. *Melissodes* is unique among eucerine bees in having the tegula markedly narrowed anteriorly so that the lateral margin is almost always slightly concave anteriorly. The hairs often must be removed from the anterior portion of the tegula in order to appreciate this character, but it is the only generic character so far found which will distinguish all of the species of *Melissodes* from the other eucerine bees. LaBerge (1955) should be consulted for a key to the subgenera. This key includes the two subgenera of *Svastra* present in North America, as well as the genus *Idiomelissodes*. Illustration of the male genitalia and other structures will also be found in that paper.

*Melissodes* is the largest of the eucerine genera of the Western Hemisphere. It is being revised by the author, and the first part of the revision has appeared (LaBerge, 1956). The genus has been split into several subgenera. Subgenus *Ecplectica* Holmberg is represented in South America by three species, in Central America by one species, and in the West Indies by a fifth species. Subgenus *Melissodes*, *sensu stricto*, in-



cludes 21 species distributed from southern Canada to Panamá and the West Indies. It can be expected to occur in northern South America as well. The subgenus *Eumelissodes* includes an undetermined number of species (perhaps 75 or 80) and is restricted to North and Central America and the West Indies, as far as is now known. The remaining subgenera—*Heliomelissodes* (two species), *Apomelissodes* (four species), *Tachymelissodes* (three species), and *Psilomelissodes* (one species)—are small subgenera related to *Eumelissodes* and occurring in the United States, southern Canada, and northern Mexico.

#### GENUS *FLORILEGUS* ROBERTSON

*Florilegus* ROBERTSON, 1900, Trans. Acad. Sci. St. Louis, vol. 10, p. 53. Type species: *Melissodes condigna* Cresson, 1878, monobasic.

DIAGNOSTIC CHARACTERS: Face broad in female, narrow in male, orbits subparallel to diverging towards vertex; lower part of paraocular carina distinct to strong, associated with lateroclypeal carina; malar area linear; clypeus moderately protuberant; maxillary palpus five-segmented. Scutellum convex to very flattened (when flattened, more than one-third as long as mesoscutum and with posterior margin abruptly declivous). Metasoma with iridescent reflections, terga 2 and 3 usually with basal bands of pale pubescence but without distal bands (at least lacking on tergum 2). Female with basitibial plate completely defined; gradulus of sternum 6 with lateral parts lamelliform, ending in a strong tooth. Male with antenna very long; sternum 6 with broad longitudinal ridge; sternum 7 with large median plates longitudinally twisted, with apical hairs; gonocoxite with dorsoapical process strong; gonostylus short, not elbowed (figs. 25 to 29).

This genus is represented by two subgenera in the area covered by this work. Subgenus *Florilegus* includes a single species from the United States and Mexico (*F. condignus*). A few other names have been proposed for species from the West Indies and Central America, but the status of these names is undecided at present. A few additional species of *Florilegus*, *sensu stricto*, occur in South America. The subgenus *Floriraptor* Moure and Michener is represented in the north by *F. isthmicus* Michener from Panamá and in the south by *F. atropos* (Smith) from Argentina and Brazil. An additional subgenus (*Euflores* Ogloblin) including at least four species has been described from South America.

Moure and Michener (1955) have given a complete description of this genus. They are in error when, in the description of the female of the subgenus *Florilegus*, they state, "Hairs of mouthparts simple." The hairs

of the galea and the under sides of the mentum and of the first segment of the labial palpus are abundant and hooked in the female of *F. (Florilegus) condignus*. This would appear to be the chief distinction of the females of the subgenus *Euflorilegus*, according to Moure and Michener. However, these two subgenera can be distinguished in the female sex by the difference in the paraocular carina (the lower part of this carina is strong and shiny in *Florilegus*, *sensu stricto*, weak and punctured in subgenus *Euflorilegus*).

The hooked hairs of the mouth parts of the female will separate the North American females of this genus from those of all other northern eucerines. Other northern genera with hooked hairs on the mouth parts have then only on the galeae or only on the stipes.

#### GENUS *GAESISCHIA* MICHENER, LABERGE, AND MOURE

*Gaesischia* MICHENER, LABERGE, AND MOURE, 1955, *Dusenian*, vol. 6, p. 220. Type species: *Svastra fulgurans* Holmberg, 1903, by original designation.

