

A STUDY  
OF THE  
CLASSIFICATION  
OF THE  
MORE PRIMITIVE  
NON-PARASITIC  
ANTHOPHORINE BEES  
(HYMENOPTERA, APOIDEA)

CHARLES D. MICHENER AND  
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THOPHORINE BEES (HYMENOPTERA,  
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## INTRODUCTION

THE PURPOSE OF THE PRESENT PAPER is to clarify the relationships and classification of the bees placed in the tribe Exomalopsini by Michener (1944) and of some relatives of this group. The small and rare Eurasian genera *Ancyla*, *Tarsalia*, and *Pararhophites* (= *Ctenoapis*) (the first two of which comprise the Ancylini of Michener, 1944; the last, the Pararhophitini of Popov, 1949) are related to the group under consideration but have been excluded from the present study because we have no new data to present concerning them and because their relationships to the genera discussed below are not close. Except for the three genera listed above, all of the primitive, non-parasitic anthophorine bees occur in the Western Hemisphere, with their center of abundance and diversity in southern South America. The South American genus *Protomeliturga*, included in the Exomalopsini in 1944, is actually one of the Panurginae, although it was placed by Ducke (1912) among the higher bees near genera now included in the Exomalopsini.

Some characters of the tribes of non-parasitic anthophorine bees are shown in table 1. The Old World groups called Ancylini and Pararhophitini are omitted. Non-parasitic groups can be recognized by the presence of scopal hairs for collecting pollen in the females. Furthermore, the parasitic tribes are usually less hairy, more slender insects, and have undergone parallel loss of several structures such as basitibial plates and combs of the stipites. All of them have the jugal lobes of the posterior wings much reduced and the inner ramus of each claw modified into a flattened basal tooth.

The characters and symbols in table 1 require some explanation, as follows: The symbol "+" indicates agreement with the statement at the left (with "++" indicating more emphatic agreement as detailed in the numbered explanations below); "-" indicates disagreement with the statement at the left (with "--" adding emphasis, as indicated below); "o" indicates an intermediate condition. Two symbols, one above the other, indicate variation within the tribe; a pair of symbols, such as "±," indicates that the intermediate condition, "o," also occurs in the tribe. The letter "e" indicates that among a

few species exceptions exist to the character indicated.

Details of the characters on which table 1 is based are as follows:

1. The symbol "+" indicates presence of yellow or white areas (lateral face marks) in the lower parts of the paraocular areas. The symbol "-" indicates lack of such markings.
2. The symbol "+" indicates that the top of the head, between the eyes, is uniformly convex; "o" indicates that it is generally so but has slight concavities laterally; while "-" indicates that the vertex is excavated between the eyes and the ocelli.
3. The symbol "+" indicates that the posterior basal angle of the mandible is on or behind a continuation of the longitudinal median axis of the eye; "-" indicates that the angle is anterior to this axis.
4. The symbol "+" indicates that the lower lateral parts of the clypeus are bent back, parallel to one another, because the clypeus has become protuberant; "-" indicates that these parts are only slightly bent back and are not parallel; "o" indicates an intermediate condition.
5. The symbol "+" indicates that the paraglossae are about as long as the first two segments of the labial palpus together; "-" indicates paraglossae not much longer than the first segment and usually shorter.
- 6 and 7. The symbol "++" indicates that the first flagellar segment is longer than the scape; "+," that it equals the scape; "o," that it is somewhat shorter than the scape; "-", that it is much shorter than the scape; and "--," that it is very much shorter than the scape and than the second flagellar segment as in many male Eucerini.
8. The symbol "+" indicates that the width of the pterostigma is markedly greater than the distance from the inner edge of the pterostigma to the wing margin; "-" indicates that these distances are equal or that the pterostigma is even narrower; while "o" indicates that the width of the pterostigma is very slightly greater than the distance from the inner margin of the pterostigma to the wing margin.
9. The symbol "+" indicates that the pterostigma is distinctly longer than the pterostigma; "o," that it is equal to the pterostigma; "-", shorter; and "--," much shorter.
10. The symbol "+" indicates that the marginal

TABLE 1

SELECTED CHARACTERS OF THE AMERICAN TRIBES OF NON-PARASITIC ANTHOPHORINE BEES

	Exomalopsini	Tetrapediini	Eucerinodini	Canephorulini	Eucerini	Emphorini	Centridini	Anthophorini
1 Paraocular areas of male maculated	+ —	—	+	—	—	—	+ —	+ —
2 Vertex convex	o —	—	—	—	—	+	—	—
3 Rear angle of mandible beneath middle of eye	+ —	—	—	+	+ —	—	—	+
4 Sides of clypeus bent to rear below	+ —	—	—	—	+e	+ o	+ —	+
5 Paraglossae long	—	—	—	+	+	—	—	—
6 First flagellar segment of male long	—	—	o	—	+ —	+ —	++ o	+ o
7 First flagellar segment of female long	o —	—	o	o	++ o	+ o	++	++ o
8 Stigma broader than prestigma	+e	+	—	—	o —	—	—	—
9 Stigma longer than prestigma	+	+	+	—	+ o	+	--	—
10 Second R <sub>1</sub> much shorter than distance to wing tip	o —	—	o	o	o	o	+	+
11 Second R <sub>1</sub> shorter than first M	+ o	o	o	—	o —	o —	o —	+
12 Second M longer than second Cu	—e	o	o	o	+ o	+ o	+	+
13 Wings papillate	o —	o —	o	+	o —	+ o	+	+
14 Basal parts of wings bare	—	—	—	+	—	—	—	+
15 Second abscissa of M+Cu short	+ —	+	—	+	—e	+	+	+
16 Jugal lobe short	++ o	++	+	—	+ o	o —	o —	+
17 Outer tarsal comb	+ —	+	—	o	—	—	—	—



TABLE 1—(Continued)

	Exomalopsini	Tetrapedini	Eucerinodini	Canephorulini	Eucerini	Emphorini	Centridini	Anthophorini
18 Inner tarsal comb	+	—	—	—	—	—	+	—
19 Gradulus of sternum 2 birecurved	—	—	—	—	++ +	—	o —	— +
20 Pygidial plate in male	+	—	—	+	+	—	+	—e
21 Sternum 7 in male with paired apical plates	++ —	—	+	—	+	++	o —	—
22 Sternum 8 in male with paired apical plates	++ —	—	o	—	—	o —	—	—
23 Spatha present	+	—	+	+	+	+	+	+
24 Gonostylus arising ventrobasally	—	+	—	—	—	—	—	—
25 Gonocoxites with ventroapical spicules	—	—	+	+	+	—	—	—
No. of primitive characters out of 19	18	14	13	7	13	13	10	8

cell (2d R<sub>1</sub>) is much shorter than the distance from its apex to the wing tip; "o," that it is *about* equal to that distance; and "—," that it is much longer.

11 and 12. The symbol "+" indicates that the first cell mentioned at the left of the table is longer than the second (cells are in forewing; terminology is that of Michener, 1944); "o" indicates cells of about equal length; "—" indicates that the first cell mentioned is shorter.

13. The symbol "+" indicates that the distal parts of the wings, beyond the veins, have papillae conspicuously larger than the hair bases elsewhere on the wings, and lack hairs; "o" indicates smaller papillae with hairs; "—" indicates that the hairs and hair bases of the distal parts of the wings are similar to those elsewhere on the wings.

14. The symbol "+" indicates that the closed cells of the wings lack or nearly lack hairs; "—" indicates abundant hairs in these cells.

15. The symbol "+" indicates that the second

abscissa of vein M+Cu of the hind wing is less, usually much less, than twice as long as the oblique cu-v; "—" indicates that the second abscissa of M+Cu is about twice as long as the transverse cu-v or longer.

16. The symbol "++" indicates that the jugal lobe of the hind wing is about one-fourth as long as the vannal lobe; "+," that it is less than half as long as the vannal lobe; "o," that it is about half as long as the vannal lobe; and "—," that it is over half of the length of the vannal lobe.

17 and 18. "Inner" indicates the same side as the strigilis; outer, the opposite side. The symbol "+" indicates presence of a comb of bristles on the anterior basitarsus, "—" indicates absence of this comb; and "o" indicates a conformation of hairs suggestive of a comb.

19. The symbol "+" indicates that the gradulus of the second sternum in the female forms two arches convex posteriorly; "++" indicates that these arches are very strong;

- "o" that they are scarcely perceptible; "—," that the gradulus is straight or somewhat recurved (except that in some *Emphorini* it is angulate medially).
20. The symbol "+" indicates that the pygidial plate is distinct and margined; "—," that it is not and is therefore usually unrecognizable.
- 21 and 22. The symbol "++" indicates that the apical part of the sternum concerned is expanded to form a pair of large lobes usually larger than the rest of the sternum; "+" indicates that these lobes are smaller but distinct; "o," that they are small and more or less indistinguishable from the body of the sternum; "—," that such lobes are absent but that the sternum has a posterior projecting body; and "—," that the sternum is reduced to a transverse band without or almost without posterior projection.
23. The symbol "+" indicates presence of a spatha; "—" indicates its absence although the dorsal bridge of the penis valves, which normally supports the spatha and forms its base, is present.
24. The symbol "+" indicates that the base of the gonostylus extends anteromedially in the conjunctiva to a point near the base of the gonocoxite ventrally; "—" indicates the limitation of the area of articulation of the gonostylus to an area at or near the apex of the gonocoxite.
25. The symbol "+" indicates that there is a group of blunt, thickened setae near the apex of the inner ventral surface of the gonocoxite; "—" indicates lack of such setae.

To present an idea of the degree of differ-

entiation of the tribes, table 2 was constructed, with the use of characters from table 1. To count as a difference for table 2, characters had to be mutually exclusive; thus "±" was not considered different from "—" nor from "o" (as "o" is intermediate between "+" and "—"). On the other hand, "+" was different from "—" and from "o."

Because of this system, the monogeneric tribes *Tetrapediini*, *Eucerinodini*, and *Canephorulini* tend to show greater numbers of differences than they might otherwise, because there is little variability within them (the last two contain only one species each). The *Exomalopsini* show the minimum average number of differences, partly because they are a highly variable group. The *Exomalopsini* appear to be a basic group from which at least some of the other anthophorine tribes evolved. Of the characters listed in table 1, 19 (2, 5–10, 13, 21, 23–25) were selected in which the primitive alternative could be distinguished with reasonable certainty from the specialized alternative (by the methods described by Michener, 1944, 1952). The numbers at the bottom of table 1 show the number of primitive characters appearing in (although not always constant for) each tribe; clearly the *Exomalopsini* have the maximum number of such characters (18 out of 19). Five of the 18 characters are variable in the *Exomalopsini*, some genera exhibiting the specialized alternatives. However, as different genera exhibit specialized alternatives of different characters, there is no

TABLE 2  
NUMBERS OF DIFFERENCES BETWEEN TRIBES BASED ON CHARACTERS LISTED IN TABLE 1

	Ex- omalop- sini	Tetra- pediini	Eucer- inodini	Cane- phoru- lini	Eucer- ini	Em- phorini	Cen- tridini	Antho- phorini
<i>Exomalopsini</i>	—	5	5	9	4	3	7	8
<i>Tetrapediini</i>	5	—	13	17	11	11	12	18
<i>Eucerinodini</i>	4	13	—	14	5	7	11	13
<i>Canephorulini</i>	9	17	14	—	9	10	11	11
<i>Eucerini</i>	4	11	5	9	—	5	7	8
<i>Emphorini</i>	3	11	7	10	5	—	6	9
<i>Centridini</i>	7	12	11	11	7	6	—	7
<i>Anthophorini</i>	8	18	13	11	8	9	7	—
Average no. of differences	5.7	12.4	9.7	11.6	7.0	7.3	8.6	10.6



large group of similarly specialized genera.

The Tetrapediini are also primitive, but are so radically different from all Exomalopsini, especially in characters 21, 23, and 24 (the last two being unique among anthophorine bees), that we have placed them as a separate tribe. Character 12 is also convenient for distinguishing Tetrapediini from Exomalopsini in almost all cases. Another feature by which one can distinguish the Tetrapediini from almost all other Anthophorinae is that they have only one hind tibial spur.

The Eucerinodini, Canephorulini, and Eucerini form a group that shows certain trends in common; the first, although having some specialized features, could have arisen near the base of this branch and still retains many features in common with the Exomalopsini. The Eucerini also retain many primitive features, although having some strikingly specialized ones. The Canephorulini have many specialized features, including some shared by the Eucerini, but have primitive alternatives of some of the characters that are specialized in the Eucerini. They must therefore have arisen from the stem ancestral to the Eucerini.

As indicated in table 2, the Emphorini<sup>1</sup> are remarkably like certain Exomalopsini and might be regarded as merely a branch of the latter. The similarity between the details of the seventh sternum of Emphorini and that of *Chalepogenus* and *Tapinotaspis* in the Exomalopsini is especially striking, while the

rounded vertex and weak stipital combs of Emphorini are suggestive of *Ancyloscelis*.

The Centridini show many specialized features but are linked with the Exomalopsini by various characters. For example, *Monoeca* in the Exomalopsini has character 18 as in the Centridini, while *Caenonomada* in the Exomalopsini has features of maculation as in some *Epicharis* in the Centridini. The evidence suggests that from an exomalopsine ancestor *Epicharis*-like bees arose, which by further specialization produced *Centris*.

The Anthophorini are highly specialized and resemble the Centridini in many features but have some characters more primitive than any Centridini. They may have arisen from the same basic stem as the Centridini.

It is necessary to point out that one of the tribes listed in tables 1 and 2 has a different name than that used by Michener (1944). Both Moure (1945b) and Michener (1954) have concluded that in order to avoid much confusion the name *Hemisia* should not be used; the Hemisiini of Michener, 1944, therefore becomes Centridini.<sup>2</sup>

The tribes discussed in detail in this paper are the first three listed in tables 1 and 2. The Canephorulini were discussed in detail by Michener, LaBerge, and Moure (1955) and the Eucerini (especially of tropical America) by Moure and Michener (1955). Recent comprehensive studies of the other tribes do not exist, although groupings within the Centridini were treated by Moure (1945a, 1950) and by Michener (1951).

## DESCRIPTIVE METHODS

The methods used in the descriptions that follow are essentially those used by Moure and Michener (1955). For easy comparison of characters among genera and among subgenera of any one genus, each description is subdivided into sections. Comparable sections

are introduced by the same letter (for genera) or number (for subgenera). Characters that exist in only one genus are listed only there and in all cases are among the distinctive and hence italicized characters; characters that exist in two or more genera are listed with alternatives where appropriate, in all generic descriptions.

<sup>1</sup> We are here using the tribe name Emphorini in place of Melitomini (see Moure, 1944, 1947) because in accordance with Copenhagen Decisions on Zoological Nomenclature, page 36, paragraph 54 (1) (a), the placement of *Emphor* as a synonym of *Ptilihris* does not invalidate the tribal name based on *Emphor*. However, one of us (Moure) is opposed to this principle and believes that the name should be Melitomini.

<sup>2</sup> The name for this tribe should be Centridini, the form used by Moure (not Centrini, as used by Cockerell and Cockerell, 1901, and most subsequent authors), for it is based probably on the Greek *Centris*, genitive *Centridos*. The word was also used in Latin, with the genitive *Centridis*. In either case the tribal name must be Centridini.

In the descriptions, in order to save space, many expressions (e.g., face narrow) are used that mean little without either comparative information or further explanations. The following paragraphs are not intended as an exposition on the characters in general but rather as an explanation of such expressions. The letters correspond to the letters used for sections in the generic descriptions.

B. *Face broad* means that the minimum distance between the eyes is equal to or sometimes greater than the length of an eye as in some females of *Tapinorhina*. *Face narrow* means that this distance is less than the eye length, as in the great majority of *Exomalopsini*.

C. *Clypeus strongly protuberant* means that, seen from the side, its lower end lies a distance about equal to the eye width in front of the lower anterior eye margin. *Clypeus moderately protuberant* indicates a distance about three-fourths of the eye width; *clypeus weakly protuberant* indicates a distance about one-half of eye width. The expression *face flat* is used when the entire face is flattened; in such cases the clypeus is only weakly protuberant.

G. This paragraph concerns the forewing; cells are referred to by words, veins by abbreviations. The *basal part of the marginal cell* is the part occupied by submarginal cells; the *free part* is the part distal to them. The submarginal cells are measured along vein M. Lengths of all other cells are maximum lengths, except as otherwise indicated. (For example, among the subgenera of *Exomalopsis*, we make use of a measurement of the length of the marginal cell on the wing mar-

gin. This is a measurement from the apex of the pterostigma to the point where the marginal cell bends away from the wing margin.) *The breadth of the prestigma* (for comparison with the pterostigma) is measured from the inner margin of the prestigma to the costal wing margin. However, in table 4 the breadth of the prestigma is actually that and no more. The hairs of the distal parts of the wings (beyond venation) are called *undifferentiated* if they are like those of the other parts of the wings; in some groups the bases of the hairs of the distal parts of the wings are swollen so that these regions approach the papillate condition found in the Anthophorini and others.

H. This paragraph concerns the hind wing.

J. Lengths of flagellar segments are measured on the shortest side.

K. *Basitibial plate large* means nearly one-fourth of the total length of the tibia; *moderate sized*, about one-fifth; *small*, about one-sixth; and *very small*, less than one-sixth.

L. The statement as to the relative lengths of anterior and dorsal surfaces of the first tergum applies to both sexes but is included here to avoid a separate paragraph under common characters. *Pygidial plate very broad* means with sides at an angle of nearly 90 degrees; *broad*, about 70 degrees; *moderately broad*, 65 degrees; *narrow*, 45 degrees; *very narrow*, ligulate or even spatulate posteriorly.

M. *Scape slender* means that its diameter is equal to or less than the median ocellar diameter; *scape thick* means that its diameter is greater than that of the ocellus (as in male *Caenonomada*). See J above.



## SYSTEMATIC ACCOUNT

### TRIBE EXOMALOPSINI

THE PRINCIPAL CHARACTERS of this tribe are listed in table 1. As comprised at present, the tribe is American, with its center of abundance in southern South America, but with one genus extending as far north as Nebraska in the United States. Further study may show that the Eurasian Ancylini should be included in this tribe.

The tribe is divisible into several sections, as follows: 1, *Caenonomada*; 2, *Monoeca*; 3, *Ancyloscelis*; 4, *Exomalopsis*, *Isomalopsis*, *Teratognatha*, and *Eremapis*; and 5, *Chalepogenus*, *Lanthanomelissa*, *Tapinotaspis*, and *Paratetrapedia*. These five sections are very different from one another. Number 3 (*Ancyloscelis*) is the most different of all, and 1 and 2 are probably more closely related to 5 than to 3 or 4. One of us (Moure) has considered regarding the five sections as tribes of a subfamily Exomalopsinae. Sections 1, 2, and even 5, each have different features suggestive of *Epicharis* in the Centridini, which indicates that the latter group had its origin from relatives of the existing Exomalopsini. Sections 3 and 5 show certain points of resemblance to the Emphorini, suggesting that that tribe and *Ancyloscelis* may have had a common origin, although the latter genus is highly specialized in many characters. Section 5, in particular, also resembles the Nomadini in many features. The latter tribe has some characters (e.g., volsellae) more primitive than any of the non-parasitic Anthophorinae; therefore it seems likely that the Exomalopsini and the Nomadini arose from an extinct, non-parasitic ancestor, and that each retained certain primitive features but became specialized in others.

A classificatory problem of great difficulty exists in section 5 (*Chalepogenus*, *Lanthanomelissa*, *Tapinotaspis*, and *Paratetrapedia*). These genera and their subgenera can be arranged in such a way as to form steps in a graded series from *Lophopedia* and *Paratetrapedia* at one extreme to *Tapinotaspis* at the other. Certain characters, selected as probably indicative of phylogenetic relationships, are summarized in table 3 for all subgroups of section 5. Asterisks are used to mark

what are considered to be the major changes in the series for several of the characters. For other features, which do not vary in such a consistent manner but are alike for groups high and low in the table and differ in intermediate forms, a dagger (†) has been used to mark the changes in the series. It will be noted that these marks (\*, †) are concentrated in the middle of the table, which indicates that there is less variation among the groups at the extremes than among those in the middle. The greatest number of marks at any one level indicates a difference between *Trigonopedia* and the forms above it and *Lanthanella* and the forms below. There are, however, changes in numbers at all levels, as can be deduced from the total scores in the column farthest to the right in table 3, and forms such as *Lanthanomelissa*, just below the line of most abrupt change, are more similar to forms such as *Arhysocele*, above this line, than either is to extreme forms such as *Lophopedia* and *Tapinotaspis*. From the point of view of phylogeny, we can interpret these facts as suggesting that there have been two main lines of evolution, one towards the large tropical groups at the top of the table, the other towards the primarily austral groups at the bottom of the table, and that a few survivors, most notably *Chalepogenus* and *Lanthanomelissa*, of the ancestral stock exist as small or monotypic austral groups. This explanation is supported by a study of the characters concerned in comparison with those of other bees. The groups in the middle of the table have more features in common with various related bees, and therefore are probably primitive in more characters, than are groups at the extremes.

The existence of a graded series of this sort, which facilitates phylogenetic explanation, hinders classification in convenient units. We are agreed that to place all the forms concerned in a single genus would unite insects very much more different than is customary among bees. One of us (Moure) advocates the recognition of most of the groups listed in table 3 as genera. The other (Michener), preferring larger genera and believing that recognition of all the groups as genera

TABLE 3

SOME CHARACTERS IN THE *Paratetrapedia-Tapinotaspis* GROUP

(Number 1 indicates agreement with statement at top of each column; the highest number in each column, the opposite condition, stated in parentheses. Intermediate numbers indicate intermediate conditions. For this summary, certain variations and other matters were ignored, as details of these and other characters are described under genera and subgenera concerned. Asterisks and daggers explained in text.)

	Punctuation of Face Coarse (Absent)	Convex Areas Next to Eyes (Absent)	Preoccipital Carina (Absent)	Prothoracic Carina (Absent)	Mesonotal Pubescence Short (Long)	Thorax High (Flattened)	Marginal Cell Long (Short)	Pterostigma Large (Small)	Prestigma Very Short (Long)	Fore Tarsal Comb Strong (Absent)	Basitibial Plate in Female Small (Large)	Inner Tibial Spur Serrate (Coarsely Pectinate)	Pygidial Plate in Female with Spatulate Apex (Normal)	Pygidial Plate in Male Absent (Present)	Total Scores
<i>Lophopedia</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
<i>Paratetrapedia</i>	1	1	1	2	1	1	1	1	1	1	1	1*	1	1	15
<i>Amphipedia</i>	1	1	1	2	1	1	1	1	1	1	2†	2	1*	1	17
<i>Tropidopedia</i>	1	1	1	2*	1	1	1	1	1	1	3	2	4	1	21
<i>Xanthopedia</i>	1*	1*	1†	3	1	1	2	1	1	1	3	2	2	1	21
<i>Arhysocele</i>	2	2	2	3	1	1	2	1	2	1	3	2	2	1	25
<i>Trigonopedia</i>	2	2	2	3	1†	1	1	1*	2	1*	3†	2	3	1*	25
<i>Lanthanella</i>	2	2	2	3	2	1	2	2	2	3	2	2	3	2	30
<i>Lanthanomesella</i>	2	2	2	3	2	1*	2*	2	2	3	2	2	3	3	31
<i>Chalepogenus</i>	2	2	2	3	1†	2	4	2	2*	2	2	2	3	2	33
<i>Tapinorhina</i>	2	2	2	3	2	2	3	2	3	2	2	3	3	2	33
<i>Tapinotaspoides</i>	2	2	1†	3	2	2	3	2	3	3	2	3	3	3	34
<i>Tapinotaspis</i>	2	2	2	3	2	2	3	2	3	3	2	4	3	3	36

would obscure the phylogenetic division into two main lines, suggests the classification indicated in the following pages. He admits its artificiality, however, for he was almost forced to separate two genera, *Lanthanomesella* (with *Lanthanella*) and *Chalepogenus*, from the center of table 3 in order to make the two large genera, *Paratetrapedia* and *Tapinotaspis*, sufficiently different to be invariably distinguishable. He believes, however, that generic recognition of such presumably relict types is easily justifiable in this case. Table 4 is a summary of the characters that separate the four genera.

