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The Bee Genus *Chilicola* in the Tropical Andes, with Observations on Nesting Biology and a Phylogenetic Analysis of the Subgenera (Hymenoptera: Colletidae, Xeromelissinae)¹

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ABSTRACT This is a revision of the species of the genus *Chilicola* found in the South American Andes, Peru to Venezuela, above elevations of 1000 m. In addition to the four previously described species known from this area, 23 new species are recognized and described. They fall into three groups: (1) The *C. ashmeadi* group of the subgenus *Anoediscelis*, for *C. ashmeadi* (Crawford) and the following new species: *C. colombiana*, *mistica*, *venezuelana*, *wygodzinskyi*, *xanthostoma*, *xanthognatha*, *cooperi*, *pedunculata*; (2) Subgenus *Hylaeosoma* for *C. aequatoriensis* Benoist and the following new species: *C. involuta*, *umbonata*, *canei*, *belli*, *smithpardoii*; (3) The new subgenus *Oroediscelis* (type species, *Chilicola styliiventris*) for *C. styliiventris* Friese, *quitensis* Benoist, and the following new species: *C. espeleticola*, *brooksi*, *benoistiana*, *cuzcoensis*, *bigibbosa*, *maculipes*, *transversaria*, *gibbosa*, *brzoskai*, *simplex*. Phylogenetic analyses are presented for the subgenera of *Chilicola* and for the species of the subgenus *Oroediscelis*. Aspects of nesting biology are presented for *C. espeleticola* and *C. styliiventris*.

Key Words: *Chilicola*, *Anoediscelis*, *Hylaeosoma*, *Oroediscelis*, Colletidae, nests, South America, Andes.

RESUMEN El presente trabajo es una revisión de las especies del género *Chilicola* que se encuentran en los Andes Suramericanos desde Perú hasta Venezuela por encima de los 1000 msnm. Adicionalmente a la especie de Mesoamerica y las cuatro especies conocidas para el área, se establecen y describen 23 especies nuevas. Las especies se distribuyen en tres grupos: (1) el grupo *ashmeadi* del subgénero *Anoediscelis*, para *C. ashmeadi* (Crawford) y las siguientes especies nuevas: *C. colombiana*, *mistica*, *venezuelana*, *wygodzinskyi*, *xanthostoma*, *xanthognatha*, *cooperi*, *pedunculata*; (2) subgénero *Hylaeosoma* para *C. aequatoriensis* Benoist y las siguientes especies nuevas: *C. involuta*, *umbonata*, *canei*, *belli*, *smithpardoii*; (3) el nuevo subgénero *Oroediscelis* (especie tipo, *Chilicola styliiventris*) para *C. styliiventris* Friese, *C. quitensis* Benoist, y las siguientes especies nuevas: *C. espeleticola*, *brooksi*, *benoistiana*, *cuzcoensis*, *bigibbosa*, *maculipes*, *transversaria*, *gibbosa*, *brzoskai*, *simplex*. Se presentan análisis filogenéticos para los subgéneros de *Chilicola* y para las especies del subgénero *Oroediscelis*, además de algunos aspectos de los hábitos de nidificación para *C. espeleticola* y *C. styliiventris*.

Palabras claves: *Chilicola*, *Anoediscelis*, *Hylaeosoma*, *Oroediscelis*, Colletidae, nidos, Suramérica, Andes.

INTRODUCTION

The genus *Chilicola* consists of small, slender, largely black bees (Fig. 1) ranging from Santa Cruz Province, Argentina, and Asién, Chile, north to the states of Tamaulipas and Jalisco in Mexico and St. Vincent in the Lesser Antilles. In much of this wide range, species of *Chilicola* are few and specimens rarely collected. The literature shows them to be abundant and diverse only in Chile, which has a fauna of 32 known species, placed in seven subgenera (Toro and Moldenke, 1979; Toro, 1986). Michener (1995) reduced the number of Chilean subgenera to four, but the diversity is clearly substantial.

Only three species from the Andes north of Chile have been described (Benoist, 1942, two species from Ecuador; Friese, 1908, one species from Peru); a fourth species found in Colombia was described from Central America. It now appears, however, that there is a rich fauna in the Andes of Peru, Ecuador, Colombia, and Venezuela, i.e., in the Puna and Páramo Nordandino and adjacent provinces recognized by Morrone (2001). The present paper concerns the 27 species known from these mountains. Because these bees are small, because there are relatively few bee collectors, and above all because Andean weather is so often not favorable for flight by insects like bees that are usually in their nests when the weather is cold, windy, cloudy, foggy, and rainy, collecting with a net from flowers is often not a successful way of sampling the Andean *Chilicola* fauna. Many more species will no doubt be found, for several of those described herein are known from a single locality and one or a few specimens. Benoist (1942) appears to have been the first person to realize that they can be obtained from pithy stems in Ecuador (regardless of the weather), and Robert W. Brooks of the University of Kansas recognized the same thing in the Venezuelan Andes, where he collected many specimens used in this study. This collecting method should greatly increase knowledge of this genus in the future, although some species may nest principally or exclusively in burrows made by beetles in wood or woody stems, rather than in pithy stems. Traps that can function whenever there is a period of sunny weather also would be worth trying.

All specimens used in the present paper were obtained at or above the elevation of 1,000 m. The only lowland species known from Peru to Venezuela are *Chilicola* (*Hylaeosoma*) *stenocephala* Brooks and Michener from Amazonian Colombia and an undescribed species probably of the *C. ashmeadi* group (males not known) from Talara in northern coastal Peru.

Andean *Chilicola* can be easily divided into three groups: (1) the *C. ashmeadi* group usually included in the subgenus *Anoediscelis*, (2) the subgenus *Hylaeosoma*, and (3) the new subgenus *Oroediscelis*. The first group ranges from the Andean region to Mexico, with other species of

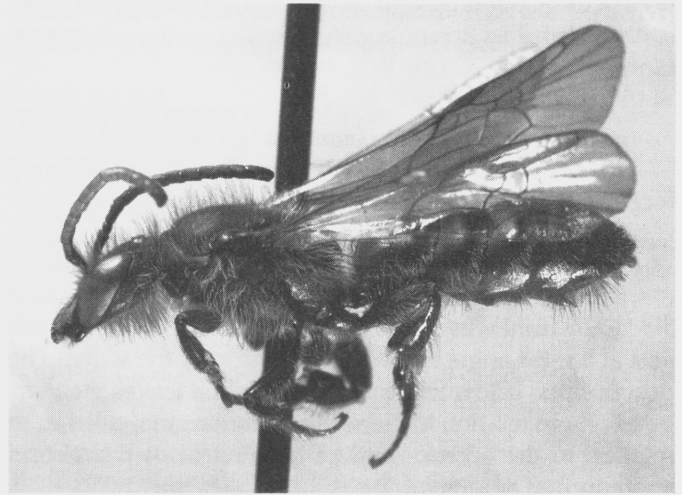


Fig. 1. *Chilicola* (*Oroediscelis*) *espeleticola* Michener, male (photo by M. S. Engel).

Anoediscelis in Chile; the second ranges from the Andean region and Brazil and Bolivia, north to Mexico; the third group, *Oroediscelis*, is limited to the Andean region north of Chile. Thus, except possibly for the *C. ashmeadi* group, the Andean fauna does not consist of a northern montane extension of the rich, temperate zone Chilean and Argentine fauna. At least the Andean *Hylaeosoma* presumably were derived from lowland tropical antecedents. *Hylaeosoma* exists in the lowland tropics and was present in the Dominican Republic and doubtless elsewhere in the tropics at least as early as Miocene times; *Chilicola* (*Hylaeosoma*) *gracilis* Michener and Poinar (1997) and *C. (H.) electrodominica* Engel (1999) were based on fossils in Dominican amber. The subgenus does not occur in temperate austral South America; its southernmost known localities are recorded below in a note on extralimital (non-Andean) species at the end of the account of species of *Hylaeosoma*. The origin of the Andean endemic subgenus *Oroediscelis* is not known.

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I am especially indebted to Dr. Robert W. Brooks who collected many of the specimens of Andean *Chilicola* and who assembled much of the borrowed material for study. He also provided the nests and information on nesting biology of two species. It was our original intent to publish this study jointly, but pressure of other responsibilities made his further contributions impossible.

Dr. Michael S. Engel made the photographic illustrations and the analyses of my character matrices with NONA.

The cooperation of many museum curators and collectors who loaned specimens is much appreciated. They

are listed in the section on Abbreviations, Terms and Methods. Roy S. Snelling and Bryan N. Danforth were especially helpful in arranging for the disposition of important material.

Finally, Dr. J. S. Ashe, Curator-in-charge of the Entomology Division, University of Kansas Natural History Museum and Biodiversity Research Center, kindly permitted my use of space and facilities.

ABBREVIATIONS, TERMS, AND METHODS

T.—tergum, followed by the number of a metasomal tergum; thus T1 is the first tergum of the metasoma.

S.—sternum (as explained for T).

Alveolus.—antennal socket.

Distal stigmal perpendicular.— an imaginary line across the front wing (Fig. 3) through the apex of the stigma and at a right angle to the costal margin of the wing. The descriptions below record where this line leaves the marginal cell, in relation to the second submarginal cell, i.e., in relation to the anterior end of the first or of the second submarginal crossvein.

Measurements and illustrations of the hind tibia of males of the subgenus *Oroediscelis* appear repeatedly in the following pages. The measurements were made on the upper outer view with the preapical brush of hairs characteristic of most species of this subgenus in full view, the crests on the under surface being out of sight. For illustrations, however, the tibia, is tilted to show the summit of the inner crest visible behind the outer crest.

For additional comments on the illustrations of *Oroediscelis*, see the account of that subgenus.

Facial proportions were obtained by dividing the length (apex of clypeus to summit of vertex in facial view) by the width (greatest distance between apparent outer limits of eyes in facial view), using an eye-piece micrometer in a dissecting microscope.

Forewing length was measured with the same equipment from the base of the enlarged base of vein R to the wing apex.

For all illustrations divided by a vertical line, the left hand side is dorsal, the right hand side ventral.

Following is a list of collections and museums containing material that I used, the cities by which they are identified (in italics) in the text, and in brackets, the names of the persons who facilitated my use of the specimens.

Aarhus = Claus Rasmussen collection, to be placed in Aarhus, Denmark.

Berkeley = Essig Entomological Museum, University of California, Berkeley, California 94720, U.S.A. [Cheryl Barr].

Berlin = Museum für Naturkunde der Humboldt-Universität, Berlin, Germany [F. Koch].

Bogotá Humboldt = Instituto Alexander von Humboldt, Santa Fé de Bogotá 2 DC, Colombia [F. Fernandez].

Bogotá Univ. = Departamento de Biología, Universidad Nacional de Colombia, Santa Fé de Bogotá, Colombia [G. Nates Parra, and V.H. González-B.].

Davis = Department of Entomology, University of California, Davis, California 95616, U.S.A. [L. Kimsey].

Ithaca = Department of Entomology, Cornell University, Ithaca, New York 14853, U.S.A. [E. R. Hoebeke].

La Molina = Museo de Entomología, Universidad Nacional Agraria La Molina, near Lima, Peru [Clorinda Vergara, C. Rasmussen].

Lawrence = Entomology Division and Snow Entomology Collection, University of Kansas Natural History Museum, Lawrence, Kansas 66045, U.S.A.

Lima = Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru [G. Lamas, C. Rasmussen].

Logan = Bee Biology and Systematics Laboratory, Utah State University, Logan, Utah 84322, U.S.A. [T. L. Griswold].

London = The Natural History Museum, London SW7 5BD, England, U.K. [C. Taylor].

Los Angeles = Natural History Museum of Los Angeles County, Los Angeles, California 90007, U.S.A. [R. R. Snelling].

Lyme Regis = M. Cooper collection, Lyme Regis, Dorset, England, U.K.

Maracay = Museo del Instituto de Zoología Agrícola, Universidad Central de Venezuela, Maracay 2101A, Venezuela [J. L. Garcia, L. J. Jolly].

Medellín = Museo Entomológico "Francisco Luis Gallego," Universidad Nacional de Colombia, Medellín, Colombia [Gilberto Morales-Soto].

New York = American Museum of Natural History, New York, New York 10024, U.S.A. [J. G. Rozen].

Ottawa = Canadian National Collection in Centre for Land and Biological Resources, Ottawa, Ontario, Canada [L. Dumochel].

Paris = Muséum National d'Histoire Naturelle, 75005 Paris, France [J. Casevitz-Weulersse].

PCAM-Austin = Programa Cooperativo sobre la Apifauna Mexicana, specimens at Central Texas Melittological Institute, Austin, Texas 78731, U.S.A. [J. L. Neff].

São Paulo = Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil [R. F. Brandão].

San Francisco = California Academy of Sciences, Golden Gate Park, San Francisco 94118, U.S.A. [W. J. Pulawski].

Washington = National Museum of Natural History, Smithsonian Institution, Washington, D. C. 20560, U.S.A. [R. J. McGinley].

In listing collecting localities, I have given provinces or departments in italics. When these were not on labels, these names are in brackets. This is sometimes potentially

important, because of occasional duplication of place names within a country. Bracketed names are my interpretations, and therefore possibly incorrect.

SUBGENERA OF *CHILICOLA*

Michener (1995, 2000) divided the Xeromelissinae into two tribes, Xeromelissini and Chilicolini, the last for two genera, *Chilicola* and *Xenochilicola*. Michener and Rozen (1999), however, described the genus *Geodiscelis*, which combines characters of the two tribes. They therefore did not recognize tribes in the subfamily.

To shed light on the genus *Chilicola* as a whole, and to show relationships and justification for the new Andean subgenus, a preliminary phylogenetic study was made, using representatives of all genus-group taxa including those that were synonymized by Michener (1995, 2000). The species used in this study of *Chilicola*, with current generic and subgeneric names, are listed in Table 1. The outgroups were *Xenochilicola*, *Xeromelissa*, and *Geodiscelis*, species 18 to 20 in Table 1.

The characters, character states, and their codes used in the study are listed in Table 2. Table 3 is a matrix that shows the distribution of the character states among the taxa.

Analysis was by performed by Michael S. Engel. Character states were treated as nonadditive (not ordered). The data matrix was constructed in Winclada (Nixon, 1991) and the analysis was made using the *whi** and *max** commands of *Nona* (Goloboff, 1993). Two minimal length trees were produced through Winclada (Length 84, Consistency Index 52, Retention Index 64), using unambiguous optimizations only. Figure 2 is a strict consensus tree based on these two.

Table 1. Species used in phylogenetic analysis of the subgenera of *Chilicola*.

1. <i>C. (Anoediscelis) ashmeadi</i> (Crawford)
2. <i>C. (Anoediscelis) herbsti</i> (Friese)
3. <i>C. (Stenoediscelis) inermis</i> (Friese)
4. <i>C. (Chilicola s. str.) rubriventris</i> Spinola
5. <i>C. (Chilioediscelis) patagonica</i> Toro and Moldenke
6. <i>C. (Hylaeosoma) mexicana</i> Toro and Michener
7. <i>C. (Hylaeosoma) aequatoriensis</i> Benoist
8. <i>C. (Oediscelis) vernalis</i> (Philippis)
9. <i>C. (Idioprosopis) solerovicensi</i> Toro and Moldenke
10. <i>C. (Oediscelisca) dalmeidai</i> Moure
11. <i>C. (Heteroediscelis) mavida</i> Toro and Moldenke
12. <i>C. (Prosopoides) prosopoides</i> (Ducke)
13. <i>C. (Pseudoscelis) rostrata</i> (Friese)
14. <i>C. (Oroediscelis) espeleticola</i> Michener
15. <i>C. (Oroediscelis) brzoskai</i> Michener
16. <i>C. (unassigned) hahni</i> Herbst
17. <i>C. (unassigned) gutierrezii</i> Moure
18. <i>Xenochilicola mamigna</i> Toro & Moldenke
19. <i>Xeromelissa wilmattae</i> Cockerell
20. <i>Geodiscelis megacephala</i> Michener and Rozen

Table 2. Characters and their states for subgeneric analysis.

1. Inner orbits: nearly straight (0); slightly emarginate at upper third or fourth (1).
2. Anterior tentorial pit: not extended (0); extended downward as deep shining groove along epistomal suture nearly to apex of clypeus (1).
3. Head of male: not more than 1.2 times as long as wide (0); more than 1.5 times as long as wide (1).
4. Facial fovea of female: absent (0); well-defined (1).
5. Malar space: linear (0); broader than long (1); longer than broad (2).
6. Clypeus of male: dark (0); with yellow (1).
7. Clypeus of female: dark (0); with yellow (1).
8. Paraocular areas of male: dark (0); with yellow (1).
9. Paraocular areas of female: dark (0); with yellow (1).
10. Paraocular lobe: absent (0); extending downward into clypeus (1).
11. Face: without depression extending dorsolaterally from antennal socket (0); with such depression (1).
12. Labrum: broader than long (0); about as long as broad (1).
13. Last antennal segment of male: normal (0); much reduced (1); a mere nub so that antenna appears to be 12-segmented (2).
14. Pronotum: with dorsal surface small (short) and at same level as scutum (0); very short and below level of scutum, medium part declivitous (1).
15. Episternal groove: extending to lower part of thorax (0); not extending below scrobal groove (1).
16. Basal area of propodeum: about as long as metanotum (0); longer than metanotum (1); about twice length of metanotum (2); about three times length of metanotum (3); shorter than metanotum (4).
17. Stigma with margins basal to vein r: diverging apically (0); parallel (1).
18. Stigma with margin within marginal cell: convex (0); nearly straight (1).
19. Distal stigmal perpendicular: crossing near middle of second submarginal cell (0); crossing near base of second submarginal cell (1); crossing near apex of second submarginal cell; crossing basal to second submarginal cell (3).
20. Hind tibial spurs: slender and almost straight (0); strong and curved (1).
21. Claws of female: bifurcate (0); with inner ramus rudimentary (1).
22. Hind basitarsus of male: simple (0); with ventral swelling basally or medially (1).
23. Hind femur of male: not or a little swollen (0); strongly swollen (1).
24. Hind tibia of male: longer than femur, when folded reaching base of trochanter unless swollen so that it cannot do so (0); shorter than to as long as femur (1).
25. S1 of male: with large tubercle or projection (0); without such a projection (1).
26. Hind tibia of male: unmodified (0); strongly swollen distally (1).
27. Hind trochanter of male: simple (0); with ventral angle or protuberance (1).

Table 2. Continued

28. S4 of male: simple (0); with two tubercles or projections (1).
 29. S8 of male, distal process: slender, deeply bifid (0); greatly broadened medially, bifid (1); truncate or emarginate, if broadened, broadest at apex (2); slender and pointed apically (3).
 30. S7 of male, apical lobes: distinct from body of sternum (0); unrecognizably fused to body of sternum (1).
 31. S7 of male: with four apical lobes (0); with one pair of lobes reduced so that only two are easily recognizable (1).
 32. Apex of penis valve: with two membranous appendages (0); with one such appendage (1); without such appendages (or they are minute) (2).
 33. Male gonostylus: recognizably distinct from gonocoxite (0); indistinguishably united with gonocoxite (1).
 34. Male gonoforceps: with ventral, mesial angle or lobe distal to volsella (0); without such an angle or lobe (1).
 35. Thoracic length (measured from posterior margin of pronotal lobe to metasomal articulation): little more than thoracic height (lateral view) (0); nearly 1.5 times thoracic height, or more (1).
 36. Top of head: not greatly developed above summits of eyes, margin in facial view extending mesiad from slightly above summits of eyes and upper ocular tangent usually passing through or above anterior ocellus (0); strongly developed above summits of eyes, margin in facial view continued upward beyond eyes before bending mesiad and upper ocular tangent in a strictly facial view usually below anterior ocellus (1).

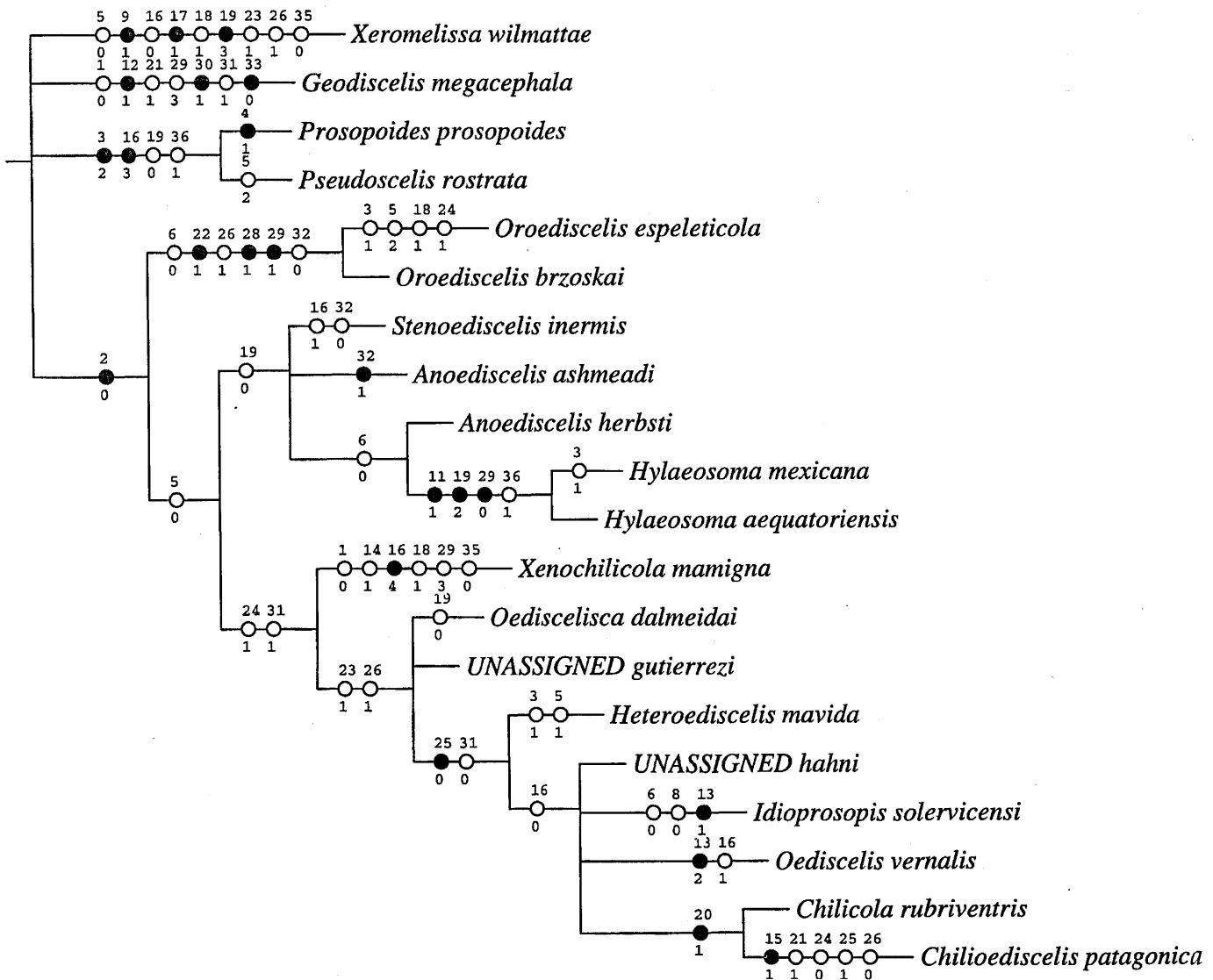


Fig. 2. Preliminary phylogenetic study of the subgenera of *Chilicola*; *Xeromelissa* and *Geodiscelis* are outgroups. This is a strict consensus tree based on two minimum-length trees found by NONA (Length 84, CI 52, RI 64). Black dots represent unique changes, white dots (circles) represent homoplasious changes that occur elsewhere in this tree. Numbers above dots are character numbers; numbers below dots show the state arising at that point.