DIAGNOSTIC CHARACTERS: Face narrow, diverging towards vertex; lower part of paraocular carina distinct (weak in male), associated with lateroclypeal carina; malar area linear; vertex elevated (moderately in North American form); maxillary palpus four- to six-segmented; tibial spurs usually normal, but in Nearctic species middle spur shorter than half of distance from its base to anterior tibiofemoral articulation and strigilis with free part of malus no longer than half of length of velum. Female with anterior coxa with inner apical spine; gradulus of tergum 6 with lateral parts absent or short, rarely long. Male with antenna long, first flagellar segment one-sixth or less of length of second, last two segments slightly flattened and expanded in North American form. Male of Nearctic species with anterior femur broadest medially; hind femur enlarged, with ventral surface dulled and transversely angled medially; hind basitarsus flattened. Male of Nearctic species with sternum 7 with lateral plate moderate sized, *inner plate much expanded apically, with subapical process directed basally; gonostylus strongly flattened, widest beyond middle, blade-like.*

The genus *Gaesischia* is predominantly a Neotropical genus. It consists of four subgenera (*Gaesischia*, *sensu stricto*, *Gaesischiopsis* Michener, LaBerge, and Moure, *Agaesischia* Moure and Michener, and *Gaesischiana* Michener, LaBerge, and Moure). The last of these, *Gaesischiana*, contains a single species (*G. exul*) which is known to occur in southern Arizona, eastern Mexico, and Guatemala. *Gaesischiana exul* is known only in the male sex. A few characters are included above in the diagnosis which Moure and Michener (1955) do not mention (length of tibial

spur, characters of terminalia). These apply only to the Nearctic subgenus.

#### GENUS *MARTINAPIS* COCKERELL

*Martinella* COCKERELL, 1903, Ann. Mag. Nat. Hist., ser. 7, vol. 12, p. 450.

Type species: *Melissodes luteicornis* Cockerell, 1896, monobasic (preoccupied).

*Martinapis* COCKERELL, 1929, Entomologist, vol. 62, p. 19 (*nomen novum* for *Martinella* Cockerell, 1903, *non* Jousseau, 1887).

DIAGNOSTIC CHARACTERS: Face broad in female, narrow in male; orbits diverging towards vertex; vertex not elevated; lower part of paraocular carina weak; malar area linear; clypeus moderately protuberant and produced; maxillary palpus five-segmented; tibial spurs normal. *Female with mandible strongly bidentate, inner tooth absent, expanded in outer half so as to be narrowest immediately before middle; last flagellar segment about twice as long as broad.* Male with antenna short, first flagellar segment three-fourths of second and subequal to scape in length (in Nearctic species), last segment tapered, curved (in Nearctic species), flagellar segments narrower than median ocellar width; mandible with apex simple, acuminate, not expanded as in female; sternum 7 with median plate large, strap-like, expanded apically, not reflexed basally (in Nearctic species with slender lobe directed mesad from inner margin of outer lobe); sternum 8 with strong tubercles on dorsal and ventral surfaces; *gonostylus arising dorsally from ventroapical projection of gonocoxite, broad and hairy medially, then abruptly attenuate, subapically angled* (figs. 30 to 32).

The genus *Martinapis* is known from a single species (*M. luteicornis*) from southwestern United States and northern Mexico and from a second species (placed in the subgenus *Svastropsis* Moure and Michener) from Argentina (*M. bipunctata*). Moure and Michener (1955) should be referred to for a more detailed description of the genus. It should be noted that two additional female characters have been added in the above diagnosis (the expanded mandible and the long last flagellar segment), both unique among eucerine bees.

#### AGAPANTHINUS, NEW GENUS

TYPE SPECIES: *Melissodes callophila* Cockerell, 1923 (= *Melissodes callophila nanula* Cockerell, 1923, and *Melissodes idonea* Cockerell, 1923).

Unfortunately, a description comparable in detail to the foregoing descriptions cannot be presented for this genus, because the specimens have not recently been available to the present author. However, the following

notes were taken from the type specimens in 1955 and should be sufficient to make the genus recognizable.