GENUS *PARATETRAPEDIA* MOURE

COMMON CHARACTERS: A. Body black or red, with or without yellow markings, often with faint, dark blue reflections. *Pubescence*

*short and in general sparse, mesonotum usually with only a fine bloom of exceedingly short hairs, but sometimes with scattered longer hairs, half as long as antennal diameters or (in one species of Trigonopedia) even longer. Metasoma very sparsely hairy, usually shining, without pubescent fasciae. B. Face narrow; orbits converging below; interocular distance more than to less than ocellular distance; upper paraocular areas smooth to punctured, concave; preoccipital carina usually present, if absent, head abruptly declivous close behind eyes, not rounded; paraocular carina absent or represented by convexities; malar area linear. C. Clypeus moderately to strongly protuberant, nearly reaching orbit to separated from it by about one-third of antennal diameter; labrum 1.6 to 2 times as broad as long. D. Mandible*

TABLE 4

SOME CHARACTERS OF THE GENERA *Paratetrapedia*, *Lanthanomelissa*, *Chalepogenus*, AND *Tapinotaspis*

	<i>Paratetrapedia</i>	<i>Lanthanomelissa</i>	<i>Chalepogenus</i>	<i>Tapinotaspis</i>
Body	With or without yellow markings	With yellow markings	With yellow markings	Without yellow markings (except face marks of some males)
Mesoscutum	With only exceedingly short hairs (sometimes with scattered hairs, denser laterally, about half as long as antennal diameter)	With abundant hairs as long or nearly as long as antennal diameter	With exceedingly short hairs, a few about half as long as antennal diameter	With at least some hairs as long as antennal diameter (except in some females of <i>Tapinotaspisoides</i> )
Anterior basitarsus	With distinct comb (except in male of <i>Tropidopedia</i> )	Without comb	With comb (not very strong)	Without or with weak comb
Prestigma	Broader than long to little longer than broad, sometimes 1.5 times as long as broad or even a little longer	About 1.5 times as long as broad	Almost 2 times as long as broad	About 2 times as long as broad
Stigma	Large, markedly broader than prestigma (smallest in some <i>Xanthopedia</i> and <i>Arhysoclele</i> )	Large, somewhat broader than prestigma	Little if any broader than prestigma	A little broader than prestigma
Marginal cell	1.2-1.8 times as long as distance from its apex to wing tip	1.1-1.2 times as long as distance from its apex to wing tip	As long as distance from apex to wing tip	1.0-1.15 times as long as distance from its apex to wing tip
Thorax	Not flattened, scutellum almost always more strongly convex medially or posteriorly than elsewhere so that posterior part is declivous; metanotum strongly convex in profile when scutellum is weakly so; metanotum and propodeum steeply declivous	Not flattened, scutellum evenly convex, metanotum convex seen in profile, metanotum and propodeum steeply declivous	Somewhat flattened, scutellum evenly and slightly convex seen in profile, metanotum and propodeum slanting to the rear	Flattened. Scutellum evenly and weakly convex, metanotum seen in profile hardly convex; metanotum and propodeum slanting to rear
Seventh tergum of male	Without defined pygidial plate	With flat apical process which is unusually margined by carinae to form pygidial plate	With pygidial plate defined by carinae and projecting as process	With pygidial plate defined by carinae and projecting as process
Metasomal terga	With posterior margins broadly smooth and usually hairless except at extreme sides	Usually hairy apically	With continuous apical hair bands	With apical bands of plumose hair at least laterally

with articulations about equidistant from eye or sometimes posterior one farther from eye than anterior; mandible with inner subapical tooth and in some species of both *Paratetrapedia*, *sensu stricto*, and *Lophopedia* with a third tooth formed from the inner upper carina<sup>1</sup>; posterior articulation behind median axis of eye and usually below posterior margin of eye. E. Distal part of galea longer than eye; *maxillary palpus* six-segmented (rarely five-segmented in *Trigonopedia*), *one-fifth, or usually one-fourth to one-third, or rarely almost half of length of distal part of galea*. First segment of labial palpus 1.5 to 2 times as long as second. F. Pronotum with transverse carina or not; scutellum convex, posterior part usually more strongly so than rest or at least *posterior part of scutellum more or less distinctly declivous; metanotum and propodeum declivous*, the former often strongly convex. G. *Marginal cell* pointed (often bluntly), *1.2 to 1.8 times as long as distance from apex to wing tip*, about four times as long as broad, basal part slightly shorter than or equal to free part; first submarginal cell slightly shorter than or rarely equal to third, second shorter than or equal to first; *pterostigma large, five to seven times as long as prestigma (which is usually little if any longer than broad but in Arhysoceble and especially Trigonopedia may be nearly twice as long as broad), broader than prestigma*; cu-v basal to or interstitial with M; first media subequal to or longer than marginal cell; second media distinctly shorter than second cubital cell. Hairs of distal portions of wings not differentiated. H. Second abscissa of M+Cu little longer than (in some *Arhysoceble*) or usually one and one-half to two times as long as cu-v one-half to two-thirds as long as M; jugal lobe one-half to over three-fourths as long as cubital cell. I. Arolia present; *anterior basitarsus with strong comb on outer margin* (weak and partially obscured by other hairs in males of *Tropidopedia*), middle basitarsus without comb.

FEMALE: J. Scape slender, much longer than interantennal distance, flagellum with first segment one-half to one-third of length of scape, slightly shorter than to longer than

second and third segments together, second broader than long and shorter than third. K. Basitibial plate very small to large, clearly defined, dull or shining; tibial spurs usually curved at apices, finely serrate, or inner hind spur finely but rather broadly pectinate. Scopa dense, of long simple hairs with shorter, strongly and finely plumose hairs among them. Hind basitarsus two-thirds to three-fourths as long as tibia, about as broad as or broader than tibia, strongly flattened, extending beyond base of second segment. L. First metasomal tergum without transverse carina except sometimes at summit of depression of anterior surface (*Trigonopedia*), dorsal surface shorter than to almost equal to anterior surface. Pygidial plate very broad or with apex very narrow but always with basal part broad, lateral margins straight to concave, apex rounded or subtruncate (marginal carinae sometimes meeting in acute point before apex of plate), gradulus absent lateral to plate.

MALE: M. Scape slender, longer or usually much longer than interantennal distance, flagellum with *first segment* one-half to one-fourth of length of scape, as broad as long or usually longer than broad, shorter than next two segments together and sometimes shorter than third alone but *longer than second*, second broader than long and shorter than third, subapical flagellar segment as long as broad (in *Arhysoceble*) or longer; apical normal. N. Posterior leg not swollen; tibial spurs as in female; middle basitarsus as long as tibia or nearly so; posterior basitarsus less than two-thirds to nearly three-fourths as long as tibia, two-thirds as broad (in *Arhysoceble*) to as broad as tibia, flattened, apex broadly truncate or subtruncate, with second segment arising from one angle, *opposite angle not or scarcely beyond base of second segment*. O. *Seventh tergum rounded or pointed, without defined pygidial plate*. P. Metasomal sterna with fringes of hairs, at least as lateral patches on fourth and fifth sterna, and usually with conspicuous fringes of specialized hairs on these and some of the other sterna; sixth sternum rounded or pointed posteriorly, without special structures except sometimes a median carina and various hair tufts. Q. Seventh sternum with postapodemal part bearing two large, setiferous lobes, sometimes

<sup>1</sup> The inner subapical tooth is at the end of the outer upper carina. The terminology of the mandibular carinae is that of Moure and Michener (1955).

weakly attached to disc of sternum (as in *Tapinotaspis*) but more commonly firmly attached; eighth sternum with large, deeply bifid, postapodemal part. R. Genitalia with spatha large; penis valves with ventrobasal tooth, without or with small outer tooth; inner apical lobes of gonocoxites present or absent; gonocoxites more or less approximate dorsally, gonostylus long.

#### SUBGENUS TRIGONOPEDIA MOURE

*Trigonopedia* MOURE, 1941, Rev. Ent., Rio de Janeiro, vol. 12, p. 518. Type species: *Trigonopedia oligotricha* Moure, 1941 (original designation).

COMMON CHARACTERS: 1. Body black to red, sometimes with yellow face marks and yellowish ferruginous thoracic markings. 2. Upper paraocular areas smooth; *face with only fine, sparse punctures*. 3. *Preoccipital carina strong*, extending laterally behind eyes (at least as a strong ridge), separated from eyes by more than antennal diameter. 4. *Paraocular area not convex* or with feeble convexity near orbit below. 5. Posterior mandibular articulation below posterior margin of eye. Maxillary palpus one-fourth or rarely one-fifth of length of distal part of galea. 6. *Pronotum usually without transverse carina* but with ridge, ends of which are quite elevated; scutellum, seen in profile, moderately to strongly convex, posterior portion moderately to strongly declivous. 7. Marginal cell at least 1.4 times as long as distance from apex to wing tip (first submarginal cell strongly convex on posterior side); first media subequal to marginal cell in length.

FEMALE: 8. *Basitibial plate large*, nearly one-fourth of length of tibia, dull; *inner hind tibial spur much more broadly pectinate than outer*. 9. Pygidial plate broad or moderately broad, *lateral margins nearly straight, converging posteriorly*.

MALE: 10. First flagellar segment one-third of length of scape or less, shorter than or equal to third segment, second twice or less than twice as broad as long. 11. Basitibial plate distinct. 12. Seventh tergum with apex rather broadly rounded; sterna 2 to 5 with apical fringes of specialized hairs. 13. Seventh sternum with two large hairy lobes weakly connected to disc of sternum, much as in *Tapinotaspis*; eighth sternum with few hairs,

form as shown in figure 2; gonocoxite with inner apical lobe absent.

The subgenus *Trigonopedia* contains several species having very much the appearance of *Paratetrapedia*, *sensu stricto*, and the subgenus *Tapinotaspoides* of *Tapinotaspis*. They are moderate-sized to large species, the outstanding subgeneric characters of which are italicized in the above description. Included species are *Paratetrapedia* (*Trigonopedia*) *ferruginea* (Fries), *glaberrima* (Fries), *michaelis* (Fries), *oligotricha* (Moure) [*Trigonopedia*], and an unidentified species. (Except as otherwise indicated, all were described in *Tetrapedia*.) All are from Brazil.

#### SUBGENUS ARHYSOCEBLE MOURE

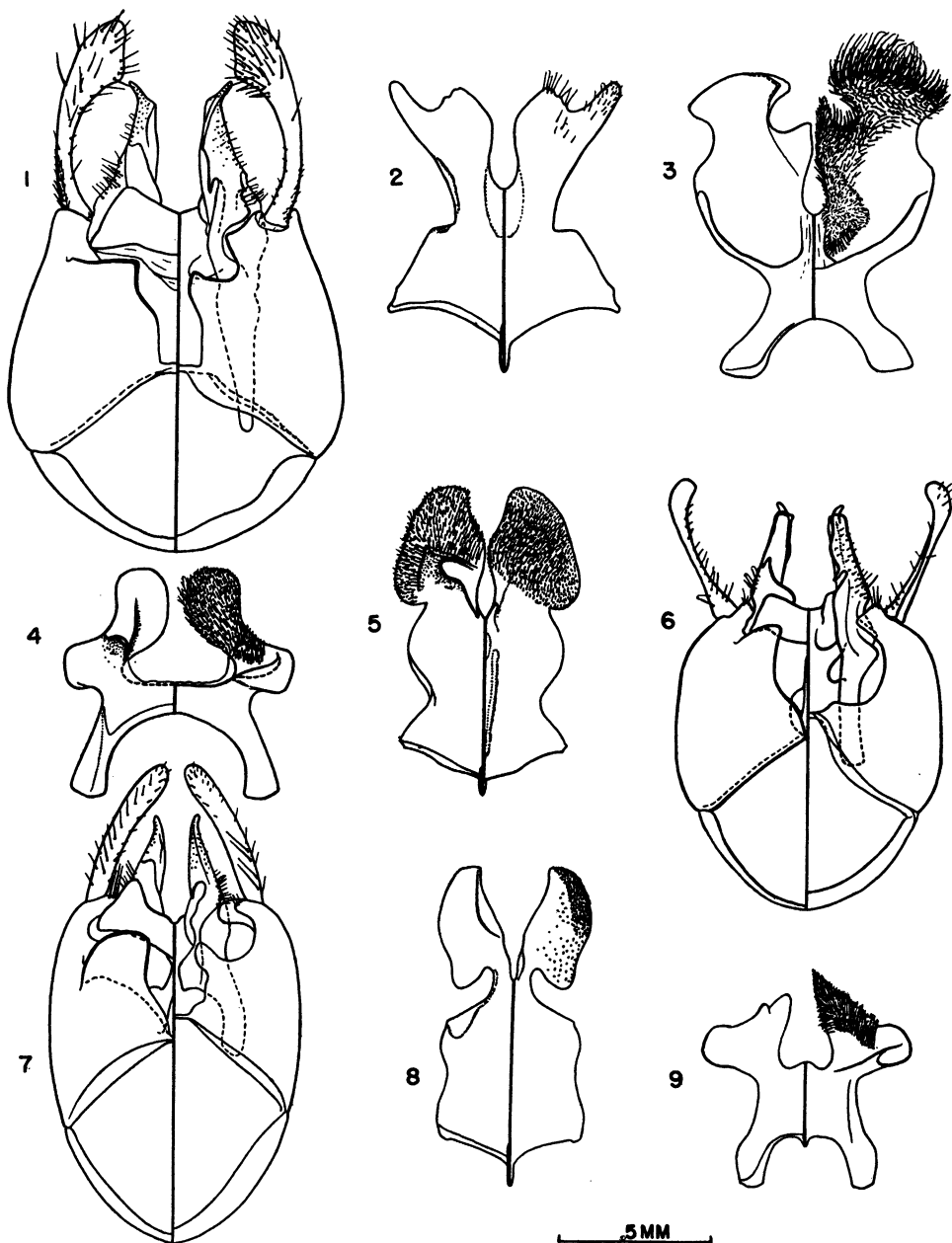
*Arhysocele* MOURE, 1948, Rev. Ent., Rio de Janeiro, vol. 19, p. 335. Type species: *Arhysocele xanthopoda* Moure, 1948 (original designation).

COMMON CHARACTERS: 1. Body black, with yellow markings on head and thorax and usually with yellow fasciae on abdomen. 2. Upper paraocular areas smooth; *face with only fine sparse punctures*. 3. *Preoccipital carina absent*. 4. *Paraocular area not convex*. 5. *Posterior mandibular articulation behind median axis of eye*. 6. *Pronotum without transverse carina*; scutellum, seen in profile, strongly convex so that posterior portion is strongly declivous. 7. Marginal cell less than 1.4 times as long as distance from apex to wing tip; first media longer than marginal cell.

FEMALE: 8. *Basitibial plate large*, between one-fourth and one-fifth of length of tibia, dull; *inner hind tibial spur much more broadly pectinate than outer*. 9. Pygidial plate with lateral margins strongly concave subapically so that *apical portion is parallel-sided or constricted subapically*, more anterior portion with sides nearly straight and converging posteriorly.

MALE: 10. *First flagellar segment* one-half to one-third of length of scape, *equal to or longer than second plus third*, second twice as broad as long or broader. 11. Basitibial plate distinct. 12. Seventh tergum broadly to narrowly rounded at apex; sterna 3 to 5 with strong apical fringes, two without or with weak fringe. 13. Seventh sternum with apical lobes of moderate size (fig. 5), eighth with hairy apical lobes; gonocoxite with inner apical lobe represented by hairy projection.





FIGS. 1-3. *Paratetrapedia (Trigonopedia) oligotricha* (Moure), male; genitalia, eighth and seventh sterna.

FIGS. 4-6. *Paratetrapedia (Arhysocele) melampoda* (Moure), male; seventh and eighth sterna, genitalia.

FIGS. 7-9. *Paratetrapedia (Xanthopedia) globulosa* (Fries), male; genitalia, eighth and seventh sterna.

This subgenus, containing rather small black and yellow species, is in many ways the most distinctive subgenus of *Paratetrapedia*, although connected through *Xanthopodia* to other subgenera. The more distinctive characters of *Arhysoceble* are italicized in the above description. Included species are *Paratetrapedia* (*Arhysoceble*) *dichroopoda* (Moure) [*Arhysoceble*], *melampoda* (Moure) [*Arhysoceble*], *picta* (Friese) [*Tetrapedia*], *xanthopoda* (Moure) [*Arhysoceble*], and *huberi* (Ducke) [*Tetrapedia*]. They range from Argentina to Ceará (northeastern Brazil).

#### XANTHOPEDIA, NEW SUBGENUS

TYPE SPECIES: *Paratetrapedia tricolor*, new species.

COMMON CHARACTERS: 1. Body black to red, with yellow marks on head and thorax and yellow fasciae on abdomen or abdomen entirely ferruginous. 2. Upper paraocular areas punctured to nearly smooth; *frons*, *supraclypeal area*, and *clypeus* with at least some punctures coarser than those found elsewhere. 3. *Preoccipital carina* present (sometimes merely a rounded ridge), extending laterally behind eyes or not, separated from eyes (when behind them) by one-half of antennal diameter to nearly antennal diameter. 4. *Paraocular area*, next to orbit, convex (probably representing paraocular carina). 5. Posterior mandibular articulation below posterior margin of eye. Maxillary palpus one-fourth to over one-third of length of distal part of galea. 6. *Pronotum* without transverse carina; scutellum, seen in profile, strongly convex so that posterior portion is strongly declivous. 7. Marginal cell less than 1.4 times as long as distance from apex to wing tip; first media longer than marginal cell.

FEMALE: 8. *Basitibial plate* large, almost one-fourth of length of tibia, dull; *inner hind tibial spur* much more broadly pectinate than outer. 9. *Pygidial plate* with lateral margins very weakly concave, so that the plate is narrow but with no distinguishable apical portion, or with lateral margins distinctly to strongly concave subapically, so that apical portion is parallel-sided or constricted subapically and anterior portion has sides nearly straight and converging posteriorly.

MALE: 10. First flagellar segment less than one-third of length of scape, shorter than

third segment, second twice as broad as long. 11. *Basitibial plate* distinct. 12. Seventh tergum produced to narrowly rounded apex much more robust than in *Paratetrapedia*, *sensu stricto*; sterna 2 to 5 with apical fringes, weak on second and third, strong on fourth and fifth, the margins of which are concave. 13. Seventh sternum with rather small, hairy, apical lobes; eighth much constricted at bases of hairless but spiculate apical lobes, gonocoxite with inner apical lobe directed inward.

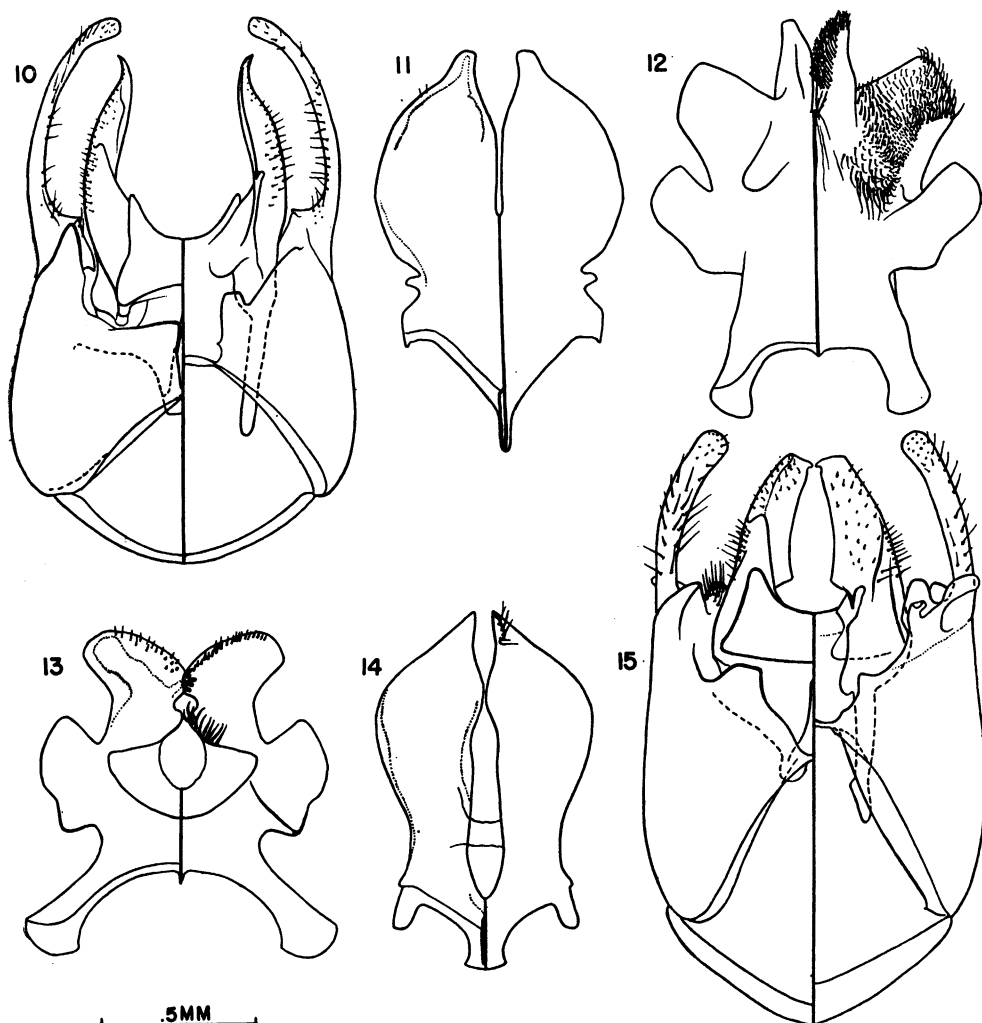
This subgenus includes small species known from Panama to Bolivia and southern Brazil. Their outstanding features are italicized in the above description. Included species are *tricolor* (Michener and Moure), *globulosa* (Friese) [*Tetrapedia*], and two apparently undescribed species. (The name *globulosa* is used in the sense of Michener, 1954; whether it is really the *Tetrapedia globulosa* of Friese is not certain.)

#### TROPIDOPEDIA, NEW SUBGENUS

TYPE SPECIES: *Paratetrapedia seabrai*, new species.

COMMON CHARACTERS: 1. Body yellow or ferruginous, with black on dorsum of head and sometimes thorax and with yellow marks on head and thorax and dusky areas on abdomen. 2. Upper paraocular area only finely punctured; *frons*, *supraclypeal area*, and *clypeus* with coarse punctures; *supraclypeal area* with strong transverse carina immediately above epistomal suture. 3. *Preoccipital carina* strong, not extending laterally behind eyes, separated from eyes by about antennal diameter. 4. *Paraocular area*, next to orbit, convex (probably representing paraocular carina). 5. Posterior mandibular articulation below posterior margin of eye. Maxillary palpus one-fourth or one-third of length of distal part of galea. 6. *Pronotum* with strong transverse carina, surface immediately anterior to carina slightly concave seen in profile; scutellum, seen in profile, strongly convex so that posterior portion is strongly declivous. 7. Marginal cell more than 1.4 times as long as distance from apex to wing tip; first media subequal to marginal cell.

FEMALE: 8. *Anterior basitarsus* extending as short lobe lateral to base of second segment. *Basitibial plate* large, over one-fifth of length of tibia, largely dull; *inner hind tibial spur*



FIGS. 10-12. *Paratetrapedia* (*Tropidopedia*) *seabrai*, new species, male; genitalia, eighth and seventh sterna.

FIGS. 13-15. *Paratetrapedia* (*Amphipedia*) *haeckeli* (Fries), male; seventh and eighth sterna, genitalia.

much more broadly pectinate than outer. 9. Pygidial plate very broad, lateral margins straight and converging posteriorly.

MALE: 10. First flagellar segment one-half of length of scape, longer than third but shorter than second plus third, second about twice as broad as long. (Comb of anterior basitarsus a mere fringe of hairs, inconspicuous because of adjacent hairs.) 11. Basitibial plate distinct. 12. Seventh tergum with narrowly rounded apical process more robust than in *Paratetrapedia*, *sensu stricto*, sterna 3 to 5 almost without fringes, fringes evident sublaterally (but without specialized hairs) on fifth and espe-

cially fourth sterna. (Sterna 3 to 5 apparently emarginate medially, actually with emarginations bridged by transparent material so that only fourth and fifth are shallowly emarginate; subapical median area of second sternum with short, semi-erect hairs.) 13. Seventh sternum with large apical hairy lobes; eighth sternum with few hairs (spiculum subtruncate); gonocoxite with inner apical lobe distinct, hairy.

The most distinctive features of this subgenus are italicized in the above description. The transverse carina at the lower margin of the supraclypeal area is found only in this

subgenus and *Amphipedia*, but *Tropidopedia* differs further from *Paratetrapedia*, *sensu stricto*, and *Amphipedia*, which it resembles superficially, in the characters italicized under 8, 9, 10, 11, and 12 above (those listed under 12 are much as in *Amphipedia*).

The subgenus includes at least two species, one from the Amazon Valley which we determine as *Paratetrapedia* (*Tropidopedia*) *duckei* (Friese) [*Tetrapedia*], the other, *seabrai*, from near Rio de Janeiro. As there exists a species of *Paratetrapedia*, *sensu stricto*, which agrees quite well with Friese's description of *duckei*, and as we have not seen the types, we can only state that we believe our identification to be correct. We have seen specimens labeled *duckei* from the Ducke collection at the Museu Goeldi, Belém, Pará, and the Departamento de Zoologia, Secretaria de Agricultura, São Paulo, Brazil.

#### AMPHIPEDIA, NEW SUBGENUS

TYPE SPECIES: *Tetrapedia haeckeli* Friese, 1910.

COMMON CHARACTERS: 1. Body black, with yellow marks on head and thorax and yellow fasciae on metasoma. 2. Upper paraocular areas only finely punctured; frons, supraclypeal area, and clypeus with coarse punctures; supraclypeal area of male with strong transverse carina overhanging epistomal suture, of female with this carina weakly indicated. 3. Preoccipital carina strong, extending laterally behind eyes, separated from eyes by more than antennal diameter. 4. Paraocular area next to orbit convex (probably representing paraocular carina). 5. Posterior mandibular articulation below posterior margin of eye. Maxillary palpus one-third or one-fourth of length of distal part of galea. 6. Pronotum with strong transverse carina, surface immediately anterior to carina straight seen in profile; scutellum, seen in profile, moderately convex so that posterior part is moderately declivous. 7. Marginal cell more than 1.4 times as long as distance from apex to wing tip; first media subequal to marginal cell.

FEMALE: 8. Basitibial plate small, more than one-sixth of length of tibia, dull (without shining excavated submarginal area found in *Paratetrapedia*, *sensu stricto*, and *Lophopedia*); inner hind tibial spur more broadly pectinate than outer. 8. Pygidial plate as in

*Paratetrapedia*, *sensu stricto*, but lateral carinae of basal part meeting in very obtuse angle at base of apical spatulate plate.