Table 3. Character states of representative taxa used in the subgeneric analysis.

Taxon	Characters 1–18																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>C. (Anoediscelis) ashmeadi</i>	1	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	
<i>C. (Anoediscelis) herbsti</i>	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	
<i>C. (Stenoediscelis) inermis</i>	1	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	
<i>C. (Chilicola) rubriventris</i>	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	
<i>C. (Chilioediscelis) patagonica</i>	1	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	
<i>C. (Hylaeosoma) mexicana</i>	1	0	1	0	0	0	0	0	0	1	0	0	0	0	2	0	0	
<i>C. (Hylaeosoma) aequatoriensis</i>	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	
<i>C. (Oediscelis) vernalis</i>	1	0	0	0	0	1	0	1	0	0	0	0	2	0	0	1	0	0
<i>C. (Idioprosopis) solervicensi</i>	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
<i>C. (Oediscelisca) dalmeidai</i>	1	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	
<i>C. (Heteroediscelis) mavida</i>	1	0	1	0	1	1	0	1	0	0	0	0	0	0	2	0	0	
<i>C. (Prosopoides) prosopoides</i>	1	1	2	1	1	1	0	0	0	0	0	0	2	0	3	0	0	
<i>C. (Pseudoscelis) rostrata</i>	1	1	2	0	2	1	0	1	0	0	0	0	2	0	3	0	0	
<i>C. (Oroediscelis) espeleticola</i>	1	0	1	0	2	0	0	1	0	0	0	0	0	0	2	0	1	
<i>C. (Oroediscelis) brzoskai</i>	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	
<i>C. (unassigned) hahni</i>	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	
<i>C. (unassigned) gutierrezii</i>	1	0	0	0	0	1	?	1	?	0	0	0	0	0	?	0	0	
<i>C. (Xenochilicola) mamigna</i>	0	0	0	0	0	1	0	0	0	0	0	0	1	0	4	0	1	
<i>Xeromelissa wilmattae</i>	1	1	0	0	0	1	1	1	1	1	0	0	1	0	0	1	1	
<i>Geodiscelis megacephala</i>	0	1	0	0	1	1	1	0	0	1	0	1	0	1	0	2	0	0

Taxon	Characters 19–36																	
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
<i>C. (Anoediscelis) ashmeadi</i>	0	0	0	0	0	0	1	0	0	0	2	0	0	1	1	0	1	0
<i>C. (Anoediscelis) herbsti</i>	0	0	0	0	0	0	1	0	0	0	2	0	0	2	1	0	1	0
<i>C. (Stenoediscelis) inermis</i>	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	1	0
<i>C. (Chilicola) rubriventris</i>	1	1	0	0	1	1	0	1	1	0	2	0	0	0	1	0	1	0
<i>C. (Chilioediscelis) patagonica</i>	?	1	1	0	1	0	1	0	1	0	2	0	0	0	1	0	1	0
<i>C. (Hylaeosoma) mexicana</i>	2	0	0	0	0	0	1	0	0	0	0	0	2	1	0	1	1	
<i>C. (Hylaeosoma) aequatoriensis</i>	2	0	0	0	0	0	1	0	0	0	0	0	2	1	0	1	1	
<i>C. (Oediscelis) vernalis</i>	1	0	0	0	1	1	0	1	1	0	2	0	0	1	0	1	0	
<i>C. (Idioprosopis) solervicensi</i>	1	0	0	0	1	1	0	1	1	0	2	0	0	1	0	1	0	
<i>C. (Oediscelisca) dalmeidai</i>	0	0	0	0	1	1	1	1	1	0	2	0	1	2	1	0	1	0
<i>C. (Heteroediscelis) mavida</i>	1	0	0	0	1	1	0	1	1	0	2	0	0	2	1	0	1	0
<i>C. (Prosopoides) prosopoides</i>	0	0	0	0	0	0	1	0	0	0	2	0	0	2	1	0	1	1
<i>C. (Pseudoscelis) rostrata</i>	0	0	0	0	0	0	1	0	0	0	2	0	0	2	1	0	1	1
<i>C. (Oroediscelis) espeleticola</i>	1	0	0	1	0	1	1	1	0	1	1	0	0	1	0	1	0	0
<i>C. (Oroediscelis) brzoskai</i>	1	0	0	1	0	0	1	1	0	1	1	0	0	1	0	1	0	0
<i>C. (unassigned) hahni</i>	1	0	0	0	1	1	0	1	1	0	2	0	0	?	1	0	1	0
<i>C. (unassigned) gutierrezii</i>	?	0	?	0	1	1	1	1	0	0	2	0	1	?	1	0	1	0
<i>C. (Xenochilicola) mamigna</i>	1	0	0	0	0	1	1	0	0	0	3	0	1	2	1	0	0	0
<i>Xeromelissa wilmattae</i>	3	0	0	0	1	0	1	1	0	0	2	0	0	2	1	1	0	0
<i>Geodiscelis megacephala</i>	1	0	1	0	0	0	1	0	0	0	3	1	1	2	0	1	1	0

Figure 2 shows *Xeromelissa* and *Geodiscelis* as outgroups, but the other intended outgroup genus *Xenochilicola*, placed close to *Chilicola* by Michener (1995, 2000), appears within *Chilicola* and should be regarded as a subgenus unless *Chilicola* is broken up. *Anoediscelis* (including *Stenoediscelis* according to Michener, 1995) is paraphyletic relative to *Hylaeosoma*. For the time being I

do not accept this conclusion, which would place *Anoediscelis* as a junior synonym of *Hylaeosoma*. As to the clade containing the unassigned species, all the taxa except *Chilicola* sensu stricto and *Chilioediscelis* were united under *Oediscelis* by Michener (1995, 2000); the last is here shown as paraphyletic relative to *Chilicola* sensu stricto and *Chilioediscelis*.

I regard this analysis as preliminary because so many clades are supported by only one or two characters. A new analysis based on more taxa and more characters is necessary before the results should be used as a basis for classification. In particular, I hesitate to place *Anoediscelis* within *Hylaeosoma*. However, recognition of the new subgenus *Oroediscelis* is well supported.

KEY TO THE SUBGENERA OF *CHILICOLA* KNOWN FROM THE ANDES
NORTH OF CHILE

1. Distal stigmal perpendicular crossing or near to first submarginal crossvein or at least before middle of second submarginal cell (Fig. 3a); malar space one third as long as broad or more (Fig. 4d); S4 of male with pair of tubercles or projections; hind tibia and usually basitarsus of male swollen and modified ... *Oroediscelis*
- Distal stigmal perpendicular crossing near middle of second submarginal cell or more distally (Fig. 3b-d); malar space linear (= absent) (Fig. 4a-c), rarely about one third as long as broad; S4 of male simple or nearly so; hind tibia and basitarsus of male slender, not modified 2

2. Head above antennal alveolus with depression (sometimes very weak) extending up toward ocellular region; S8 of male with apical process deeply bifid (as in Figs. 14c, 15c); body length 4.0 to 5.5 mm but as little as 3.0 mm in *C. smithpardoii* *Hylaeosoma*
- Head without depression above antennal alveolus; S8 of male with apical process truncate (as in Figs. 5b, 6c); body length 3.0 to 3.75 mm *Anoediscelis*

THE GROUP OF *CHILICOLA* (*ANOEDISCELIS*) *ASHMEADI*

This group consists of nine species and ranges from central Mexico (states of Jalisco and Puebla) to Peru. It agrees with the subgeneric characters as indicated by the keys and descriptions of Toro and Moldenke (1979), using *Anoediscelis* in a narrow sense, and of Michener (1994, 1995, 2000), recognizing the subgenus in a broader sense, except that the stigma is sometimes as long as the costal margin of the marginal cell. The following are characters of the species group:

Body length 3.0 to 3.75 mm; forewing length 2.4 to 2.9 mm. **Coloration:** Black, clypeus of male usually largely yellow or with yellow area, face otherwise black (or rarely

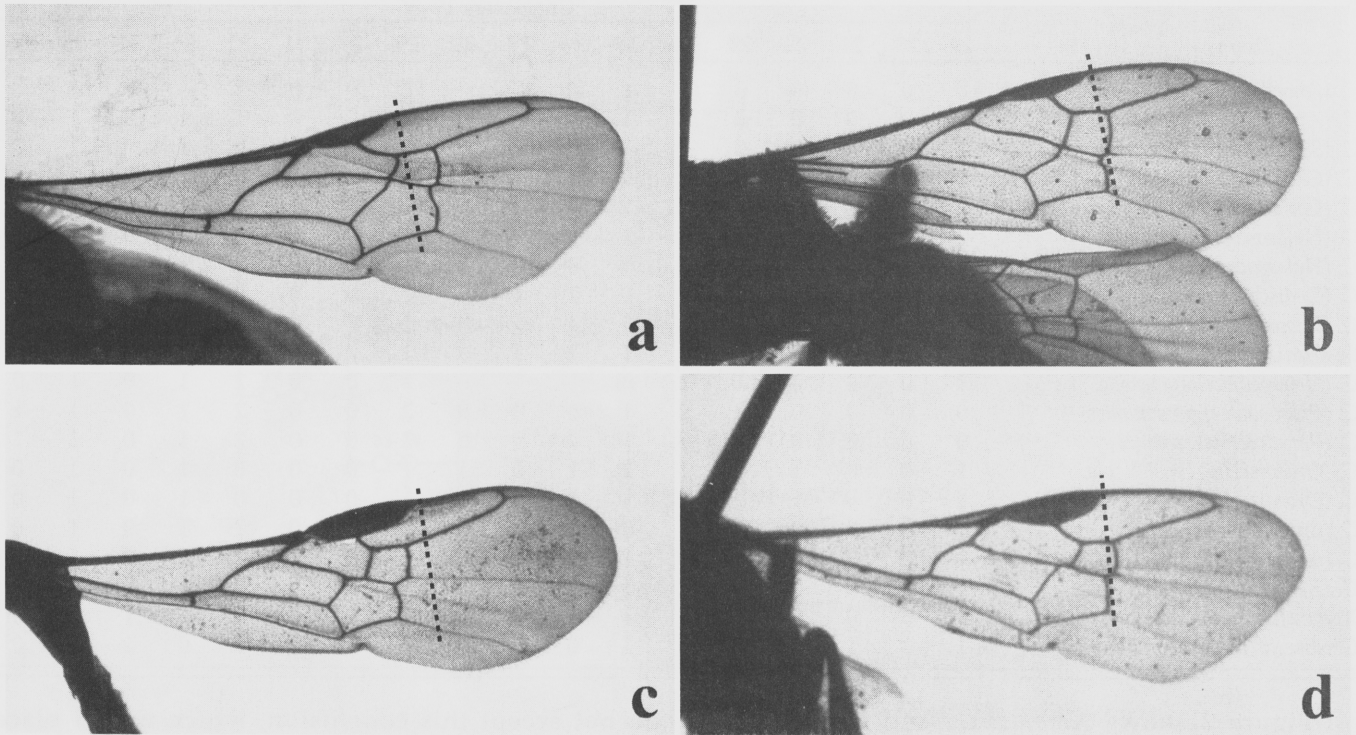


Fig. 3. Forewings of *Chilicola* with distal stigmal perpendiculars indicated by broken lines. a, *C. (Oroediscelis) espeleticola* paratype; b, *C. (Hylaeosoma) near canei* (female); c, *C. (Hylaeosoma) aequatoriensis*; d, *C. (Anoediscelis) xanthognatha* paratype. (Photos by M. S. Engel.)

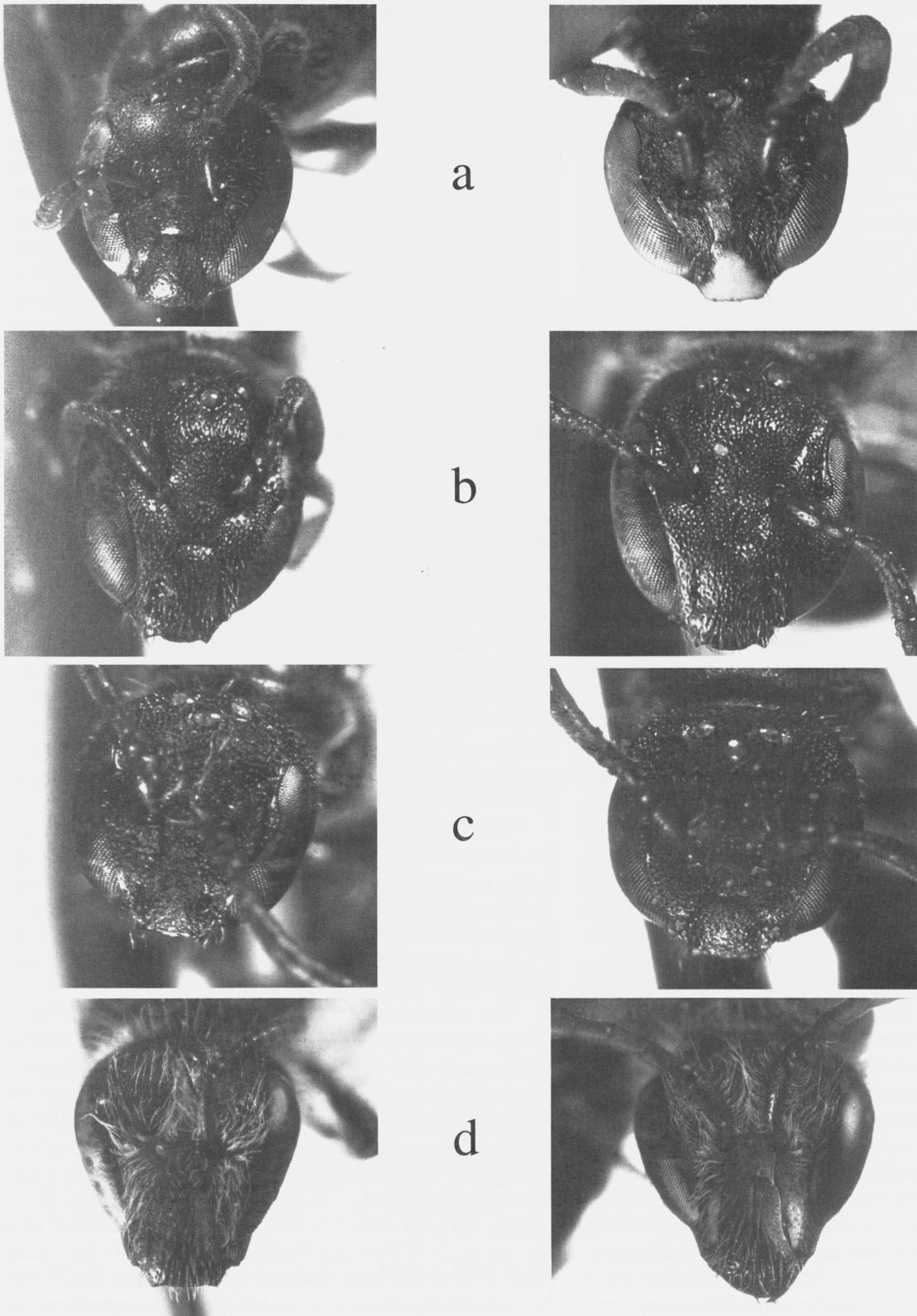


Fig. 4. Faces of *Chilicola*, females at the left, males at the right. a, *C. (Anoediscelis) colombiana*; b, *C. (Hylaeosoma) umbonata*; c, *C. (Hylaeosoma) aequatoriensis*; d, *C. (Oroediscelis) espeleticola*.

face all black); in *Chilicola cooperi* lower paraocular areas in addition to clypeus yellow; mandible in males of *C. xanthognatha* and *C. xanthostoma* largely yellow (females unknown); labrum also with yellow in *C. cooperi* and *C. xanthostoma*; flagellum yellow-brown to dark brown beneath, dark brown to black above; legs with following parts yellow: front tibia (largely), front and middle tarsi (often dusky apically, mid tarsus sometimes mostly dark), apices of femora (rarely reduced to small light brown areas), bases and apices of mid and hind tibiae (rarely reduced to light brown areas or even blackish), sometimes part of hind tarsus, especially basal part. **Sculpturing:** Light, surface almost everywhere dulled by lineolation or other microsculpturing, well-separated small punctures on much of head and thorax. **Pubescence:** Short, sparse, dull whitish or yellowish, rarely dusky, not forming metasomal fasciae laterally; scopa of female white, weakly developed on hind femur and tibia, well developed and hairs with many branches on S1 to S3, longest on S2. **Head:** Face approximately as wide as long in both sexes; upper orbital tangent near or below lower margin of median ocellus; vertex seen from front a uniform curve between summits of eyes; frons convex, without depression or fossa receiving scape; frontal line absent or weakly indicated; frontal tubercle weakly indicated, between antennal bases; clypeus and supraclypeal area not protuberant, in profile only weakly convex except distinctly so at lower end of clypeus; eyes strongly converging below so that lower interocular distance is about half of upper interocular distance; emargination of inner eye margin extremely weak, adjacent to emargination strip of impunctate, smooth cuticle above which is sometimes shiny area of well-separated punctures; antennal sockets near middle of face, interalveolar distance twice alveolocular distance; lower margin of clypeus only slightly below lower ocular tangent; upper clypeal width, between subantennal sutures, shorter than distance from lower end of subantennal suture to eye margin; lower clypeal margin laterally curved back at side of labrum, not or little elevated to form tooth; labrum of male about three times as wide as long, of female over twice as wide as long; maxillary palpus less than half as long as prementum, with first two segments robust, less than twice as long as broad, third and sixth segments longest, fourth and fifth somewhat shorter, sixth broadest preapically (as in other subgenera) with apical third or fourth narrower and looking like a small apical segment; labial palpus about as long as glossa, second segment shortest, less than twice as long as broad, other segments subequal (proboscis not fully examined for some species, but uniform in structure for all that could be seen); subantennal sutures about twice as long as diameter of alveolus, converging below; anterior tentorial pit not elongate (Michener, 1995, Fig 1); malar space linear. **Thorax:**

With pronotal collar narrow, elevated part less than half as wide as maximum width of flagellum. Stigma two-thirds to three-fourths as long, or rarely almost as long as, length of marginal cell on costa; first recurrent vein meeting or slightly basal to first submarginal crossvein (Fig. 3d). Dorsal surface of propodeum as long as or longer than scutellum. Posterior tibia of male slender, about five times as long as wide, widest in apical third (Michener, 1994, Fig. 1). **Metasoma:** First tergum about 1.5 times as long as broad in males, as long as broad in females. Terga shining, discs transversely lineolate, punctures minute and scattered or reduced to minute, scattered hair bases; marginal zones smooth, impunctate, hairless, but with hair bases laterally on T4 to T6 of males, less smooth and with more hair bases on T4 to T5 of females. Exposed sterna unmodified. S8 with apical process expanded and truncate distally (as in Fig. 5b). Penis valve without dorsoapical membranous process except single large process in *C. ashmeadi*.

I have found no reliable specific characters to distinguish females of this group. Differences in punctation and fine sculpturing of the scutum and face are apparent among individuals but do not seem to differentiate these species. Likewise the yellow areas of the legs vary among individuals but seem to offer no specific characters.

Available series of males of most species are small and one could reasonably wonder if the species recognized herein might be based on individual variants. However, *C. ashmeadi* is available in large numbers from Central America; I have dissected two Colombian specimens and eight from localities in Costa Rica without finding significant variation in the specific characters.

Three female specimens from Talara, Piura, Peru (*Logan*) are probably members of the *Chilicola ashmeadi* group. In the absence of males, and because Talara is coastal, not Andean, they remain unnamed. They differ from all other females of the *C. ashmeadi* group in the largely yellow labrum, mandibles, legs including trochanters, tegulae (translucent), and axillary sclerites.

The species of *Anoediscelis* other than the *Chilicola ashmeadi* group are quite diverse in contrast to the similar species in the *C. ashmeadi* group; thus in the cladogram presented above, the subgenus is paraphyletic. Except for the *C. ashmeadi* group, they are all from Chile; additional species of the subgenus may exist in Argentina. The Chilean species differ from the *C. ashmeadi* group in the characters indicated below for each numbered group. (1) *C. inermis* (Fries) and *C. mailen* Toro and Moldenke (the *Stenoediscelis* of Toro and Moldenke, 1979) have the apical lobes of S7 of the male directed apically rather than laterally, and each penis valve has two preapical membranous projections. The hind tibiae of the males are somewhat thickened, about or less than four times as long as broad. (2) *C. olmue* Toro and Moldenke and *C. orophila* Toro and

Moldenke (included in *Heteroediscelis* by Toro and Moldenke) also have two preapical membranous projections on each penis valve, and long hairs on both lobes of S7. Their tentorial pits are somewhat more elongate and the lower part of the clypeus more protuberant than those of the *C. ashmeadi* group. Also included in *Heteroediscelis* by Toro and Moldenke is *C. minor* (Philippi) which differs from members of the *C. ashmeadi* group by the strong tooth on the hind trochanter of the male as well as in the form of the lobes of S7, with the lower apicolateral lobe small and pointed laterodistally. (3) The three species placed in *Anoediscelis* by Toro and Moldenke (1979) are so diverse that each could be in its own group. *Chilicola plebeia* Spinola has thickened hind tibiae in the male, as in group (1) above; *C. plebeia* and *yali* Toro and Moldenke have the apical process of S8 of the male deeply bilobed and the lateral lobes developed so as to nearly meet the apical process. *Chilicola herbsti* (Friese) has long hairs on both upper and lower apicolateral lobes of S7 of the male. At least one species in each numbered group above has yellow lower paraocular areas in the male, a feature known in the *C. ashmeadi* group only in *C. cooperi*. The Chilean species most similar to the *ashmeadi* group are *C. herbsti* (Friese) and *C. minor* (Philippi); in some males of the latter the lower paraocular area is marked with yellow. Of the species of the *C. ashmeadi* group, the most distinctive, especially in the form of S7, is *C. pedunculata* new species (Fig. 12c).