COMMON CHARACTERS: a. Orbits diverging towards vertex; vertex not or weakly elevated; malar area linear; *hypostomal carina with lateral arm* (just below mandible) leading to posterior mandibular articulation *sharp, very distinct, and well separated from mandibular base*; eyes in profile about half as wide as long.

b. Clypeus round, moderately protuberant; lateral angles not reflexed; not produced; closely approaching eye laterally.

c. Mandibular articulations equidistant from eye or nearly so; lower outer carina less salient than inferolateral one.

d. Distal part of galea subequal to eye in length; maxillary palpus five-segmented, fifth segment minute, palpus about one-third of length of stipites.

e. Scutellum convex.

f. Marginal cell subequal or slightly shorter than distance from its tip to wing tip; second submarginal cell shortest, third cell equal to or slightly longer than second above (r-m angled).

g. Tibial spurs normal, those of middle and hind legs weak, those of hind legs no longer or shorter than long scopal hairs above them in female, *middle spur less than half as long as distance from its base to anterior tibiofemoral articulation*.

h. Propodeum with distinct dorsal surface; triangular area finely sculptured.

i. Metasoma not metallic; terga 2 and 3 with broad, arched, basal bands of short white pubescence and short, simple, dark brown hairs apically almost to margins; without spatuloplumose hairs.

FEMALE: j. Scape subcylindrical; first flagellar segment much longer than second which is slightly shorter than third, segments 3 to 9 longer than broad, last segment normal, not twice as long as broad.

1. Anterior coxa not spined; claws small, nearly symmetrical (posterior claw with inner ramus slightly longer than anterior claw); scopal hairs plumose, with three to six branches on each side of strong rachis which extends well beyond last branch.

n. Gradulus of sternum 2 strongly biconvex.

MALE: o. Antenna moderately long; first flagellar segment equal to one-sixth of second segment or slightly less, *ultimate segment mammillate at tip, nipple bent downward* (fig. 36).

p. Clypeus, labrum, and mandibular base black.

r. Femora normal; hind legs unmodified; claws weak, symmetrical or nearly so.

s. Tergum 6 with lateral gradular teeth; tergum 7 without lateral teeth.

t. Sternum 6 with strong oblique carinae near apical margin; *with two long, prominent, median carinae which diverge somewhat basally, closest just before apices of lateral carinae, diverging again apically and terminating just mesad of inner apices of oblique carinae*; with deep, longitudinal, bare sulcus between median carinae.

u. Sternum 7 (fig. 33) with large lateral plate with slightly hooked apical process; with very large median plate which is divided into a neck region and a large, subcordate apical lobe, neck region somewhat twisted ventrally and laterally, lobe with hairs medially; without median projection; membranous area between plates large; apodeme pointed, subtriangular. Sternum 8 (fig. 34) deeply emarginate apically; small, carinate tubercle ventrally almost at apex; large, truncate, dorsal tubercle present at apex.

v. Gonocoxite short, with prominent, blunt, dorsoapical process; *gonostylus extremely short (shorter than dorsoapical process of gonocoxite), almost as broad as long, narrowed abruptly in last third, long haired*; *penis valve with dorsal, mesially directed process with serrate inner margin at apex, as well as laterally directed, sharp, apical process*; *spatha almost three times as broad as long* (fig. 35).

This is a very distinctive genus known only from one species, *Agapanthinus callophilus* (Cockerell), from San José Island in the Gulf of California. It is probably more widespread in Baja California and western Mexico.

#### GENUS *MELISSOPTILA* HOLMBERG

*Melissoptila* HOLMBERG, 1884, Actas Acad. Nac. Cien. Córdoba, Argentina, vol. 5, p. 119. Type species: *Melissoptila tandilensis* Holmberg, 1884, monobasic.

*Thyreotremata* HOLMBERG, 1887, Bol. Acad. Nac. Cien. Córdoba, Argentina, vol. 10, p. 225 (*nomen nudum*).

*Thyreothremma* HOLMBERG, 1903, An. Mus. Nac. Buenos Aires, ser. 3, vol. 2, p. 391. Type species: *Thyreothremma rhopalocera* Holmberg, 1903 (= *Melissoptila tandilensis* Holmberg, 1884), designated by Sandhouse, 1943.