MALE: 10. First flagellar segment about two-fifths of length of scape, subequal to third, second about twice as broad as long. 11. Basitibial plate with margins recognizable but not overhanging. 12. Seventh tergum with acute apical point, more robust than that of *Paratetrapedia*, *sensu stricto*, sterna 2, 3, and 5 without specialized fringes but with some ordinary hairs laterally, sternum 4 with sub-lateral sections of fringe of specialized hairs. (Sterna 3 to 5 apparently emarginate medially; actually emarginations bridged by transparent material so that only fourth and fifth are shallowly emarginate.) 13. Seventh sternum with large apical lobes with a few specialized hairs; eighth sternum without hairs; gonocoxite with inner apical lobe large, hairy.

This subgenus, so far as we know, includes only one species, *Paratetrapedia* (*Amphipedia*) *haeckeli* (Friese), from Brazil. It is similar to *Tropidopedia* in many characters but differs in those italicized above. In the italicized characters listed under 8 and 9 above, it resembles *Paratetrapedia*, *sensu stricto*, and *Lophopedia*; the basitibial plate is larger than in those subgenera and dull, yet much smaller than in other subgenera.

Our determination of *haeckeli* is based on the description and on a specimen identified by Friese, kindly lent for study by the Departamento de Zoologia, Secretaria de Agricultura do Estado de São Paulo, Brazil.

#### LOPHOPEDIA, NEW SUBGENUS

TYPE SPECIES: *Tetrapedia pygmaea* Schrottky, 1902.

COMMON CHARACTERS: 1. Body entirely black (sometimes with pale face marks in male) to ferruginous, or rarely with yellow marks on head and thorax and yellow fasciae on abdomen. 2. Upper paraocular areas punctured, at least marginally; frons, supraclypeal area, and clypeus with coarse punctures. 3. Preoccipital carina strong, extending laterally behind eyes, separated from eyes by antennal diameter or less. 4. Paraocular area, next to orbit, convex (probably representing paraocular carina). 5. Posterior mandibular articulation below posterior margin of eye; maxillary palpus one-fourth to one-third of

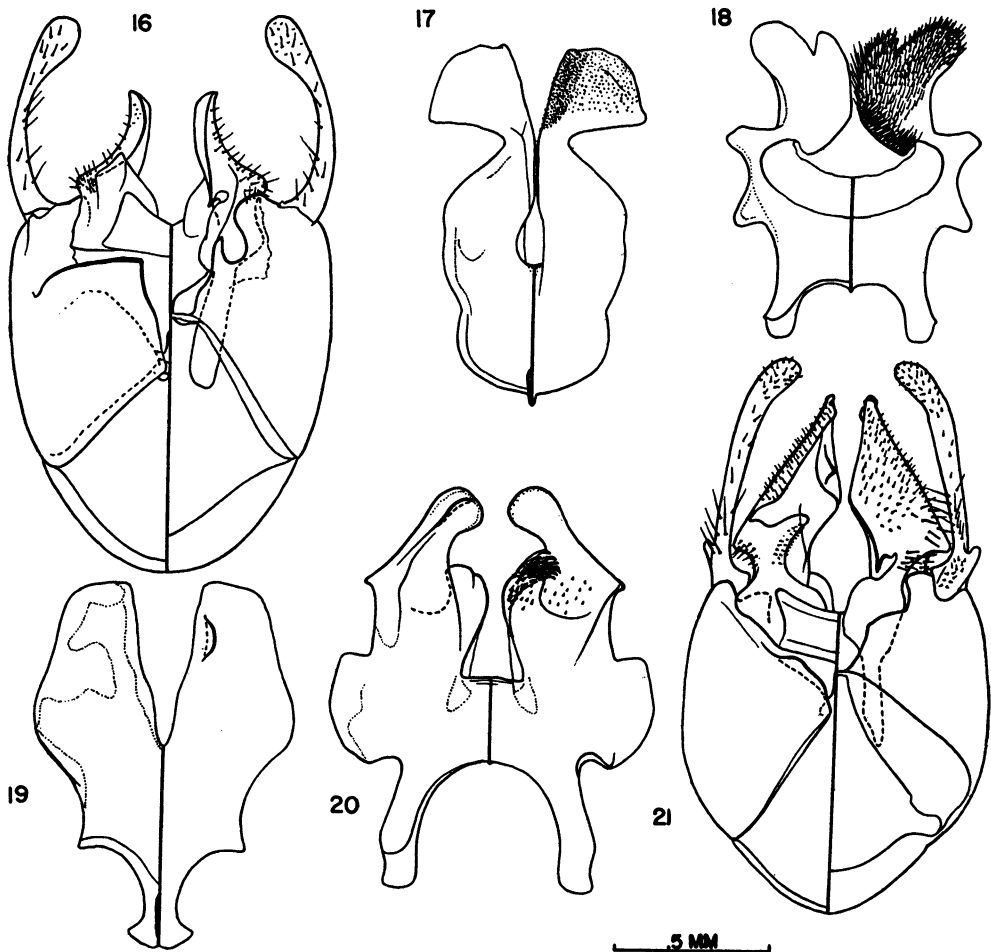
length of distal part of galea. 6. *Pronotum with high, translucent, transverse lamella, so that surface of pronotum immediately anterior to lamella is concave seen in profile; scutellum, seen in profile, strongly convex so that posterior portion is strongly declivous.* 7. Marginal cell more than 1.4 times as long as distance from apex to wing tip; first media subequal to marginal cell.

FEMALE: 8. Basitibial plate very small, less than one-sixth of length of tibia, shining, excavated submarginally; inner hind tibial spur very narrowly pectinate or serrate, like outer. 9. Pygidial plate as in *Paratetrapedia*, *sensu stricto*.

MALE: 10. First flagellar segment one-

third of length of scape or less, equal to or sometimes shorter than third, second about twice as broad as long. 11. Basitibial plate obsolete, margins almost unrecognizable laterally. 12. Seventh metasomal tergum produced to acute hairy process; *second and third sterna without or with weak fringes*, fourth with strong fringe of specialized hairs, fifth without or almost without fringe. 13. Seventh sternum with apical lobes large, hairy; eighth sternum hairless but spiculate, strongly constricted at bases of apical lobes; gonocoxite with inner apical lobe present, often extremely small, hairless (*gonostylus without outer basal lobe*).

This subgenus is related to *Paratetrapedia*,



FIGS. 16-18. *Paratetrapedia (Lophopedia) pygmaea* (Schrottky), male; genitalia, eighth and seventh sterna.

FIGS. 19-21. *Paratetrapedia (Paratetrapedia) lineata* (Spinola), male; eighth and seventh sterna and genitalia.



*sensu stricto*. The characters italicized under 2, 3, 4, 6, 8, and 9 in the description of that subgenus are the more important common features that indicate this relationship. This subgenus differs from *Paratetrapedia*, *sensu stricto*, however, by a number of characters, the more noteworthy of which are italicized in the above description. The species are, on the average, smaller than those of *Paratetrapedia*, *sensu stricto*.

*Lophopedia*, like *Paratetrapedia*, *sensu stricto*, ranges from tropical Mexico to Bolivia and southern Brazil, and appears to inhabit principally moist zones. Included species are *acuta* (Vachal), *albipes* (Fries), *apicalis* (Cresson), *bicolor* (Smith), *nigriceps* (Fries), *puncticollis* (Fries), *pygmaea* (Schrottky), and *tarsalis* (Vachal) [all described in the genus *Tetrapedia*], and doubtless many others.

SUBGENUS **PARATETRAPEDIA** MOURE,  
SENSU STRICTO

*Paratetrapedia* MOURE, 1941, Rev. Ent., Rio de Janeiro, vol. 12, p. 517. Type species: *Ancyloscelis lineata* Spinola, 1853 (original designation).

*Chalepogenoides* MICHENER, 1942, Jour. New York Ent. Soc., vol. 50, p. 279. Type species: *Chalepogenus leucostoma* Cockerell, 1923 (original designation).

**COMMON CHARACTERS:** 1. Body entirely black (usually with pale face marks in male) or rarely ferruginous, rarely with yellow marks on head and thorax and yellowish fasciae on abdomen. 2. Upper paraocular areas punctured; *frons*, *supraclypeal area*, and especially *clypeus* with coarse punctures. 3. *Preoccipital carina* strong, extending laterally behind eyes, separated from eyes by more than antennal diameter. 4. *Paraocular area*, next to orbit, convex, sometimes almost cariniform (representing paraocular carina). 5. Posterior mandibular articulation below posterior margin of eye. Maxillary palpus one-fourth to one-third of length of distal part of galea. 6. *Pronotum* with strong transverse carina, surface immediately anterior to carina convex; scutellum seen in profile, not strongly convex, posterior portion only moderately declivous. 7. Marginal cell more than 1.4 times as long as distance from apex to wing tip; first media subequal to marginal cell.

**FEMALE:** 8. Outer margin of second anterior tarsal segment with a greatly thickened,

hooked bristle. Basitibial plate very small, less than one-sixth of length of tibia, shining, excavated submarginally; inner hind tibial spur very narrowly pectinate or serrate, like outer. 9. Pygidial plate with lateral margins strongly concave subapically so that apical portion is constricted subapically to form a spatulate plate at a level below that of rest of pygidial plate; lateral carinae of rest of plate nearly straight, converging posteriorly, and meeting in point at base of apical spatulate plate.

**MALE:** 10. First flagellar segment one-third of length of scape or less, shorter than or equal to third, second less than twice as long as broad. 11. Basitibial plate obsolete, margins almost unrecognizable laterally. 12. Seventh tergum produced to acute hairy process; second sternum without or with weak fringe, third with large area and fringe of specialized hairs, fourth with strong fringe of specialized hairs, fifth without or almost without hairs. 13. Seventh sternum with large apical lobes, variously ornamented with hairs; eighth sternum hairless (*spiculum* broadened, rounded or subtruncate); gonocoxite with inner apical lobe absent (*gonostylus* with basal outer lobe).

This subgenus is most closely related to *Lophopedia*; the principal differentiating characters are italicized in the description of that subgenus and in items 8, 12, and 13 of the above description. The other italicized characters in the above description are the more distinctive features which *Lophopedia* shares with *Paratetrapedia*, *sensu stricto*. A major feature of this subgenus, found in no other, is the curious thick, hooked bristle on the outer margin of the second segment of the anterior tarsus of the female.

It is noteworthy that the mandibles of females of several species of both *Paratetrapedia*, *sensu stricto*, and *Lophopedia* are tridentate (see generic description). This character in both subgenera is usually but not always associated with a ridge (instead of rounded angle) separating the anterior from the lateral surfaces of the mesepisterna.

The subgenus *Paratetrapedia* ranges from tropical Mexico (as far north as the state of Tamaulipas) to Bolivia and southern Brazil. It appears to be a group of moist tropical areas and is absent from the arid coast of Peru. Species included are *P. (P.) amplipennis* (Smith), *bunchosiae* (Fries), *calcarata* (Cresson), *flavipennis* (Smith), *flaviventris*

(Friese), *gigantea* (Schrottky), *leucostoma* (Cockerell) [*Chalepogenus*], *lineata* (Spinola) [*Ancyloscelis*], *lugubris* (Cresson), *maculata* (Friese), *obsoleta* (Schrottky), *testacea* (Smith), *velutina* (Friese), and *xanthaspis* (Cockerell) [*Chalepogenus*] (all described as *Tetrapedia* except as otherwise stated). Many other species must belong to this subgenus, but it is impossible to place species with certainty from the old descriptions. It should be noted that, as we have not seen type material of many of the species listed above, the possibility exists that some of them are misidentified and that therefore certain names listed really belong in other subgenera.

We are indebted to Mr. Karl V. Krombein of the United States Department of Agriculture for notes on the type of *Chalepogenus leucostoma* Cockerell, which is in the United States National Museum.

#### GENUS LANTHANOMELISSA HOLMBERG

COMMON CHARACTERS: A. *Body with yellow marks* including clypeus (in males and in some females) but usually not paraocular areas, and with basal patches or fasciae of yellow on metasomal terga. *Pubescence* of head and thorax long although sparse, that of *mesoscutum much longer than antennal diameter* (except in females of *discrepans*, where it is a little shorter but dense). Metasoma without pubescent fasciae, but posterior portions of terga usually with some hairs. B. Face narrow, orbits strongly converging below; interocular distance greater than ocellocular distance; upper paraocular areas smooth, or nearly so, slightly concave; preoccipital carina absent; paraocular carina absent or virtually so; malar area linear. C. Clypeus moderately protuberant, closely approaching orbits to separated from them by half of flagellar diameter; labrum about twice as broad as long. D. Mandible with articulations equidistant from eye; with strong inner subapical tooth; posterior articulation behind median axis of eye. E. Distal part of galea slightly longer than eye; maxillary palpus six-segmented, two-thirds as long as distal part of galea. First segment of labial palpus longer than second. F. Pronotum not carinate; scutellum uniformly convex; metanotum (which is strongly convex) and base of propodeum strongly slanting, remainder of propodeum

abruptly declivous. G. Marginal cell pointed apically, three and one-half to nearly four times as long as broad, longer than distance from apex to wing tip, basal part slightly shorter than free part; sometimes with two submarginal cells, second much longer than first, sometimes with three submarginal cells, first subequal to or slightly longer than third, second a little shorter; pterostigma large, four to over five times as long as the prestigma (which is about 1.5 times as long as broad), broader than latter; cu-v slightly basal to distal to M; first media subequal to or longer than marginal cell, second media shorter than second cubital. Hairs of distal parts of wings differentiated or not. H. Second abscissa of M+Cu 1.5 to 2 times as long as cu-v and shorter than M; jugal lobe nearly as long as cubital cell. I. Arolia present; anterior and middle basitarsi without combs (although anterior basitarsus of female flattened and with hair pattern suggestive of a comb on outer margin).

FEMALE: J. Scape slender, longer than interantennal distance; flagellum with first segment less than half of length of scape, as long as next two segments together, second segment slightly shorter than third and about twice as broad as long. K. Basitibial plate moderate sized to large, clearly defined, surface dull, with short hairs; middle tibial spur robust, narrowly pectinate, strongly curved at apex; outer hind tibial spur narrowly pectinate, inner broadly and finely pectinate, apices sometimes strongly curved. Scopa dense and rather long, hairs mostly plumose with scattered long simple hairs among plumose ones; hind basitarsus about as broad as tibia, little over half of length of tibia, much flattened. L. First metasomal tergum without transverse carina, dorsal surface much shorter than anterior surface; pygidial plate narrow, sometimes constricted subapically, margins slightly concave, apex rounded, gradulus very weak lateral to plate.

MALE: M. Antenna as described for female (J); subapical *flagellar segment about as broad as long*, apical normal. N. Posterior legs not swollen; tibial spurs as in female; middle basitarsus slightly shorter than tibia, hind two-thirds of length of tibia to slightly shorter than tibia, flattened, nearly as wide as tibia. O. Sixth tergum with apical process, flat-

tened above and sometimes margined to form distinct pygidial plate. P. Third to fifth metasomal sterna with dense subapical fringes of hair; sixth convex, without special structures. Q. Seventh sternum with large postapodemal part which is deeply bilobed, each lobe itself bilobed, inner lobes smaller than outer, all lobes hairy; eighth sternum with large postapodemal part, deeply cleft medially. R. Genitalia with spatha of moderate size; penis valve with ventrobasal tooth, outer tooth absent; inner apical lobe of gonocoxite present, simple, with few to many hairs; gonocoxites approximate dorsally, dorsal bridge short; gonostylus rather long.

#### LANTHANELLA, NEW SUBGENUS

TYPE SPECIES: *Lanthanomelissa* (*Lanthanella*) *completa*, new species.

1. *Forewings with three submarginal cells*; first media as long as marginal cell. 2. Second abscissa of M+Cu of hind wings 1.5 times as long as cu-v and less than half as long as M. *Hairs of distal parts of wings strongly differentiated, with large bases*. 3. Hind basitarsus of male only slightly shorter than tibia. 4. *Seventh metasomal tergum of male pubescent except for longitudinal median line, apical portion a dorsoventrally flattened projecting subtruncate process* which represents pygidial plate but is only very vaguely margined apically.

This subgenus differs from *Lanthanomelissa*, *sensu stricto*, by the characters listed above, the most noteworthy of which are italicized.

We have seen only males of the type species, which is from Argentina.

#### SUBGENUS LANTHANOMELISSA HOLMBERG, SENSU STRICTO

*Lanthanomelissa* HOLMBERG, 1903, An. Mus. Nac. Buenos Aires, ser. 3, vol. 2, p. 418. Type species: *Lanthanomelissa discrepans* Holmberg, 1903 = *Tetrapedia goeldiana* Friese, 1899 (monobasic).

*Schrottkya* FRIESE, 1908, Zeitschr. Syst. Hymenopterologie Dipterologie, vol. 8, p. 170. Type species: *Tetrapedia goeldiana* Friese, 1899 (first included species, Friese, 1908, Flora og Fauna, vol. 10, p. 58).

1. *Forewings usually with two submarginal cells*; first media longer than marginal cell. 2.

Second abscissa of M+Cu of hind wing 1.5 to two times as long as cu-v and almost always more than half as long as M. Hairs of distal parts of wings not or little differentiated. 3. Hind basitarsus of male two-thirds to three-fourths as long as tibia. 4. *Seventh metasomal tergum of male with clearly defined, slender, sometimes almost parallel-sided, pygidial plate*, projecting as rounded or subtruncate apical process, and clearly defined by lateral carinae and surface sculpturing and vestiture on disc of tergum.

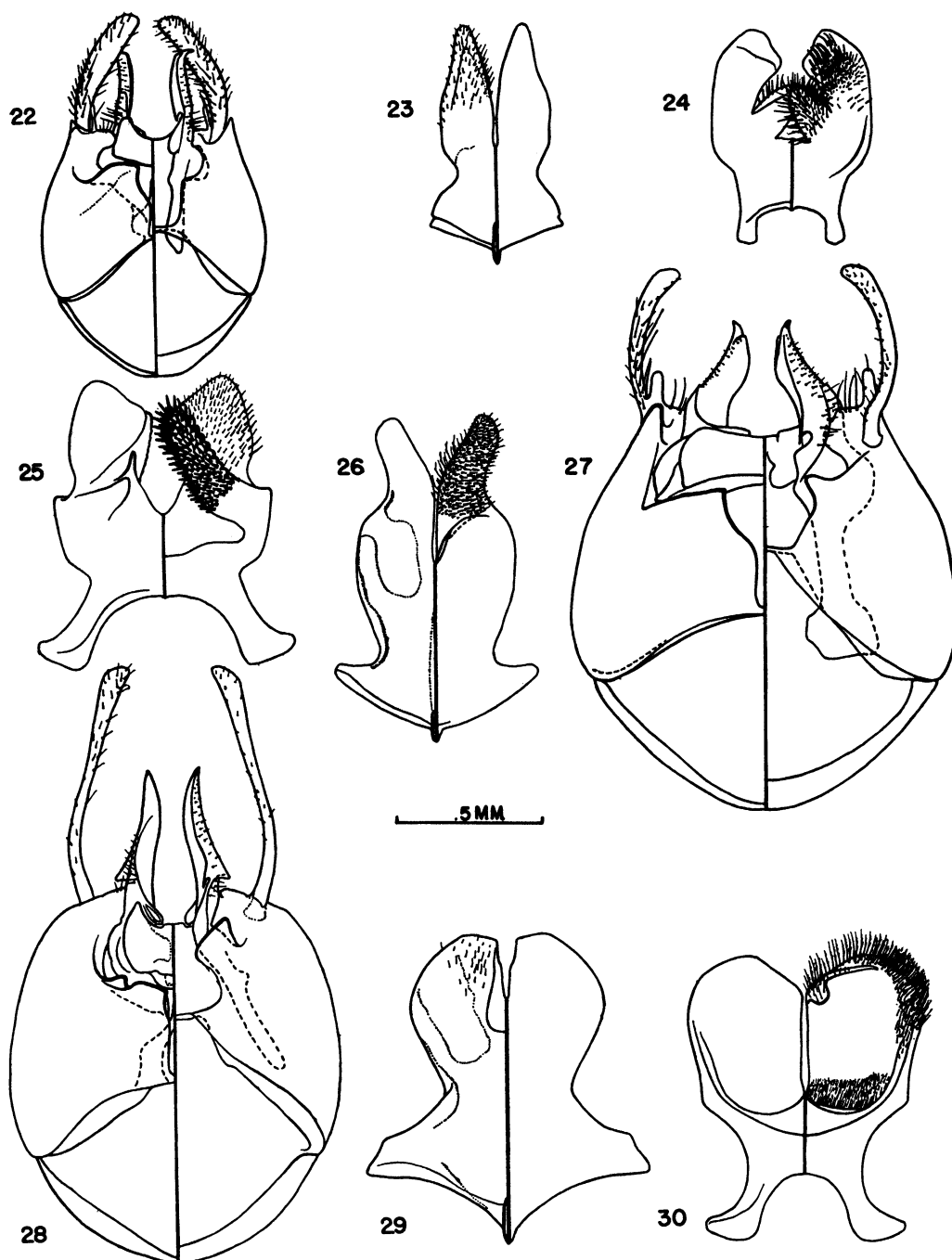
This subgenus contains two or three species from southern Brazil, Paraguay, and Argentina. Brazilian specimens before us are not *L. goeldiana* (Friese) which was described from specimens from "São Paulo?" and which seems to be the same as *L. discrepans* Holmberg from Argentina, as pointed out by various previous authors.

#### GENUS CHALEPOGENUS HOLMBERG

*Chalepogenus* HOLMBERG, 1903, An. Mus. Nac. Buenos Aires, ser. 3, vol. 2, p. 416. Type species: *Chalepogenus incertus* Holmberg, 1903 = *Tetrapedia muelleri* Friese, 1899 (monobasic).

*Desmotetrapedia* SCHROTTKY, 1909, An. Soc. Cien. Argentina, vol. 68, p. 223. Type species: *Tetrapedia muelleri* Friese, 1899 (original designation).

COMMON CHARACTERS: A. Body with yellow markings on face (clypeus, paraocular areas, etc.) and with *basal yellow fasciae on metasomal terga*. *Pubescence* of head and thorax moderately long, sparse, except that of *mesoscutum which is exceedingly short, with a few longer hairs nearly half as long as antennal diameter*. *Metasoma with abundant pubescence on posterior parts of terga, forming apical bands on more posterior terga*. B. Face narrow, orbits strongly converging below; interocular distance greater than ocellocular distance; upper paraocular areas nearly smooth, concave; preoccipital carina absent but angle marking posterior limit of vertex behind ocelli quite sharp, not rounded as in *Lanthanomelissa*; paraocular carina absent; malar area linear. C. Clypeus moderately protuberant, separated from eye by less than one-third of flagellar diameter; labrum nearly twice as broad as long. D. Mandible with articulations equidistant from eye; with strong inner subapical tooth; posterior articulation



FIGS. 22-24. *Lanthanomelissa* (*Lanthanomelissa*) *goeldiana* (Fries), male; genitalia, eighth and seventh sterna.

FIGS. 25-27. *Lanthanomelissa* (*Lanthanella*) *completa*, new species, male; seventh and eighth sterna, genitalia.

FIGS. 28-30. *Chalepogenus muelleri* (Fries), male; genitalia, eighth and seventh sterna.

scarcely behind median axis of eye. E. Distal part of galea about as long as eye; maxillary palpus six-segmented, about two-thirds as long as distal part of galea. First segment of labial palpus longer than second. F. Pronotum not carinate; scutellum uniformly and weakly convex, metanotum (which is strongly convex) and base of propodeum slanting, remainder of propodeum more steeply slanting. G. *Marginal cell rounded apically*, about four times as long as broad, *as long as distance from apex to wing tip*, basal part subequal to free part; first submarginal cell subequal to third, slightly longer than second; pterostigma little over four times as long as prestigma (which is almost twice as long as broad), little broader than latter; cu-v interstitial with or slightly distal to M; *first media much longer than marginal cell*; second media much shorter than second cubital. Hairs of distal parts of wings not differentiated. H. Second abscissa of M+Cu about one and one-half times as long as cu-v and more than half as long as M; *jugal lobe less than half as long as cubital cell*. I. Arolia present; anterior basitarsus with distinct but weak comb on outer side, middle without comb.

MALE: M. Scape slender, much longer than interantennal distance; flagellum with first segment less than half of length of scape, about as long as third segment, second segment shorter than third and broader than long; subapical segment much longer than broad; apical normal. N. Posterior legs not swollen but tibia and basitarsus densely hairy; middle tibial spur narrowly pectinate, curved at tip; outer hind tibial spur narrowly pectinate, inner broadly and rather finely pectinate, apices a little curved; middle basitarsus slightly shorter than tibia; hind about two-thirds of length of tibia, flattened, about as wide as tibia. O. *Sixth tergum with distinct, margined, pygidial plate projecting as a rounded apical process*. P. Third to fifth metasomal sterna with dense apical fringes of long hair medially; sixth with apex rounded, without special structures. Q. Seventh sternum with postapodemal part bearing two broad, hairy, bifid lobes weakly attached to disc of sternum (as in *Tapinotaspis*); eighth sternum with large, deeply bifid, postapodemal part.