In the accounts of the species unique features found in only one species are italicized.

KEY TO MALES OF THE *CHILICOLA* (*ANOEDISCELIS*) *ASHMEADI* GROUP

1. Mandible yellow or largely so 2
Mandible dark brown to black 4
2. Lower paraocular area with yellow; S6 with submarginal bristles, without small brush of dense setae (Fig. 13c) *C. cooperi*
Lower paraocular area blackish; S6 with midapical brush of dense setae (Fig. 11c) 3
3. S7 with coarse setae of upper apicolateral lobe restricted to distal half of lobe, lower lobe produced to attenuate apex anterior to upper lobe (Fig. 10)
..... *C. xanthostoma*
S7 with coarse setae of upper apicolateral lobe extending nearly to base of lobe, lower lobe with apex less attenuate and overlapping upper lobe (Fig. 11a)
..... *C. xanthognatha*
4. S7 with upper apicolateral lobe pedunculate with apical fringe of large, long hairs (Fig. 12d); clypeus black *C. pedunculata*
S7 with upper apicolateral lobe broadest at base, tapering, without large, long hairs; clypeus at least partly

yellow except in some specimens of *C. colombiana* ... 5

5. S7 with lower apicolateral lobe large, deeply bifid, with small setae on one apex (Fig. 8a); midapical tuft or brush of S6 small (Fig. 8b) *C. venezuelana*
S7 with lower apicolateral lobe small, hairless; midapical tuft or brush of S6 well developed or absent 6
6. S6 without midapical tuft or brush (Fig. 9c)
..... *C. wygodzinskiyi*
S6 with distinct midapical tuft or brush (Figs. 5d, e; 6c; 8b) 7
7. Penis valves each with diverging preapical membranous projection extending beyond level of apices of gonoforceps (Fig. 5a) *C. ashmeadi*
Penis valves without diverging membranous process, not attaining level of apices of gonoforceps (as in Fig. 9a) 8
8. S6 with erect midapical tuft or brush arising near truncate sternal margin and relatively broad (Fig. 6c)
..... *C. colombiana*
S6 with erect midapical tuft or brush near convex sternal margin and relatively narrow (Fig. 5d, e)
..... *C. mistica*

Chilicola (*Anoediscelis*) *ashmeadi* (Crawford)
(Figure 5)

Hylaeosoma ashmeadi Crawford, 1906:161. Cockerell, 1919:185.

Type in Washington.

Oediscelis costaricensis Friese, 1916:302. Type in Berlin, not seen; "typus" in New York.

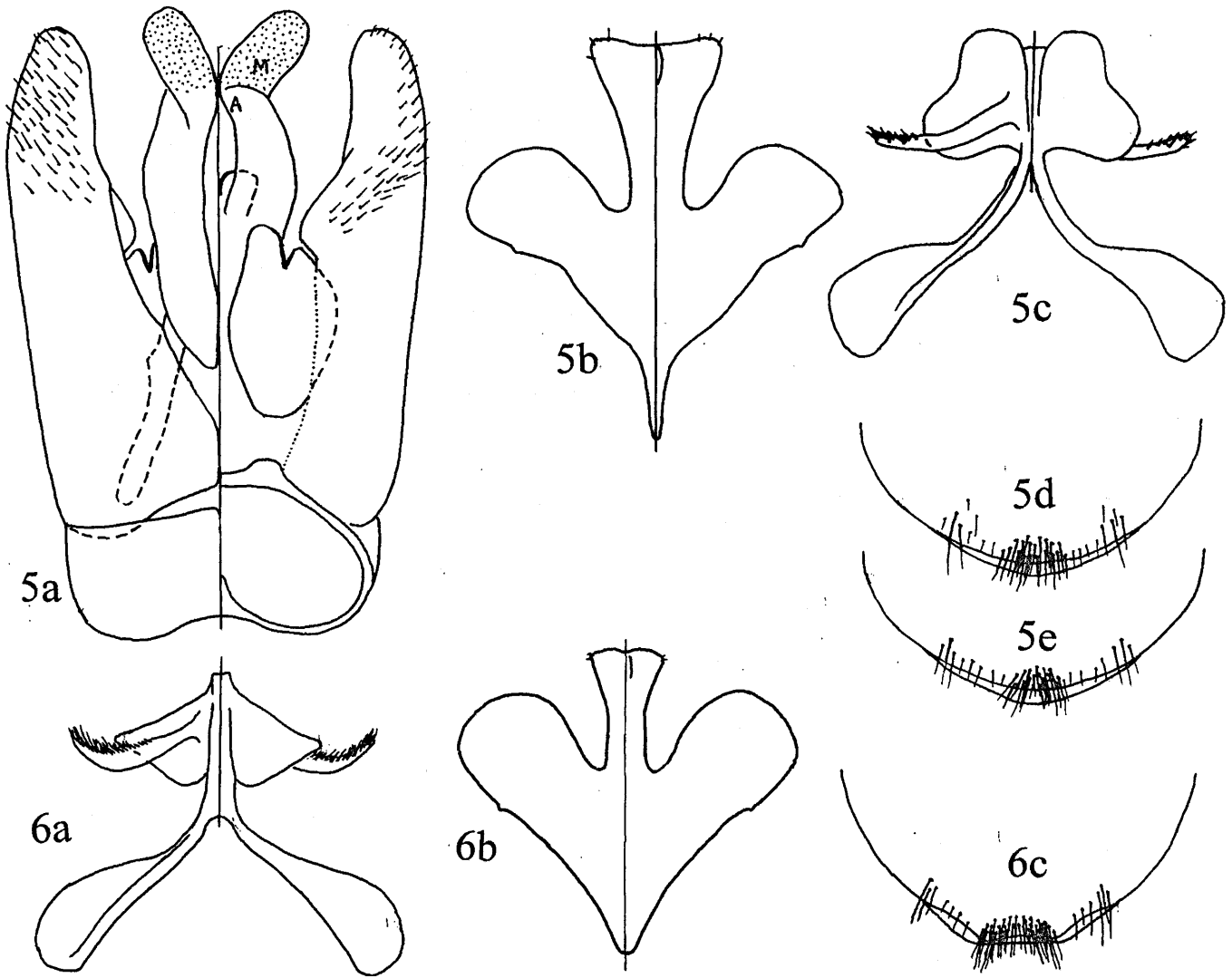
Prosopis howardiella Cockerell, 1918:423. Type in Washington.

Chilicola ashmeadi: Eickwort, 1967:42. Snelling, 1971:52.

Chilicola (*Anoediscelis*) *ashmeadi*: Michener, 1994:91. Ayala, Griswold, and Yanega, 1996:444.

Characters of this species were illustrated by Michener (1994:79, 90, 92). Distinguishing characters of males are the following:

Yellow area of clypeus minutely sculptured like adjacent black areas except smooth (but with scattered punctures) lower part, yellow area with margin irregular, often asymmetrical, not reaching upper margin of clypeus, sometimes reduced to area less than half that of clypeus; mandible black, apex reddish; under surface of flagellum tan, distal segments not quite as wide as upper width of clypeus; middle flagellar segments about as long as broad, somewhat variable depending on curvature of antenna. T1 longer than broad. S6 with midapical tuft of hairs that diverge so that tuft is often divided medially, sternal margin convex; S7 and genitalia as in Figure 5, penis valves each with rounded, diverging preapical membranous process extending beyond level of apices of gonoforceps (Fig. 5a).



Figs. 5–6. 5: *Chilicola (Anoediscelis) ashmeadi*, male. a, Genitalia (A, apex of penis valve; M preapical membrane process of penis valve); b, S8; c, S7; d, e, Apical part of S6 of two individuals. 6: *C. (A.) colombiana*, male. a, S7; b, S8; c, Apical part of S6. The genitalia are similar to those of *C. wygodzinskyi*.

This species is well known from central Mexico (states of Puebla to Nayarit) south to Costa Rica. The type localities and many collecting localities were listed by Michener (1994). The following are new locality and floral records for Mesoamerica: MEXICO: *Oaxaca*: Km 201 and 202 on highway from Tuxtepec to Oaxaca, 2000 m, 26 Dec. 1990, 19 Feb. 1991 and 19 May 1991, all on flowers of *Wigandia urens* (L. Godinez; Lawrence); Monte Alban, 24 March 1991, on *Pera barbellata* (L. Godinez; Lawrence); *Chiapas*: Parque Nacional Montebello, 50 km east of La Trinitaria, 1460 m, 14 Apr. 1993, on *Baccharis trinervis* (J. L. Neff, PCAM, deposited at Austin). On three different dates many specimens were taken in Oaxaca on

Wigandia (Hydrophyllaceae) which may be a favored food plant.

The Andean and first South American records for this species are the following: COLOMBIA: *Valle*: three males, two females, Cali, probably 1000 m, 8 Jan. 1972 (C. D. Michener, Lawrence); one male, Pichinde, 1700 m, Aug. 28, 1967 (P. and B. Wygodzinsky, New York). The specimens from Cali were taken in a dry disturbed area at the edge of the city. At slightly higher elevations and in moister habitats a few kilometers west of Cali, at Pichinde, one male of *C. ashmeadi*, one male of *C. wygodzinskyi*, and several males of *C. colombiana*, as well as several unidentified females of this group, were also taken.

Chilicola (Anoediscelis) colombiana new species

(Figures 4a; 6)

This species agrees with the characters listed for the group of *Chilicola ashmeadi*, and the specific characters indicated in the key to the species of that group. The following characters are those of the male.

Yellow area of clypeus minutely sculptured like adjacent black areas, yellow area with margin irregular, often asymmetrical, not reaching upper margin of clypeus or (as in holotype) reaching that margin only at median point (or yellow absent in some specimens from Ecuador); mandible blackish, apex reddish; under surface of flagellum tan, distal segments as wide as upper width of clypeus; middle flagellar segments about as long as broad, slightly longer in some specimens probably depending on curvature of flagellum. T1 longer than broad. S6 with mid apical fringe, longest hairs at sides of fringe, which ends abruptly laterally, bases of hairs in gently recurved series near weakly concave middle part of sternal margin (Fig. 6c). S7 and S8 as in Figure 6a, b; S7 with lower apicolateral lobe inconspicuous, small triangular (Fig. 6b), upper apicolateral lobe slender, with hairs short; genitalia similar to those of *Chilicola wygodzinskyi*.

Holotype male and three male paratypes: COLOMBIA: Valle: Pichinde, 1630 m, 26 Sept. 1976 (Bell, Breed, and Michener, *Lawrence*). Additional paratypes, all from Valle: one male and one female, summit west of Cali, 2000 m altitude, 17 Sept. 1976 (Bell, Breed, and Michener, *Lawrence*); one male, same locality, 18 Sept. 1976 (C. D. Michener, *Lawrence*); one female (not a paratype), same locality, 2 Feb. 1977 (M. Breed, C. D. Michener, *Lawrence*); four males and three females, 10 km west of Cali, 1400 m, 19 Sept. 1976 (Bell, Breed, and Michener, *Lawrence*). Females collected with males have been considered paratypes even though I do not know how to distinguish them from related species.

Additional material: COLOMBIA: Antioquia: one male, three females, La Selva, Rionegro, 2120 m, Oct., 1994, on *Rubus* (A. Correa, A. Vasquez, *Medellín*); two females, same locality, on soil, June, 1975 (J. Cano, R. Añez, *Medellín*). A female without a metasoma from Valle: 6 miles [9.7 km] west of Cali, 1630 m, 20 Mar. 1955 (E. I. Schlinger, E. S. Ross, *San Francisco*), may be this species. A female that is likely to be *C. colombiana* is from Antioquia: Güarne, 3 Oct. 1976 (C. D. Michener, *Lawrence*). A male from ECUADOR: Pichincha, Calderón, 8500 ft. [2972 m], 1 May 1958 (R. W. Hodges, *Ithaca*) agrees with *C. colombiana* morphologically but lacks the yellow clypeal area. Two males and three females are from Cumbaya, 7 km east of Quito, 2600 m, 17 June 1987 (M. Cooper, *Lyme Regis*). One of these males has the clypeus entirely black while the other has a small, ill-defined triangular yellowish spot on the lower third of clypeus.

Specimens have been taken in February, March, June, August, September, and October.

Etymology: An adjectival form based on Colombia.

Chilicola (Anoediscelis) mistica new species

(Figure 7)

This species exhibits a mixture of the characters of *Chilicola ashmeadi* and *C. colombiana*. Thus the hair tuft on the apex of S6 is as in *C. ashmeadi* while the penis valves and the lower apicolateral lobes of S7 are more nearly as in *C. colombiana*. The following are characters of the male.

Yellow of clypeus minutely sculptured like adjacent areas except smooth (but with scattered punctures) below, yellow area with irregular and somewhat asymmetrical margins; mandible black, apex reddish; under surface of flagellum tan (dusky on last three segments), distal segments nearly as wide as upper width of clypeus; middle flagellar segments about as long as broad to slightly longer than broad, seemingly slightly longer than in *C. ashmeadi* and *colombiana* (this statement difficult to document because of variation with curvature of flagellum); T1 longer than broad. S6 as in *C. ashmeadi* with midapical tuft of hairs that diverge so that tuft is divided medially, apical sternal margin convex; S7 as in Figure 7, with lower apicolateral lobe small, triangular; S8 as in *C. ashmeadi*; genitalia similar to those of *C. wygodzinskyi*.

Holotype male: VENEZUELA: [Mérida]: Mérida, 1950 m, 13 Sept. 1973 (R. M. Bohart, *Logan*). One male paratype with apex of metasoma missing, same data (*Lawrence*).

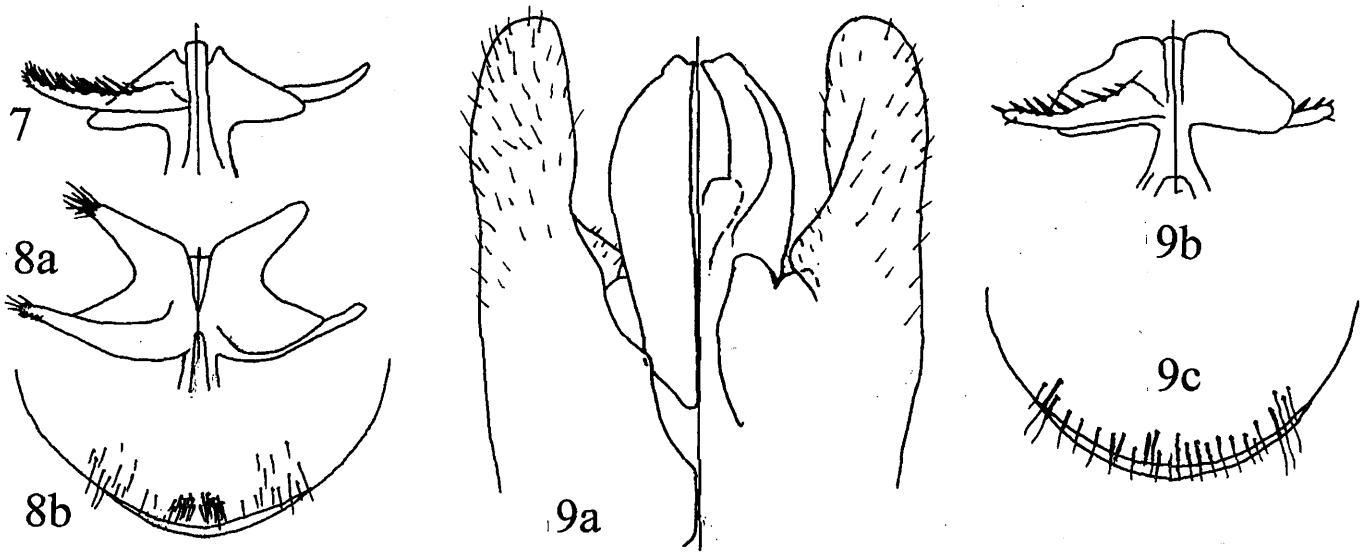
Etymology: *misticus*, Latin, mixed, with reference to the mixture of the characters of other species possessed by this species.

Chilicola (Anoediscelis) venezuelana new species

(Figure 8)

This species from near the eastern end of the Venezuelan montane spur agrees with the characters listed for the group of *Chilicola ashmeadi*, and the specific characters indicated in the key to species of that group. The following characters are those of the male.

Yellow area of clypeus, like rest of face, dull with fine microsculpturing, yellow area with margin somewhat irregular, not reaching upper margin of clypeus; mandible black; middle flagellar segments longer than broad; under surface of flagellum brown, distal segments about four-fifths as wide as upper width of clypeus. T1 longer than broad. S6 with weakly developed mid apical tuft of diverging hairs, suggestive of that of *Chilicola ashmeadi* but less well developed; margin of sternum convex (Fig. 8b). S7 as in Figure 8a with ventral apicolateral lobe large and deeply emarginate, unlike that of any other species of this group; upper apicolateral lobe slender, hairs short and restricted



Figs. 7-9. 7: *Chilicola (Anoediscelis) mistica*, male. Apical part of S7. S6 and S8 are as in *C. ashmeadi*; genitalia as in *C. wygodzinskyi*. 8: *C. (A.) venezuelana*, male. a, Apical part of S7; b, Apical part of S6. S8 about as in *C. ashmeadi* but minute apical setae even smaller; genitalia about as in *C. wygodzinskyi*. 9: *C. (A.) wygodzinskyi*, male. a, Genitalia. b, Apical part of S7; c, Apical part of S6. S8 is similar to that of *C. ashmeadi*.

to apex; S8 similar to that of *C. ashmeadi* but with hairs at apical corners of apical process even smaller; genitalia similar to those of *C. wygodzinskyi*.

Holotype male: VENEZUELA: Distrito Federal: Parque Nacional El Avila, El Eden, 15 May 1975 (E. E. Dietz, Maracay).

Additional material: A female possibly of this species is from each of the following localities: VENEZUELA: Aragua: Rancho Grande Biological Station, Portachuelo Pass, 1100 m [10° 21' 0" N, 67° 41' 0" W], 4 June 1998 (J. Ashe, R. Brooks, R. Hanley, Lawrence); La Mora, near Colonia Tovar, 21 km north of La Victoria on Route 4, 28 May 1988 (A. L. Norrbom, G. J. Steck, Washington).

Etymology: An adjectival form based on Venezuela, the country of origin.

Chilicola (Anoediscelis) wygodzinskyi new species (Figure 9)

In a series of two males and five females of the *Chilicola ashmeadi* group from Pichinde, Colombia (New York), one male was found on dissection to be *C. ashmeadi*, the other a well defined new species, here described. This species agrees with the characters listed for the group of *C. ashmeadi*, and the specific characters indicated in the key to species. The following characters are based on the male.

Yellow area of clypeus shiny, especially below, as in *Chilicola xanthognatha*, but not reaching upper margin of clypeus, lateral margin of yellow area concave, not irregular; mandible black; middle flagellar segments longer than

broad; under surface of flagellum brown, distal segments about four-fifths as wide as upper width of clypeus. T1 conspicuously longer than broad; apex of S6 broadly rounded with sparse hairs (Fig. 9c), as in *C. cooperi*, no tuft or dense fringe as in other species of the *C. ashmeadi* group. S7 and genitalia as in Figures 9a, b; S7 suggestive of *C. ashmeadi* but upper lateroapical lobe with coarser, better separated hairs. S8 similar to that of *C. ashmeadi*. Penis valves not attaining apices of gonoforceps, lacking apical membranous appendages.

Holotype male: COLOMBIA: Valle: Pichinde, 1700 m, 28 Aug. 1967 (P. and B. Wygodzinsky, New York).

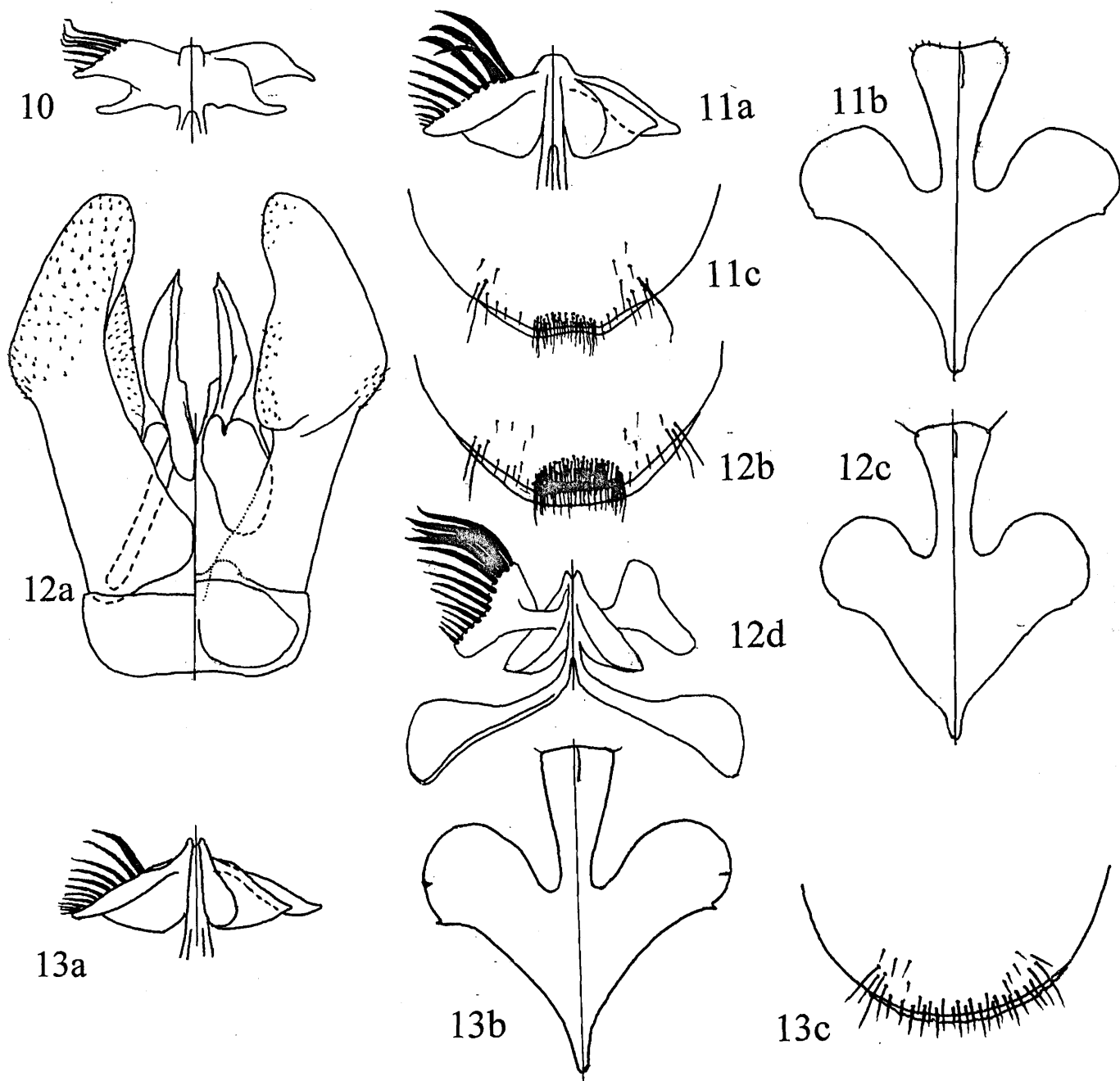
Females bearing the same collection data may belong to this species, although a male *C. ashmeadi* was in the same series of specimens and *Chilicola colombiana* has been taken at the same locality.