*Thyreotremata* SANDHOUSE, 1943, Proc. U. S. Natl. Mus., vol. 92, p. 604. Type species: *Thyreothremma rhopalocera* Holmberg, 1903 (= *Melissoptila tandilensis* Holmberg, 1884), designated by Moure and Michener, 1955.

DIAGNOSTIC CHARACTERS: Face very broad to somewhat narrowed, narrow below; vertex not elevated; lower part of paraocular carina distinct, connected to lateroclypeal carina; malar area linear; clypeus weakly protuberant, slightly produced, close to eye; maxillary palpus

two- or three-segmented. *Pterostigma large*; second submarginal cell slightly shorter or subequal to first, longer than broad. Metasoma with or without iridescent reflections, without basal pale bands. Female with gradulus of tergum 6 with lateral parts lamelliform and ending in a strong tooth (hidden by hairs). Male with antenna moderately short to long (short in northern species), first flagellar segment over one-fourth of length of second; terga 6 and 7 with strong gradular teeth laterally; *sternum 7 with lateral plate large, outer margin convex, membranous area absent, with median plate very small, fused to lateral plate*; gonostylus short, simple, relatively broad; spatha four to almost eight times as broad as long.

This distinctive genus has been split into three subgenera—*Melissoptila, sensu stricto*, with one species from Argentina; *Comceptila* Moure and Michener, with three species from Argentina, Paraguay, and southern Brazil; and *Ptilomelissa* Moure (1943), with 25 species distributed from Argentina to southern United States. *Melissoptila (Ptilomelissa) otomita* (Cresson) from Mexico has been collected at Brownsville, Texas (specimen in the United States National Museum), and is also known from Guatemala and Honduras. *Melissoptila otomita* (Cresson) (= *Melissodes pinguis* Cresson, new synonymy) was first described as a *Melissodes*. The genus includes two additional species from Mexico and Central America—*M. velutina* (Cockerell) and *M. joseana* (Friese).

#### GENUS THYGATER HOLMBERG

*Thygater* HOLMBERG, 1884, Actas Acad. Nac. Cien. Córdoba, Argentina, vol. 5, p. 133. Type species: *Tetralonia terminata* Smith, 1854 (= ? *Macrocera analis* Lepeletier, 1841).

*Macroglossa* RADOSYKOWSKY, 1884, Horae Soc. Ent. Rossicae, vol. 18, p. 17 (preoccupied).

*Macroglossapis* COCKERELL, 1899, Catálogo de las abejas de Mexico, p. 4 (*nomen novum* for *Macroglossa* Radosykowski, 1887, *non* Ochseneimer, 1816). Type species: *Macroglossa oribazi* Radosykowski, 1884 (= *Macrocera analis* Lepeletier, 1841), monobasic.

DIAGNOSTIC CHARACTERS: Face broad, orbits diverging below in northern species; vertex not elevated; lower part of parocular carina absent; malar area one-fifth as long as wide or usually more; clypeus very strongly protuberant, strongly produced; *lower outer mandibular carina at least as salient as inferolateral carina, usually expanded and more salient*; distal part of galea at least one and one-half times eye length; maxillary palpus three- or four-segmented. Female with scape thickened, little over half as long as interantennal distance, flagellum with basal segment longer than scape; gradulus of tergum 6 with lateral parts ab-

sent; *gradulus of sternum 2 weakly biconvex*. Male with clypeus black; tergum 6 without lateral teeth; tergum 7 without lateral teeth, *without recognizable pygidial plate, apex of tergum with two blunt, rarely vestigial teeth*; sternum 7 with very short apodeme; gonostylus robust, usually enlarged apically; spatha three to four times as long as broad; gonocoxite with extremely short ventroapical spicules. In the northern species, female with inner orbits diverging below and male with antenna very long, flagellar segments flattened, in width one and one-half or more times median ocellar width, first segment one-sixth as long as second segment or less.

This very distinctive genus has been split into two subgenera by Moure and Michener (1955) who present a detailed generic description. The subgenus *Nectarodiaeta* Holmberg contains only two species, from Argentina and southern Brazil, respectively. The subgenus *Thygater*, *sensu stricto*, includes 20 or more species ranging from Argentina to Mexico. Lutz and Cockerell (1920) list seven species of *Thygater* from Central America and Mexico, and Michener (1954) lists an additional species from Panamá.