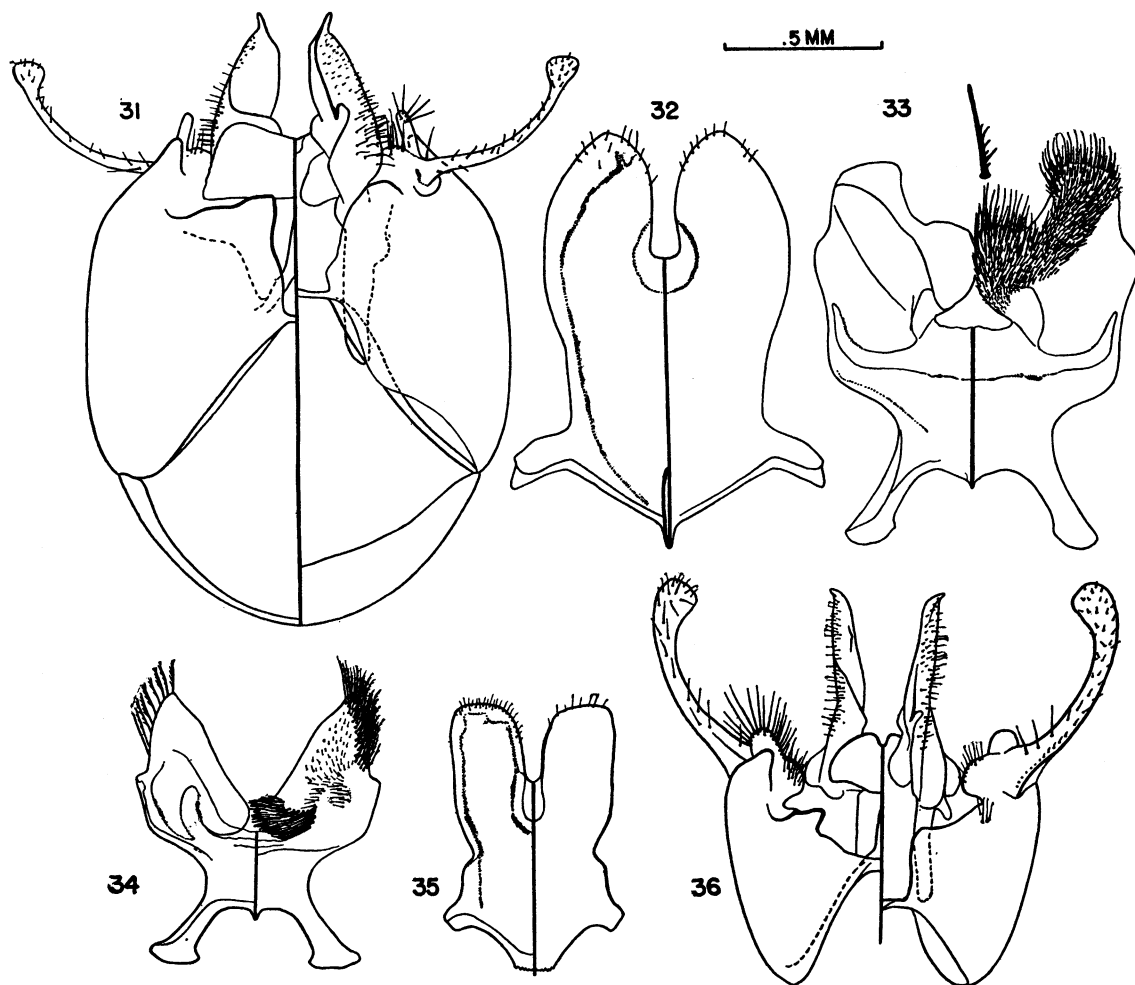
The only species that we can place in this

genus with certainty is *D. muelleri* (Fries), known from southern Brazil, Paraguay, and Argentina. *Desmotetrapedia melochiae* Schrottky may or may not belong in this genus; we have not seen specimens of it. We have seen only males of this genus. The first metasomal tergum, as in related genera, has the dorsal surface much shorter than the anterior surface. (For convenience, this character is cited in descriptions under the female, but it is really common to the two sexes.)

#### GENUS *TAPINOTASPIS* HOLMBERG

COMMON CHARACTERS: A. Body often with dark blue reflections; *without yellow markings*, or clypeus of male and rarely labrum, paraocular areas, and supraclypeal area with yellow. Pubescence of head and thorax long, sparse to dense, *mesonotum with at least some hairs as long as or longer than antennal diameter*. Metasoma with apical pubescent fasciae at least laterally or with abundant hair on posterior marginal portions of terga laterally. B. Face narrow or (in some females) broad; orbits converging below; interocellar distance less than to slightly more than ocellocular distance; upper paraocular areas smooth or weakly punctured, slightly to strongly concave; preoccipital carina absent or indicated by sharp angle behind ocelli; paraocular carina absent or virtually so; malar area linear or nearly so. C. Clypeus moderately to strongly protuberant, nearly reaching orbit to separated from them by nearly antennal diameter; labrum less than to more than twice as broad as long. D. Mandible with articulations equidistant from eye (some males) or anterior one farther from eye than posterior (females and some males), mandible with inner apical tooth (absent, probably worn off, in our female specimens of *herbsti*); posterior articulation behind median axis of eye. E. Distal part of galea longer than eye; *maxillary palpus* six-segmented, *one-half to over two-thirds of length of distal part of galea*. First segment of labial palpus over one and one-half times as long as second. F. Pronotum not carinate; *scutellum uniformly gently convex, metanotum weakly convex seen in profile*, metanotum and base of propodeum subhorizontal seen in profile, remainder of propodeum slanting. G. *Marginal cell* pointed (often bluntly), about four to nearly five





FIGS. 31-33. *Tapinotaspis* (*Tapinorhina*) *caerulea* (Friese), male; genitalia, eighth and seventh sterna (with an enlarged hair from near margin of last).

FIGS. 34-36. *Tapinotaspis* (*Tapinorhina*) *herbsti* (Friese), male; seventh and eighth sterna and genitalia (spiculum of eighth sternum and gonobase lost).

times as long as broad, 1.0 to 1.15 times as long as distance from its apex to wing tip, basal part about equal to free part, first submarginal cell equal to or shorter than third, second shorter than or almost equal to first; pterostigma of moderate size, three to four times as long as prestigma, which is fully twice as long as broad, little if any broader than prestigma; cu-v basal to or interstitial with M; first media as long as or longer than marginal cell; second media very slightly to considerably shorter than second cubital cell. Hairs of distal parts of wings undifferentiated or nearly so except in *Tapinotaspis*, *sensu stricto*. H. Second ab-

scissa of M+Cu as long as to twice as long as cu-v, less than one-fourth to two-thirds as long as M; jugal lobe one-third to three-fourths as long as cubital cell. Arolia present; anterior and middle basitarsi without combs, sometimes indication of weak outer comb among longer hairs on anterior basitarsus.

FEMALE: J. Scape slender, longer or usually much longer than interantennal distance; flagellum with first segment less than to more than half of length of scape, as long as to longer than second and third segments together, second broader than long and shorter than third. K. Basitibial plate small (usually

one-sixth of tibial length or less, rounded), clearly defined, full; middle tibial spur robust, curved at apex, narrowly pectinate; outer hind tibial spur serrate, inner broadly pectinate and sometimes contorted. Scopa dense, of long simple hairs with shorter, strongly and finely plumose hairs among them. Hind basitarsus two-thirds to more than three-fourths as long as tibia, about as broad as tibia, strongly flattened, extending far beyond base of second segment. L. First metasomal tergum without transverse carina, dorsal surface much shorter than anterior surface. Pygidial plate narrow, lateral margins concave, apex rounded or subtruncate, gradulus absent lateral to plate.

MALE: M. Scape slender, longer or usually much longer than interantennal distance; flagellum with first segment one-half to one-third of length of scape, broader than long to longer than broad, shorter or longer than second, subapical flagellar segment longer than broad, apical normal or with shining white or yellow smooth area. N. Posterior leg not swollen; tibial spurs as in female; middle basitarsus as long as tibia or nearly so; posterior basitarsus as described for female. O. *Seventh tergum with pygidial plate*, usually delimited by distinct carinae but often hidden by hair, projecting as *subtruncate apical process*. P. Metasomal sterna 2 or 3 to 5 with long apical fringes of specialized or ordinary hairs (these fringes weak in some groups), sixth rounded posteriorly, without special structures. Q. *Seventh sternum with postapodemal part bearing two broad, hairy, and usually bifid or emarginate lobes which are weakly attached to disc of sternum*; eighth sternum with large, deeply bifid postapodemal part. R. Genitalia with spatha large; penis valves with ventrobasal tooth, without or with small outer tooth; inner apical lobe of gonocoxite present, usually simple, hairy; gonocoxites more or less approximate dorsally; gonostylus long and slender.

#### TAPINORHINA, NEW SUBGENUS

TYPE SPECIES: *Exomalopsis caerulea* Friese, 1906.

COMMON CHARACTERS: 1. Distance between posterior ocelli slightly greater to slightly less than (some males) ocellocular distance; upper paraocular areas gently concave;

preoccipital carina absent. 2. Labrum about twice as broad as long; anterior mandibular articulation farther from eye than posterior one (except in some males). *Maxillary palpus over half as long as free part of galea*. 3. Marginal cell slightly longer than distance from apex to wing tip; first submarginal cell slightly shorter to slightly longer than third, much longer than second; first media slightly longer than or subequal to marginal cell, second media shorter than or subequal to second cubital. Second abscissa of M+Cu of hind wing twice as long as cu-v or nearly so, one-half of to nearly as long as M; *jugal lobe two-thirds to four-fifths as long as cubital cell*. 4. Inner hind tibial spur not contorted.

FEMALE: 5. Face moderately to very broad. *Flagellum with first segment about or less than half of length of scape, subequal to second and third together*, third to ninth segments broader than long except in *herbsti*.

MALE: 6. Clypeus black. Flagellum with first segment as broad as long to longer than broad, longer than second which is broader than long; remaining segments, at least beyond middle of flagellum, as long as or longer than broad. 7. Legs not unusually hairy; metasomal sterna with hairs not forming definite fringes (*caerulea*) or forming fringes (weak medially) of not or little specialized hairs on sterna 2 to 5 (*herbsti*, *nigrispinis*).

This subgenus, known from Chile and Argentina, contains *Tapinotaspis* (*Tapinorhina*) *caerulea* (Friese) [*Exomalopsis*], *herbsti* (Friese) [*Exomalopsis*], *nigrotarsalis* (Brèthes) [*Melittoma*?], *nigrispinis* (Vachal) [*Tetrapedia*], an additional Chilean species which may be new, and a species which we have not seen but which probably belongs here, *perimelaena* (Cockerell) [*Exomalopsis*].

*Tapinorhina* differs from the other subgenera by numerous characters, the most noteworthy of which are italicized in the above description.

The principal problem has been to decide whether, in view of the entirely different appearance of the various included species, several subgenera should not be erected. We have decided against further subdivisions because we would need four groups for the five species we know, but the following comments show the diversity of the included species; *herbsti*, *caerulea*, and the new Chilean species

have very long hair on the thorax and on the male clypeus as do many bees from Chile and Patagonia; the last two have strongly blue abdomens, while the blue color is very weak in other species; the same three species have the face of the female very broad, with the clypeo-ocular distance relatively great and the anterior mandibular articulation farther from the eye than in other forms (probably all manifestations of a single character, the broad face); the two blue forms have the scape shorter than do other species of the genus and the top of the head is more broadly rounded and less angulate behind the eyes; *herbsti* is unique in the subgenus in the rather long, slender antennal flagellum, all the segments except the second being longer than broad in both sexes; it is also unique in the very feeble margin of the pygidial plate. *Tapinotaspis nigrispinis*, which has much the appearance of a small *Tapinotaspoides* because of its short, largely dark hair, resembles *caerulea* in the short antennae; in sternal fringes it resembles *herbsti*; in the length of the second median cell, *nigrispinis* resembles the new Chilean species and differs from *caerulea*, in which it is shorter, and *herbsti*, in which it is longer. *Tapinotaspis nigrotarsalis* is known only from the type, which is in very bad condition, but it, too, has some striking distinctive features; for example, it differs from all the others in having veins  $M+Cu$  and  $M$  of the hind wing almost equal in length.

#### SUBGENUS TAPINOTASPOIDES MOURE

*Tapinotaspoides* MOURE, 1944, Rev. Ent., Rio de Janeiro, vol. 15, p. 10. Type species: *Tetrapedia serraticornis* Friese, 1899 (original designation).

COMMON CHARACTERS: 1. Distance between posterior ocelli much less than ocellocular distance; upper paraocular areas strongly concave; *preoccipital carina present behind ocelli in females*, absent in males. 2. Labrum less than twice as broad as long (males); anterior mandibular articulation a little farther from eye than posterior one in females, not in males. Maxillary palpus about half as long as distal part of galea. 3. Marginal cell subequal to distance from apex to wing tip; first submarginal cell shorter than third and about equal to second; first media longer than marginal cell, second media much shorter than

second cubital. Second abscissa of  $M+Cu$  of hind wing about equal to  $cu-v$  and one-fourth as long as  $M$ ; *jugal lobe one-third as long as cubital cell or less*. 4. Inner hind tibial spur not contorted.

FEMALE: 5. Face moderately broad. *Flagellum with first segment much more than half of length of scape*, longer than second and third together.

MALE: 6. Clypeus black or, rarely, clypeus and adjacent areas yellow. Flagellum with first segment longer than broad, as long as or longer than second, second to tenth somewhat longer than broad, often bicarinate along outer sides, often crenulate, often with smooth yellow or white areas on posterior sides of last and sometimes other segments. 7. Middle and hind tibiae and basitarsi with long dense hairs; metasomal sterna 2 to 5 with strong apical fringes of long, specialized hairs.

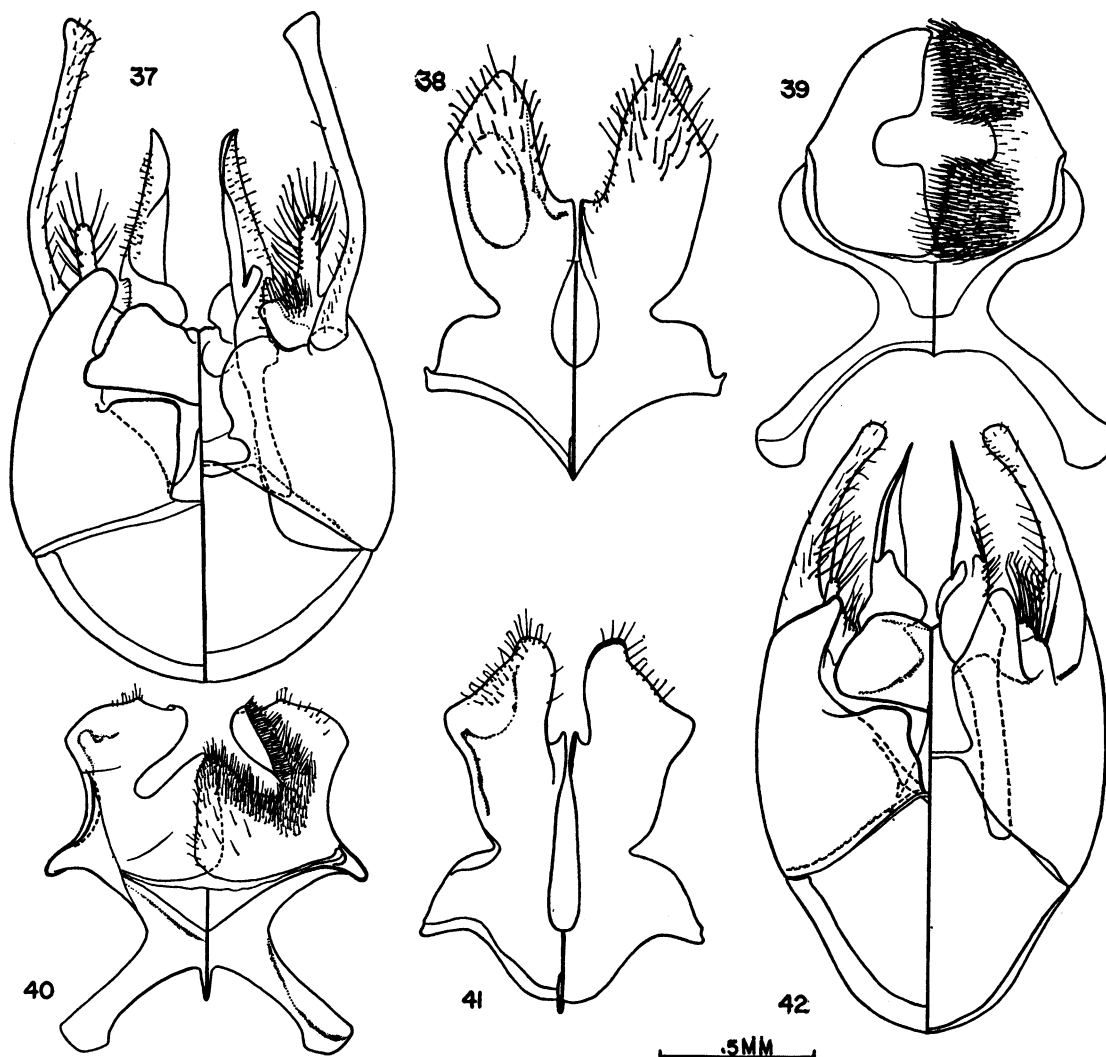
This subgenus, found in Argentina, Paraguay, and Brazil at least as far north as Paraíba, contains the following species: *T. (Tapinotaspoides) serraticornis* (Friese) [*Tetrapedia*], *nigerrima* (Schrottky) [*Tetrapedia*], *tucumana* (Vachal)<sup>1</sup> [*Tetrapedia*], and at least one new species before us. We have not seen specimens of *serraticornis*.

#### SUBGENUS TAPINOTASPIS HOLMBERG, SENSU STRICTO

*Tapinotaspis* HOLMBERG, 1903, An. Mus. Nac. Buenos Aires, ser. 3, vol. 2, p. 413. Type species: *Tapinotaspis chacabucensis* Holmberg, 1903 = *Exomalopsis chalybaea* Friese, 1899, designation of Sandhouse, 1943, Proc. U. S. Natl. Mus., vol. 92, p. 603.

COMMON CHARACTERS: 1. Distance between posterior ocelli subequal (*sabularum*) to much less than (male *chalybaea*) ocellocular distance; upper paraocular areas gently to strongly (in male *chalybaea*) concave; preoccipital carina absent (although head rather narrowly rounded, hence forming distinct ridge, behind ocelli). 2. Labrum less than twice as broad as long (females) or about twice as broad as long (males); anterior mandibular articulation slightly farther from eye

<sup>1</sup> *Tetrapedia tucumana* Vachal, 1904 = *Tetrapedia nigripennis* Friese, 1910 (new synonymy) = *Tetrapedia pernigra* Schrottky, 1920 (new synonymy). Synonymy first noted by Moure.



FIGS. 37-39. *Tapinotaspis* (*Tapinotaspis*) *chalybaea* (Friese), male; genitalia, eighth and seventh sterna.

FIGS. 40-42. *Tapinotaspis* (*Tapinotaspoides*) *tucumana* (Vachal), male; seventh and eighth sterna, genitalia.

than posterior one in females, not in males. Maxillary palpus about half as long as distal part of galea. 3. Marginal cell longer than distance from apex to wing tip; first submarginal cell shorter than third and about equal to second; first media as long as marginal cell, second media distinctly shorter than second cubital. Second abscissa of  $M+Cu$  of hind wing as long (*chalybaea*) to nearly twice as long (*sabularum*) as  $cu-v$  and less than one-fourth (*chalybaea*) to one-half (*sabularum*) as

long as  $M$ ; jugal lobe one-half as long as cubital cell or slightly less. 4. Inner hind tibial spur contorted, especially in female, and unusually coarsely pectinate.

FEMALE: 5. Face moderately broad. Flagellum with first segment more than half of length of scape, slightly longer than second and third together.

MALE: 6. Clypeus yellow. Flagellum reaching base of metasoma, first segment broader than long, less than half length of second, second to

tenth segments almost twice as long as broad, shining except for basal pubescent zone on each segment, producing annulated appearance, sometimes (*chalybaea*) with yellow areas on posterior sides of segments. 7. Middle and hind tibiae and basitarsi with long dense hairs; metasomal sterna 3 to 5 with fringes of long, unspecialized hairs.

So far as we know, this subgenus contains only two species: *T. (T.) chalybaea* (Fries) and *sabularum* Holmberg. The latter species is very different in appearance from *chalybaea*, being small, pale haired, its general habitus suggesting *T. (Tapinorhina) herbsti*, but its basic features are as in *chalybaea*. Some differences are indicated in the preceding description. Both species occur in Argentina although *chalybaea* was described, perhaps by error, from Brazil.

#### GENUS *MONOECA* LEPELETIER AND SERVILE

*Monoeca* LEPELETIER AND SERVILE, 1828, Encyclopédie méthodique, Histoire naturelle, Insectes, vol. 10, p. 528. Type species: *Monoeca brasiliensis* Lepeletier and Serville, 1828 (monobasic).

*Epeicharis* RADOSZKOWSKY, 1884 (not *Epiicharis* Klug, 1807), Horae Soc. Ent. Rossicae, vol. 18, p. 18.

*Fiorentinia* DALLA TORRE, 1896, Catalogus hymenopterorum, vol. 10, p. 334. Type species: *Epeicharis mexicanus* Radoszkowsky, 1884 (monobasic).

*Pachycentris* FRIESE, 1902, Zeitschr. Syst. Hymenopterologie Dipterologie, vol. 2, p. 186. Type species: *Pachycentris schrottkyi* Friese, 1902 = *pili-ventris* (Friese), 1899 (monobasic).

*Chaetostetha* MICHENER, 1942, Jour. New York Ent. Soc., vol. 50, p. 281. Type species: *Exomalopsis pyropyga* Friese, 1925 (original designation).

COMMON CHARACTERS: A. Body black, without yellow markings or with yellow metasomal fasciae. Pubescence of head and thorax moderately dense and long, that of mesoscutum longer than antennal diameter; metasoma with or without pubescent fasciae. B. Face rather narrow; orbits slightly converging below; interocellar distance subequal to ocellular distance; upper paraocular areas smooth or nearly so, broadly concave; preoccipital carina present behind ocelli, but not sharp; paraocular carina absent; malar area linear. C. Clypeus moderately protuberant, almost reaching orbits. Labrum less than twice as broad as long. D. Mandible

with articulations equidistant from eyes, with subapical inner tooth; posterior articulation behind median axis of eye. E. Distal part of galea slightly longer to one and one-half times as long as eye; maxillary palpi six-segmented, one-fourth to nearly one-half as long as distal part of galea. First segment of labial palpus more than twice length of second. F. Pronotum not carinate; scutellum uniformly convex in profile; posterior part, metanotum and propodeum abruptly declivous; metanotum distinctly convex seen in profile. G. Marginal cell narrowly rounded or pointed apically, three and one-half times as long as broad, longer than distance from apex to wing tip, basal part equal to free part; first submarginal cell subequal to third, much longer than second; pterostigma three to four times length of prestigma and slightly broader than latter; cu-v basal to or interstitial with M; first media subequal to marginal cell, second shorter than second cubital. H. Second abscissa of M+Cu nearly or fully twice as long as cu-v and more than half as long as M; jugal lobe one-half to two-thirds of length of cubital cell. Hairs of distal parts of wings slightly to strikingly thickened basally. I. Arolia present; *anterior basitarsus with comb on inner margin; middle basitarsus with comparable comb on anterior margin, at least distally.*

FEMALE: J. Scape slender, longer than interantennal distance; flagellum with first segment half of length of scape or less, equal to or shorter than next two segments together, second segment shorter than third and nearly twice as broad as long. K. *Venter of thorax, coxae, and trochanters with stiff, hooked bristles*; basitibial plate moderate sized, strongly defined, surface with minute hairs; middle tibial spur robust, narrowly pectinate, strongly bent at apex; outer hind tibial spur strongly serrate or narrowly pectinate, *inner tibial spur broadly and coarsely pectinate*. Scopa dense and rather long, hairs strongly plumose basally, many of them plumose to apices or nearly so; hind basitarsus much shorter and broader than tibia, strongly flattened, apex broadly truncate, slightly beyond apex of second segment. L. First metasomal tergum without carina, dorsal surface shorter than anterior one. Pygidial plate extremely broad, lateral margins straight, apex angulate; gradulus lateral to plate short.



**MALE:** M. Scape slender, longer than interantennal distance; flagellum with first segment much less than half of length of scape and shorter than second and third together, second shorter than third, less than twice as broad as long; subapical flagellar segment longer than broad; apical segment normal. N. Posterior legs not swollen; middle and posterior basitarsi rather slender, latter truncate, second segment arising from end of truncation; middle tibial spur as in female, or sometimes even more strongly bent apically with subapical serrate lobe on outer margin; hind tibial spurs robust, curved at apices, outer serrate, inner pectinate. O. Pygidial plate projecting as rounded or subtruncate process, but margins usually not clearly defined. P. Second to fifth metasomal sterna with margins not or feebly concave, usually with broad apical bands of very dense hairs; sixth sternum normal. Q. Seventh and eighth sterna with postapodemal parts much longer than broad, with small apical or subapical lobes. R. Genitalia with spatha over twice as broad as long, narrowed laterally; penis valve very large, with various projecting lobes, without ventral basal or outer teeth; inner apical lobes of gonocoxite virtually absent.