Etymology: This species is named for one of its collectors, the late Peter Wygodzinsky, in recognition of his extensive work on neotropical insects.

Chilicola (Anoediscelis) xanthostoma new species (Figure 10)

This species agrees with the characters listed for the group of *Chilicola ashmeadi* and indicated in the key to species. It is the only species with the labrum largely yellow. The following are characters of the male:

Yellow area of clypeus dull, minutely sculptured like adjacent black areas, yellow area extending full width of clypeus below, but not reaching upper margin of clypeus;



Figs. 10–13. 10: *Chilicola* (*Anoediscelis*) *xanthostoma*, male. Apical part of S7. S8 as in *C. ashmeadi* but with posterior margins of lateral lobes even more strongly convex. Genitalia as in *C. wygodzinskyi*. S6 is missing in the preparation of the paratype of *C. xanthostoma* but in the undissected holotype S6 looks like that of *S. xanthognatha* or possibly *C. ashmeadi*. 11: *C. (A.) xanthognatha*, male. a, Apical part of S7; b, S8; c, Apical part of S6. The genitalia are similar to those of *C. wygodzinskyi*. 12: *C. (A.) pedunculata*, male. a, Genitalia; b, Apical part of S6; c S8; d, S7. 13: *C. (A.) cooperi*, male. a, Apical part of S7; b, S8; c, Apical part of S6. The genitalia are similar to those of *C. wygodzinskyi*.

punctures of lower part of clypeus not sharply defined; mandible yellow, base narrowly black and apex reddish; labrum with large basal and discal area yellow; middle and penultimate flagellar segments about as long as broad;

under surface of flagellum tan, distal segments about as wide as upper width of clypeus. Legs with more than usual amount of yellow, bases and apices of mid and hind tibiae broadly yellow, front and mid tarsi yellow, hind

tarsus dusky with base of basitarsus yellow. T1 longer than broad. S6 much as in *Chilicola ashmeadi*, with midapical fringe abruptly ending laterally, lateral hairs not longest, sternal margin convex. S7 as in Figure 10, with lower apicolateral lobe extended and pointed laterally, upper apicolateral lobe broad basally, tapering and pointed laterally, with long, coarse hairs on posterior margin. S8 as in *C. ashmeadi* but posterior margins of lateral lobes even more strongly convex. Genitalia similar to those of *C. wygodzinskyi*.

Holotype male: PERU: Cuzco: Limatambo, 7 Feb. 1978 (P. M. Marsh, Washington). One male paratype, same data (Lawrence). Only the paratype carries a label indicating the collector.

Etymology: Greek *xanthos*, yellow, plus *stoma*, mouth, with reference to the yellow clypeus, labrum, and mandibles.

Chilicola (Anoediscelis) xanthognatha new species
(Figures 3d, 11)

This species agrees with the characters listed for the group of *Chilicola ashmeadi*, and the specific characters indicated in the key to species. The following characters are those of males; females of this species are unknown.

Yellow area of clypeus (at least lower part) smooth except for a few punctures, shining, triangular, extending from lower to upper clypeal margins, lateral margins of yellow area slightly irregular. Upper margin of clypeus, between subantennal sutures, usually shorter than distance from lower end of subantennal suture to eye margin (usually equal in other species of *Chilicola ashmeadi* group). Mandible yellowish except for black base and reddish apex. Middle flagellar segments longer than broad; under surface of flagellum tan, distal segments about as wide as upper width of clypeus. T1 little longer than broad (more conspicuously longer in other species of the group). S6 with apical fringe about 0.2 as wide as width of sternum, smaller than fringe of *C. colombiana*, bases of hairs along a straight median part of sternal margin. S7 as in Figures 11a; with lower apicolateral lobes larger than in *C. colombiana* and upper lobes with long blade-like hairs, longest hairs basally; S8 as in Figure 11a; genitalia similar to those of *C. wygodzinskyi*.

Holotype male and three male paratypes: PERU: [Junín]: La Merced, Río Chanchamayo, 17 June 1920 (Cornell Univ. Exp., Lawrence, except two paratypes at Ithaca). Two paratypes lack metasomas.

Additional material: PERU: [Junín]: one female, Chanchamayo, 1800 m, 1 Apr. 1940 (W. K. W[eyrauch], Lawrence) may belong to this species. It appears to be indistinguishable from females of *Chilicola ashmeadi*, *colombiana*, etc.

Etymology: *xanthos*, Greek, yellow, plus *gnathos*, Greek, jaw, with reference to the yellow mandibles.

Chilicola (Anoediscelis) cooperi new species
(Figure 13)

Except for yellow on the lower paraocular areas, this species agrees with the characters listed for the group of *Chilicola ashmeadi*; see the specific characters indicated in the key to species of that group. The following are characters of the male.

Clypeus entirely yellow (or in paratype with small dusky area at each side near upper margin), minutely roughened, with widely scattered punctures. Upper margin of clypeus, between subantennal sutures, subequal to distance from lower end of subantennal suture to eye margin. Lower paraocular area with yellow extending up almost to level of summit of clypeus, or in paratype limited to area below tentorial pit. Mandible (except for reddish apex) and labrum yellow. Middle flagellar segments about as long as broad, varying with antennal curvature; under surface of flagellum tan, distal segments about as broad as upper width of clypeus. T1 longer than broad. S6 with scattered marginal hairs (as in *Chilicola wygodzinskyi*), without a tuft or fringe (Fig. 13c); S7 (Fig. 13a) similar to that of *C. xanthognatha* but with marginal bladelike hairs somewhat smaller. S8 as in Figure 13b. Genitalia similar to that of *C. wygodzinskyi*. Genitalia and distal sterna of both specimens were dissected and found to be alike in spite of the difference in lower paraocular markings.

Holotype male: PERU: Amazonas: Valley of Rio Umbamba below Chachapoyas, 1690 m, 10 May 1982 (M. Cooper, London). Paratype male: Rodriguez de Mendoza, 1400 m, 23 May 1984 (M. Cooper, Lyme Regis). The collector requested that the holotype be placed in London.

Etymology: This species is named for its collector, Mr. M. Cooper, of Lyme Regis, England, in recognition of his extensive collections of minute Hymenoptera in South America.

Chilicola (Anoediscelis) pedunculata new species
(Figure 12)

Except for its black face, this species agrees with the characters listed for the group of *Chilicola ashmeadi*; see also the specific characters indicated in the key to the species of that group. The following characters are those of the male.

Face and mandible entirely black, clypeus minutely sculptured like adjacent areas; middle flagellar segments longer than broad; under surface of flagellum brown, distal segments narrower than upper width of clypeus. T1 about as broad as long. Apex of S6 with midapical fringe similar to that of *Chilicola colombiana* (Fig. 12b), bases of hairs forming gently recurved band along straight middle part of sternal margin. S7 with ventral apicolateral lobe small, triangular (Fig. 12d); S7 with dorsal apicolateral lobe peduncu-

late, strongly expanded apically, thus completely different from other species of the *C. ashmeadi* group, with apical fringe of long, blade-like hairs; S8 as in Figure 12c; penis valves much shorter than expanded apices of gonoforceps, thus genitalia (Fig 12a) also differing from other species of the group.

Holotype male: PERU: [Junín]: La Merced, Río Chanchamayo, 17 June 1920 (Cornell Univ. Exped., lot 569; Lawrence). One male paratype without metasoma, same

data as holotype but (*Ithaca*). The metasoma of the holotype has been glued to the side of the micropin mount, the apex has been removed to a genitalia vial on the pin.

This species was evidently collected with specimens of *Chilicola xanthognatha*.

Etymology: *pedunculata*, Latin, pedunculate, footlike, with reference to the shape of the dorsal apicolateral lobe of S7.

SUBGENUS *HYLAEOSOMA* ASHMEAD

Hylaeosoma Ashmead, 1898:284. Type species: *Hylaeosoma longiceps* Ashmead, 1898, by original designation. See Michener (1994:81) for note on date of publication of this specific name.

This subgenus was defined by Michener (1994, 1995, 2000); it ranges from northeastern Mexico (state of Tamaulipas) to Bolivia and the state of São Paulo, Brazil. Michener (1995) mentioned Colombian species whose wing venation does not agree with that of other species of *Hylaeosoma* known at that time. Also in Andean species, T1 of females is only about as long as broad (somewhat longer in *Chilicola smithpardoii*), and in some species the head is only about as long as broad, in contrast to previously recognized species of *Hylaeosoma*. For such reasons recognition of some of the Andean species as *Hylaeosoma* was not possible based on earlier literature, and indeed such species may support the union of the paraphyletic *Anoediscelis* with *Hylaeosoma* as suggested by Figure 2. However, these Andean species fall clearly within *Hylaeosoma* in its usual sense. The best character for its recognition is the elongate, deeply bifid S8 of the male. (This sternum is also bifid in *Oroediscelis* but is relatively short; see below.) The description below is based on the Andean species (with some annotations about other species).

Body length 4.0 to 5.5 mm; forewing length 3.50 to 3.75 mm (thus smaller than species of *Hylaeosoma* from elsewhere), even smaller in *Chilicola smithpardoii*, body 3.5 mm, forewing 2.8 mm. **Coloration:** Black without yellow facial markings, or with ill-defined yellowish area in some males of *C. smithpardoii* and *belli*; antennal flagellum dark brown beneath, light brown in *C. smithpardoii*; tegula black to brownish black; legs black except that *C. belli* and *smithpardoii* have extreme apices of femora and bases of tibiae, and more extensive areas of tibiae and tarsi yellowish brown to yellow; posterior pronotal lobe in *C. belli* and *smithpardoii* yellowish brown posteriorly; wings somewhat dusky, veins and stigma black; posterior margins of metasomal segments inconspicuously pallid, preceded by brownish or in *C. canei* and in *aequatoriensis* merely dark brownish. **Sculpturing:** Variable, see descriptions of species. **Pubescence:** Sparse, dull whitish, yellowish dusky to dusky on head and thoracic dorsum; long scattered hairs of lower part of clypeus shorter than scape except as long as scape in *C. aequatoriensis* and *canei* in which lower part

of clypeus is quite bristly; weak lateral apical fasciae of white hairs on T1 to T3 or even more weakly on T4, such fasciae absent on *C. aequatoriensis* and almost absent on *C. canei*; T2 and T3 of females, T2 to T4 of males, with broad basal zones of very short, erect hairs arising from finely densely punctate, depressed zones (such basal zones not evident in *C. smithpardoii*); hind femoral and sternal scopae of females dense, rather long, white. **Head:** Extending upward well above summits of eyes so that in facial view, lateral margins of head extend upward for distance about equal to length of scape before curving strongly mesad, except in *C. involuta* in which lateral margins bend mesad little above summits of eyes; upper orbital tangent well below level of lower margin of median ocellus except at that level in *C. involuta*; frons convex; depression or fossa receiving antennal scape extending up and toward summit of eye from each alveolus, except in *C. aequatoriensis* in which this depression is weak and scarcely if at all recognizable; mesal wall of fossa often with limited smooth areas between punctures except in *C. aequatoriensis*; frontal line absent or feebly suggested; frontal tubercle absent except variably developed between antennal bases in females of *C. aequatoriensis*; clypeus and supraclypeal areas rather flat, lower part of clypeus distinctly convex, especially in *C. aequatoriensis*, upper part of clypeus distinctly convex in profile in *C. aequatoriensis* and less conspicuously so in male of *C. canei*; eyes converging below, lower interocular distance more than half of upper interocular distance; irregular shining area along inner ocular margin, especially in or near emargination; above emargination extension of shining ridges often form a slender fovea-like shining depression and in *C. involuta* female, a well formed small fovea, less well developed in at least one female of *C. canei*; antennal sockets near middle of face, interalveolar distance twice alveolocular distance except in *C. aequatoriensis* and *involuta* in which it is less than twice alveolocular distance; upper clypeal width, between subantennal sutures, shorter than distance from lower end of subantennal suture to eye margin; lower margin of clypeus below lower ocular tangent by distance more than width of scape, this clypeal margin laterally elevated and curved backward at side of labrum forming projection that in facial view looks like a strong tooth at each side of la-

brum; labrum about 2.5 times as broad as long; maxillary palpus over half as long as prementum (in *C. aequatoriensis* nearly as long as prementum), first two segments robust, about twice as long as broad, remaining segments longer, subequal or last segment longest (thus maxillary palpus ordinary compared to some lowland species of *Hylaeosoma* in which they are greatly elongated); labial palpus exceeding glossa, segments subequal or second slightly shorter than others; subantennal sutures converging below, little longer than alveolar diameter (*C. aequatoriensis*), markedly longer, or (in *C. belli*, *smithpardoii* and *umbonata*) about twice as long as alveolar diameter; anterior tentorial pit not elongate (*C. aequatoriensis*) or usually with shiny groove on epistomal suture extending about half way down from main site of pit toward mandibular articulation; malar space linear (i.e., absent) except about one-fourth as long as wide in *C. involuta*. Antennal scape about or nearly three times as long as broad, broadest in distal half; pedicel and first flagellar segment both variable in both sexes from slightly broader than long to about twice as long as broad; middle flagellar segments usually longer than broad but in female of *C. aequatoriensis* broader than long although flagellar segments 8 to 10 each longer than broad. **Thorax:** Pronotal collar narrower than maximum width of flagellum (more than twice width of flagellum in non-Andean *megalostigma* group). Wing venation (Fig. 3b, c) variable, not always agreeing with subgeneric characters indicated by Michener (1994, 1995). Dorsal surface of propodeum longer than scutellum and than posterior surface of propodeum. Legs slender, basal half of hind tibia especially slender. **Metasoma:** First segment longer than wide in males, in females about as long as wide or longer than wide in *C. smithpardoii*. Terga shining with well separated punctures, T2 and T3 with depressed basal zones with fine punctures, lineolations and short hairs, except in *C. smithpardoii*; T1 to T5 with broad impunctate, but shining lineolate marginal zones, that of T5 of female narrower. Hidden sterna and genitalia as illustrated, dorsal and ventral apidateral lobes of S7 closely appressed or fused, so that there may be only one rather than two such lobes on each side; S8 about twice as long as wide, deeply bifid apically.

In the descriptions below, most of the specific characters mentioned in the subgeneric description are omitted.

KEY TO THE ANDEAN SPECIES OF THE SUBGENUS HYLAEOSOMA

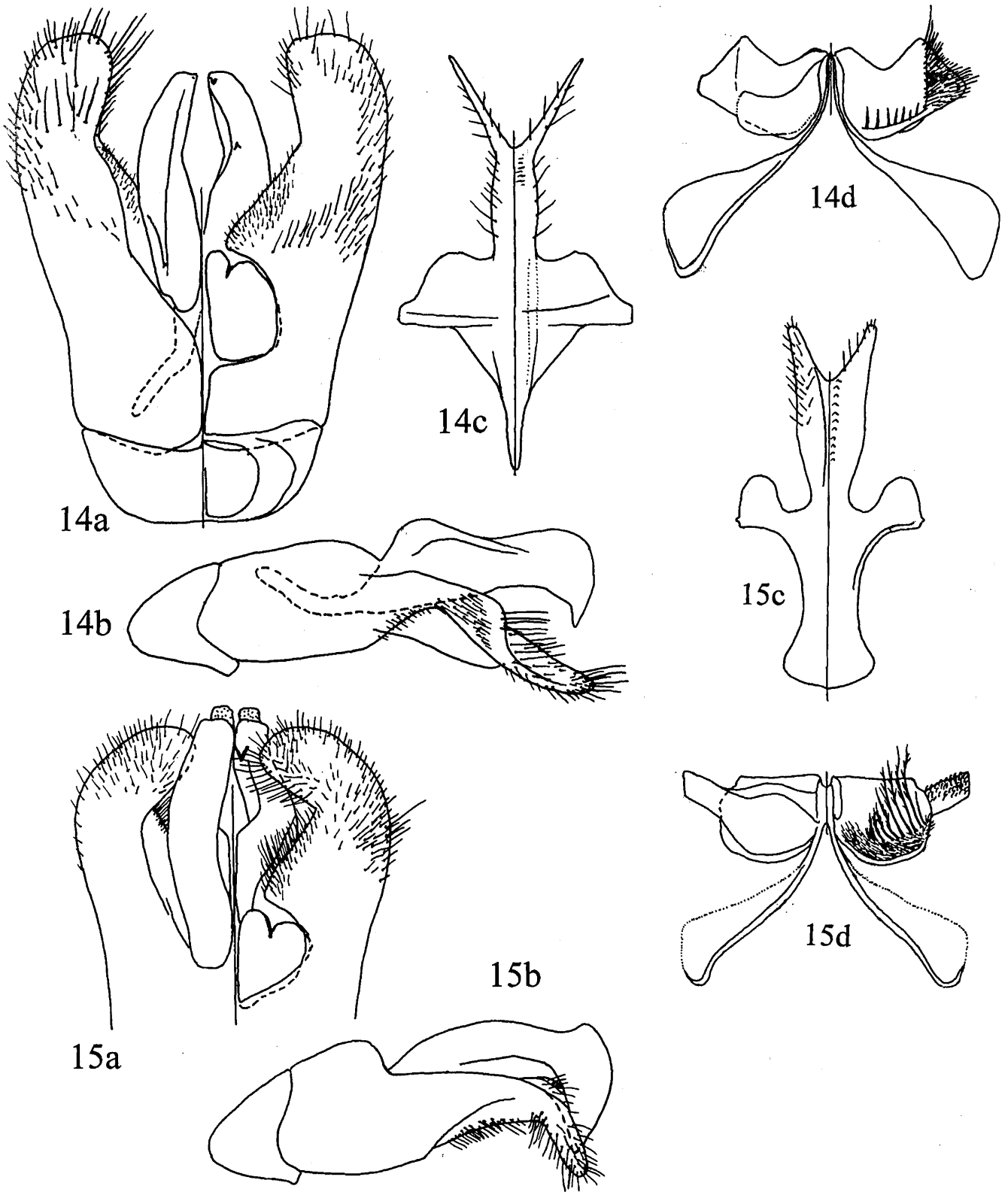
1. Head somewhat broader than length measured from lower clypeal margin to lower margin of median ocellus (Fig. 4c); distal stigmal perpendicular (= line through apex of stigma perpendicular to wing margin) passing through or slightly distal to apex of second submarginal cell (Fig. 3c); fossa for scape above anten-

- nal alveolus almost unrecognizable (Fig. 4c)
 *C. aequatoriensis*
 Head appearing more elongate, about as broad as long measured as above; distal stigmal perpendicular passing through second submarginal cell (Fig. 3b) or through or beyond its apex in *C. belli* and *smithpardoii*; fossa for scape above antennal alveolus distinct (Fig. 4b) 2
2. Hypostomal area dull, densely finely strigose or coarsely lineolate; apical processes of S8 of male broad, less than three times as long as basal widths. (Fig. 15c) *C. involuta*
 Hypostomal area shiny, punctures or grooves widely separated; apical processes of S8 of male slender, four or more times as long as basal width. (Figs. 16b, 17c, 18b) 3
 3. Propodeal triangle coarsely reticulate or with five to seven irregular longitudinal striae; smooth paired, preapical bosses of S2 to S5 of male weak, not noticeable in lateral view of metasoma (Fig. 20a); apices of male gonoforceps angulate 4
 Propodeal triangle with many fine striae diverging posteriorly; smooth paired, preapical bosses of S2 to S5 of male strong, noticeable in lateral view (Fig. 20b, c); apices of male gonoforceps rounded 5
 4. Middle of mesepisternum with large punctures separated by about a puncture width; S7 of male as in Figure 17b *C. belli*
 Middle of mesepisternum shining, with large punctures separated by more than a puncture width; S7 of male as in figure 19b *C. smithpardoii*
 5. Punctures of scutum mostly separated by about two puncture widths of dull, strongly microsculptured ground *C. canei*
 Punctures of scutum separated by less than a puncture width of shiny although microsculptured ground (female unknown, but would presumably be here)
 *C. umbonata*

Chilicola (Hylaeosoma) aequatoriensis Benoist (Figures 3c, 4c, 14)

Chilicola aequatoriensis Benoist, 1942:81.

The depressions above the antennal alveoli of this species are weaker than in any other known species of *Hylaeosoma* (see description of subgenus, above) and the large stigma, extending as far as or beyond the apex of the distal submarginal cell, is also unique in the subgenus. The head is round if one ignores the great development above the eyes; other *Hylaeosoma* have more elongate heads. Other specific characters are indicated below and in the description of the subgenus.



Figs. 14–15 15: *Chilicola (Hylaeosoma) aequatoriensis*, male. a, b, Genitalia; c, S8; d, S7. 15: *C. (H.) involuta*, male. a, b, Genitalia; c, S8; d, S7.

Male: Face 1.05 to 1.08 times longer than broad, thus almost round. Head surface dull, very closely and strongly punctate above level of antennae, below antennae becoming granular, lower genal area grading into the strongly longitudinally microstriate and slightly more shiny hypostomal area. Preoccipital ridge sharply rounded but not carinate, distant from lateral ocellus by about or more than 1.5 times diameter of that ocellus. Antennal flagellum less than twice as thick distally as basally, first flagellar segment as broad as long or broader, second and third equal, much broader than long; middle flagellar segments longer than broad. Scutum, scutellum, and side of thorax dull, microsculptured, with scattered small punctures separated by several puncture widths or closer on lateral parts of scutum; erect hairs on scutum little longer than ocellar diameter or twice as long as ocellar diameter in holotype from Quito, Ecuador; propodeal triangle with fine, close, longitudinal radiating striae not reaching apex, striae distinct in holotype, often irregular producing a granular surface in specimens from other localities, including those in Ecuador. Wings with stigma as long as or slightly longer than length of marginal cell on costal wing margin; distal stigmal perpendicular slightly distal to or crossing second submarginal crossvein, thus at or beyond apex of second submarginal cell; first recurrent vein joining first submarginal cell about one-fifth or one-sixth of length of cell from its apex. Legs black. Exposed metasomal sterna simple, S2 to S5 with preapical sublateral smooth, slightly convex areas comparable to bosses or tubercles of some other species, but not noticeable in lateral view. Genitalia and hidden sterna as in Figure 14; ventral side of ventral apicalateral lobe of T7 with strong transverse ridge bearing strong hairs, surface distal to ridge sloping away and hairy.