#### SPECIES DESCRIPTIONS

In this section are presented the descriptions of two new species, the first of which is the type species of the new genus *Loxoptilus* described in the foregoing paragraphs. The second species belongs to the same genus. Diagnostic characters separating the two species are italicized.

##### ***Loxoptilus longifellator*, new species**

FEMALE: Length, 14–16 mm.; width, 5–6 mm.; wing length, 9–10 mm. Black, except for red macula on apical half of mandible; *flagellum black*; eyes brownish gray; *wing membranes deeply infumate, brown*, veins dark brown or black. *Vertex elevated above median ocellus by one ocellar width or nearly so*; orbits subparallel or diverging towards mandibles; *distal part of galea twice as long as eye or nearly so*, dulled by dense shagreening; *hooked hairs of stipes with tips long, slender, wavy*; clypeus and supraclypeal area coarsely punctate, punctures shallow, elongate laterally, clypeus moderately shiny to dull. Mesoscutum with large shallow punctures, almost confluent anteriorly and laterally, more distant posteromedially, ground areas shiny posteromedially, moderately shiny elsewhere; scutellum with punctures minute anteromedially, becoming progressively larger laterally and posteriorly until they equal mesoscutal punctures, ground shiny; metanotum minutely punctured, opaque, propodeum with crowded punctures dorsally, posteriorly, and laterally,

ground areas (including upper impunctate triangle of posterior surface) dulled by dense, fine tessellation, mesepisternum sculptured as on anterior half of mesoscutum, ground and bottoms of punctures dull. Metasomal tergum 1 with small, crowded punctures basally and laterally, impunctate apically; terga 2 and 3 with minute punctures separated by one to two puncture widths except extremely narrow, apical, impunctate margin, terga with ground areas dulled by fine, transverse, reticulate shagreening.

Hairs of head ochraceous below to reddish above, with long black hairs on vertex. Thorax with ochraceous hairs on lower lateral surface to reddish above; mesoscutum with large median patch of brown hairs, fox-red anteriorly, laterally, and posteriorly; scutellum with hairs red, a few very short, pale hairs anteromedially. Metasomal tergum 1 with long ochraceous hairs basally and laterally; tergum 2 with basal band of short, white, scale-like pubescence, interband zone of appressed, white pubescence interrupted in median third or fourth by hairs similar to interband zone, the three zones subequal in length and about same width across tergum, apical and basal pale zones connected at extreme sides; terga 3 and 4 similar to tergum 2, but basal zone consists of black tomentum, apical zones of pale pubescence uninterrupted and subequal to that on tergum 2; terga 5 and 6 with long black hairs, white lateral tufts on tergum 5; sterna 2 to 5 with hairs pale laterally, brown medially, dark brown on sternum 6. Legs with hairs pale ochraceous except brown on outer surfaces of fore tibia and tarsus, middle tibia, and around hind basitibial plate.

MALE: Length, 15 mm.; width, 4-5 mm.; wing length, 9-10 mm. Integument black except as follows: *apical half of clypeus with transverse yellow zone; mandible with small, triangular, basal, yellow spot; flagella slightly reddened beneath*; wing membranes slightly infumate, yellowish; eyes greenish to brownish gray. Minimum length of first flagellar segment about one-eighth of maximum length of second segment; *distal part of galea at least twice as long as eye; mandible with inner subapical tooth vestigial or absent*. Sculpturing of head, mesosoma, and metasoma as in female except as follows: scutellum with anteromedian area of small punctures much restricted in size; terga 3 to 5 with somewhat coarser punctures than tergum 2.

Gonostylus with abundant long hairs extending beyond elbow on outer surface; *spatha less than three times as broad as long*. Sternum 7 with *median plate long, tongue-shaped, hairless* or with one or two hairs; *apodeme subtriangular*. Sternum 8 with median ventral carina bidentate; dorsal carina vestigial (figs. 37 to 39).