This genus contains moderate-sized, robust bees, black or sometimes with the abdomen red or banded with yellow. The distribution is in moist tropical or subtropical zones from southern Brazil to central Mexico. Included species are *Monoeca lanei* (Moore) [*Pachycentris*], *piliiventris* (Friese) [*Tetrapedia*], *schizacantha* (Ducke) [*Chacoana*], *pyropyga* (Friese) [*Exomalopsis*], *mexicana* (Radoszkowsky) [*Epeicharis*], *brasiliensis* Lepeletier and Serville, and several other unidentified or unnamed species.

The name *Monoeca* has not been used by recent authors, but it seems quite evident from the description, especially of the hind tibial spurs, that *Monoeca* is an older name for the group commonly called *Fiorentinia* or *Epeicharis*. The description of Lepeletier and Serville fits very well a specimen from Rio de Janeiro.

#### GENUS CAENONOMADA ASHMEAD

*Caenonomada* ASHMEAD, 1899, Trans. Amer. Ent. Soc., vol. 26, p. 68. Type species: *Caenonomada Brunerii* Ashmead, 1899 (monobasic and original designation).

*Chacoana* HOLMBERG, 1903, An. Mus. Nac. Buenos Aires, ser. 3, vol. 2, p. 342. Type species: *Chacoana melanoantha* Holmberg, 1903 = *Caenonomada brunerii* Ashmead, 1899 (monobasic).

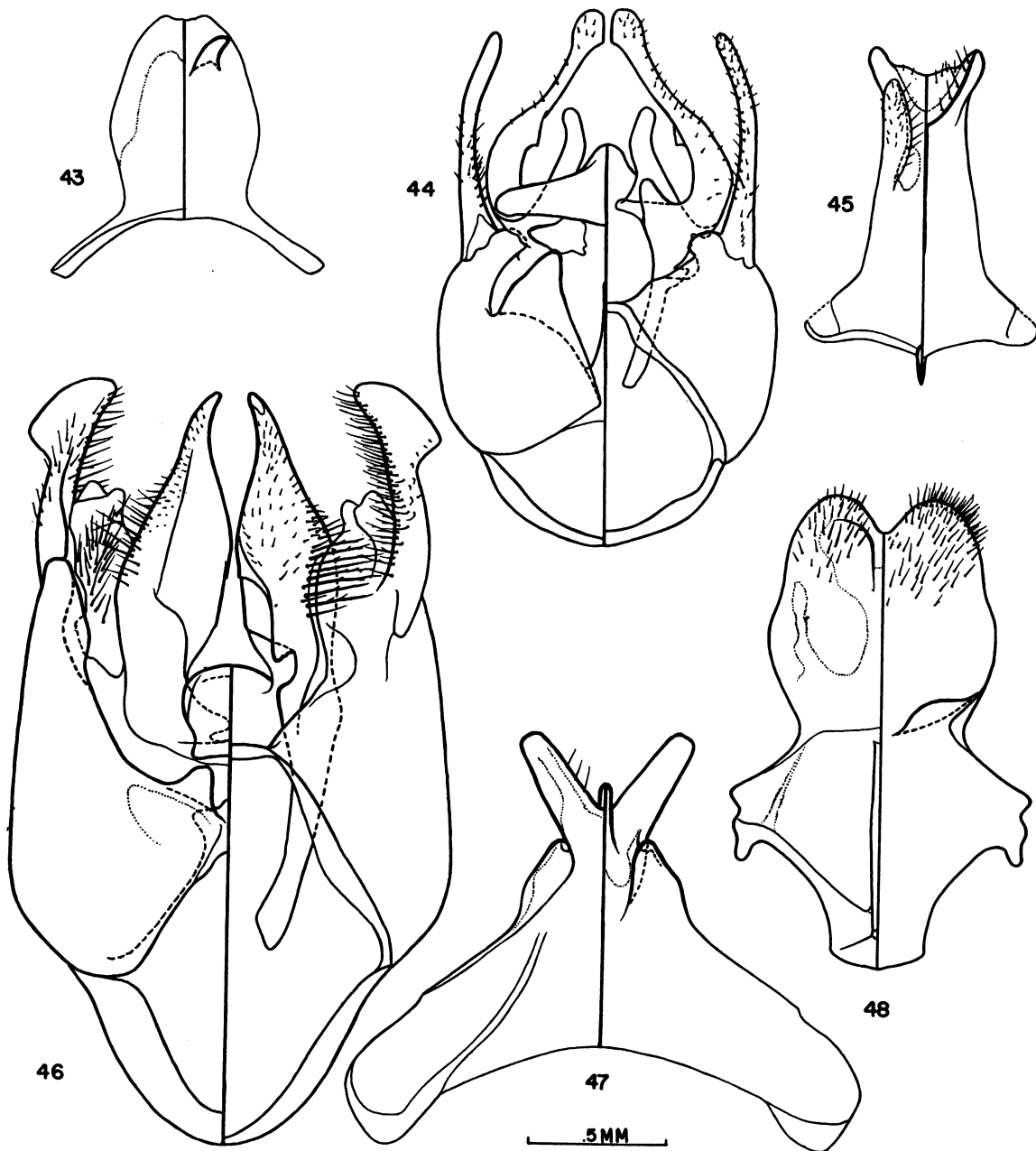
**COMMON CHARACTERS:** A. Body with extensive yellow markings, including parts of clypeus, paraocular areas, and metasomal fasciae. Pubescence of head and thorax sparse but rather long, that of mesoscutum longer than antennal diameter; metasoma without pubescent fasciae. B. Face narrow; orbits strongly converging below; interocular distance equal to or less than ocellocular distance; upper paraocular areas nearly smooth, broadly concave; preoccipital carina absent; paraocular carina absent; malar area sublinear. C. Clypeus moderately protuberant, almost reaching orbits; labrum less than twice as broad as long. D. Mandible with articulations equidistant from eye, usually with subapical inner tooth; posterior articulation behind median axis of eye. E. Distal part of galea slightly longer than eye; maxillary palpi six-segmented, more than half of length of distal part of galea. First segment of labial palpus less than twice length of second. F. Pronotum not carinate; scutellum almost uniformly convex in profile, posterior part, metanotum and propodeum abruptly declivous, anterior part of last slanting; metanotum straight to convex seen in profile. G. Marginal cell rounded apically, three and one-half to four and one-half times as long as broad, slightly longer than distance from apex to wing tip, basal part longer than free part; first submarginal cell subequal to or slightly longer than second, *third submarginal cell much longer than first or second*; pterostigma two to two and one-half times length of prestigma and slightly broader than latter; cu-v basal to M, first media longer than marginal cell; second media shorter than second cubital. Hairs of distal parts of wings distinctly thickened laterally. H. Second abscissa of M+Cu little longer than cu-v and less than half as long as M; jugal lobe one-third to one-fourth of length of cubital cell. I. *Arolia very minute*; anterior and middle basitarsi without combs.

**FEMALE:** J. Scape slender, much longer than interantennal distance; flagellum with first segment more than half of length of scape and as long or nearly as long as segments 2 to 4 together, *second* much shorter

than third, *more than twice as broad as long*. K. Basitibial plate large, strongly defined, surface hairy; middle tibial spur narrowly pectinate, strongly bent at apex; outer hind tibial spur strongly serrate or narrowly pectinate, *inner tibial spur broadly pectinate*. Scopa rather short, hairs simple apically, strongly

plumose basally. L. First metasomal tergum without carina at dorsal surface, shorter than anterior one. Pygidial plate with lateral margins nearly straight, apex broadly rounded, gradulus absent lateral to plate.

MALE: M. *Scape thick*, much longer than interantennal distance; *pedicel nearly hidden*



FIGS. 43-45. *Monoeca lanei* (Moure), male; seventh sternum, genitalia, eighth sternum.  
FIGS. 46-48. *Caenonomada brunerii* Ashmead, male; genitalia, seventh and eighth sterna.

in apex of scape; flagellum with first segment much less than half of length of scape and shorter than second and third together, second shorter than third, about twice as broad as long; subapical flagellar segment twice as long as broad or nearly so, apical acuminate. N. Posterior legs often swollen; middle tibial spur rather slender, narrowly pectinate; outer hind tibial spur absent, inner large, robust, sometimes truncate, marginal teeth minute or basally forming a pectinate zone. Middle and posterior basitarsi often flattened, latter rounded posteriorly and giving rise to second segment in middle of apical margin. O. Pygidial plate distinct posteriorly, projecting as rounded or subtruncate process; anteriorly marginal carinae diverge but little and fade away. P. Fifth metasomal sternum emarginate posteriorly and with long dense fringe in emargination; preceding sterna without specialized fringes; sixth sternum sparsely hairy, margin rounded and transparent. Q. Seventh sternum with pair of slender apical lobes and median projection between them; eighth sternum with postapodemal part longer than broad, weakly bilobed. R. Genitalia with spatha very small, about as long as broad; penis valve with ventrobasal tooth, lacking outer tooth; inner apical lobes of gonocoxite very large, pubescent above.

This genus contains moderate-sized bees with extensive yellow maculations. The four or five species range from Argentina to the arid northeast of Brazil. Included species are: *bruneri* Ashmead, *pluricincta* (Vachal) [*Tetrapedia*], *tertia* Cockerell, *unicarata* (Ducke) [*Epicharis*], and *gaullei* (Vachal) [*Tetrapedia*].

#### GENUS *EXOMALOPSIS* SPINOLA

COMMON CHARACTERS: A. Body black, without yellow markings, or clypeus and labrum of male yellow. Pubescence of head and thorax moderately dense and long, that of mesonotum longer than antennal diameter. Metasoma with or without pubescent fasciae. B. Face narrow; orbits slightly to strongly converging below; interocellar distance less than to greater than ocellular distance; upper paraocular areas smooth or nearly so, slightly concave or flat, preoccipital carina absent or indicated by ridge behind ocelli; paraocular carina absent or weak;

malar area linear. C. Clypeus weakly protruberant, face usually flat; clypeus almost reaching orbits. Labrum more than twice as broad as long. D. Mandible with articulation behind median axis of eye. E. Distal part of galea slightly shorter than to one and one-half times as long as eye; maxillary palpus six-segmented, one-half to four-fifths as long as distal part of galea. First segment of labial palpus slightly longer than to twice as long as second. F. Pronotum not carinate; scutellum uniformly convex or more strongly so posteriorly; metanotum and base of propodeum slightly slanting, remainder of propodeum declivous; metanotum distinctly convex seen in profile. G. *Marginal cell obliquely truncate apically*, three to three and one-half times as long as broad, longer than distance from apex to wing tip, basal part subequal to free part; first submarginal cell subequal to or longer than third, second much shorter than others, rarely two submarginal cells, second equal to or longer than first; pterostigma usually large, three to six times as long as prestigma, and broader than latter, rarely little longer than prestigma; cu-v considerably distal to M; *first media considerably longer than marginal cell, second much shorter than second cubital*. Hairs of distal parts of wings undifferentiated or slightly so in *Anthophorula*. H. Second abscissa of M+Cu more than three to five times as long as cu-v and as long as M; jugal lobe two-thirds to three-fourths of length of cubital cell. I. Arolia present; anterior and middle basitarsi without combs.

FEMALE: J. *Scape slender, much longer than interantennal distance*; flagellum with first segment distinctly less than half of length of scape, shorter than next two segments together, second segment usually equal to, sometimes shorter than, third and usually as broad as long, sometimes broader than long. K. Basitibial plate moderate sized to large, clearly defined, surface dull and with short hairs; tibial spurs slender, little curved, very finely serrate. Scopa long and rather dense, hairs strongly plumose to apices; hind basitarsus narrower than tibia or of same width, longer than or equal to tibia, slightly flattened, extending as slender process far beyond base of second segment. L. *First metasomal tergum with transverse carina* (some-

times absent in subgenus *Anthophorisca*) separating anterior from dorsal surfaces, these two surfaces equal in length; pygidial plate broad, lateral margins straight or slightly concave, apex rounded; gradulus present lateral to plate.

MALE: M. *Scape* slender, rarely swollen; much longer than interantennal distance; flagellum with first segment less than half of length of scape (sometimes one-eighth of length of scape), usually shorter (rarely longer) than second, subapical flagellar segment longer than broad, apical usually normal. N. Posterior legs not or slightly swollen (strongly so in some North American species); tibial spurs as in female; middle and posterior basitarsi slightly longer to slightly shorter than tibiae, usually simple. O. Seventh tergum rounded or rarely subtruncate posteriorly, margined or carinate posteriorly to form indication of broad pygidial plate occupying much of dorsum of tergum. P. Metasomal sterna without strong fringes of specialized hairs, sixth rounded posteriorly, without special structures. Q. Seventh and eighth sterna with distinct postapodemal parts, exceedingly variable in size and form. R. Genitalia with spatha of moderate size to small, narrowed laterally; penis valve with ventrobasal tooth absent; gonocoxites commonly widely separated dorsally, dorsal bridge a broad inclined plate; gonostylus short.

As here understood, this genus is divisible into several subgenera. One of us (Moure) believes that it would be preferable to separate it into two genera, *Exomalopsis* (for the first four subgenera) and *Anthophorula* (for the last two subgenera), separating them on the basis of subgeneric characters italicized in the description of *Exomalopsis*, *sensu stricto*. Michener, on the other hand, preferring large genera and noting that in some of these characters *Phanomalopsis* and *Anthophorisca* are intermediate between *Exomalopsis* and *Anthophorula*, believes that all these forms should be united under the genus *Exomalopsis*.

SUBGENUS **EXOMALOPSIS** SPINOLA,  
SENSU STRICTO

*Exomalopsis* SPINOLA, 1853, Mem. R. Accad. Sci. Torino, ser. 2, vol. 13, p. 89. Type species: *Exomalopsis fulvopilosa* Spinola, 1853, *lapsus calami* for *Exomalopsis aureopilosa* Spinola, 1853,

by designation of Taschenberg, 1883, Berliner Ent. Zeitschr., vol. 27, p. 82.

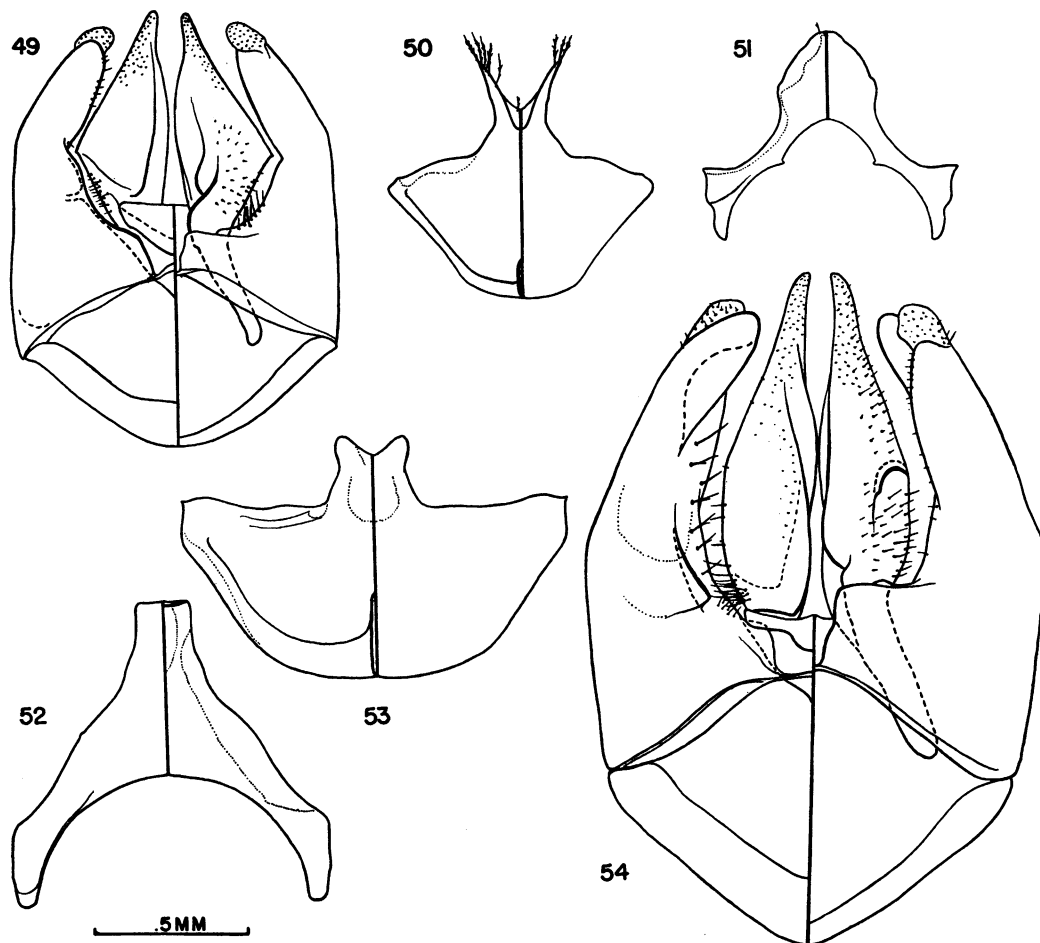
*Epimonispractor* HOLMBERG, 1903, An. Mus. Nac. Buenos Aires, ser. 3, vol. 2, p. 426. Type species: *Epimonispractor graciosus* Holmberg, 1903 = *Exomalopsis analis* Spinola, 1853, designation of Sandhouse, 1943, Proc. U. S. Natl. Mus., vol. 92, p. 548 (Sandhouse erroneously credits the genotype designation to Holmberg).

COMMON CHARACTERS: 1. Face very flat; ocelli usually large, interocellar distance usually more than ocellocular distance; upper paraocular area gently concave; head short behind ocelli, with preoccipital carina usually indicated by ridge immediately behind ocelli; paraocular carina absent. 2. Distal part of galea slightly shorter to slightly longer than eye, maxillary palpus two-thirds to three-fourths as long as distal part of galea. 3. Pterostigma as long as length of marginal cell on wing margin, over four to over five times as long as prestigma and generally wider than latter; three submarginal cells.

FEMALE: 4. Second as well as middle flagellar segments as long as broad or slightly longer. 5. Basitibial plate large, one-third to one-fourth of length of tibia, raised margin broad, disc much depressed but covered with short dense hairs, giving the effect of a raised surface, these hairs not reaching raised margin so that a deep groove seems to surround an apparently raised median area. 6. First metasomal tergum without depressed posterior zone or rarely with faint indication of it; pygidial plate very broad.

MALE: 7. Face black. First flagellar segment slightly longer than broad to broader than long, in former case remaining segments subequal to first, in latter case remaining segments much longer than first. 8. First metasomal tergum without transverse carina; seventh metasomal tergum broadly rounded, margin weakly raised and partially fringed with hairs. 9. Seventh sternum with subtriangular or quadrangular postapodemal process, almost or entirely hairless; eighth sternum with postapodemal process bifid, resulting lobes sometimes quite long, always slender. 10. Genitalia with gonostyli usually very short; penis valve without or with outer tooth, without inner serrations.

This large subgenus ranges from Argentina and northern Chile to Cuba and southern



FIGS. 49-51. *Exomalopsis (Exomalopsis) aureopilosa* Spinola, male; genitalia, seventh and eighth sterna.

FIGS. 52-54. *Exomalopsis (Megomalopsis) fulvofasciata* Smith, male; seventh and eighth sterna, genitalia.

Texas.<sup>1</sup> The species are of rather small size. Included species are *analisis* Spinola, *artifex* Smith, *aureopilosa* Spinola, *azulensis* Cockerell, *bruesi* Cockerell, *fulvipennis* Schrottky, *giacomelli* Cockerell, *globulosa* (Fabricius) [Apis], *hiberna* Schrottky, *iridipennis* Smith, *latifasciata* Brèthes, *lisotera* Moure, *mourei* Michener, *ogilviei* Cockerell, *penelope* Cockerell, *pulchella* Cresson, *rufitarsis* Smith, *similis* Cresson, *sororcula* Brèthes, *vincentiana* Cockerell, *ypiranguensis* Schrottky, *zexmeniae*, Cockerell, and many others. Numerous unidentified species before us belong to this

subgenus, and numerous described species which we have not recognized doubtless belong here.

*Exomalopsis vernoniae* Schrottky, which is the same as or closely related to *pampeana* Brèthes, is included in this subgenus in spite of its large size, although most individuals show a distinct depression across the first metasomal tergum a short distance behind the carina. In some individuals this is very faint. Unfortunately, we do not have males which might support or refute this placement. *Exomalopsis solitaria* Brèthes is also placed here tentatively, although it, too, has a depression across the first tergum; it is known only from the female.

<sup>1</sup> Since preparation of this paper, Prof. T. B. Mitchell has sent us *E. pulchella* Cresson and *similis* Cresson from southern Florida.

## MEGOMALOPSIS, NEW SUBGENUS

TYPE SPECIES: *Exomalopsis diversipes* Cockerell, 1949.

COMMON CHARACTERS: 1. Face very flat; ocelli large, interocellar distance subequal to ocellocular distance; upper paraocular area gently concave; head short behind ocelli, with preoccipital carina indicated by ridge immediately behind ocelli; paraocular carina very weak or absent. 2. Distal part of galea longer than eye, maxillary palpus nearly two-thirds of length of distal part of galea. 3. *Pterostigma about two-thirds as long as length of marginal cell on wing margin, little over four times as long as prestigma, about as wide as latter; three submarginal cells.*

FEMALE: 4. Flagellar segments slightly longer than broad. 5. Basitibial plate as in *Exomalopsis, sensu stricto*. 6. Dorsum of first metasomal tergum with broad, feebly indicated posterior zone and *fascia of hairs arising from weak depression separating posterior from anterior zone*; pygidial plate very broad.

MALE: 7. Face black. First flagellar segment about as broad as long and markedly shorter than remaining segments which are longer than broad. 8. First metasomal tergum without transverse carina; seventh metasomal tergum broadly rounded, margin weakly raised and partially fringed with hairs. 9. Seventh sternum with subtriangular, hairless, postapodemal process; eighth sternum with small notched or bifid postapodemal process. 10. Genitalia with gonostyli very short; penis valves without outer tooth, without inner serrations.

This small subgenus contains large, closely punctured, and dull species ranging from Paraguay and probably Argentina north to Mexico and southernmost Texas but is absent from Chile and western Peru. The subgenus is most closely related to *Exomalopsis, sensu stricto*, from which it differs not only in size and appearance but especially in the characters italicized in the above description. Included species are *E. (Megomalopsis) crucis* Cockerell, *diversipes* Cockerell, *fulvo-fasciata* Smith, and *thermalis* Cockerell. There appear to be other species in the group, and there are several other specific names involved (see Michener, 1954).

## PHANOMALOPSIS, NEW SUBGENUS

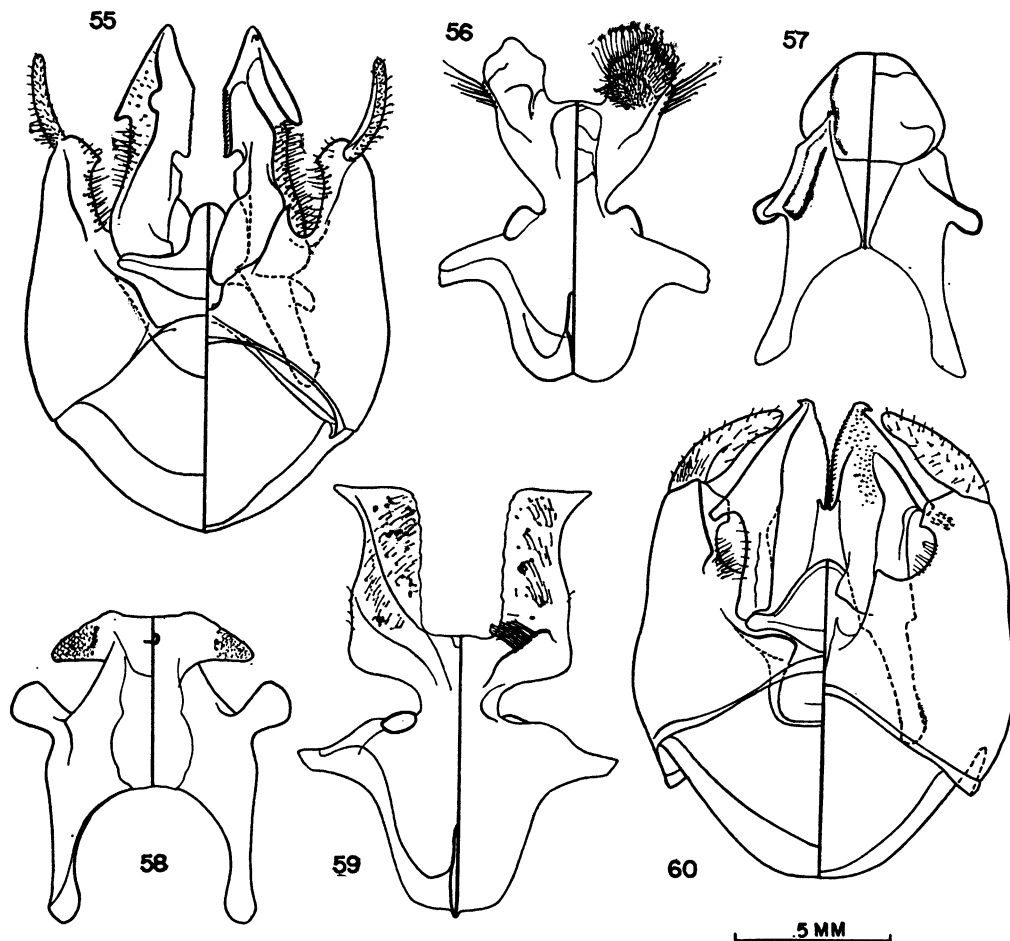
TYPE SPECIES: *Exomalopsis jenseni* Friese, 1908.