Female: In addition to usual sexual characters, differs from description of male as follows: Face about 1.14 to 1.20 times longer than broad. Frons with surface largely strigose; hypostomal area more shiny and anterior part only weakly microstriate. Preoccipital ridge distant from lateral ocellus by about twice diameter of ocellus. Antennal flagellum almost twice as thick apically as basally, middle flagellar segments broader than long.

Holotype male: ECUADOR: [*Pichincha*]: Quito, 2850 m according to Benoist (1942), 27 Oct. 1930 (collected by Benoist in *Rubus* stem, *Paris*). I have examined the type; it seems identical to specimens recorded below except for its longer hair (see above), but I did not examine the genitalia or hidden sterna of the unique type.

Additional material: PERU: *Amazonas*: Chachapoyas, 2300 m, 17 Mar. 1984 (M. Cooper, *Lyme Regis*). ECUADOR: *Tungurahua*: one male, Baños, 2100 m, 14 July 1981 (M. Cooper, *Lyme Regis*); one male, Baños, 2400 m, 21 July 1981 (M. Cooper, *Lyme Regis*); one female, Baños, 2100 m, 26

Jan. 1982 (M. Cooper, *Lyme Regis*); one female, trail south of Baños, 27 Jan. 1976 (Spangler et al., *Washington*); one female, 39 km east of Baños, 25 Jan. 1976 at black light (Spangler et al., *Washington*). COLOMBIA: *Antioquia*: one male, two females, Rionegro, 2120 m, May, 1975, on *Frambuesa* [probably *Rubus*] (J. Cano, *Medellín*); two males, two females, same locality, Sept. 1974, on *Rubus* except one male on *Clibadium* (A. Correa, *Medellín*). *Cundinamarca*: one female, 12 mi SE of Bogotá, 2930 m, 13 Mar. 1955 (E. I. Schlinger, E. S. Ross, *San Francisco*); one female, Sueva, 2500-2700 m, 27 Apr. 1987 (R. Ospina, *Bogotá Univ.*); one male, Usme, 2700 m, 28 Sept. 1991 (C. Sarmiento, *Bogotá Univ.*); one male, Vereda de Cetine near Cota, 40° 49' N, 74° 6' W, 2800 m, 24 July 1983 (A. Liévano, *Bogotá Univ.*). *Valle*: two females, near Pichinde, 1900 m, 3 Feb. 1977 (M. D. Breed, C. D. Michener, *Lawrence*). VENEZUELA: *Mérida*: about 130 specimens of both sexes, near La Carbonera, 42.4 km NW Mérida, 8° 37' 38" N, 72° 21' 10" W, 2360 m, 25 May 1998 on flowers of *Rubus* (J. Ashe, R. Brooks, R. Hanley, *Lawrence*); one male, one female, Mérida, 26 Jan. 1986 (M. Cooper, *Lyme Regis*); one female, two males, Mérida, 17 Nov. 1972 (G. E. Bohart, *Logan*).

Specimens have been collected in every month of the year except June, August, and December.

Chilicola (Hylaeosoma) involuta new species
(Figure 15)

The dull, minutely striate hypostomal area is unique among Andean *Hylaeosoma*. The broad, tapering apical processes of S8 of this species are also distinctive. For additional characters, note the subgeneric description, especially the facial foveae of the female and the presence of a small malar space in both sexes.

Male: Face about 1.23 times longer than broad. Head surface dull, very closely punctate throughout, becoming finely strigose on upper genal area and closely lineolate or finely striate below and on entire hypostomal area. Preoccipital ridge sharply rounded but not carinate, distant from lateral ocellus by about 1.5 times diameter of that ocellus. Antennal flagellum less than twice as thick distally as basally, first flagellar segment about 1.6 times as long as broad, longer than pedicel; second slightly longer than broad; third about as broad as long; middle flagellar segments longer than broad. Thoracic punctation as described for *Chilicola aequatoriensis*; erect hairs on scutum variable, longest about three times as long as ocellar diameter; propodeal triangle with fine longitudinal radiating striae. Wings with stigma shorter than length of marginal cell on costal wing margin; distal stigmal perpendicular crossing middle of second submarginal cell; first recurrent vein almost meeting first submarginal crossvein. Legs black. Exposed metasomal sterna as in *C. aequatoriensis*. Genitalia and

hidden sterna as in Figure 15. T7 with ventral apicolateral lobe thickened or folded with two posterior margins.

Female: In addition to usual sexual characters, differs from description of male as follows: Face about 1.27 times longer than broad. Head with punctation slightly less dense than in male, genal and hypostomal areas less lineolate but dull and microsculptured. Antennal flagellum almost twice as thick apically as basally; second and third flagellar segments each about as long as broad; middle segments much broader than long. Erect hairs on scutum mostly about as long as ocellar diameter.

Holotype male: ECUADOR: *Azuay*: near Mollecurro, 45 km west northwest of Cuen[c]a, 3200 m, 29 Dec. 1992 (M. Wasbaeux, *Davis*); one paratype female, Río Mazan Reserve, 10 km W of Cuenca, 3150 m, 2 Jan. 1992 (C. Carlton, R. Leschen, *Lawrence*). The collector of the holotype was probably M. Wasbauer. In spite of the different lengths of scutal hairs, the two specimens (male and female) appear to be the same species.

Etymology: *involuta*, Latin, intricate, with reference to the complex folding of the lobes of S7 of the male.

Chilicola (Hylaeosoma) umbonata new species

(Figures 16, 20b)

This species, like *Chilicola canei*, has strong sternal tubercles in the male (Fig. 20b). Among Andean *Hylaeosoma* it is unique in having the middle flagellar segments of the male broader than long, the antenna suggesting that of a female although 13-segmented. The constriction near the middle of S8 of the male is distinctive (Fig. 16b). For additional characters, note the subgeneric description as well as the specific description below:

Male: Face about 1.25 times longer than broad. Head rather uniformly strigose-punctate, limited areas between punctures minutely roughened but shining, lower gena more shining with punctures more widely separated, surface grading into hypostomal area which is anteriorly without punctures, highly shining, even though at certain angles weakly lineolate. Preoccipital ridge sharp, almost carinate, with depressed zone across head anterior to ridge, ridge distant from lateral ocellus by about 1.5 times diameter of that ocellus. Antennal flagellum like that of females, about twice as thick apically as at base, first flagellar segment 1.75 times as long as broad, as long as pedicel; second and third segments subequal, each about as long as broad; middle flagellar segments broader than long. Scutum and scutellum with punctures in some areas of scutum separated by a puncture width, elsewhere by less, ground between punctures shining but minutely roughened; sides of thorax duller with minute sculpturing, punctures scattered and inconspicuous; longest erect hairs of scutum over 1.5 times length of ocellar diameter; propodeal

triangle with fine, close, longitudinal radiating striae. Legs brownish-black, "knees" brownish, basal fifth of hind tibia testaceous (but see "Additional material"). Wings with stigma shorter than length of marginal cell on costal wing margin; distal stigmal perpendicular passing through second submarginal cell; first recurrent vein almost meeting first submarginal crossvein. S2 to S5 each with preapical, sublateral smooth, shining elevated area or tubercle, clearly visible in lateral view (Fig. 20b), these areas of S5 fused to form transverse ridge. Hidden sterna as in Figures 16b,c; genitalia (damaged in paratype) similar to those of *Chilicola involuta* but lacking clumps of large hairs laterally on gonoforceps, and volsella shaped as in Figure 16a.

Holotype male and one male paratype: COLOMBIA: *Valle*: Summit west of Cali, 2000 m, 31 Jan. 1977 (M. Breed, C. D. Michener, *Lawrence*). One male paratype: Same locality, 17 Sept. 1976 (Bell, Breed and Michener, *Lawrence*).

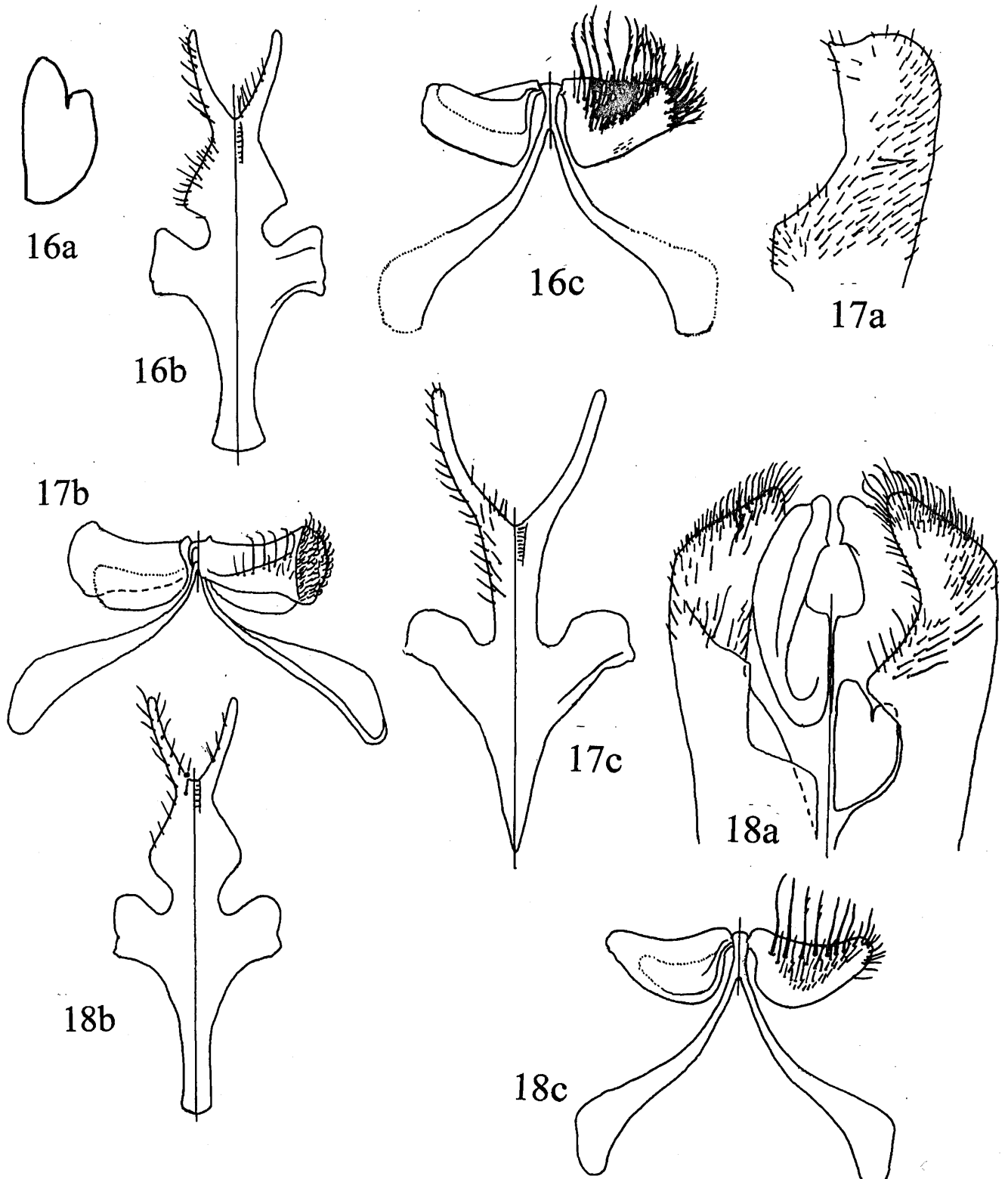
Additional material: One male from ECUADOR: *Loja*: La Argelia, 4° 2.023' S, 79° 11.765' W, 2350 m, Feb. 20, 2001 (C. Rasmussen, *Lima*) differs from Colombian material in the more finely punctate scutum, slender flagellum, yellowish mandible, and on the legs the following parts yellow: apices of femora, bases of tibiae (about one-third of hind tibia), apices of tibiae, and tarsi except blackish distal segments. One female from a nearby locality, Malacatos, Feb. 26, 2001 (C. Rasmussen, *Lima*) agrees in these features with the male except that the front tarsus is almost all yellow, the hind tibia has the basal yellow zone only one-fourth as long as the tibia and the hind tarsus is mostly blackish. These specimens probably represent another species but the genitalia and sterna of the male are so similar to those of Colombian specimens that recognition of another species on the basis of the male seems premature. VENEZUELA: *Aragua*: one female, Rancho Grande, 1100 m, 17-20 Jan. 1978, black light, cloud forest (J. B. Heppner, *Washington*). It differs from *Chilicola umbonata* males in the larger stigma, the distal stigmal perpendicular falling immediately distal to the second submarginal crossvein. This character usually does not differ between sexes, and I suppose this female to represent a new species.

Etymology: *umbonata*, Latin, knobbed or bossed, with reference to the prominent sternal bosses of the males.

Chilicola (Hylaeosoma) canei new species

(Figures 3b, 18, 20c)

Like *Chilicola umbonata*, the male of this species has strong tubercles on the metasomal sterna. *C. canei* differs from *C. umbonata* in the scutal and scutellar punctures which are widely separated by dull ground as in *C. aequatoriensis*. Some specific characters are indicated in the subgeneric description, as well as in the specific description below.



Figs. 16-18. 16: *Chilicola (Hylaesoma) umbonata*, male. a, Volsella; b, S8; c, S7. 17: *C. (H.) belli*, male. a, Distal part of gonoforceps, ventral view, genitalia otherwise similar to those of *C. aequatoriensis*; b, S7; c, S8. 18: *C. (H.) canei*, male. a, Genitalia; b, S8; c, S7.

Male: Face about 1.12 times longer than broad. Head surface dull, densely strigose punctate, below level of antennae punctures scarcely recognizable, surface being strigose granular; upper genal area with punctures separated by shiny ground, this grading into shiny hypostomal area with few, irregular punctures and only feeble lineolation, mostly posteriorly. Preoccipital ridge sharp, almost carinate, distant from lateral ocellus by about ocellar diameter. Antennal flagellum about twice as thick apically as basally, first flagellar segment over 1.5 times as long as wide, second segment slightly longer than broad, third as long as broad; middle segments slightly longer than broad (perhaps as long as broad in straightened flagellum). Thoracic punctation as described for *C. aequatoriensis*; erect hairs on scutum almost as long as two ocellar diameters; propodeal triangle with numerous fine radiating striae diverging from finely granulostriate base, and becoming weak on rather shiny marginal area; one longitudinal median stria particularly strong. Wings with stigma shorter than length of marginal cell on costal wing margin; distal stigmal perpendicular cutting through second submarginal cell; first recurrent vein joining first submarginal cell about one-eighth of length of cell from its apex. Legs black. S2 to S5 each with preapical, sublateral, smooth, shining elevated area or tubercle clearly visible in lateral view, elevations of S5 fused to form transverse ridge. Genitalia and hidden sterna as in Figure 18.

Female: In addition to usual sexual characters, differs from description of male as follows: Face about 1.23 times longer than broad. Frons in front of ocelli with some shining ground between punctures visible on convexities; clypeus with distinct, often round punctures on minutely roughened ground (upper clypeal surface, seen in profile nearly flat); hypostomal area shining but more conspicuously lineolate than in male. Preoccipital ridge separated from lateral ocellus by about 1.5 ocellar diameters. Third flagellar segment broader than long; middle segments broader than long. Propodeal triangle without strong median stria. First recurrent vein almost meeting first submarginal crossvein.

Holotype male: COLOMBIA: *Antioquia*: 1 km north northwest of Sonsón, 21 Jan. 1984 (James H. Cane, Lawrence).

Additional material: COLOMBIA: *Antioquia*: four females, 15 km west of Medellín, 18 Jan. 1984 (James H. Cane, Lawrence). These females might be a different (new) species since they are from another locality and differ from the male in the longer head, flatter clypeus, clypeal punctation, wing venation, and other characters as indicated above. They are not paratypes.

In the holotype, T7 was only slightly exposed and the apical metasomal sclerites were retracted so that the metasoma seemed blunt (Fig. 20c). These features disap-

peared with dissection of the terminalia and are probably not specific characters but rather depend on the condition of the specimen when it died.

Etymology: This species is named after its collector and authority on bee biology, James H. Cane of the USDA Bee Biology and Systematics Laboratory at Utah State University, Logan.

Chilicola (Hylaeosoma) belli new species

(Figures 17, 20a)

Among Andean *Hylaeosoma*, this species resembles *Chilicola smithpardoii* in the coarsely reticulate or coarsely striate propodeal triangle with only about five or seven irregular striae plus about two shorter striae on each side. The pallid "knees" and apices of the tibiae are also distinctive among Andean *Hylaeosoma* although in *C. smithpardoii* these areas are more extensive and yellow. In addition to the characters described below, note the other specific characters incorporated into the description of the subgenus.

Male: Mandible and labrum largely pale yellow. The following parts brownish yellow: posterior part of pronotal lobe, extreme apices of femora, bases and apices of tibiae (on front leg extending along outer side of tibia, on hind leg basal fourth of tibia pale yellow), tarsi (dusky except pale base of hind tarsus). Face about 1.16 times longer than broad. In addition to small lateral tergal fasciae of white hairs (see subgeneric description), band of short white hairs in groove between pronotum and scutum. Head surface dull, very closely punctate throughout, only on lower genal area grading into shining hypostomal area with a few weak punctures and weak lineolation. Preoccipital ridge sharp, almost carinate, with depressed zone across head anterior to ridge, ridge distant from lateral ocellus by about 1.5 times diameter of that ocellus. Antennal flagellum almost twice as wide apically as basally (segment 2), first flagellar segment 1.5 times as long as broad, second and third subequal, about as long as broad; middle flagellar segments longer than broad. Scutum, scutellum, and side of thorax with strong punctures mostly separated by less than a puncture width of shining but minutely sculptured ground; erect hairs on scutum little longer than ocellar diameter; propodeal triangle coarsely reticulate, without numerous fine striae found in other species, but reticulation reducible to about five irregular longitudinal striae with one or two shorter ones on each side. Wings with stigma shorter than length of marginal cell on costal wing margin; distal stigmal perpendicular slightly basal to second submarginal crossvein, thus within second submarginal cell; first recurrent vein joining first submarginal cell about one-sixth of length of cell from its apex. Exposed metasomal sterna almost simple, S2 to S4 with distinct

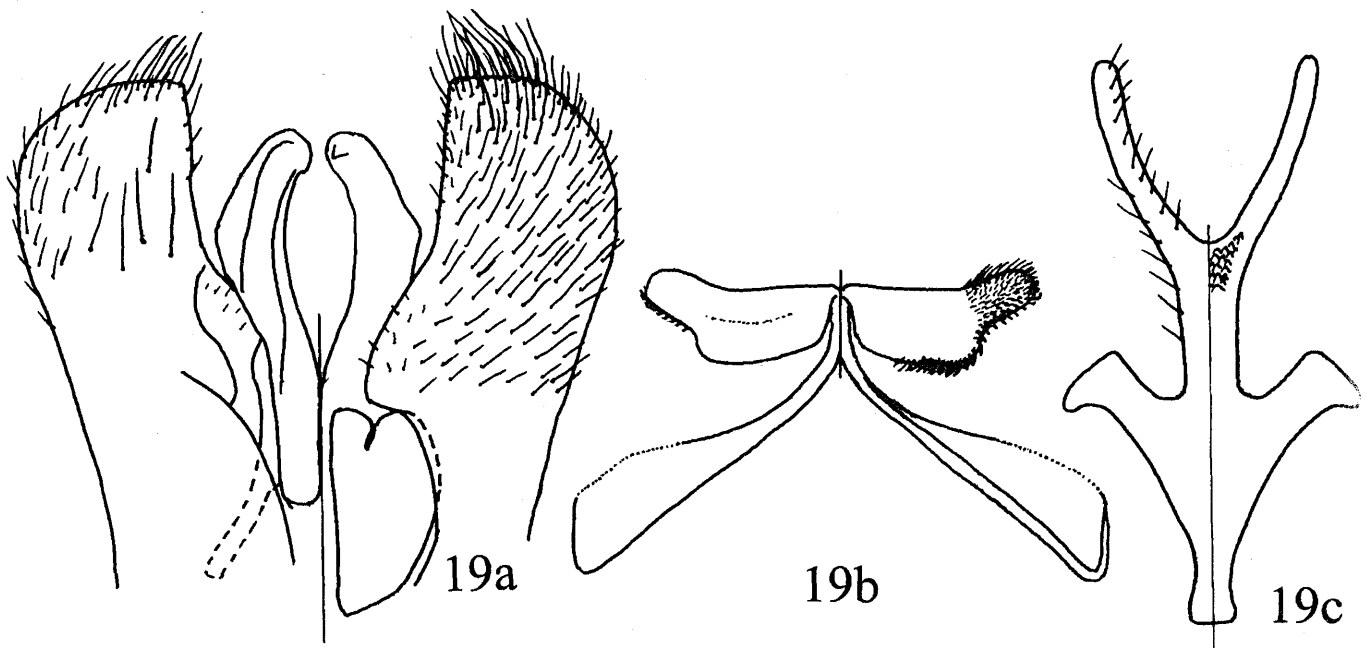


Fig. 19. *Chilicola (Hylaeosoma) smithpardoii*, male. a, Genitalia; b, S7; c, S8.

preapical sublateral smooth convex areas resembling bosses or tubercles of some other species but so low as to be scarcely recognizable in lateral view (Fig. 20a); S5 with similar but scarcely elevated areas. Genitalia and hidden sterna as in Figure 17a to c, S7 with ventral lobe having transverse ridge as in *Chilicola. aequatoriensis*; genitalia similar to those of *C. aequatoriensis* but gonoforceps with apex pointed and ventobasal lobe truncate.

Female: In addition to usual sexual characters, differs from description of male as follows: Mandible and labrum black. Other pale areas of male less evident, more brownish testaceous, hind tarsus entirely dusky. Face about 1.14 times longer than broad. Punctures of face and vertex somewhat less close, mostly somewhat elongate, with a little shining ground between them. Preoccipital ridge distant from lateral ocellus by about diameter of that ocellus. Antennal flagellum more than twice as wide apically as basally; third flagellar segment broader than long; middle flagellar segments broader than long. Propodeal triangle with five striae (about seven in specimen from Rionegro) much less irregular than in male, longitudinal rather than diverging as in other species.

Holotype male and one female paratype: COLOMBIA: Valle: 10 km west of Cali, 1400 m, 19 Sept. 1976 (Bell, Breed and Michener, *Lawrence*).

Additional material: COLOMBIA: *Antioquia*: one female, La Selva, Rionegro, 2120 m, October 1974, on flowers of *Borreria* (A. Vásquez, *Medellín*). VENEZUELA: *Mérida*: one female, Mérida, 17 Nov. 1972 (G. E. Bohart, *Logan*); *Trujillo*: two males and one female, La Mesa, 11 Nov.