TYPE MATERIAL: Holotype male, allotype female, 21 paratype males and 14 paratype females from 29 miles north of Taxco, Guerrero, Mexico, August 8, 1954, at 4900 feet altitude, by the University of Kansas Mexican Expedition of 1954. Six female and 19 male paratypes are as follows: six females and 11 males, 8 miles northeast of Taxco, Guerrero, August 8, 1954, at 5150 feet altitude, University of Kansas Mexican Expedition of 1954; five males, 5 miles north of Tuxpan, Michoacán, Mexico, July 16, 1953, at 5500 feet altitude, University of Kansas Mexican Expedition of 1953; one male, Garape, Michoacán, September 18, 1938, L. J. Lipovsky; two males, Puente Grande, Jalisco, August 20, 1954, at 5000 feet altitude, University of Kansas Mexican Expedition of 1953. The holotype male is in the Snow Entomological Museum at the University of Kansas, Lawrence, Kansas. The allotype female is in the collection of the American Museum of Natural History. Paratypes are in the Snow Entomological Museum, the American Museum of Natural History, the United States National Museum, and the author's collection.

#### ***Loxoptilus brevifellator*, new species**

FEMALE: Length, 13 mm.; width, 4 mm.; wing length, 7 mm. Black except as follows: *flagellar segments 3 to 10 reddened beneath*; mandible red medially, with golden median macula; *wing membrane only slightly infuscated, milky*, veins dark brown. *Vertex weakly elevated*, extending above median ocellus by no more than half of ocellar width; *distal part of galea subequal to eye in length or slightly longer*, moderately shiny; *hairs of stipes stout, tapered, hooked but not with tips wavy*. Sculpturing of head, mesosoma, and metasoma as in *longifellator* except as follows: clypeal punctures coarser laterally and not elongate; mesoscutum with ground areas uniformly dulled by fine tessellation; scutellum without anteromedian area of fine punctures or this area small; metasomal tergum 1 with fine punctures extending almost to apical margin.

Hair color as in *longifellator* except as follows: lower parts of head and mesepisterna with white hairs; mesoscutum without median patch of brown hairs; mesoscutal and scutellar hairs dull ochraceous to pale fuscous; metasomal tergum 1 with apical half with short, appressed, simple, black hairs; tergum 2 with apical pale band only narrowly interrupted medially, longer than interband zone; terga 2 and 3 (and medially on tergum 4) with extremely narrow zones of black pubescence apical to distal white bands; tergum 5 without lateral tufts of white hairs; sternal hairs ochraceous to white.

MALE: Length, 12–13 mm.; width, 3.0–3.5 mm.; wing length, 7 mm. Integument black except as follows: *clypeus yellow except narrow posterior area* (forming a trilobed yellow spot with median lobe again

triangled); *labrum* cream-colored; *mandible* with basal third yellow; *flagella* red except narrow reddish brown zone above; wing membranes clear to milky, veins dark brown; eyes yellowish brown to gray. Minimum length of first flagellar segment about one-ninth of maximum length of second segment; *distal part of galea* subequal to or slightly longer than eye; *mandible* with inner subapical tooth prominent. Sculpturing of head, mesosoma, and metasoma as in female except as follows: clypeal punctures less distinct, tergal punctures more crowded, and ground areas moderately shiny.

Gonostylus with short, sparse hairs confined to below elbow; *spatha* at least three times as broad as long. Sternum 7 with *median plate* truncate, small, with abundant long hairs; *apodeme* slender. Sternum 8 with ventromedian tubercle rounded; dorsal tubercle present, small, rounded (figs. 40 to 42).

Hair color as in female but tergum 2 with broad basal band of white, scale-like pubescence which is narrowly connected medially with apical band, apical tergal band narrower; terga 6 and 7 with long dark brown hairs; sternal hairs mostly pale.

TYPE MATERIAL: Holotype male and allotype female, 16 miles northwest of Ixtlan, Nayarit, Mexico, July 19, 1953, at 2800 feet altitude, University of Kansas Mexican Expedition of 1953. Nine female and one male paratypes are as follows: one male, Tepic, Nayarit, Mexico, July, 1953, N. L. H. Krauss; nine females, 12 miles east of Cuernavaca, Morelia, Mexico, August 14, 1954, at 4300 feet altitude, University of Kansas Mexican Expedition of 1954. The holotype male is in the Snow Entomological Museum at the University of Kansas, Lawrence, Kansas. The allotype female is in the collection of the American Museum of Natural History. Paratypes are in the Snow Entomological Museum, the American Museum of Natural History, the United States National Museum, and the author's collection.

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