COMMON CHARACTERS: 1. Face commonly a little more protuberant than in *Exomalopsis, sensu stricto*; ocelli often smaller in diameter than scape, interocellar distance usually equal to or less than ocellocular distance; upper paraocular area usually not or scarcely concave; *head rounded behind ocelli, without evidence of preoccipital carina*; paraocular carina present or absent. 2. Distal part of galea as long as or a little longer than eye, maxillary palpus two-thirds as long to as long as distal part of galea. 3. *Pterostigma about two-thirds as long as length of marginal cell on wing margin, three to four times as long as prestigma, about as wide as prestigma; three submarginal cells.*

FEMALE: 4. Second flagellar segment slightly broader than long to longer than broad, others at least slightly longer than broad. 5. Basitibial plate as in *Exomalopsis, sensu stricto*. 6. *First metasomal tergum with broad posterior zone separated from rest of tergum by a weak depression which is not provided with a hair fascia. Pygidial plate broad.*

MALE: 7. Face black. First flagellar segment as broad as long or longer than broad and much shorter than remaining segments which are much longer than broad. 8. First metasomal tergum without transverse carina; seventh metasomal tergum broadly rounded, margin raised as sharp carina with or without hairs near by. 9. *Seventh sternum with large and complicated postapodemal portion; eighth with pair of very large posterior lobes bearing hairs.* 10. *Genitalia with gonostyli much longer than broad; penis valves with inner and outer teeth and inner serrations.*

This subgenus consists of rather large species and ranges from Argentina and Paraguay to the southwestern United States. It is absent from Chile and western Peru. The characters italicized above distinguish the group easily from *Exomalopsis, sensu stricto*. In several characters (1, 3, etc., above) *Phanomalopsis* resembles *Anthophorisca* and *Anthophorula*. Included species are *E. (Phanomalopsis) aureosericea* Friese, *jenseni* Friese, *snowi* Cockerell, *solani* Cockerell, *solidaginis*



FIGS. 55-57. *Exomalopsis* (*Phanomalopsis*) *jenseni* Friese, male; genitalia, eighth and seventh sterna.

FIGS. 58-60. *Exomalopsis* (*Phanomalopsis*) *aureosericea* Friese, male; seventh and eighth sterna, genitalia.

Cockerell, *spgazzinii* Brèthes, *testaceinervis* Brèthes, *trifasciata* Brèthes, and a half dozen unidentified species before us. *Exomalopsis birkmanni* Cockerell and *fulvozonata* Cockerell presumably belong here.

#### DIOMALOPSIS, NEW SUBGENUS

TYPE SPECIES: *Exomalopsis bicellularis*, new species.

COMMON CHARACTERS: 1. Face very flat, broader than usual; ocelli large, interocellar distance greater than ocellular distance; upper paraocular areas nearly flat; head short behind ocelli but without evidence of pre-occipital carina; paraocular carina present. 2.

Distal part of galea slightly longer than eye; maxillary palpus four-fifths as long as distal part of galea. 3. *Pterostigma* longer than length of marginal cell on wing margin, over five times as long as prestigma and much wider than latter; two submarginal cells.

FEMALE: 4. Second flagellar segment as long as broad, remaining segments slightly longer. 5. Basitibial plate as in *Exomalopsis*, *sensu stricto*. 6. First metasomal tergum without depressed posterior zone; pygidial plate broad, lateral margins strongly elevated, almost lamellate.

MALE: 7. Face black. First flagellar segment slightly broader than long, others as



long as to slightly longer than broad. 8. First metasomal tergum with mere angle, no carina, separating anterior from dorsal surfaces; seventh metasomal tergum broadly rounded, margin weakly raised, resulting carina largely obscured by hairs. 9. *Seventh sternum with broadly truncate distal process bearing thickened or peg-like hairs; eighth sternum with postapodemal part large, truncate apically, strongly constricted basally, hairy.* 10. Genitalia with gonostyli short; penis valve with small outer but without inner tooth and without inner serrations; *dorsal gonocoxal bridge short.*

This subgenus is known only from the type species from southern Brazil. It is a small species, superficially like an unusually slender species of *Exomalopsis* proper, but differs from that subgenus by the characters italicized in the above description. The lack of preoccipital carina and presence of paraocular carinae suggest *Anthophorula*, *Anthophoriscia*, and some species of *Phanomalopsis*, but the characters italicized under 3, 9, and 10 are completely unlike those of any other *Exomalopsis* known to us.

#### SUBGENUS ANTHOPHORULA COCKERELL

*Anthophorula* COCKERELL, 1897, Bull. Agr. Exp. Sta., New Mexico College Agr., no. 24, p. 44. Type species: *Anthophorula compactula* Cockerell, 1897 (monobasic).

*Diadasiella* ASHMEAD, 1899, Trans. Amer. Ent. Soc., vol. 26, p. 64. Type species: *Diadasiella coquilletti* Ashmead = *Synhalonia albicans* Provancher, 1896 (original designation and monobasic).

*Pachycerapis* COCKERELL, 1922, Amer. Mus. Novitates, no. 47, p. 4. Type species: *Exomalopsis (Pachycerapis) cornigera* Cockerell, 1922 (original designation and monobasic).

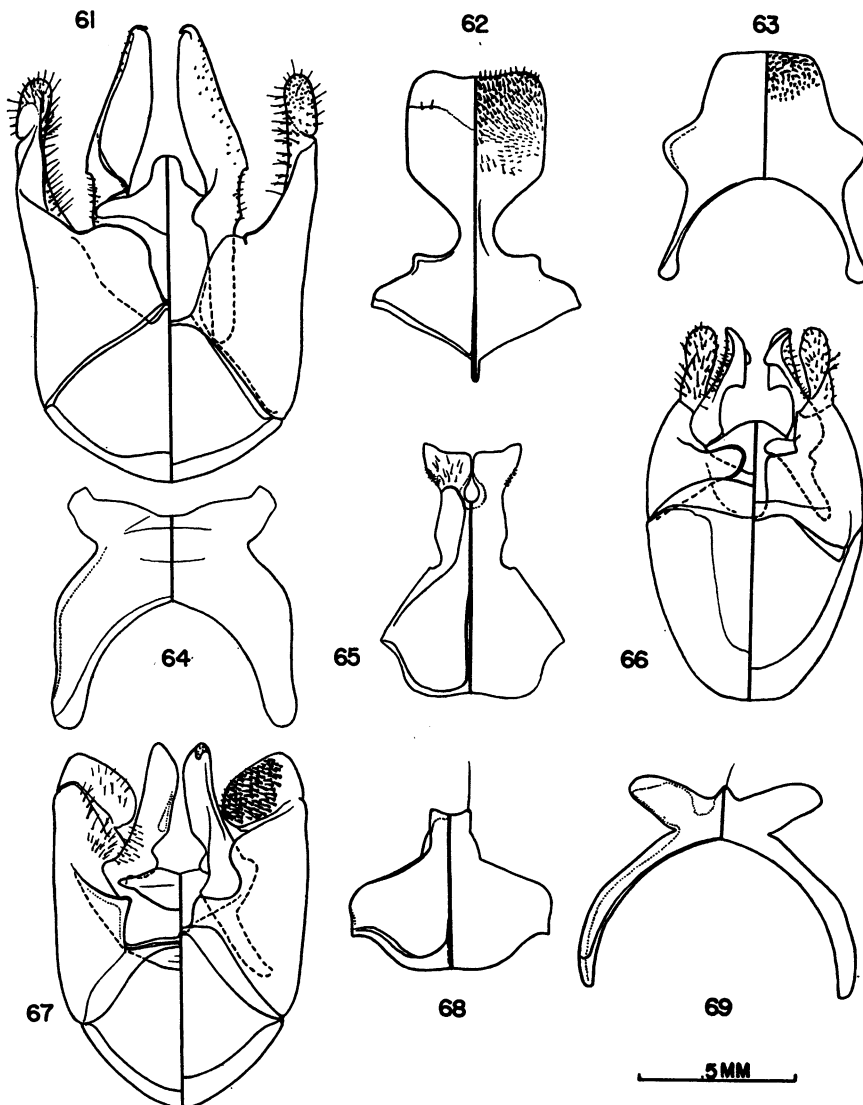
COMMON CHARACTERS: 1. Face weakly protuberant; ocelli large, interocellar distance much greater than ocellocular distance; upper paraocular area not or scarcely concave; *head broadly rounded behind, without evidence of preoccipital carina*; paraocular carina present. 2. Distal part of galea equal to or shorter than eye; maxillary palpus as long as distal part of galea to three-fourths of length of latter. 3. *Pterostigma one-half to one-third (one-half in albata) as long as length of marginal cell on wing margin, little longer than prestigma to more than twice as long, about as wide as latter*; two or three submarginal cells.

FEMALE: 4. Second flagellar segment much broader than long, median segments usually slightly broader than long. 5. *Basitibial plate less than one-sixth of length of tibia, margin not raised*, disc without hair pattern described for *Exomalopsis*, *sensu stricto*. 6. First metasomal tergum with broad posterior zone separated from rest of tergum by depression (at least laterally) which is provided with a weak or strong hair fascia. *Pygidial plate rather narrow.*

MALE: 7. *Clypeus, labrum, and usually mandibles and often under side of scape yellow*; first flagellar segment broader than long and much shorter than remaining segments which are usually longer than broad. 8. *First metasomal tergum with transverse carina (sometimes weak) separating anterior from dorsal surfaces; seventh metasomal tergum broadly rounded, with large triangular pygidial plate defined by carinae.* 9. Seventh sternum with postapodemal portion much broader than long; *eighth sternum with much produced, strongly bilobed, postapodemal portion.* 10. Gonostyli of moderate length, longer than broad; penis valve with inner tooth, without outer tooth or inner serrations.

This subgenus is found in desert and semi-desert areas of the southwestern United States and Mexico. To judge by Timberlake's (1947) study of the group, the following species fall in this subgenus: *Exomalopsis (Anthophorula) albata* Timberlake, *albicans* (Provancher) [*Synhalonia*], *albovestita* Timberlake, *cerasi* Timberlake, *compactula* (Cockerell) [*Anthophorula*], *completa* Cockerell, *cornigera* Cockerell, *deserticola* Timberlake, *eriogoni* Timberlake, *euphorbiae* Timberlake, *gutierreziae* Timberlake, *palmarum* Timberlake, *rufiventris* Timberlake, *torticornis* Cockerell, and *varleyi* Timberlake.

*Exomalopsis cornigera* is the type species for a subgeneric name, *Pachycerapis*. The type specimen of this species was available for study, thanks to Mr. Herbert F. Schwarz of the American Museum of Natural History. It appears to be merely a species of *Anthophorula*, with the peculiar features of the males of certain species of this subgenus accentuated. The acute pygidial plate of the male is about as in *E. torticornis*. The flagellum is little if any more thickened and dentate than in *E. compactula* and *torticornis*; the segments, except for the last three, are



FIGS. 61-63. *Exomalopsis* (*Diomalopsis*) *bicellularis*, new species, male; genitalia, eighth and seventh sterna.

FIGS. 64-66. *Exomalopsis* (*Anthophorula*) *compactula* (Cockerell), male; seventh and eighth sterna, genitalia.

FIGS. 67-69. *Exomalopsis* (*Anthophorisca*) *pygmaea* (Cresson), male; genitalia, eighth and seventh sterna.

broader than long, the last segment is curved and flattened. The tibiae are little if any more swollen than in *compactula*. The pterostigma is a little larger than in *compactula*, about as in *torticornis*. From these notes it can be seen that the distinctive features attributed to the bee by Cockerell were exaggerated. A more unusual feature is the shining, strongly biconvex frons.

#### ANTHOPHORISCA, NEW SUBGENUS

TYPE SPECIES: *Melissodes pygmaea* Cresson, 1872.

COMMON CHARACTERS: 1. Face very weakly protuberant; ocelli of moderate size, diameter equal to or less than that of scape, inter-ocellar distance greater than to slightly less than ocellocular distance; upper paraocular area not or scarcely concave; head rounded

behind without evidence of preoccipital carina; paraocular carina absent or nearly so. 2. Distal part of galea slightly longer than eye; maxillary palpus two-thirds to three-fourths of length of distal part of galea. 3. *Pterostigma one-half to three-fourths as long as length of marginal cell on wing margin, two and one-half to more than four times as long as prestigma, about as wide as to distinctly wider than latter*; three submarginal cells.

FEMALE: 4. Second flagellar segment slightly to considerably broader than long, median segments about as long as broad. 5. Basitibial plate as in *Anthophorula*. 6. *First metasomal tergum with carina separating anterior and dorsal faces weak or sometimes absent*, posterior zone not separated from anterior zone of dorsal surface by depression, except weakly laterally. Pygidial plate broader than in *Anthophorula*.

MALE: 7. Clypeus (at least in center), labrum, and usually bases of mandibles yellow or white; first flagellar segment broader than long to longer than broad, subequal to or shorter than remaining segments which are as long as or longer than broad. 8. *First metasomal tergum without transverse carina*. Seventh metasomal tergum rounded or truncate, margin raised. 9. Seventh sternum with postapodemal part much broader than long; *eighth sternum with short, subtruncate, postapodemal process*. 10. *Gonostyli short and very broad*, with bristles beneath, penis valves with neither inner nor outer teeth.

This subgenus is nearest to *Anthophorula*, from which it differs most conspicuously by the characters italicized in the preceding description. It is noteworthy that in several features (characters 3, 4, 8, etc.) *Anthophorisca* approaches *Phanomalopsis*.

*Anthophorisca* is restricted to Mexico and the southern and central United States, north to central California, Colorado, Nebraska, and east to Mississippi.

The following species are placed in *Anthophorisca*, some of them with the aid of Timberlake's (1947) study of *Exomalopsis*: *albovittata* Cockerell, *chionura* Cockerell, *chlorina* Cockerell, *micheneri* Timberlake, *morgani* (Cockerell), *nitens* Cockerell, *pygmaea* (Cresson) [*Melissodes*], *sidae* Cockerell, and *texana* Friese.

#### ISOMALOPSIS, NEW GENUS

TYPE SPECIES: *Tetralonia niveata* Friese, 1908.

COMMON CHARACTERS: A. Body black, without yellow markings, except for labrum of male; pubescence rather long and sparse, that of mesoscutum much longer than antennal diameter; metasoma with pubescent fasciae weak. B. Face narrow; orbits strongly converging below; interocellar distance greater than ocellocular distance; upper paraocular area nearly smooth, broadly concave; *preoccipital carina absent*; paraocular carina absent; malar area linear. C. Clypeus moderately (almost strongly) well separated from orbits; labrum less than twice as broad as long. D. Mandible with articulations equidistant from eye, without inner tooth; posterior articulation behind median axis of eye. E. Distal part of galea slightly longer than eye; maxillary palpi six-segmented, almost three-fourths as long as distal part of galea. First segment of labial palpus longer than second. F. Pronotum not carinate; scutellum slightly more convex posteriorly than elsewhere. Metanotum and base of propodeum slightly slanting, remainder of propodeum declivous; metanotum slightly convex seen in profile. Q. Marginal cell obliquely truncate apically, three and one-half times as long as broad, longer than distance from apex to wing tip, basal part shorter than free part; *first submarginal cell much longer than third*, second less than one-fourth as long as first; pterostigma about four times as long as prestigma and slightly broader than latter; *cu-v interstitial with M*, or slightly distal to it; first media longer than marginal cell; hairs of distal parts of wings undifferentiated, of remainder of wings very sparse; second media much shorter than second cubital. H. Second abscissa of  $M+Cu$  about four times as long as *cu-v*, and subequal to *M*; jugal lobe as long as cubital cell. I. Arolia present; anterior and middle basitarsi without combs.

FEMALE: J. *Scape slender, much longer than interantennal distance*; flagellum with first segment much less than half of length of scape and as long as third segment, second shorter than third, broader than long. K. *Basitibial plate moderate sized*, clearly defined, surface dull; tibial spurs slender, little

curved, finely serrate; scopa long and rather dense, hairs strongly plumose to apices; hind basitarsus slightly shorter and narrower than tibia, slightly flattened, extending as slender process far beyond base of second segment.

L. *First metasomal tergum with transverse carina separating anterior from dorsal surfaces*, these two surfaces almost equal in length; pygidial plate broad, lateral margins slightly concave, gradulus present lateral to plate.

MALE: M. Scape slender, longer than inter-antennal distance; flagellum with first segment about one-fourth of length of scape, one-third of length of second; subapical flagellar segment almost twice as long as broad, apical normal. N. Posterior legs not swollen; tibial spurs as in female; middle basitarsus slightly shorter and posterior one simple and much shorter than tibia; second posterior tarsal segment arising from apex of basitarsus. O. Seventh tergum rounded, weakly margined posteriorly, with central triangular bare area. P. Metasomal sterna without strong fringes of specialized hairs; *sixth sternum with pair of acute projections bearing series of coarse spicules on inner margins*, and separated by median hairy area. Q. Seventh sternum a broad plate, emarginate posteriorly; eighth sternum with small postapodemal part notched posteriorly. R. Genitalia with spatha large, penis valve with neither ventral basal nor outer teeth; inner apical lobes of gonocoxite absent; *gonocoxites very widely separated dorsally*, dorsal bridge a narrow vertical plate; *gonostyli short*.

*Isomalopsis* is related to *Exomalopsis*, as shown, for example, by characters italicized at the end of G above and under J, L, and R. On the other hand, the genus differs from *Exomalopsis* by the long male antennae (almost equaled by some *Exomalopsis*), the first two characters italicized under G above, and the character italicized under P, as well as by the large spatha and narrow vertical gonocoxal bridge. It is interesting that *Isomalopsis* shows markedly closer affinity with the subgenus *Anthophorula* from North America than with other groups of *Exomalopsis*, as shown by the presence of a transverse carina across the first tergum in the male as well as the female, the pale

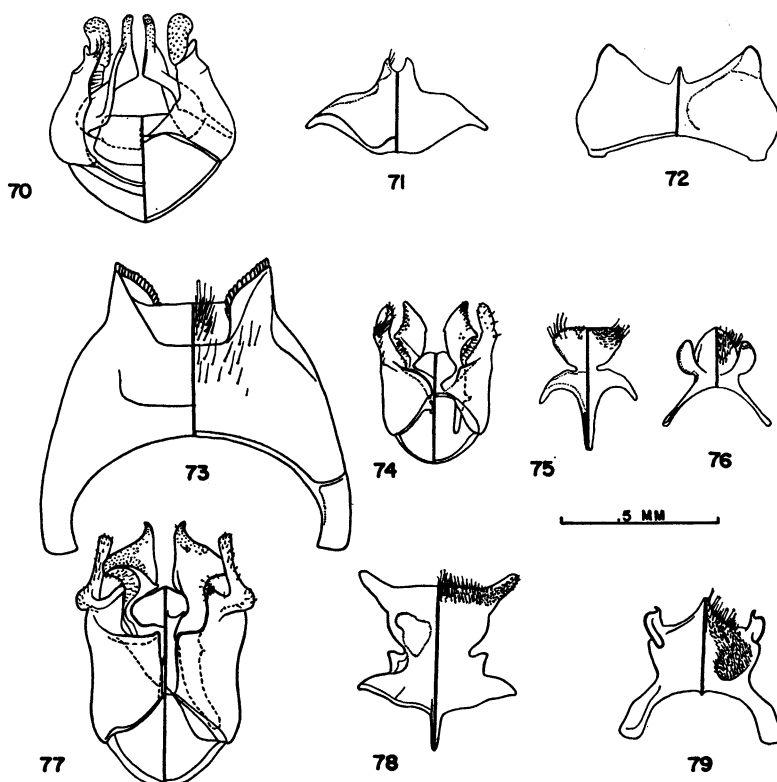
labrum of the male, and characters italicized under B, C, and K above. To one of us (Michener) it seems likely that *Isomalopsis* should be considered as a specialized South American representative of the *Anthophorula* stock, and hence a subgenus of *Exomalopsis*.

So far as we know, this genus includes but one species, *Isomalopsis niveata* (Friese), from the desert areas of Argentina. No doubt because of the long male antennae, Friese placed this bee in the Eucerini (*Tetralonia*), but its obvious relationships are with *Exomalopsis*. We are indebted to Dr. A. A. Ogloblin for calling to our attention the specific name of this insect, which we might otherwise have described as a new species.

#### GENUS EREMAPIS OGLOBLIN

*Eremapis* OGLOBLIN, 1956, Dusenja, vol. 7, p. 149. Type species: *Eremapis parvula* Ogloblin, 1956 (original designation).

COMMON CHARACTERS: A. Body black, without pale markings except that clypeus (sometimes only lower half in female, entirely in male) and labrum are yellowish white. Pubescence of head and thorax moderately dense and long, that of mesonotum longer than antennal diameter. Metasoma without or with weak apical pubescent fasciae. B. Face narrow; orbits very slightly (female) to distinctly (male) converging below; *interocellar distance nearly twice ocellular distance*; *upper paraocular areas punctured*, not concave (top of head convex almost as in *Ancyloscelis*); preoccipital carina absent; paraocular carina weak; malar area linear. C. Clypeus weakly protuberant, nearly reaching orbits; labrum less than twice as broad as long. D. Mandible with articulations equidistant from eye, without inner tooth; posterior articulation behind median axis of eye. E. Distal part of galea slightly shorter than eye length; *maxillary palpus five-segmented*, a little more than half as long as distal part of galea. First segment of labial palpus about one and one-half times as long as second. F. Pronotum not carinate; scutellum uniformly convex, metanotum and base of propodeum subhorizontal, remainder of propodeum declivous; metanotum nearly straight seen in profile. G. Marginal cell pointed apically, slightly obliquely truncate,



FIGS. 70-73. *Isomalopsis niveata* (Fries), male; genitalia, eighth, seventh, and sixth sterni.

FIGS. 74-76. *Eremapis parvula* Ogloblin, male; genitalia, eighth and seventh sterni.

FIGS. 77-79. *Teratognatha modesta* Ogloblin, male; genitalia, eighth and seventh sterni.

over three times as long as broad, longer than distance from apex to wing tip, basal part shorter than free part, first submarginal cell almost as long as second and third together, second much shorter than others and narrowed towards costal margin, *third submarginal cell about two-thirds as long as first*; pterostigma larger, almost four times as long as prestigma and broader than latter; cu-v basal to M or interstitial; first media shorter than or equal to marginal cell, *second media as long as or longer than second cubital cell*. Hairs of distal parts of wings undifferentiated, of remainder of wings very sparse. H. Second abscissa of M+Cu about twice as long as cu-v, shorter than M; jugal lobe about as long as cubital cell. I. Arolia present; anterior and middle basitarsi without combs.

FEMALE: J. Scape slender, longer than interantennal distance; flagellum with first segment about one-fourth of length of scape,

as long as third segment, longer than second, latter broader than long. K. Basitibial plate of moderate size, clearly defined, dull and with short hairs; *tibial spurs slender, little curved, finely serrate*. *Scopa* rather long, sparse, hairs strongly plumose to apices; hind basitarsus longer and narrower than tibia, slightly flattened, *apex without brush and without process extending beyond base of second segment*. L. First metasomal tergum without transverse carina, dorsal surface almost as long as anterior surface. Pygidial plate rather broad, lateral margins weakly concave, apex rounded, gradulus present lateral to plate.

MALE: M. Scape slender, longer than interantennal distance, flagellum with first segment about one-fifth of length of scape, broader than long, shorter than second, subapical flagellar segment longer than broad, apical normal. N. Posterior legs not swollen; tibial spurs as in female; *middle and posterior*

*basitarsi slightly shorter than tibia, slender and simple.* O. Seventh tergum rounded posteriorly, margin sharp but not elevated, dorsal surface bare posteriorly and probably representing broad pygidial plate. P. Metasomal sterna without strong fringes of specialized hairs, sixth rounded posteriorly, without special structures. Q. Seventh sternum with large postapodemal part which is strongly trilobed, the median lobe hairy; eighth with large, truncate, hairy postapodemal part. R. Genitalia with spatha rather small; penis valve with ventrobasal tooth absent, outer tooth large; inner apical and dorso-apical points of gonocoxite unrecognizable; *gonocoxites approximate dorsally; gonostylus moderately long.*

This genus is in general similar to *Exomalopsis* and *Isomalopsis*, as indicated, for example, by the characters italicized under K and N above and by the form of the first metasomal tergum which has a dorsal surface almost as long as the anterior surface. However, the genus is very different from these two, as shown by the other italicized characters. *Eremapis* is much more different from *Exomalopsis* than is *Isomalopsis*. In several characters, especially those of wing venation, *Eremapis* approaches the group of *Tapinotaspis* and *Lanthanomelissa*, but differs from these in many ways, including K and N above. Several features of the genitalia and hidden sterna suggest the group of *Chalepogenus*. We can only conclude that *Eremapis* and its relative, *Teratognatha*, are very distinct genera, probably survivors of a primitive stock that exhibits characters of several of the major divisions of the Exomalopsini.

So far as known, this genus contains a single species which is widespread in the deserts of Argentina.

#### GENUS *TERATOGNATHA* OGLOBLIN

*Teratognatha* OGLOBLIN, 1956, *Dusenja*, vol. 7, p. 154. Type species: *Teratognatha modesta* Ogloblin, 1956 (original designation).