1973 (R. M. Bohart, *Logan*). The specimen from Mérida lacks the pale hair in the groove between the pronotum and the scutum. The specimens from La Mesa have more pale color on the legs than in the types, the tarsi being brownish to almost testaceous and the trochanters of one of the males being yellowish; in this last individual there is also a yellow area on the lower part of the clypeus. In all the additional specimens the striae of the propodeal triangle are rather straight, as in the paratype, not so irregular as in the holotype.

Etymology: This species is named in honor of the late William J. Bell of the Department of Entomology, University of Kansas, one of the collectors, in recognition of his intense interest in tropical insects and insect behavior, and his successful career as a now much missed professor of Entomology at the University of Kansas.

Chilicola (Hylaeosoma) smithpardoii new species
(Figure 19)

This is the smallest known species of *Hylaeosoma* (see description of the subgenus) and the only one other than *Chilicola belli* with a yellowish area on the clypeus of some males. It is similar in various ways to *C. belli* as indicated at various points in the description of the subgenus. It differs from *C. belli* by characters indicated in the key to the species of *Hylaeosoma*, as well as by the more extensive yellow markings on the legs, the less pointed apex of the male gonoforceps (Fig. 19a), etc. In addition to the characters listed below, note the other specific characters incorporated into the subgeneric description.

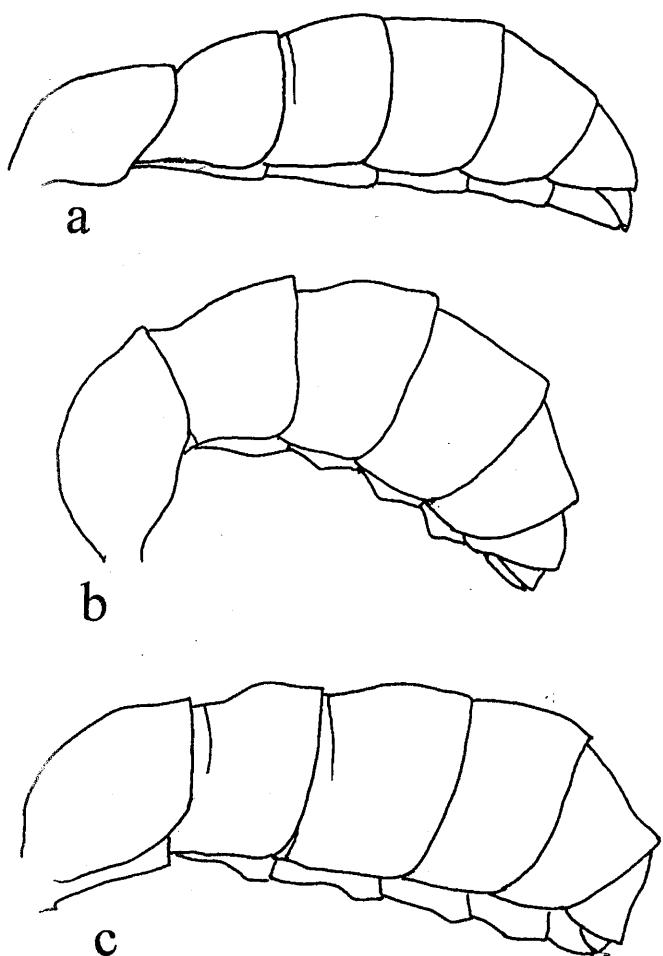


Fig. 20. Lateral views of metasomas of males. a, *Chilicola* (*Hylaeosoma*) *belli*; b, *C. (H.) umbonata*; c, *C. (H.) canei*. Drawings by Robert W. Brooks.

Male: Lower part of the clypeus with ill-defined triangular yellow area in holotype, absent in some paratypes, median point (upper part brownish) extending to upper third of clypeus in holotype; the following parts yellow: labrum, mandible (except dark apex), posterior part of pronotal lobe, apices of femora, bases and apices of tibiae (rest of front tibia brownish yellow, basal third to almost half of hind tibia yellow), tarsi (distal segments reddish yellow on mid and hind legs). Face about 1.21 times longer than broad. Hairs of head and thorax mostly dusky, only about half as long as ocellar diameter, about as long as ocellar diameter and pale on upper gena, preoccipital ridge, mesepisternum, and on metasoma where they form weak, whitish lateral tergal fasciae (see subgeneric description). Head surface closely punctate and therefore dull except for small shiny impunctate area lateral to lateral ocellas and shiny interspaces (mostly less than a puncture width) on lower genal and hypostomal areas. Preoccipital ridge

sharp, almost carinate, strong depression across head anterior to ridge, which is distant from lateral ocellus by about 1.25 ocellar diameters. Antennal flagellum about 1.5 times as wide apically as basally (segment 2), first and third flagellar segments about as long as broad, second broader than long, middle and preapical flagellar segments about 1.5 times as long as broad. Scutum, scutellum, and side of thorax with strong punctures mostly separated by half a puncture width (more on mesepisternum) of shining ground; erect hairs on scutum inconspicuous, about half as long as ocellar diameter; propodeal triangle coarsely reticulate, with about five longitudinal striae or only median stria recognizable. Wings with stigma slightly shorter than length of marginal cell on costal wing margin; distal stigmal perpendicular meeting or slightly distal to second submarginal crossvein; first recurrent vein joining first submarginal cell about one-fifth or one-sixth of length of cell from its apex. Exposed metasomal sterna almost simple, S2 to S4 as described for *Chilicola belli*, smooth elevated areas scarcely evident on S4 and S5. Genitalia and hidden sterna as in Figure 19; note angulate (but not acute as in *C. belli*) apex of gonostylus and blunt, peglike setae along anterior margin of apicolateral lobe of S7.

Female: In addition to the usual sexual characters, differs from description of male as follows: Clypeus and labrum black, mandible reddish yellow. Middle part of front tibia dusky; hind tibia with basal fourth to half yellow; tarsi yellow, distitarsi of mid and hind legs dusky. Face about 1.17 times longer than broad. Head surface not quite so closely punctate, especially in ocellar area punctures well separated by shining but minutely roughened ground. Preoccipital ridge distant from lateral ocellus by 1.5 ocellar diameters. Antennal flagellum twice as wide apically as basally (segment 2), first segment slightly longer than broad, second about as broad as long, segments 3 to 7 much broader than long, 4 to 6 twice as broad as long, segments 8 and 9 about as broad as long or slightly broader than long. Propodeal triangle dull with median stria.

Holotype male: COLOMBIA: *Antioquia*: Municipio de Amalf, Cañón del Rio Porce, Santa Lucía, 6° 46' 20.4" N, 75° 6' 8.4" W, 1125 m, in rastrojo alto (secondary forest), collected with a net (Jama) 10-12 am Aug. 28, 1997 (Allan Smith-Pardo, *Medellín*). One male and two female paratypes: Same data as holotype. Four female paratypes (one headless): Same data as holotype but 2-4 pm (one, *Lawrence*). Two male and one female paratypes: Same data as holotype but 2-4 pm, Sept. 17, 1997 (one of each sex, *Lawrence*). One female paratype: Same data as holotype but collected on decomposed fish bait, 2-4 pm (*New York*). (Except as otherwise indicated, all specimens are at *Medellín*.)

Etyymology: Named for Allan Smith-Pardo who collected all the material and helped to arrange for the loan.

NOTE ON EXTRALIMITAL *HYLAEOSOMA*

While on the subject of South American *Chilicola*, it is worth recording major range extensions for the subgenus *Hylaeosoma*.

In an unpublished thesis (Wilms, 1995, p.183), *Chilicola* (*Hylaeosoma*) *megalostigma* (Ducke) is recorded from the Boracéia reserve in the Serra do Mar of São Paulo, Brazil. Wilms' specimens (São Paulo) were compared by me with specimens from the type locality, Serra de Baturité, Ceará, collected by Ducke (São Paulo), and appeared identical. This is some 2300 km south of the Ceará locality (northeastern

Brazil), which is the previously known southern record for the subgenus. Specimens from Boracéia were dated January 20 and 31, 1994, and were taken by Wilms on flowers of a cactus, *Rhipsalis capilliformis*.

Secondly, in the collection of M. Cooper (*Lyme Regis*) there are specimens of the *Chilicola megalostigma* group from Puerto Bermudez, Pasco, Peru, 800 m, and from Rurrenabaque, La Paz, Bolivia, 270 m. Thus, *Hylaeosoma* ranges southward not only in the Serra do Mar of Brazil but also in the margin of the Andean uplift, at elevations lower than those where the distinctive Andean fauna occurs.

OREODISCELIS NEW SUBGENUS

Type species: *Oediscelis styliiventris* Friese, 1908.

In the key to subgenera of *Chilicola* by Michener (1995), species of this group run to *Anoediscelis* with some difficulty. The epistomal suture below the tentorial pit is strong and could be interpreted (incorrectly, I believe) as an extension of the pit. Avoiding this difficulty, one reaches couplet 6. In *C. styliiventris* the male hind tibia is clearly longer than the femur so that when folded it reaches or nearly reaches the base of the trochanter. This species was therefore placed in *Anoediscelis* by Michener (1995), although with the comment that the hind tibia of the male is more modified than in other species of *Anoediscelis*. In some species described below, however, the hind tibia is even more enlarged and modified than in *C. styliiventris*. It is longer than the femur, but partly because of its enlargement, it can only be folded to reach the middle of the trochanter, thus for this measurement more nearly resembling the species of the subgenus *Oediscelis*. The greatly enlarged hind femur of male *Oediscelis* (sensu Michener, 1995) differs from both *Anoediscelis* and *Oroediscelis*.

In the key to subgenera of *Chilicola* by Toro and Moldenke (1979), one encounters problems with species of *Oroediscelis* at couplet 3. Females of *Oroediscelis* have the first flagellar segment longer than the pedicel (or as long as the pedicel in *C. simplex* and *C. transversaria*), thus leading to *Idioprosopis* (included in *Oediscelis* by Michener, 1995), while males of some species of *Oroediscelis* have the first flagellar segment shorter than the second and run to *Anoediscelis*.

Some Chilean species of the subgenus *Anoediscelis* [*Chilicola inermis* (Friese), *mailen* Toro and Moldenke, *plebeia* Spinola] have the distal half of the hind tibia of the male somewhat enlarged (see Toro and Moldenke, 1979), suggesting the more elaborate condition of *Oroediscelis*. In *Anoediscelis*, however, the tibia is not thickened to support inner and outer crests; there is a single ventral ridge or crest. Moreover, the male basitarsi of *Anoediscelis* are simple, unlike those of *Oroediscelis*. The presence of a distinct malar space in *Oroediscelis* easily differentiates it from *Anoediscelis*.

No species of *Oroediscelis* is recorded from Chile; thus characteristics of this group were not considered by Toro and Moldenke (1979) in their seminal work on the Chilean Xeromelissinae. The subgenus is known only in the Andes from Bolivia and Peru to Venezuela. The principal characters of the subgenus are enumerated below.

Body length 5.5 to 8.5 mm; forewing length 3.5 to 5.7 mm. **Coloration:** Black, face of male sometimes black but frequently with transverse apical yellow clypeal mark and with yellow on lower paraocular area; base of mandible of male rarely with yellow spot; flagellum sometimes dark brown on under side; tarsi rarely partly dark brown; anterior tibia with anterior surface yellow in *Chilicola bigibbosa* and *maculipes*, and sometimes with small yellow streak in *C. brzoskai*; posterior margins of metasomal terga translucent or sometimes brownish, sterna partly dark brown, such brown coloration especially evident in *C. bigibbosa*; wings somewhat dusky, veins and stigma black or dark brown in *C. simplex*. **Sculpturing:** Variable, see specific descriptions. **Pubescence:** Sparse, whitish, dusky in some lights on vertex and dorsum of thorax, longest, densest, and whitest on lower genal area, venter of thorax, and elsewhere as noted in specific descriptions; posterior margins of T1 to T4 or T5 usually with weak lateral apical fasciae of pale hairs. Scopa sparse and weak on hind femora, limited to a few long plumose hairs on S1; S2 with areas of long, plumose hairs laterally, these hairs converging over impunctate and hairless area medially, perhaps forming a corbicula; S3 without scopal hairs, its vestiture similar to that of S4. **Head:** Not greatly developed above eyes as in *Hylaeosoma*; upper orbital tangent at or above level of lower margin of anterior ocellus; preoccipital ridge behind vertex sharp, not carinate, overhanging, distant from lateral ocellus by about 1.5 ocellar diameters (or near 1.75 ocellar diameters in *C. cuzcoensis*); frons weakly convex; fossa for scape above alveolus absent; frontal line absent or feebly indicated; frontal tubercle absent or small, between antennal bases; clypeus and supraclypeal area rather flat in profile, lower part of clypeus somewhat convex, upper part of supraclypeal area somewhat protuberant; eyes converg-

ing below but lower interocular distance much more than half of upper interocular distance; emargination of inner eye margin rather broad and shallow; surface of face at and slightly above ocular emargination in female with punctures separated by shiny ground, forming undefined shiny area; antennal sockets near middle of face; interalveolar distance equal to or slightly less than alveolocular distance; upper clypeal width, between subantennal sutures, less than to about equal to distance from lower end of subantennal suture to eye margin; lower margin of clypeus below lower ocular tangent by distance considerably more than width of scape; labrum about 2.5 times as wide as long; maxillary palpus over half as long as prementum, first two segments shortest but second sometimes over twice as long as broad, remaining segments longer, last sometimes longer than others; labial palpus exceeding glossa, second segment shorter than others; subantennal sutures converging below, about 1.5 times (or in the female of *C. bigibbosa* nearly twice, and intermediate in *C. gibbosa* and *brzoskai*) as long as diameter of alveolus; anterior tentorial pit not noticeably elongate (see introductory remarks on this subgenus); malar space about 0.4 to 1.2 times as long as broad (Fig. 4d). Antennal scape widest at apex, about four times as long as broad; pedicel in male about as long as broad, in female longer than broad; male with flagellum scarcely thickened distally, almost parallel sided, with a tendency to be weakly crenulate; first flagellar segment at least two-thirds as long as second, sometimes as long as second; second as long as third, segments of basal half all much longer than broad, distal half with segments shorter but usually at least a little longer than broad; female with flagellum less than twice as thick distally as basally, first flagellar segment 1.5 to nearly 2.0 times as long as broad, shorter in *C. transversaria*, longer than second and third segments which are broader than long, as are all subsequent segments except the last. **Thorax:** Pronotal collar about as wide as flagellum. Forewing (Fig. 3a) with stigma shorter than length of marginal cell on wing margin, distal stigmal perpendicular basal or distal to level of first submarginal crossvein; first recurrent vein nearly meeting first submarginal crossvein. Dorsal surface of propodeum as long as scutellum or slightly less, shorter than posterior surface of propodeum, propodeal triangle extending onto posterior surface. Middle femur of male with basal concavity on under side (Fig. 29a), some-

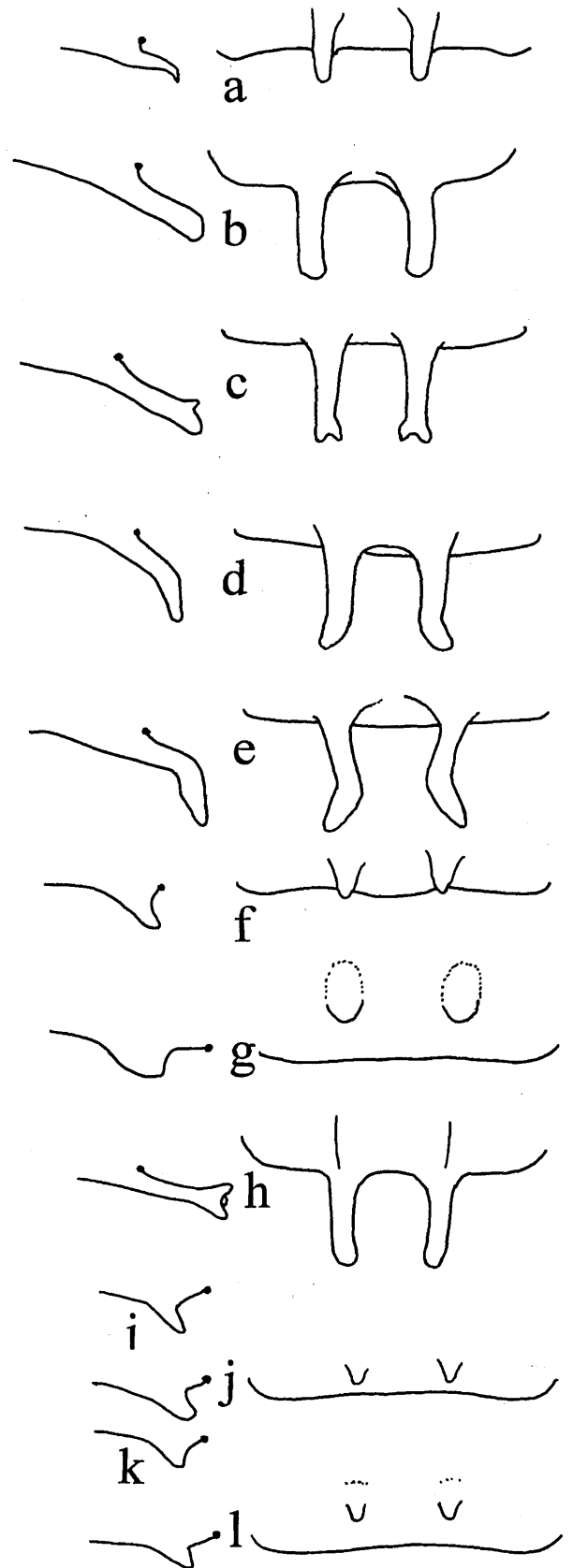


Fig. 21. Diagrams of processes of S4 of males of *Chilicola* (*Oroediscelis*). At left, lateral views with apex of sternum indicated diagrammatically by a black dot; at right, ventral views. a, *C. espeleticola*; b, *C. brooksi*; c, *C. benoistiana*; d, *C. quitensis*; e, *C. cuzcoensis*; f, *C. bigibbosa*; g, *C. maculipes*; h, *C. styliventris*; i, *C. transversaria* (ventral view as in *C. gibbosa*); j, *C. gibbosa*; k, *C. brzoskai* (ventral view as in *C. gibbosa*); l, *C. simplex*.

times accentuated by basal projection, especially in *C. bigibbosa* (Fig. 28a). Posterior leg of male with femur moderately swollen, tibia and basitarsus modified, tibia longer than femur and when flexed reaching to middle or basal part of trochanter; tibia with upper outer surface broadest subapically where it bears a preapical brush of rather long hairs often largely hiding slender distal part of tibia, this brush almost absent in *C. bigibbosa*, and *maculipes*; under surface of tibia hairless, shining, distal half or third of tibia with a concavity between outer and inner parallel crests except outer crest low and concavity shallow or absent in *C. bigibbosa*, *brzoskai*, *maculipes* and *simplex*. **Metasoma:** First segment about as broad as long. Terga with depressed apical shining or microlineolate zones. S4 of male with a pair of preapical processes or large tubercles (Fig. 21). Genitalia and hidden sterna of male as shown in figures; S7 with ventral apicolateral lobes large and complex, dorsal lobes with distal parts small, slender, heavily sclerotized; S8 medially constricted, apex broadly bifid.

Etymology: *Oroediscelis* from *oreo-* Greek, mountain, plus *Oediscelis*, a major genus-group name in the Xeromelissinae, with reference to the restriction of this subgenus to the Andes.

ILLUSTRATIONS OF *OREODISCELIS*

In both genitalic and leg illustrations, certain points indicated by letters are the same in the different views illustrated. For the legs, A marks the distal end of the inner crest of the hind tibia; B marks the distal end of the outer crest, C and D are locations, often convexities, on the outer and inner tibial crests respectively. X marks the projections or angle on the outer surface of the hind basitarsus while Y marks the projections or angle on the under surface. Hair tufts on the leg are diagrammatic; numerous other hairs are omitted. A dotted line on the tibia represents a rounded rather than a sharp or carinate ridge. Dotted areas on the legs are testaceous to yellow. The position of the leg is important in comparing specimens with drawings. A few degrees of rotation makes a difference in visible crests. A, B, and C on the drawings of genitalia mark membranous lobes of the penis valves, while P marks a penis valve. Dotted areas on genitalic figures are membranous processes of the penis valves.

KEY TO THE SPECIES OF THE SUBGENUS *OREODISCELIS*

Males:

1. Processes of S4 relatively long so that emargination formed by them is deeper than wide (Fig. 21a-e, h) .. 2
Processes or tubercles of S4 shorter so that emargination formed by them is wider than deep (Fig. 21g, i-l) 6
2. S4 with projections converging to preapical region be-

yond which they diverge (Fig 21e), divergent parts strongly flattened; middorsal parts of T1 to T4 with punctures minute, inconspicuous, separated by several puncture widths; clypeus with yellow subapical area
C. cuzcoensis

S4 with projections nearly parallel, not strongly flattened apically except in *Chilicola quitensis* (Fig. 21a-c, h); middorsal parts of T1 to T4 with punctures coarser, conspicuous, in at least some areas with punctures separated by one puncture width; clypeus black or frequently with yellow subapical area in *C. styliiventris*. 3

3. Processes of S4 in lateral view with apices strongly bidentate, the teeth of about equal size (Fig. 21h); first flagellar segment on upper surface slightly shorter than second (distinctly shorter on lower surface)
..... *C. styliiventris*

Processes of S4 in lateral view not toothed or with small upper preapical tooth; first flagellar segment on upper surface as long as second (commonly shorter on lower surface) 4

4. Hind basitarsus with thickening on outer surface strongest near middle, forming rounded convexity as seen in ventral view (Fig. 25b) *C. quitensis*

Hind basitarsus with thickening strongest on outer surface basal to middle, where it is abruptly cut off to form premedian angular tooth as seen in ventral view (Figs. 23f and 24c) 5

5. Inner crest on under surface of hind tibia ending in an apical right angle, and with another angle at midlength of tibia (A and D in Fig. 24d) *C. benoistiana*

Inner crest on under surface of hind tibia ending in erect, acute, projecting angle and without angle at midlength of tibia (A in Fig. 23g) *C. brooksi*

6. Hind basitarsus with two strong projections or lobes on lower margin (Figs. 27e and 30b) (malar space at least nearly as long as broad) 7

Hind basitarsus with basal half thickened and sometimes biconvex or with one strong median projection on lower region but without two strong projections or lobes 8

7. Base of front femur with ventral projecting lobe (Fig. 28b), of middle femur with basal tooth followed by emargination (Fig. 28a); S2 with sublateral tubercles not connected by strong ridge, smaller than tubercles of S4 in lateral view; S4 with tubercles reaching sternal margin (Fig 21f) *C. bigibbosa*

Bases of femora unmodified except for concavity at base of middle femur (Fig. 29); S2 with sublateral tubercles

connected by strong ridge, these tubercles larger than those of S4 as seen in lateral view; S4 with tubercles arising from sternal surface such that neither expanded bases nor apices reach sternal margin (Fig 21g) *C. maculipes*

8. Malar space nearly as long as wide; S4 with projections slender, pointed in lateral view (Fig. 21a); lower paraocular areas with yellow *C. espeleticola*
Malar space half to two thirds as long as wide; S4 with projections robust, like strong tubercles; face black or rarely lower paraocular areas with yellow 9
9. Hind basitarsus with lobe (Fig. 32b) projecting near middle of lower margin; projections of S4 long enough to reach sternal margin if they could be pressed down (Fig. 21i, j) 10
Hind basitarsus with or without weak thickening of middle of lower margin (Fig. 33b, 34f); projections of S4 mere tubercles, not long enough to reach sternal margin (Fig. 21k, l) 11
10. S2 with sublateral tubercle with crest obliquely transverse, appearing acute or right angular in lateral view *C. transversaria*
S2 with sublateral tubercle with crest longitudinal, broadly rounded in lateral view *C. gibbosa*
11. Hind basitarsus almost unmodified; hind tibia with apex of inner crest strongly acute (Fig. 34e, f) *C. simplex*
Hind basitarsus with median convexity on outer surface (Fig. 33a); hind tibia with apex of inner crest usually rounded *C. brzoskai*

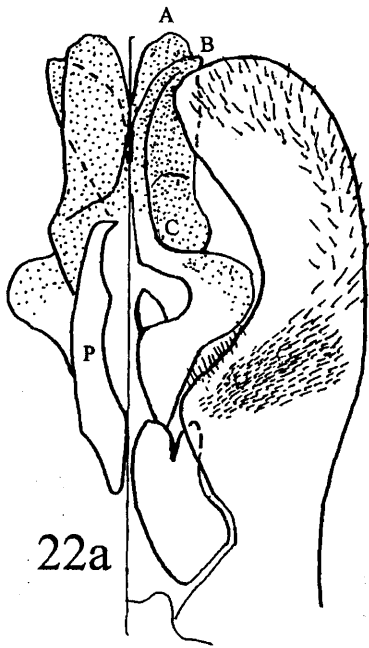
Females (unknown for *Chilicola cuzcoensis* and *C. maculipes*):

1. Malar area about as long as broad 2
Malar area about half as long as broad 3
2. Long hairs of scutum nearly as long as scape *C. espeleticola*
Long hairs of scutum about half as long as scape *C. bigibbosa*
3. Body length 6.5 to 7.0 mm *C. benoistiana, quitensis*
Body length 5.0 to 6.0 mm 4
4. Upper two-thirds of clypeus with fine microsculpturing but rather shiny and with conspicuous punctures separated by a puncture width or more *C. simplex*
Upper two-thirds of clypeus dull with microsculpturing, with punctures weak, not well defined, and widely separated *C. brzoskai, gibbosa, styliiventris, transversaria*

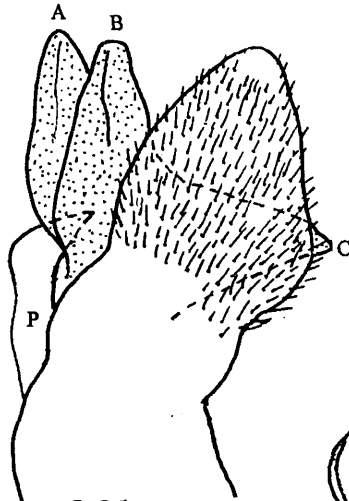
Chilicola (Oroediscelis) espeleticola new species
(Figures 1, 3a, 4d, 21a, 22, 29)

This is one of the largest species of the genus, equal in size to *Chilicola brooksi* and slightly larger than *C. quitensis*. It differs from other species of *Oroediscelis* except *C. bigibbosa* and *maculipes* in the large malar space and the more produced clypeus. Those species can be distinguished from *C. espeleticola* by the modification of the hind basitarsus of the male (Fig. 22e–g) and the slightly longer malar space.

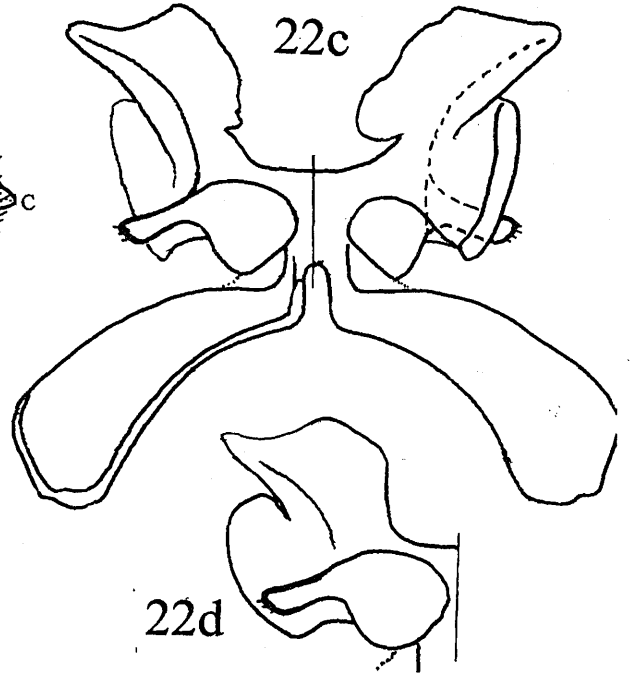
Male: Length 6.5 to 8.5 mm; forewing length 5.5 to 5.7 mm. Face about 1.1 times longer than broad. Clypeus black; lower paraocular area beside clypeus with yellow mark. Head surface dull, closely and finely punctate above antennae, lower face dull with microsculpture, with well separated inconspicuous punctures, except lower third of clypeus with large punctures; malar space nearly as long as wide; lower ocular tangent near middle of clypeus; genal area finely strigose punctate above, grading into coarsely lineolate hypostomal area which becomes smoother anteriorly, finally nearly smooth and shiny in anterior one-fourth. First flagellar segment as long as second, slightly shorter on lower (or anterior, i.e., shortest) side, each nearly twice as long as broad; last three or four flagellar segments subequal, each slightly longer than broad or segments 9 and 10 sometimes as long as broad. Thorax dull, strongly microsculptured, dorsally with small punctures separated by a puncture width or more, on mesepisternum punctures coarser. Dorsal surface of propodeum shorter than scutellum, finely granular with many fine longitudinal striae, often rather irregular. Longest erect hairs on scutum and scutellum as long as scape, those on side of thorax and lower genal area even longer. Stigma over half as long as marginal cell on wing margin, distal stigmal perpendicular basal to first submarginal crossvein or meeting that crossvein. Hind tibia (Figs. 22e–g) nearly three times as long as greatest width, at preapical brush; bare area of outer surface shining but with minute microsculpturing; inner crest with strong marginal carina ending in a broad rounded area (A) folded on outer side; hind basitarsus (Fig. 22e–g) nearly as long as remaining tarsal segments together, widest slightly before middle because of low broad rounded expansion of lower margin, this expansion in ventral view extending little beyond outline of basitarsus; outer surface of hind basitarsus distally concave, shining but with fine microsculpturing. Metasoma dull microlineolate, punctures small, separated by a puncture width or more on T1 to T3, denser on more posterior terga; posterior marginal zones of terga not punctate but lineolate, brownish, laterally partly covered by pale hairs forming weak lateral fasciae. S2 and S3 each with two preapical sublateral shining bosses, S2 with bare area



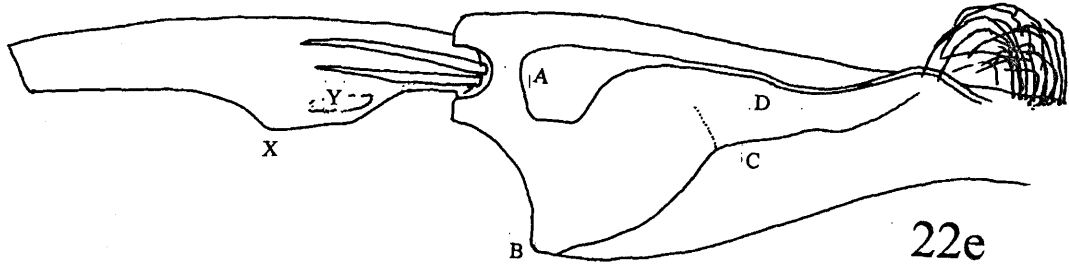
22a



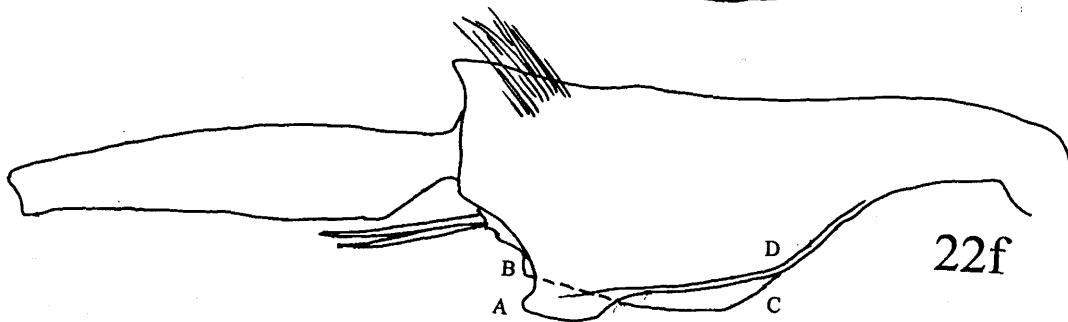
22b



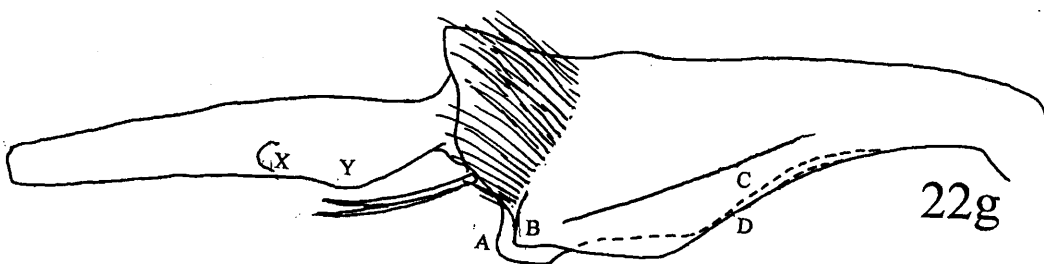
22d



22e



22f



22g

medially and long hairs laterally, suggesting female scopa; S4 with two slightly tapering projections (Fig. 21a), flattened at tips and sharply pointed in lateral view and apically curved ventrally, emargination between them much broader than deep, depressed area between them with short, erect hairs, lateral to them long, incurved hairs; S5 with apical fringe represented only by short, inconspicuous hairs, lateral hairs long, curved, erect; S6 with surface mostly shining and hairless, with broad median depression defined laterally by rounded ridge, lateral to which is deep depression, at extreme side dense tuft of yellow hairs, apical margin with fringe of well spaced hairs surpassed by transparent rounded lamella. Genitalia and hidden sterna as in Figure 22a–d; S7 with posterior margin of apicolateral lobe membranous and sometimes irregular (right side, Fig. 22c), midlateral process of same lobe forming rounded dark plate that may hang down (Fig. 22c) or project more laterally (Fig. 22d); S8 similar to that of *Chilicola brooksi*; genitalia differing from those of *C. brooksi*, especially in the two long membranous processes from the apex of each penis valve and the less hairy gonoforceps (Fig. 22a, b).

Female: Agrees with description of male except for usual sexual features and the following: Length 6.0 to 8.0 mm; forewing length 4.6 to 5.4 mm. Face without yellow markings. First flagellar segment over 1.5 times as long as broad (see description of female antenna in account of subgenus). Mesepisternal punctures similar to those of thoracic dorsum. Posterior marginal zones of metasomal terga with punctures and strong lineolation extending nearer to tergal margins.

Holotype male and 42 male and 93 female paratypes: VENEZUELA: Mérida: Paso Pico Aguila, Páramo de Mucuchies, 8° 51' 5" N, 70° 48' 34" W, 3710 m, 26 May 1998, in dead dry flowering stems of *Espeletia schultzei* (J. Ashe, R. Brooks, R. Hanley, Lawrence, with paratypes distributed to Davis, Ottawa, Los Angeles, London, New York, Paris, San Francisco, Washington). One additional male paratype, same data but 21 May 1998 and not from *Espeletia* stems but caught on flowers (R. Brooks, pers. comm.) (Lawrence).

Additional material: VENEZUELA: Mérida: two females, Páramo Las Cruces, 3900–4300 m, 11 Sept. 1982 (P. Berry, Ithaca); three males, four females, Páramo de Mucuchies, Alto de Timotes, 8° 51' 24" N, 70° 49' 30" W,

4020 m, 26 May 1998, in dead dry flowering stems of *Espeletia timotensis* (J. Ashe, R. Brooks, R. Hanley, Lawrence); one male, Parque Nacional Sierra Nevada, trail between L. Mucubají and L. Negra, 3500 m, 4 June 1988 (A. L. Norrbom, G. J. Steck, Washington).

Two female specimens differ from *Chilicola espeleticola* in that the malar space is about three-fourths as long as broad, the clypeus is cut below the middle by the lower ocular tangent, and the clypeus has a longitudinal median depressed line (rarely well developed in *C. espeleticola*). Thus they resemble *C. quitensis* and its close relatives, which, however, have an even shorter malar space and less produced clypeus. Probably these females represent a new species, the male of which remains unknown. They are from PERU: Lima: Matucana, 2400 m, one 23 June 1955 (C. D. Michener, Lawrence), the other 12 May 1920 (Cornell Exped. Lot 569, Ithaca).

Etymology: The specific name is based on *Espeletia* (Asteraceae), the well known paramo plant in whose dead flowering stalks the type series was taken.

NESTS OF *CHILICOLA ESPELETICOLA*

The paratype series of 42 males and 93 females was extracted at Paso Pico Aguila, 3710 m altitude, from about 35 nests found in dead, dry flowering stems on living plants of *Espeletia schultzei* on May 26, 1998. The following is based on observations by R. W. Brooks. Occupied stems sloped upward (vertical to about 20° above horizontal) to the broken apices that allowed access to the pith. Hundreds of similar horizontal to drooping stems were examined without finding nests of *Chilicola*. About a kilometer away in the same paramo, at Alto de Timotes, 4020 m, in stems of *Espeletia timotensis*, only three nests were found among hundreds of appropriate looking, dead, dry, broken, old flowering stems. At both sites, no other kinds of suitable pithy stems were available.

The bees (or possibly initially other insects) burrowed into pith in stems 7 to 9 mm in diameter, forming nests 5 to 25 cm deep and 3 to 4.5 mm in diameter. This variability in burrow diameter suggests that some were excavated by some other insects before arrival of a bee.

The cells had been largely destroyed by the emerged adult bees which were found in cold weather lined up head to tail in burrows, but Brooks' impression is that few adults had left the nests; only one (a male) was found on a flower during an hour of sunshine (collecting by two people at the Paso Pico Aguila site). The female-biased sex ratio, however, possibly indicates departure of some males. Two to about 12 adults occupied each nest and probably indicated the number of cells that had been in each nest. Since all were unworn, the bees that made and provisioned the nests must have disappeared and their progenies were ready to leave the nests.

←
Fig. 22. *Chilicola* (*Oroediscelis*) *espeleticola*, male. a, b, Genitalia, dorsal (gonoforceps omitted), ventral and lateral views; c, S7; d, Apicolateral part of S7 of another individual, dorsal view, with laterobasal lobe more horizontal instead of directed ventrally as in c (Posterior margins of the apicolateral processes are membranous, delicate, asymmetrical or damaged); e–g, Posterior tibia and basitarsus in ventral, inner and outer views. For further explanation, see account of the subgenus.

The cells appear to have been similar to those of *Chilicola styliventris* described elsewhere in this paper. Measurements between remnants of intercellular walls indicated that cells were 10 mm long. Two measurable cell diameters were each 3 mm. The burrows, as indicated above, are often larger than 3 mm in diameter. The cell membrane in such cases were separated from the burrow walls by spaces containing scattered threads extending from the burrow wall to, and supporting, the cell membrane.

Nearly all the larval feces, bits of cell membrane, and other debris appeared to have been removed from the nests by the bees. Perhaps one female was preparing to re-use each burrow.

Chilicola (Oroediscelis) brooksi new species
(Figures 21b, 23)

From the other similarity large species, *Chilicola espeleticola*, *C. brooksi* differs by the short malar space and clypeus, as well as other characters indicated below. The right angular to acute tooth on the outer side of the hind basitarsus is distinctive for *C. brooksi*. It differs from the description of *C. espeleticola* as follows:

Male: Length 7.5 to 8.5 mm; forewing length 5.4 to 5.5 mm. Face about 1.08 times longer than broad. Clypeus, malar space, lower ocular tangent, and hypostomal area as described for *Chilicola quitensis*. Last three or four flagellar segments each longer than broad. Scutum and scutellum with punctures almost as dense as they can be. Longest hairs of scutum and scutellum about three-fourths as long as scape, those of lower side of thorax and lower genal area as long as scape. Hind tibia about three times as long as greatest width, inner crest ending in sharp erect tooth, basal to which crest is gradually reduced (Fig. 23g). Hind basitarsus shorter than remaining tarsal segments taken together, only about as long as 2.5 following segments; hind basitarsus widest near base because of expansion of lower margin, outer expansion forming right-angular to acute tooth about one-third of length of basitarsus from base (Fig. 23f). Metasoma more shiny although interspaces finely lineolate, punctures not denser on posterior than on anterior terga; posterior marginal zones of terga with well separated fine punctures extending near to margins; lateral fasciae of pale hairs absent; S4 and S5 as described for *C. quitensis*; S6 with apical fringe of long, well spaced hairs surpassing apical transparent lamella. Genitalia and hidden sterna as in Figures 23a-e; differences from *C. espeleticola* are indicated under that species; S7 has anterolateral margin of the ventral lobes wrinkled and irregular and the basal part covered with minute spicules (Fig. 23c, right half).

Female: Agrees with description of male except for usual sexual features. Length 7 mm; forewing length 5.4 mm. Face about 1.1 times longer than broad.

Holotype male and three male and one female paratypes: VENEZUELA: Mérida: 42.4 km northwest of Mérida, near La Carbonera, 8° 37' 38" N, 74° 21' 10" W, 2360 m, 25 May 1998, from *Rubus* flowers (J. Ashe, R. Brooks, R. Hanley, Lawrence).

Additional material: VENEZUELA: Trujillo: one male, 7.2 km from Boconó, old Trujillo road, 9° 20' 42" N, 70° 17' 47" W, 2200-2300 m, 20 May 1998 (J. Ashe, R. Brooks, R. Hanley, Lawrence). COLOMBIA: Antioquia: one male, La Selva, Rionegro, 2120 m, August, 1975, on *Polygonum segetum* (J. Cano, Medellín); one female, same locality, July 1975, in stem (R. Añez, Medellín).

The female paratype has the thoracic hair badly worn so that few long hairs are present and one cannot verify this character. Both sexes lack the pale lateral hair fasciae on the metasomal terga but in the long series of *Chilicola quitensis* this feature is variable, perhaps due to wear.

Etymology: The name is a patronymic for Dr. R. W. Brooks, one of the collectors of the specimens as well as a contributor toward completion of this paper.

Chilicola (Oroediscelis) benoistiana new species
(Figures 21c, 24)

This species is slightly smaller than *Chilicola quitensis* but is morphologically more similar to the larger *C. brooksi*, from which it differs in the hind tibial structure of the male, as indicated in the key to species. As noted in the description of the subgenus, its lower subantennal sutures are more strongly convergent below than in other species of the subgenus. It agrees with the description of *C. espeleticola* except as follows:

Male: Length 6.0 to 7.5 mm; forewing length 4.7 mm. Malar space about half as long as broad; subantennal sutures strongly converging below; lower ocular tangent below middle of clypeus. Last four flagellar segments each slightly longer than broad. Mesoscutum with punctures separated by much less than a puncture width. Dorsal surface of propodeum about as long as scutellum. Distal stigmal perpendicular meeting first submarginal crossvein. Hind tibia over three times as long as breadth at preapical brush; inner crest ending in right angular apical tooth (Fig. 24d, A) and with another tooth at midlength of tibia (Fig. 24d, D), outer crest very broad, broadest well before apex of tibia; hind basitarsus shorter than remaining tarsal segments together, widest near base because of rounded expansion of lower margin (Fig. 24c), in ventral view forming strong tooth slightly basal to middle of basitarsus on outer surface (rounded in specimen from Route de Calderon). Metasomal terga with punctures separated by less than one puncture width except for impunctate marginal zones; S2 and especially S3 with bosses higher than in *C. espeleticola*; S4 with projections strong, emargination between them deeper than broad, surface between them