**COMMON CHARACTERS:** A. Body black, without pale markings except that labrum of male is yellowish. Pubescence sparse, particularly that of mesoscutum very sparse but longer than antennal diameter. Metasomal terga with apical pubescent fasciae. B. Face narrow, orbits converging below; *interocular distance slightly less than (female) to sub-*

*equal to ocellocular distance;* upper paraocular areas finely punctured, like adjacent areas, not concave (top of head convex as in *Eremapis*); preoccipital carina absent; paraocular carina absent; malar area linear. C. Clypeus weakly protuberant, closely approaching orbits; *labrum about three times as broad as long.* D. Mandible with articulation beneath posterior margin of eye. E. Distal part of galea subequal to eye length; *maxillary palpus of female* six-segmented, about *one and one-fourth times as long as distal part of galea* because second and third segments are much elongated, *fourth and fifth segments with subapical club-shaped hairs projecting at right angles from palpal axis, entire sixth segment projecting at right angles to palpal axis;* maxillary palpus of male six-segmented but *fourth and minute fifth partly fused so that there appear to be but five segments,* about three-fourths as long as distal part of galea. Labial palpus of female with *first two segments fused, second with long hooked bristles; third segment unusually long, almost one-third as long as fused first and second, somewhat contorted with few blunt recurved hairs; fourth projecting at right angles to third;* labial palpus of male with first segment more than twice as long as second, peculiar form and vestiture of female scarcely evident. F. Pronotum not carinate; scutellum uniformly, weakly convex; metanotum and base of propodeum subhorizontal, rest of propodeum declivous; metanotum convex seen in profile. G. Marginal cell pointed apically, slightly obliquely truncate, three times as long as broad, slightly longer than distance from apex to wing tip, basal part shorter than free part, *first submarginal cell shorter than second and third together* but markedly longer than third which is longer than second; pterostigma large, about three times as long as prestigma and broader than latter; cu-v and M interstitial; *first media distinctly longer than marginal cell, second media shorter than second cubital.* Hairs of distal parts of wings undifferentiated. H. Second abscissa of M+Cu more than three times as long as cu-v, a little shorter than M; jugal lobe almost three-fourths as long as cubital cell. I. Arolia present; anterior and middle basitarsi without combs.

**FEMALE:** J. Scape slender, much longer than interantennal distance; *flagellum with first segment almost two-thirds as long as scape,*

about one and one-half times as long as second which almost equals third; second almost one and one-half times as long as broad (third to ninth one and one-half times as long as broad). K. *Basitibial plate* small, clearly defined, dull, with short hairs; tibial spurs slender, nearly straight, finely serrate. Scopa rather long, sparse, hairs with a few branches except near the apices which are simple; hind basitarsus scarcely longer than tibia, narrower than tibia, somewhat flattened, apex extending far beyond base of second segment and with very small brush. L. First metasomal tergum without transverse carina, dorsal surface about as long as anterior surface. *Pygidial plate* narrow, lateral margins nearly straight, apex rounded, gradulus present lateral to plate.

MALE: M. Scape slender, longer than interantennal distance, *flagellum* with first segment more than half as long as scape, longer than broad, about as long as second, subapical flagellar segment one and one-half times as long as broad, apical normal. O. Seventh tergum rounded posteriorly, weakly margined, no evident pygidial plate. P. Metasomal sterna without strong fringes of specialized hairs, sixth rounded posteriorly, without special structures. Q. Seventh and eighth sterna with large, hairy, postapodemal parts which are not strongly bilobed (eighth in Ogloblin's figure and one of our specimens has short median apical point which is absent in specimen figured). R. Genitalia with spatha rather small; penis valve without ventrobasal tooth, outer tooth large; inner apical lobe of gonocoxite absent or fused to dorso-apical point; gonocoxites approximate dorsally; gonostylus moderately long.

This genus is most closely related to *Eremapis*, from which it differs by the characters italicized above. In some respects it is closer to *Isomalopsis* and *Exomalopsis*, for example, in the characters italicized under G and in the extension of the hind basitarsus beyond the origin of the second segment in the female and presence of a brush on the apex of the basitarsus. The long antennae of the female are unique for the group, and the palpi are utterly different from those of any other bee.

The genus is known from a single species from the deserts of Argentina. In addition to

the localities listed by Ogloblin, we have a specimen from Alpasinche, Province of La Rioja (November), this being the first record for that province. It is a minute bee (4-5 mm. long), superficially very like *Eremapis*. The peculiar palpi of the female are evidently used to pull pollen out of flowers, for they bear masses of pollen in the specimen before us, held by hairs of the second segment of the labial palpus.

Ogloblin (1956) notes that the gradulus of the first sternum has the form of "Diana's bow." It is true that it is feebly emarginate medially, but is quite unlike the gradulus of Eucerini which is more strongly emarginate medially (or biconvex).

#### GENUS *ANCYLOSCELIS* LATREILLE

*Ancyloscelis* LATREILLE, 1829, in Cuvier, Le règne animal, ed. 2, vol. 5, p. 355. Type species: *Ancylosceles ursinus* Haliday, 1836, first included species.

*Ancylosceles* HALIDAY, 1836, Trans. Linnean Soc. London, vol. 17, p. 320. Type species: *Ancylosceles ursinus* Haliday, 1836 (monobasic).

*Leptergatis* HOLMBERG,<sup>1</sup> 1903, An. Mus. Nac. Buenos Aires, ser. 3, vol. 2, p. 422. Type species: *Leptergatis halictoides* Holmberg, 1903 (designation of Lutz and Cockerell, 1920, Bull. Amer. Mus. Nat. Hist., vol. 42, p. 592).

*Dipedia* FRIESE, 1906, Flora og Fauna, vol. 8, p. 22. Type species: *Ancyloscelis armata* Smith, 1854 (designation of Lutz and Cockerell, 1920, Bull. Amer. Mus. Nat. Hist., vol. 42, p. 592).

COMMON CHARACTERS: A. Body black, without yellow marks, except frequently on labrum, clypeus, and mandibles of male, and sometimes on mandible of female. Pubescence of head and thorax moderately dense, that of mesoscutum usually longer than antennal diameter. Metasoma with pubescent fasciae on tergal margins or entirely pubescent in some males. B. Face narrow, orbits slightly converging below; interocellar distance greater than ocellocular distance; *upper paraocular areas densely punctured, top of head convex seen from front*; preoccipital carina present behind ocelli, but usually not sharp; *paraocular carina present; malar area distinct anteriorly*. C. *Clypeus* strongly protuberant, *usually dis-*

<sup>1</sup> The statement of Moure (1950), followed by Michener (1954), that *Leptergatis* Holmberg is a synonym of *Diadasia* (*Dasiapis*) was a *lapsus memoriae*. The matter was corrected by Moure (1953).



*tinctly separated from orbits.* Labrum broader than long. D. Mandible with anterior articulation farther from eye than posterior one, usually with small subapical inner tooth in males; *posterior articulation on median axis of eye.* E. Distal part of galea one-half to three times as long as eye; maxillary palpus six-segmented, about one-third as long as distal part of galea. First segment of labial palpus slightly longer than or shorter than second. F. Pronotum not carinate; scutellum uniformly convex in profile; metanotum and propodeum steeply slanting, anterior part of latter only moderately so; metanotum distinctly convex seen in profile. G. Marginal cell pointed apically, about four times as long as broad, longer than distance from apex to wing tip, basal part slightly shorter than free part; first submarginal longer than or subequal to third, second shortest; pterostigma two to two and one-half times length of prestigma, and slightly broader than latter; cu-v basal to M; first media subequal to marginal cell; second much shorter than second cubital. Hairs of distal parts of wings with bases slightly thickened. H. Second abscissa of M+Cu nearly three times as long as cu-v, little shorter than M; jugal lobe nearly as long as cubital cell. I. Arolia present; anterior and middle basitarsi without combs.

FEMALE: J. Scape slender, slightly longer to slightly shorter than interantennal distance; first flagellar segment more than half of length of scape, shorter than segments 2 and 3 together, second segment slightly shorter than third, nearly as long as broad. K. Basitibial plate very small, slender, well defined, surface with very short hairs; middle tibial and hind tibial spurs slender, nearly straight, finely serrate. Scopa long, rather sparse, coarsely plumose to apices; *hind basitarsus* considerably shorter and more slender than tibia, flattened, *without apical brush*, extending but little beyond base of second segment. L. First metasomal tergum without carina, dorsal surface much shorter than anterior surface. Pygidial plate narrow, acuminate, lateral margins strongly concave, apex rounded, gradulus lateral to plate distinct.

MALE: M. Scape slender, slightly longer or slightly shorter than interantennal distance; flagellum with first segment slightly more or

slightly less than half of length of scape, subequal to second segment, which is subequal to third, all longer than broad; subapical segment longer than broad, apical normal. N. Posterior legs strongly swollen; tibial spurs small, slender, finely serrate, outer hind spur shorter than inner. *Middle basitarsus* slender, *longer than tibia*; posterior basitarsus curved, nearly hairless beneath and variously dentate, an apical spine extending beyond base of second segment. O. Pygidial plate absent, margin of seventh tergum rounded, sometimes produced medially. P. Metasomal sterna without strong fringes; sixth with apex broadly emarginate. Q. Seventh sternum divided medially by hyaline area, apex with four lobes, eighth sternum with postapodemal part longer than broad, constricted basally, bilobed apically and sometimes with median projection and with thickened hair. R. Genitalia with spatha very small, much broader than long, almost membranous; penis valve without ventral basal tooth but with an outer tooth sometimes broadened and denticulate; inner apical lobes of gonocoxite small or absent, without hairs; gonostylus long and expanded, curved inward; *gonobase as long as broad, or longer.*

This genus is very different from other Exomalopsini and one of us (Moore) is inclined to consider it as a separate tribe. The convex vertex is suggestive of the Emphorini, but the seventh and eighth sterna do not resemble those of that tribe, and there is no way to know whether the vertex indicates relationship or is merely a parallelism. As shown in the Introduction, the Emphorini are similar to the Exomalopsini; there are genera of the latter (e.g., *Tapinotaspis*) in which the sterna are very like those of Emphorini, but *Ancyloscelis* is not among them.

*Ancyloscelis* consists of small to moderate-sized species with the hind legs of the male much swollen. They appear to be strongly oligolectic; most species are found in flowers of *Ipomoea*, but a few visit only or principally other flowers.

The genus is rather variable, as shown below. The largest group of species (for which the name *Dipedia* might be used as a subgenus) consists principally of smaller species like *A. armatus* (but *armatitarsis* is as large as species of the other group), with few hooked

bristles (and these only on the stipites) on the proboscis, with the clypeus strongly protuberant, and with the thoracic sternum of the males simple. At the opposite extreme, *A. gigas* has the under sides of the prementum, stipites, and first segment of the labial palpi covered with coarse bristles which are hooked or wavy at the tips. The proboscis is extremely long, and, presumably to provide space for it, the clypeus is very strongly protuberant, the malar space being unusually long for the genus. The male has a large tubercle anterior to each middle coxa. The group of *ursinus* and *turmalis* falls between *gigas* and the group of *armatus*. The hooked bristles of the proboscis are weaker than in *gigas* and are absent from the prementum, although present on the stipites and first segment of the labial palpi. The proboscis is of moderate length, the clypeus little if any more protuberant than in *armatus*, and the malar space almost as in that species. The males, as in *gigas*, have a large tubercle or spine anterior to each middle coxa.

The species of the genus range from Argentina to the southwestern United States. There is much more diversity of structure among the species of South America than among those of Central and North America. Included species are *A. armatitarsis* Strand, *armatus* Smith (= *Melissodes toluca* Cresson), *bonariensis* Brèthes, *duckei* Friese (1904, not 1910), *ecuadorius* Friese, *fiebrigi* Brèthes, *friesanus* Ducke [*Dipedia*], *gigas* Friese, *globulifer* Cockerell [*Leptergatis*], *halictoides* (Holmberg) [*Leptergatis*], *mesopotamicus* (Holmberg) [*Leptergatis*], *panamensis* Michener, *romeroi* (Holmberg) [*Leptergatis*], *sejunctus* Cockerell, *turmalis* Vachal, *ursinus* Haliday [*Ancylosceles*], and *wheeleri* Cockerell.

As pointed out in detail by Schrottky (1920) and in less detail by Michener (1942), the generic name has had a varied history. We trust that its spelling and the group to which it is applied are now stabilized.

#### KEY TO THE GENERA AND SUBGENERA OF EXOMALOPSINI

1. Clypeus strongly protuberant; posterior legs of male greatly swollen; paraocular carina present, sharp, extending nearly to level of ocelli; malar area distinct anteriorly; anterior mandibular articulation farther from eye than posterior. . . . . *Ancyloscelis*  
Clypeus weakly to moderately protuberant; posterior legs of male usually not swollen; paraocular carina absent, weak and indicated only near clypeus, or rounded rather than sharp (or if sharp and distinct as in some *Exomalopsis*, ending well below level of ocelli); malar area linear; mandibular articulations approximately equidistant from eye or sometimes posterior one farther from eye than anterior . . . . 2
2. Arolia very minute, so that they might easily be considered absent; male with outer hind tibial spur absent, antennal scape thick, pedicel nearly hidden in its apex . . . . . *Caenomomada*  
Arolia large; both sexes with both hind tibial spurs present, antennal scape slender, pedicel fully exposed . . . . . 3
3. Fore basitarsus with comb on inner margin (next to strigilis); middle basitarsus with comparable comb on anterior margin, at least distally; thoracic sternum, coxae, and trochanters of female with stiff, hooked bristles . . . . . *Monoeca*  
Fore basitarsus without comb or with comb on outer margin; middle basitarsus without comb; thoracic sternum, coxae, and trochanters with ordinary hairs . . . . . 4
4. Mandible simple; scopal hairs coarsely plumose to apices or nearly so; basitarsi slender, little flattened . . . . . 5  
Mandible with subapical inner tooth; scopa consisting of a mixture of long, simple hairs and shorter plumose ones; middle and hind basitarsi broad and flat . . . . . 13
5. Interocellar distance nearly twice ocellular distance; second medial cell of forewing as long as second cubital; upper paraocular areas strongly punctate, not excavated . . . . . *Eremapis*  
Interocellar distance much less than twice ocellular distance; second medial cell of forewing much shorter than second cubital; upper paraocular areas usually impunctate or finely and sparsely punctate, usually somewhat excavated . . . . . 6
6. Outer surface of posterior tibia strongly tuberculate or spiculate (suggesting *Lithurge*), so that seen in profile, it is highly irregular; first metasomal tergum without transverse carina; palpi of female peculiarly modified and bearing hooked bristles . *Teratognatha*  
Outer surface of posterior tibia not or weakly spiculate, projections not or scarcely evident in profile; first metasomal tergum of female (except in some North American *Anthophorisca*) with transverse carina separating anterior and dorsal surfaces; palpi

- not strongly modified and without hooked bristles . . . . . 7
7. Vein cu-v of forewing interstitial with M or nearly so; middle flagellar segments of male over twice as long as broad; sixth sternum of male with two projections bearing on their inner margins series of spicules . . . . . *Isomalopsis*
- Vein cu-v of forewing much distal to M; middle flagellar segments of male less than twice as long as broad; sixth sternum of male simple (*Exomalopsis*) . . . . . 8
8. Clypeus of male white or yellow (at least partly so); basitibial plate of female small, surface plane . . . . . 9
- Clypeus of male dark like that of female; basitibial plate of female large, with central pilose area (apparently raised) separated by groove from raised margin . . . . . 10
9. First metasomal tergum of male with carina, separating anterior from dorsal surfaces, comparable carina of female strong; pterostigma little over twice as long as prestigma or less; male pygidial plate distinctly defined and eighth sternum with large, bilobed, apical portion . . . *Anthophorula*
- First metasomal tergum of male without carina separating anterior from dorsal surfaces, comparable carina of female weak or sometimes absent; pterostigma three times as long as prestigma or more; male pygidial plate undefined (probably indicated by raised margin of seventh tergum) and eighth sternum with small, subtruncate, apical process . . . . . *Anthophorisca*
10. Pterostigma about as long as or rarely longer than length of marginal cell on wing margin; first metasomal tergum of female usually without depressed posterior marginal zone . . . . . 11
- Pterostigma about two-thirds as long as length of marginal cell on wing margin; first metasomal tergum of female with broad posterior marginal zone which is depressed (or sometimes not appreciably so) and marked off from rest of tergum by weakly depressed, arcuate, sometimes fasciate line . . . . . 12
11. Vertex and occiput meeting in a usually sharp angle (representing the preoccipital carina) behind ocelli; three submarginal cells. . . . . *Exomalopsis, sensu stricto*
- Vertex and occiput meeting in rounded angle so that there is no evidence of preoccipital carina; two submarginal cells. *Diomalopsis*
12. Vertex and occiput meeting in sharp angle (representing preoccipital carina) behind ocelli; depressed line across first metasomal tergum of female fasciate . *Megomalopsis*
- Vertex and occiput meeting in broadly rounded surface; depressed line across first metasomal tergum of female bare or nearly so . . . . . *Phanomalopsis*
- 13.<sup>1</sup> Prestigma at least twice as long as apical breadth; metanotum and propodeum slanting to rear; scutellum weakly and evenly convex seen in profile, posterior margin not much declivous; metanotum hardly convex seen in profile; thorax and abdomen with no yellow markings (genus *Tapinotaspis*) . . . . . 14
- Prestigma slightly to considerably less than twice as long as apical breadth; metanotum and propodeum usually steeply declivous; scutellum usually strongly convex, more so posteriorly or medially than elsewhere so that posterior margin is strongly declivous, *if not*, metanotum usually strongly convex seen in profile; *if* metanotum and propodeum slanting to rear then metanotum strongly convex seen in profile, and abdomen with yellow markings . . . . . 16
14. Jugal lobe of posterior wing two-thirds to three-fourths as long as cubital cell; flagellum of female with first segment half of length of scape or less . . . *Tapinorhina*
- Jugal lobe of posterior wing one-third to one-half as long as cubital cell; flagellum of female with first segment distinctly more than half of length of scape . . . . . 15
15. Male flagellum reaching base of metasoma, first segment broader than long, less than half of length of second, second to tenth segments almost twice as long as broad; preoccipital carina absent . . . . .
- . . . . . *Tapinotaspis, sensu stricto*
- Male flagellum shorter, first segment longer than broad, as long as or longer than second, second to tenth segments less than one and one-half times as long as broad; preoccipital carina present behind ocelli in female. . . . . *Tapinotaspoides*
16. Mesoscutum with abundant hair which is longer than or nearly as long as antennal diameter; anterior basitarsus without distinct comb on outer margin (genus *Lanthanmelissa*) . . . . . 17
- Mesoscutum with exceedingly short hair, sometimes with scattered hairs half as long as antennal diameter or, rarely, even longer; anterior basitarsus with distinct comb on outer margin (except in males of *Tropidopedia*) . . . . . 18

<sup>1</sup> Couplet 13 was difficult to construct because of variation within certain of the groups concerned. A study of table 4 will help to clarify the characters of the genera in case it is difficult to decide which alternative to follow from the key above.

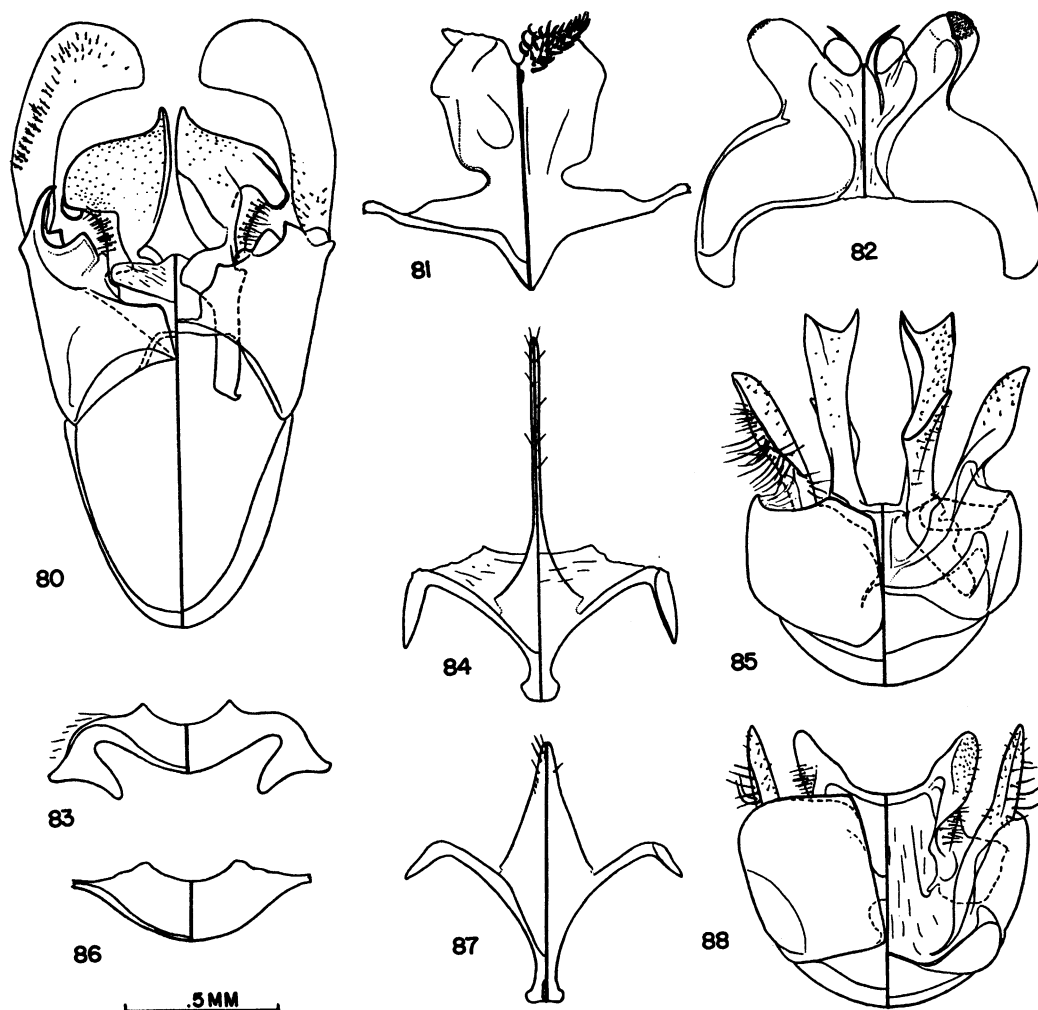
17. Three submarginal cells; pygidial plate of male very inconspicuously margined . . . . . *Lanthanella*  
Two submarginal cells; pygidial plate of male long, almost parallel sided, margined by distinct carina . . . . . *Lanthanomelissa, sensu stricto*
18. Marginal cell as long as distance from apex to wing tip; pygidial plate of male clearly defined; scutellum evenly and slightly convex, metanotum and propodeum slanting to rear as seen in profile . . . *Chalepogenus*  
Marginal cell 1.2 to 1.8 times as long as distance from apex to wing tip; pygidial plate of male absent; scutellum usually more strongly convex, its posterior margin declivous; metanotum and propodeum declivous (genus *Paratetrapedia*) . . . . . 19
19. Paraocular areas flat next to orbits; face shining, finely and sparsely punctate . . . 20  
Paraocular areas convex next to orbits; frons, supraclypeal area, and clypeus almost always strongly punctured . . . . . 21
20. Preoccipital carina strong; posterior mandibular articulation below posterior eye margin; marginal cell at least 1.4 times as long as distance from apex to wing tip; abdomen without yellow bands . . . . . *Trigonopedia*  
Preoccipital carina absent; posterior mandibular articulation in front of posterior eye margin; marginal cell less than 1.4 times as long as distance from apex to wing tip; abdomen with yellow bands . . . *Arhysocele*
21. Inner hind tibial spur much more broadly (but finely) pectinate basally than outer; basitibial plate of female large (rarely small), dull, without shining excavated zone, of male distinct, with lateral margins clearly defined; pygidial plate of female variable, only rarely with depressed spatulate apical portion and in this case with marginal carinae of anterior portion meeting in obtuse angle at base of spatulate portion . . . 22  
Inner hind tibial spur serrate like outer; basitibial plate of female very small, with shining excavated submarginal zone, of male obsolete with lateral margins not clearly defined; pygidial plate of female with depressed spatulate apical portion, marginal carinae of anterior portion meeting in acute angle at base of spatulate portion . . . 24
22. Pronotum without transverse carina; fourth and fifth sterna of male with strong, continuous, apical fringes; lower margin of supraclypeal area unmodified . . . . . *Xanthopedia*  
Pronotum with transverse carina; fourth and fifth sterna of male almost unfripped or with remnants of fringe sublaterally; lower margin of supraclypeal area with transverse carina, at least in male . . . . . 23
23. Pygidial plate of female with no apical spatulate portion; basitibial plate of female large; preoccipital carina not extending behind eyes; comb of anterior basitarsus of male a mere fringe, inconspicuous because of near-by hairs . . . . . *Tropidopedia*  
Pygidial plate of female with apical spatulate portion (much as in *Paratetrapedia, sensu stricto*); basitibial plate of female small; preoccipital carina extending behind eyes; comb of anterior basitarsus of male distinct . . . . . *Amphipedia*
24. Preoccipital carina separated from eye by antennal diameter or less; pronotum with high, translucent, transverse lamella, so that surface immediately anterior to lamella is concave in profile; second anterior tarsal segment of female without hooked bristle . . . . . *Lophopedia*  
Preoccipital carina separated from eye by more than antennal diameter; pronotum with strong transverse carina, surface immediately anterior to carina convex; second anterior tarsal segment of female with greatly thickened hooked bristle on outer margin . . . *Paratetrapedia, sensu stricto*

#### TRIBE TETRAPEDIINI

The principal characters of this tribe are listed in table 1 or italicized in the description of the single genus, *Tetrapedia*.

#### GENUS TETRAPEDIA KLUG

COMMON CHARACTERS: A. Body black, usually without yellow markings, or with yellow clypeus. Pubescence short and sparse, that of mesonotum longer than antennal diameter, metasoma without pubescent fasciae. B. Face narrow; orbits converging below; interocellar distance subequal to ocellular distance; upper paraocular areas smooth, scarcely concave; preoccipital carina absent; paraocular carina absent; malar area linear. C. Clypeus weakly to moderately protuberant, almost reaching orbits. Labrum usually almost as long as broad, or rarely nearly twice as broad as long. D. Mandibles with articulations equidistant from eye, with or without subapical inner tooth; posterior articulation behind median axis of eye. E. Distal part of galea shorter than or equal to eye; maxillary palpi five-segmented, one-third to one-fifth as long as distal part of



FIGS. 80-82. *Ancyloscelis ursinus* Haliday, male; genitalia, eighth and seventh sterna.

FIGS. 83-85. *Tetrapedia* (*Tetrapedia*) *diversipes* Klug, male; seventh and eighth sterna, genitalia.

FIGS. 86-88. *Tetrapedia* (*Lagobata*) *ornata* (Spinola), male; seventh and eighth sterna, genitalia.

galea. First segment of labial palpus subequal to second. F. Pronotum not carinate; scutellum uniformly very slightly convex, in profile nearly horizontal; metanotum and propodeum slanting, former nearly straight seen in profile. G. *Marginal cell* narrowly rounded apically, *bending away from wing margin for almost entire length*, three and one-half to four times as long as broad, distinctly longer than distance from apex to wing tip, basal part equal to free part; first submarginal cell equal to second or slightly longer, third submarginal cell equal to first or much longer; pterostigma three to four times length of

prestigma, broader than latter, cu-v interstitial with or distal to M; first media slightly longer than marginal cell, second subequal to second cubital. Hairs of distal parts of wings thickened basally or not. H. Second abscissa of M+Cu subequal to or nearly twice length of cu-v and half as long as M, or longer; jugal lobe one-fourth as long as cubital cell. I. *Arolia absent*; anterior basitarsi with comb on outer margins.

FEMALE: J. Scape slender, subequal to or slightly longer than interantennal distance; flagellum with first segment more than half of length of scape, subequal to or shorter than

next two segments together, second segment shorter than or subequal to third, slightly broader than long. K. Basitibial plate small, hairless; *middle tibial spur* robust, strongly curved at apex, *broadly and coarsely pectinate*; *outer hind tibial spur absent*, inner broadly and coarsely pectinate. *Scopal hairs* long, stiff, mostly simple, *projecting in all directions, especially from basitarsus which is subcylindrical*, slightly shorter and more slender than tibia; hind basitarsus extending but little beyond base of second segment, lacking special apical brush. L. First metasomal tergum without carina. Pygidial plate narrow, acuminate, lateral margins strongly concave, apex very narrowly rounded, gradulus lateral to plate distinct.

MALE: M. Antennal characters as described for female; subapical segment of flagellum longer than broad, apical segment normal. N. Posterior legs usually swollen; middle basitarsus normal, posterior thickened, curved, bare or nearly so beneath, variously modified; tibial spurs as in female. O. Pygidial plate absent, *margin of seventh tergum broadly emarginate between two blunt teeth*. P. Third metasomal sternum with dense apical fringe of long, often curled hairs, fourth similar, or with hairs shorter, fifth unmodified; sixth sternum with two tufts or lines of stiff, usually converging bristles. Q. *Seventh sternum reduced to transverse plate, with post-apodemal part nearly absent; eighth sternum with median apical point, not lobed; lateral apodemes of seventh and eighth sterna large, converging anteriorly*. R. *Genitalia with spatha absent, penis valves connected by narrow transverse bridge*; penis valves without outer or inner teeth; *gonostyli extending mediobasally to nearly basal level of gonocoxites*; inner apical lobes of gonocoxite absent.

This genus contains rather slender bees which are usually black but sometimes largely reddish.

#### SUBGENUS TETRAPEDIA KLUG

*Tetrapedia* KLUG, 1810, Mag. Gesell. Naturf. Fr. Berlin, vol. 4, p. 33. Type species: *Tetrapedia diversipes* Klug, 1810 (monobasic).

*Tetrapedium* Berthold, 1827, and *Tetrapaedia* Dalla Torre, 1896, are unnecessary emendations of *Tetrapedia* Klug.

COMMON CHARACTERS: 1. Clypeus black,

sometimes partly yellow in male. 2. Thorax without scale-like hairs, sometimes with some short plumose hairs that are almost scale-like. 3. Second abscissa of M+Cu of posterior wings usually much longer than cu-v. Hairs of distal parts of wings not differentiated.

FEMALE: 4. Mandible simple. 5. Basitibial plate well defined, concave, usually shining and hairless.

MALE: 6. Penis valve exceeding gonostylus, with two or three large apical and median projections.

This subgenus ranges from southern Brazil and northern Argentina, and Ecuador on the Pacific coast, northward to the extremities of the Neotropical zone in Mexico. Included species are *alfkeni* Cockerell, *amplatarsis* Friese, *anisitsi* Schrottky, *curvatarsis* Friese, *diversipes* Klug, *maura* Cresson, *peckholtii* Friese, *pyramidalis* Friese, *rugulosa* Friese, *tarijensis* Brèthes, and *xanthostigma* Schrottky.

#### SUBGENUS LAGOBATA SMITH

*Lagobata* SMITH, 1861, Jour. Ent., London, vol. 1, p. 151. Type species: *Lagobata diligens* Smith, 1861 = *Ancyloscelis ornata* Spinola, 1853 (monobasic).

COMMON CHARACTERS: 1. Clypeus at least partly yellow. 2. Dorsum of thorax and especially triangular area of propodeum with short, broad, scale-like hairs (among longer normal hairs). 3. Second abscissa of M+Cu of posterior wings about as long as cu-v. Hairs of distal parts of wings thickened basally.

FEMALE: 4. Mandible with subapical inner tooth. 5. Basitibial plate defined only apically, not or little concave, sometimes dull.

MALE: 6. Penis valves short and simple.

This Brazilian subgenus contains *Tetrapedia ornata* (Spinola) and *clypeata* Friese. Of the two species, *ornata* is the most different from *Tetrapedia*, *sensu stricto*; study of males of *clypeata* which have not been available to us may show that *Lagobata* merges with *Tetrapedia*, *sensu stricto*, in too many characters to be retained as a subgenus.

#### TRIBE EUCERINODINI

The principal characters of this monotypic tribe are listed in table 1 or italicized in

the description of the genus. In general form and appearance, the species placed in this tribe resembles the common Eucerini such as *Melissodes*, and not the very different Exomalopsini and Tetrapedini.

#### EUCERINODA, NEW GENUS

TYPE SPECIES: *Anthophora gayi* Spinola, 1851 = *Melitoma ruficruris* Vachal, 1909.

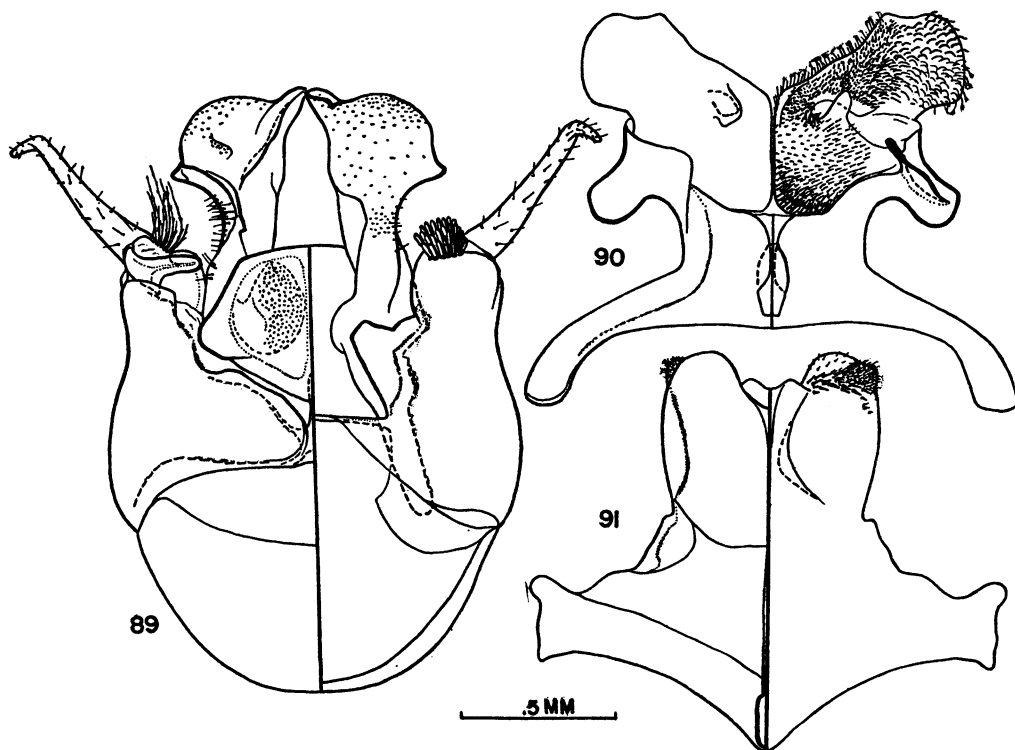
COMMON CHARACTERS: A. Body black, clypeus, lower paraocular areas, and part of supraclypeal area whitish in male. Pubescence of head and thorax dense and rather long, that of mesothorax much longer than antennal diameter; metasomal terga with apical fasciae of appressed pale pubescence. B. Face narrow (in male very narrow); orbits of female parallel, of male convex, closest above level of antennal bases, diverging above and below; interocellar distance slightly more (female) to nearly twice (male) ocellocular distance; upper paraocular areas punctate like adjacent regions, not concave; preoccipital carina absent; paraocular carina absent (feebly indicated below in male); malar area linear. C. Clypeus weakly protuberant, separated from orbits by about one-third of antennal diameter; labrum more than twice as broad as long (in male with two longitudinal median ridges near midline). D. Mandibles with articulations equidistant from eye, badly worn in available specimens but probably simple; posterior articulation behind median axis of eye. E. Distal part of galea about 1.6 times as long as eye; maxillary palpi six-segmented, about one-fifth of length of distal part of galea. First segment of labial palpus less than twice length of second. F. Pronotum not carinate; scutellum nearly flat and horizontal as seen in profile except for downturned posterior margin; metanotum strongly convex, but subhorizontal; extreme base of propodeum slanting, remainder strongly declivous. G. Marginal cell rounded apically, four times as long as broad, slightly longer than distance from apex to wing tip, basal part subequal to free part, *first submarginal cell equal to second, much shorter than third; pterostigma a little longer than prestigma*, as wide as latter; cu-v and M interstitial; first media subequal to marginal cell, *second media longer than second cubital*. Hairs of distal parts of wings strongly

thickened basally. H. Second abscissa of M+Cu almost twice length of cu-v, one-half to three-fifths of length of M; jugal lobe two-thirds as long as cubital cell. I. Arolia large; anterior and middle basitarsi without combs.

FEMALE: J. *Scape* slender, *over twice as long as interantennal distance*; flagellum with first segment distinctly more than half of length of scape and slightly longer than next two segments together, second very little shorter than third, longer than broad or about as long as broad. K. Basitibial plate small, margin entirely visible, surface dull; tibial spurs serrate, *inner hind tibial spur* exceeding outer, *flattened and blade-like* (but not expanded) apically, serrate margins forming opposite edges of blade. Scopa rather short, hairs coarsely plumose (with few branches) to apices. Hind basitarsus more than half as long as tibia, narrower than tibia, somewhat flattened, extending a little beyond base of second segment. L. First metasomal tergum without carina, dorsal surface about as long as posterior surface. Pygidial plate narrow, lateral margins slightly concave, apex narrowly rounded, gradulus strong, arcuate, and continuing to side of tergum.

MALE: M. *Scape* slender, *over twice as long as interantennal distance*; flagellum with first segment two-thirds as long as scape, subequal to next two segments together, second equal to third, much longer than broad, following segments (except last) progressively slightly shorter but all longer than broad, apical segment normal. N. Posterior legs swollen; *basitibial plate absent*; middle tibial spur as in female, *posterior tibial spurs absent*; *basitarsus swollen, with long upper or outer apical process and broad lower or inner apical projection from the outer side of which arises second tarsal segment*; *inner surface of basitarsus divided by longitudinal carina into hairy outer portion and inner portion which has only very fine, short hairs*. O. Seventh tergum with short, rounded, apical projection hidden in dense hair, without pygidial plate. P. Metasomal sterna hairy, without specialized fringes; fifth sternum with large median hair tuft; sixth sternum with margin broadly truncate with median cleft, median and marginal portions elevated but large area on either side of median portion deeply concave.





FIGS. 89-91. *Eucerinoda gayi* (Spinola), male; genitalia, seventh and eighth sterna.

Q. Seventh sternum with large postapodemal part. R. Genitalia with spatha broader than long; penis valve without ventrobasal tooth, with outer tooth; apex of gonocoxite or base of penis valve with inwardly directed, partially separate process in position of dorso-

apical point of gonocoxite; inner apical lobes of gonocoxites absent; *ventro-apical spicules of gonocoxite long and prominent*.

This genus is known from a single species, *Eucerinoda gayi* (Spinola), from Chile.

## APPENDIX

### DESCRIPTION OF NEW SPECIES

BECAUSE SOME OF THE subgenera described above are based on new species, the following descriptions of such forms are presented here:

#### **Paratetrapedia (*Xanthopedia*) tricolor,** new species

This species is described here in order to provide a firm type species for the subgenus *Xanthopedia*, as we do not have older specific names that are certainly correct for any of the species of the subgenus. The species here described had been tentatively identified by one of us (Moure) as the female of *Tetrapedia iheringii* Friese, 1899, but it differs from that species (authentically identified specimens of which we have not seen) by the black apical bands on the metasomal terga.

**FEMALE:** Length, 8 mm.; wing length, 6 mm. Black, *the following parts yellow*: clypeus (except upper lateral black area); large spot on supraclypeal area; lower paraocular area, to level above antenna, where yellow is excavated medially and curves away from eye margin at summit which is one-fourth of distance from antennal bases to ocelli; line along posterior orbits; under side of scape; labrum; basal half of mandible; upper margin of pronotum; pronotal lobes; small posterior lateral marginal spot on mesoscutum; axilla; scutellum, except anterior and posterior marginal area; metanotum; anterior end of tegula; fore tibia and apex of femur; spot at base of middle tibia; dorsolateral spots on first tergum; basal fasciae on second to fifth terga, those of second to fourth broadly narrowed medially. *The following parts ferruginous*: tegula and legs, except yellow portions, and except coxae, trochanters, and bases of anterior femora which are blackish; metasoma, except yellow parts and except broad posterior depressed marginal brownish black bands, widest medially, on second to fourth terga. Flagellum dark brown, paler beneath. Wings slightly dusky, more yellowish basally, veins and stigma ferruginous. Pubescence yellowish ferruginous on legs and abdomen; scopa ferruginous except that of basitarsus (except near inner margin) is black.

Eye length to lower interocular distance to upper interocular distance as 26:20:24; pre-occipital carina sharp behind vertex, extending laterally behind eyes as rounded ridge separated from eye by slightly less than antennal diameter. Lateral margins of pygidial plate distinctly concave posteriorly so that apical part of plate is parallel sided. Frons and supraclypeal area more coarsely punctate than any other parts of body; clypeus with finer scattered punctures; rest of head with only very fine scattered punctures. Mesoscutum and scutellum with very fine punctures separated by about a puncture width, mesepisternum with scattered, larger, shallow punctures almost as large as and much less distinct than those of clypeus. Rest of thorax with punctures so fine and sparse as to be negligible. Metasoma shining, with only very fine, scattered, setiferous punctures except for basal portions of third and following terga which have coarser piliferous punctures.

**TYPE MATERIAL:** Holotype female and one female paratype: São Paulo, São Paulo, Brazil. One female paratype: Vila Velha, Paraná, Brazil, November, 1952. The holotype and one paratype are in the collection of J. S. Moure (Curitiba); the other paratype is in the Snow Entomological Museum of the University of Kansas.

#### **Paratetrapedia (*Tropidopedia*) seabrai,** new species

This species is related to the form that we have identified as *Paratetrapedia duckei* (Friese, 1910) but is more robust, with the mesoscutum mostly honey-colored instead of black, with the first two flagellar segments concolorous with the rest instead of yellow beneath, and with the scutellum a little more strongly convex and densely covered with rather long ferruginous hair in the male. *Paratetrapedia (*Tropidopedia*) seabrai* may be *Tetrapedia pallidipennis* Friese, 1899, but as there are similarly colored species in various subgenera, it is difficult to be sure without seeing Friese's type.

**MALE:** Length, 9 (to 10) mm.; wing length, 9 mm. Head yellow, with two reddish spots on clypeus, blackish area below each antennal

base; frons, vertex, and upper part of occiput black with large yellow spot in center of frons, small one at summit of each eye, and yellow extending up along inner orbits nearly to latter spot. Thorax yellow, anterior and posterior-lateral parts of mesoscutum infuscated, rest of mesoscutum honey-colored except for yellow lateral margins and longitudinal discal stripes; mesepisternum and sides of propodeum with some irregular honey-colored patches. Tegula honey-colored except for yellow mesal area. Metasoma yellowish honey-colored, dorsum heavily infuscated, especially posteriorly. Antennae dark brown, flagellum lighter beneath, scape yellow beneath. Legs yellow, tarsi infuscated apically. Wings yellow, dusky apically, veins and stigma honey-colored. Pubescence honey-colored to ferruginous, sparse, darker near apex of abdomen, posterior basitarsus and outer side of posterior tibia (except base) with large dense mass of black hair.

Eye length to lower interocular distance to upper interocular distance as 30:22:26.

Frons more coarsely punctured than any other area of body, supraclypeal area and clypeus nearly as coarsely so; rest of head with only fine scattered punctures. Mesoscutum with fine, rather close punctures; scutellum with somewhat coarser, more separated punctures; mesepisternum, centrally, with scattered punctures nearly as coarse as those of clypeus, rest of sides of thorax with very sparse, fine punctures; metanotum and posterior surface of propodeum with finer, closer punctures. Metasoma shining and nearly impunctate.

FEMALE: Length, 9 mm.; wing length, 8.5 mm. Agrees with description of male except as follows: mesoscutum practically without infuscated area, and yellow lines on mesoscutum narrow and vague; posterior basitarsus nearly all black. Hairs of posterior basitarsus black; black hairs of posterior tibia limited to posterior part of distal half.

Eye length to lower interocular distance to upper interocular distance as 32:24:25.

Mesoscutum and scutellum exceedingly finely and closely punctured, surfaces largely invisible except where mat of short, felt-like hairs is scraped off; metasomal sterna and sides of terga with much coarser piliferous punctures than male.

TYPE MATERIAL: Holotype male and three male paratypes; Alto de Boa Vista, Floresta de Tijuca, Rio de Janeiro, Brazil, December 27, 1950 (C. R. Hathaway). Allotype female, without data, probably from same place and date.

This species is named in honor of Dr. Carlos Alberto Campos Seabra of Rio de Janeiro, who has collected much interesting material at the type locality and who has assembled an enormous and valuable collection of bees.

The holotype and allotype are in the Moure collection in Curitiba, two paratypes are in the collection of Dr. Carlos Alberto Campos Seabra, and one paratype is in the Snow Entomological Museum of the University of Kansas.

***Lanthanomelissa (Lanthanella) completa*,  
new species**

This species differs from other known *Lanthanomelissa* by larger size, presence of three submarginal cells, lack of yellow areas on the thorax, and other characters listed in the subgeneric description.

MALE: Length, 7 mm.; wing length, 6 mm. Head and thorax black, the following parts yellow: clypeus except for testaceous apical margin, quadrate spot above clypeus, small spot on paracocular area near lateral angle of clypeus, labrum, basal half of mandible. Distal half of mandible reddish; antennal flagellum testaceous, paler beneath than above; tegulae transparent brownish, yellowish anteriorly. First metasomal tergum black, with translucent brownish posterior margin; second, third, and (in holotype but not paratype) fourth and fifth terga with blackish discal areas; second to sixth with broad, translucent, brownish posterior margins which permit yellow areas beneath to be seen; second with large basilateral yellow area, third to fifth with broad basal yellow fasciae, that of third broken medially, sixth and seventh terga (fifth also in paratype) largely yellow, pygidial plate light brown. Metasomal sterna largely yellowish. Legs yellow, coxae, trochanters, and basal two-thirds or three-fourths of femora black; tibial spurs translucent testaceous. Wings transparent, veins brown, stigma yellowish brown. Pubescence dull white, long and abundant on head and

thorax, that of mesoscutum abundant and more than twice as long as flagellar diameter, that of metasomal sterna dense, suberect, denser near posterior margins of terga than elsewhere.

Eye length to lower interocular distance to upper interocular distance as 25:21:28.

Head with only very fine scattered punctures, most distinct on frons and lower parts of paraocular areas. Thorax similarly inconspicuously punctate and almost smooth except for mesoscutum and scutellum which have punctures of moderate size, coarsest on anterior part of mesoscutum where they are separated by little more than a puncture width, progressively finer posteriorly to the scutellum where they are separated in most areas by three puncture widths. Metanotum shining, very finely, sparsely, and inconspicuously punctate.

TYPE MATERIAL: Holotype male and one male paratype; Sierras Bayas, Departamento de Olavarría, Provincia de Buenos Aires, Argentina.

The holotype is in the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires; the paratype, in the Moure collection, Curitiba, Brazil.

We are indebted to Dr. Ricardo N. Orfila of the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" for the opportunity to study this interesting species.

***Exomalopsis (Diomalopsis) bicellularis*,  
new species**

This is the only known species of its subgenus. It is superficially most like some small, dark-haired species of *Exomalopsis*, *sensu stricto*, such as *iridipennis* Smith, from which it differs by the absence of a preoccipital carina, the presence of but two submarginal cells, and other characters indicated in the subgeneric description.

MALE: Length, 5.5 to 6 mm.; wing length, 5 mm. Black, under sides of antennal flagella dark brown, legs and metasomal sterna dark reddish brown, tibial spurs and tarsi reddish brown, sixth metasomal sternum with margin translucent, seventh brownish red. Wings brownish, veins dark brown, stigma honey-colored. Pubescence black, fuscous on lower half of face, occiput, under surfaces of legs, venter of metasoma, and apical half of dor-

sum of metasoma, ferruginous on tarsi except near bases and on seventh metasomal tergum; a small patch of whitish appressed hair lateral to base of each antenna.

Eye length to lower interocular distance to upper interocular distance as 17:16.5:17.

Head shining, finely and sparsely punctate, except for some coarser punctures along orbital margins of paraocular areas and much coarser, widely separated punctures on clypeus; mesoscutum, except for small, impunctate posterior median area, with punctures finer than those of clypeus and separated by more than a puncture width; scutellum with large, smooth, discal area, posterior and lateral margins with punctures similar to those of mesoscutum, close posteriorly; mesepisternum with punctures coarser than those of dorsum of thorax and almost as coarse as those of clypeus; rest of side of thorax more finely punctate; middle of metanotum punctate, but sides and posterior surface of propodeum smooth and impunctate; first metasomal tergum smooth and impunctate medially, with fine piliferous punctures laterally; other terga progressively more coarsely punctate towards rear of abdomen; metasomal sterna each with submedian transverse zone of piliferous punctures.

FEMALE: Length, 7.5 mm.; wing length, 6.5 mm. Differs from description of male as follows: middle and especially posterior tarsi ferruginous; integument of metasoma nearly black except for dark reddish brown pygidial plate. Tibial scopa black, with some ferruginous hairs apically; basitarsal scopa ferruginous. Hairs of metasomal sterna and posterior terga pale dusky ferruginous, apical fringe of fifth tergum dark ferruginous, hairs lateral to pygidial plate ferruginous.

Eye length to lower interocular distance to upper interocular distance as 21:20:20.

Mesoscutum with posterior median area punctured, although more finely and sparsely so than elsewhere; mesepisterna much more coarsely punctured than mesoscutum but much more finely so than clypeus; metasomal punctation finer than in male, disc of second as well as first tergum impunctate.

TYPE MATERIAL: Holotype male, allotype female, and one male paratype: Curitiba, Paraná, Brazil, September, 1943 (R. B. Lange). One female paratype: same locality,

November 1, 1956 (C. D. Michener and R. B. Lange).

The holotype and allotype are in the Moure collection in Curitiba, the male paratype is in the collection of the University of Kansas, and the female paratype is in the collection of Carlos Alberto Campos Seabra, Rio de Janeiro.

#### SOME SPECIES ERRONEOUSLY PLACED IN *EXOMALOPSIS*

While we are on the subject of species of Exomalopsini, it seems appropriate to indicate some new generic and tribal assignments of species erroneously described in *Exomalopsis*, based on examination of types in the United States National Museum, as follows:

##### TRIBE EMPHORINI

*Melitoma monozonula* (Cockerell), 1949, new combination.

*Diadasia (Dasiapis) nitidicincta* (Cockerell), 1949, new combination.

##### TRIBE EUCERINI

*Melissoptila (Ptilomelissa) rufitecta* (Cockerell), 1949, new combination.

*Melissoptila (Ptilomelissa) rufitecta palliditecta* (Cockerell), 1949, new combination.

The following species are of uncertain generic assignment in the Eucerini: *E. percon-*

*cinna* Cockerell, 1949; *fulvotecta* Cockerell, 1949; and *wilmattae* Cockerell, 1949.

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