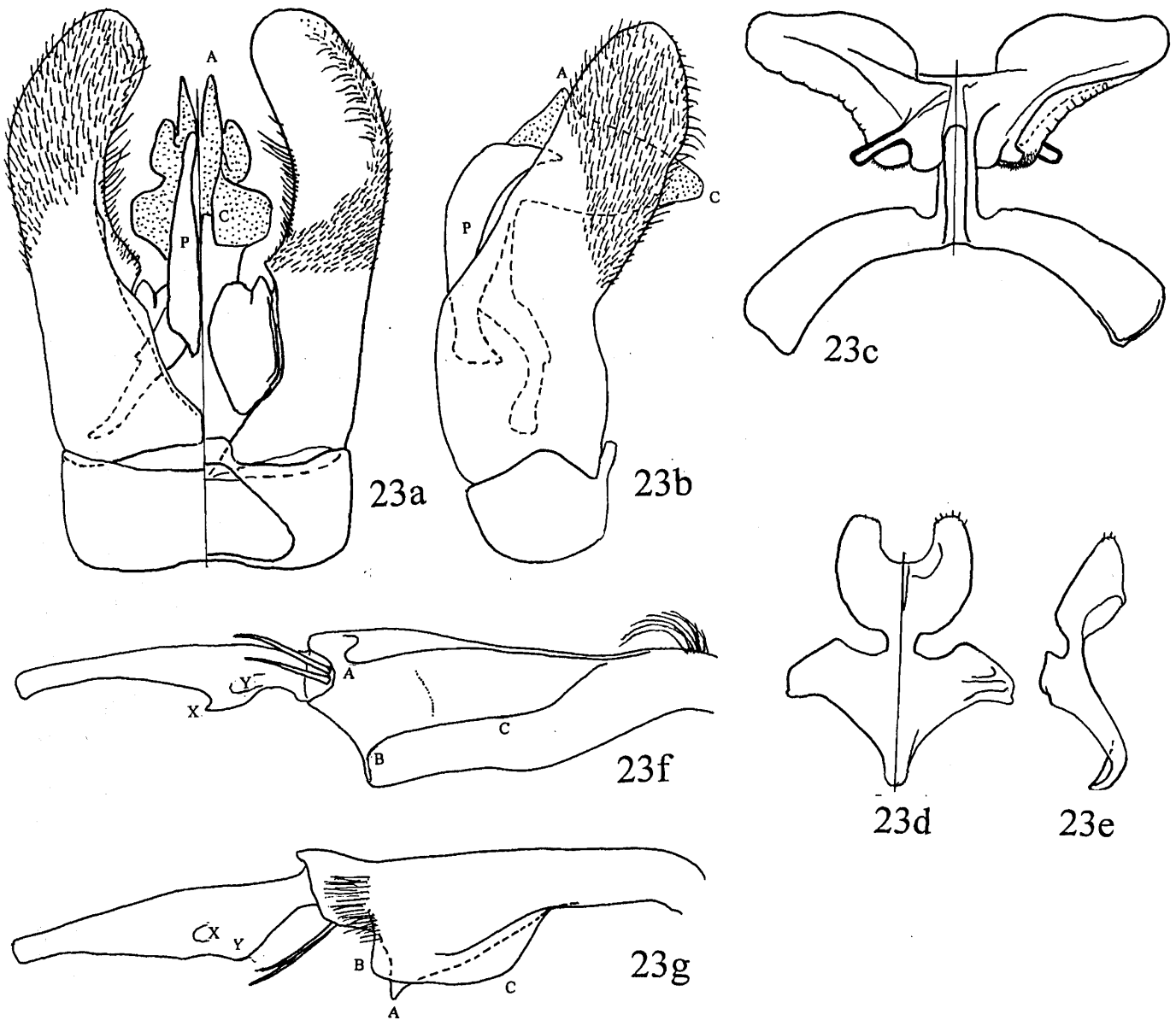


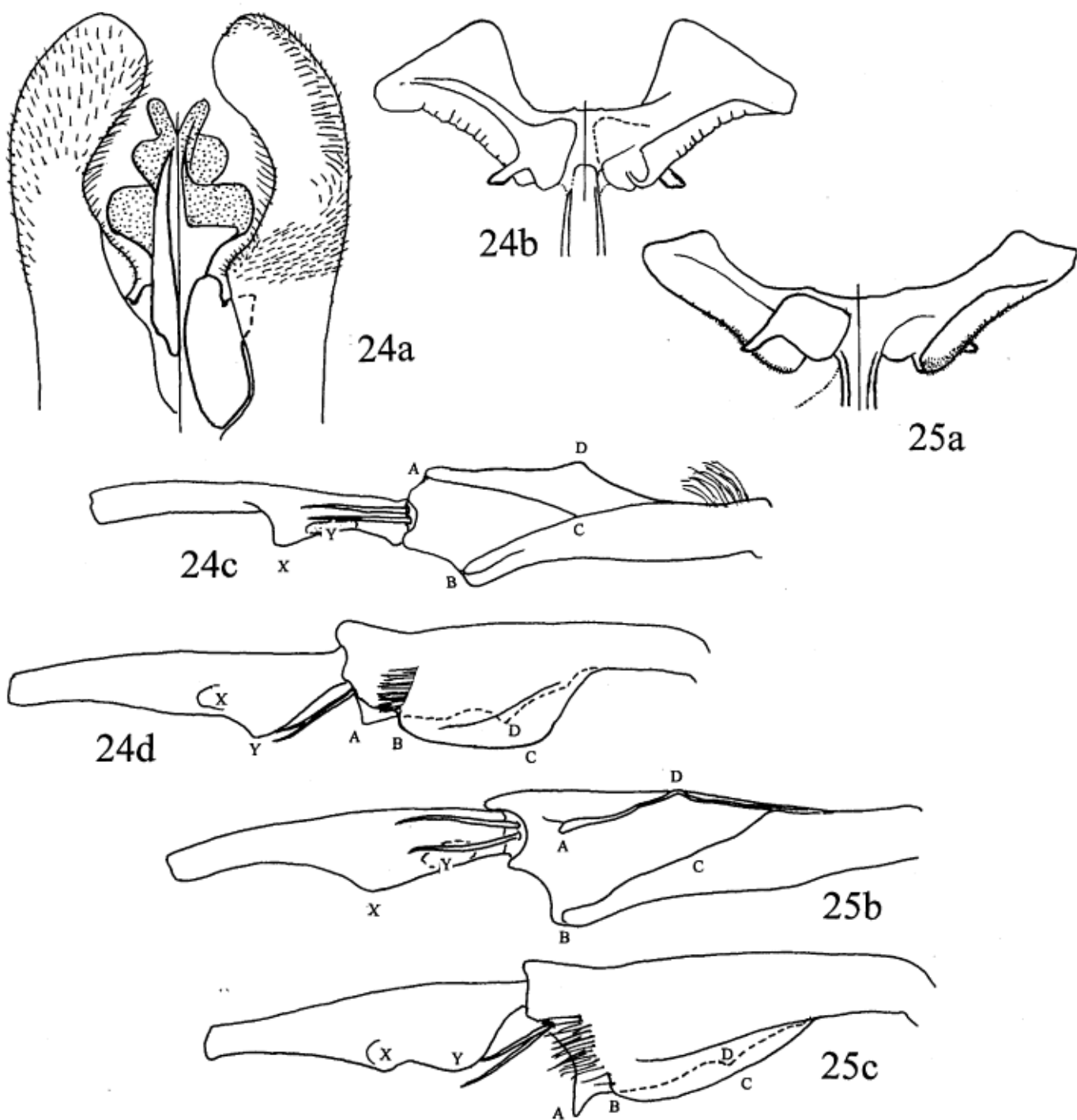
Fig. 23. *Chilicola (Oroediscelis) brooksi*, male. a, b, Genitalia, dorsal, ventral and lateral views; c, S7; d, e, S8, dorsal, ventral and outer views; f, g, Posterior tibia and basitarsus in ventral and outer views. For further explanation, see account of the subgenus.

with few hairs (none posteriorly), projections not flattened, apices minutely bilobed (Fig. 21c) and in side view showing small preapical tooth on upper surface (this tooth absent in specimen from Route de Calderon); hairs lateral to projections of S4 long but not strongly incurved; S6 with ridges lateral to broad median concavity sharp, almost carinate, converging posteriorly; longest hairs of fringe of S6 surpassing apical translucent lamella. Genitalia and hidden sterna much as in *C. styliiventr*, anterolateral margins of ventral lobes of S7 more irregular, posterior parts differently shaped (Fig. 24b); mesal margins of gonoforceps

with longer hairs, penis valves with apical membranous appendages longer (Fig. 24a); S8 as in *Chilicola cuzcoensis* or with apical hairs nearly all marginal.

Female: Agrees with description of male except for the usual sexual features and the following: Length 6 mm; forewing length 4.4 mm. Mesepisternum with punctures similar to those of dorsum of thorax but separated by about three puncture widths. Metasomal terga with punctures fine and separated by several puncture widths.

Holotype male, one male and three female paratypes: ECUADOR: [*Pichincha*]: Sambiza (no other data) (R.



Figs. 24-25. 24: *Chilicola (Oroediscelis) benoistiana*, male. a, Genitalia; b, S7; c, d, Posterior tibia and basitarsus, ventral and outer views. S8 is as in *C. cuzcoensis* or with hairs all marginal. 25: *C. (O.) quitensis*, male. a, S7; b, c, Posterior tibia and basitarsus, ventral and outer views. Genitalia and S8 are as in *C. brzoskai*. For further explanation, see account of the subgenus.

Benoist, Paris); one male and one female paratype: Catacallao, 22 Feb. 1931 (R. Benoist, Paris).

Additional material: ECUADOR: [*Pichincha*]: one male, Route de Calderon, 10 Oct. 1930 (R. Benoist, Paris) differs from the type material by characters indicated in the above

description; it may represent another species. In the key it runs best to *Chilicola quitensis* from which it differs in the form of the processes of S4 and of the crests of the hind tibia. One female from Cumbayo, 19 June 1931 (R. Benoist, Paris) may belong to this species.

Etymology: The name *benoistiana* is an adjectival patronymic in honor of Raymond Benoist, the first student of Andean *Chilicola* and the collector of the specimens here described.

Chilicola (Oroediscelis) quitensis Benoist
(Figures 21d, 25)

Chilicola quitensis Benoist, 1942:79.

Chilicola quitensis var. *immaculata* Benoist, 1942:80. New Synonymy.

This species agrees with the description of *Chilicola espeleticola* except as indicated below. As in the case of *C. brooksi*, the shorter malar space and less produced clypeus distinguish it easily from *C. espeleticola*.

Male: Length 6.5 to 7.5 mm; forewing length 5.2 to 5.6 mm. Face about 1.05 times longer than broad. Lower paraocular yellow areas as in *Chilicola espeleticola* or reduced, sometimes to mere line, or rarely entirely absent (var. *immaculata*). Clypeus with scattered large punctures, those on upper part often little smaller than those of lower third, depressed median longitudinal line of clypeus commonly evident; malar space about half as long as wide; lower ocular tangent below middle of clypeus; smooth anterior extremity of hypostomal area short. Thorax with punctures separated by less than a puncture width. Dorsal surface of propodeum slightly shorter than scutellum, striae quite irregular. Longest hairs of scutum about two-thirds as long as scape, those of scutellum about three-fourths as long as scape, those of sides of thorax and lower genal area nearly as long as scape. Hind tibia about three times as long as greatest width, inner crest strongly carinate, ending in sharp apical spine (Fig. 25c) and with weak angle near middle; hind basitarsus slightly shorter than remaining tarsal segments together, widest near base (Fig. 25c) because of broad rounded lobe of lower margin, this expansion continuing to beyond middle of basitarsus as small secondary lobe, projections on outer surface rounded (Fig. 25b). Metasoma more shiny although interspaces finely lineolate. S4 with projections long, often slightly enlarged apically, emargination between them deeper than wide (Fig. 21d), area between their bases with a few rather long hairs, without short hairs; S5 without apical fringe; S6 with lateral tuft not very yellow, marginal fringe weak, broken medially, much surpassed by transparent lamella. Genitalia and S8 as in *C. brooksi*; S7 with ventral apicolateral lobes more slender (Fig. 25a), basal part with minute spicules as in *C. brooksi*.

Female: Agrees with description of male except for usual sexual features. Forewing length 4.5 to 5.6 mm. Face about 1.08 times longer than broad. First flagellar segment about 1.5 times as long as broad.

Lectotype male (of *Chilicola quitensis*) here designated: ECUADOR: [Pichincha]: Quito [2850 m elevation, accord-

ing to Benoist], 24 Oct. 1931 (R. Benoist, Paris). This specimen also bears a red label, "allotype" and a white printed label "Museum Paris, Coll. R. Benoist 1924." These labels were presumably attached by the Museum after receipt of the Benoist collection; see comments below. Lectotype male (of *C. quitensis* var. *immaculata*) here designated: [Pichincha]: Quito, 16 Oct. 1930, "Rubus" (R. Benoist, Paris). This specimen also bears an olive green printed label "Museum Paris/Equateur/Coll. R. Benoist 1924." Such labels, on all of Benoist's specimens, must have been added after the collection arrived at the Museum although the specimens were collected years later than the 1924 date on the labels. Lectotypes are designated to verify the meaning of the name *quitensis*; in Benoist's series were also specimens of *C. benoistiana*.

When he described this species, Benoist considered the female first and the male characters subsequently. Accordingly, in the Paris Museum a female has a red holotype label and a male, a red allotype label. Such labeling has not been published. In any case, Benoist did not label any specimens as types of any kind; he did write the name "*Chilicola quitensis*" in red ink on labels of two females, of which one was at the head of the series of specimens, and it is this female that has additionally been labeled holotype by the Museum. It is not a holotype since it was not published as such by Benoist. Since in this group the principal specific characters are in the male, I here designate and label as lectotype of *Chilicola quitensis* the male that had been previously labeled as the allotype.

Of the 19 males in Benoist's series, only two completely lack yellow facial markings. One of these bears Benoist's label in red ink, "var. *immaculata*." I designate and label that specimen as lectotype of *Chilicola quitensis* var. *immaculata* Benoist.

Additional material: Of the 35 specimens in the Paris Museum, most are from Quito. Nearby localities for this species listed by Benoist (1942) are as follows: Rumipamba, Cotocollao, route de Calderón, Palmira, valle de Lloa, Páramos de Aloag and Otavalo. Of these localities, only Palmira is verifiable by male specimens. Specimens from Cotocollao and route de Calderón are *Chilicola benoistiana* or a related species, while those from Otavalo are *Hylaeus benoisti* Michener, a species that superficially resembles *C. quitensis*. Dr. Luis Coloma of the Universidad Católica de Quito has verified that these localities are near Quito in the Province of Pichincha, with the possible exception of Palmira, which is the name of a town in the province of Chimborazo. Almost certainly Benoist's Palmira was a different place, near Quito. One additional male specimen is from ECUADOR: Napo: Misahualli, 1-2 April, 1986 (S. McKamey, Berkeley).

Benoist (1942) collected *Chilicola quitensis* throughout the year. Although some of his specimens are labeled "Ru-

bus," no doubt meaning taken from nests in dead pithy stems of *Rubus*, others are not so labeled and some were taken on flowers. The implication is clear that the bees are active throughout the year. Benoist indicated that the species visits various flowers but is especially abundant on flowers of *Baccharis polyantha* (Asteraceae).

Chilicola (*Oroediscelis*) *cuzcoensis* new species
(Figures 21e, 26)

This species resembles *Chilicola espeleticola*, from which it differs in the shorter malar space and clypeus, thus resembling *C. quitensis*, *brooksi*, etc. It differs from those species in the subapical yellow clypeal mark and the very fine, sparse punctation of the metasomal terga. *C. cuzcoensis* differs from the description of *C. espeleticola* as follows:

Male: Length 7.5 mm; forewing length 5.6 mm. Face about 1.05 times longer than broad. Clypeus with subapical transverse yellow lunule (in addition to yellow of paraocular area). Lower face (i.e., below antennae) with well separated strong punctures; malar space about two-thirds as long as wide. First flagellar segment as long as second, even on lower side; last three or four flagellar segments each distinctly longer than broad. Thoracic punctation strong, particularly on posterior part of scutum and on scutellum where punctures are separated by more than one puncture width of shining ground; punctures of anterior two-thirds of scutum separated a puncture width or less of finely sculptured, dull ground. Dorsal surface of propodeum as long as scutellum. Thoracic and cephalic hairs about as described for *Chilicola brooksi*. Hind tibia about three times as long as greatest width, similar to that of *C. brooksi*. Hind basitarsus as long as tarsal segments 2 to 4 taken together, expansion of outer surface (ventral view) forming rounded, obtuse tooth on outer side about two-fifths of distance from base to apex, thus differing from right angular or acute tooth of *C. brooksi*. Metasomal terga with punctures minute, widely separated. S2 with hairs of lateral area not long; S4 with projections long, widest preapically, apices diverging, emargination between them deeper than wide, area between their bases with ordinary hairs (Fig. 21e); S5 with sparse apical fringe, not erect; S6 with rounded ridges diverging basad, apices each produced into small projection near margin of sternum, areas lateral to ridges not deeply depressed, apical margin with fringe of well spaced hairs nearly reaching apex of transparent lamella. Genitalia and hidden sterna as in Figures 26a-d; broad midlateral process of apicolateral lobe of S7 resembles that of *C. espeleticola*.

Holotype male: PERU: [Cuzco]: Cuzco (=Cusco)[?], 31 Jan. 1968 (A. Garcia, C. Porter, Lawrence). The printed label originally read Pisac, Cuzco. The word Pisac has been crossed out, leaving Cuzco, probably meaning the

vicinity of the city of Cuzco rather than the department. Pisac is a town near Cuzco.

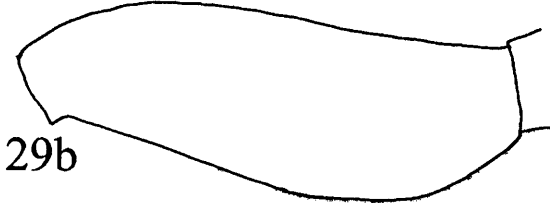
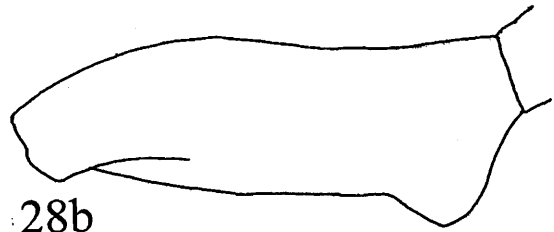
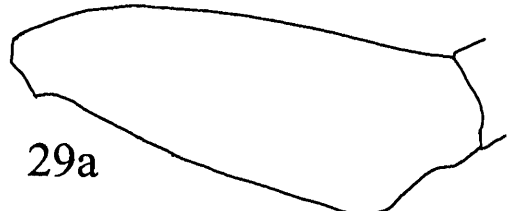
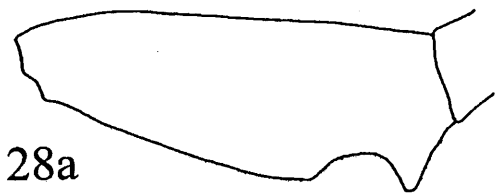
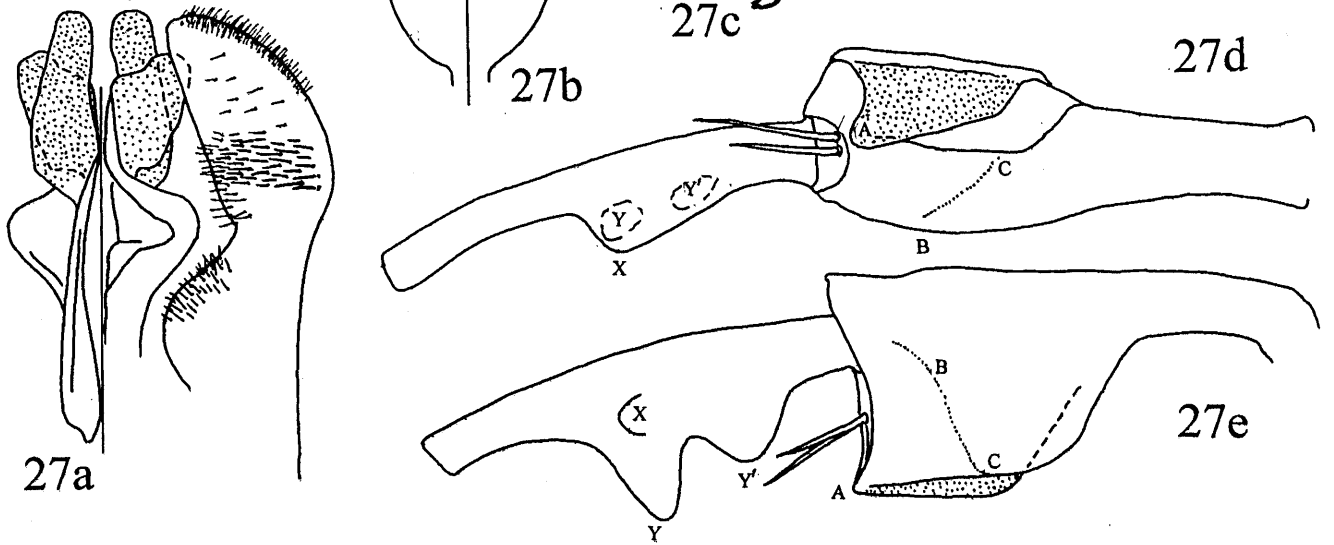
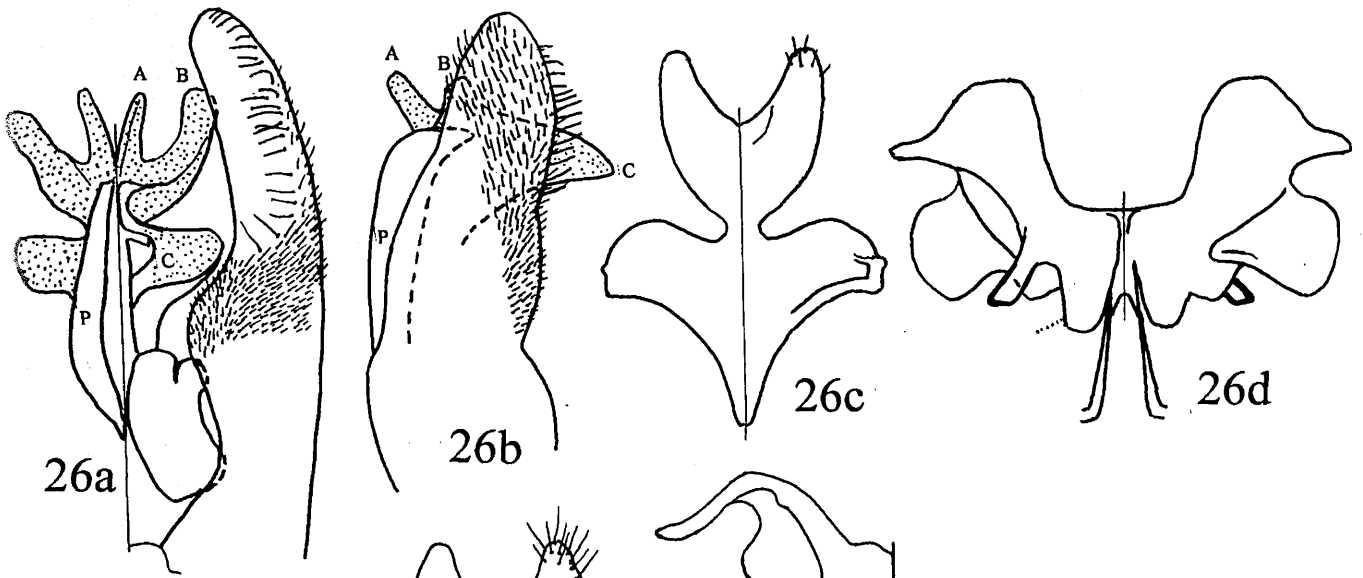
Etymology: The name is based on that of the city and department of Cuzco, Peru, where the species was collected.

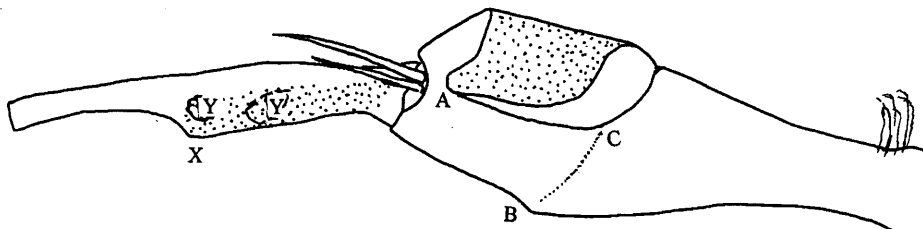
Chilicola (*Oroediscelis*) *bigibbosa* new species
(Figures 21f, 27, 28)

Of known species of *Oroediscelis*, this is the one with the longest malar area, the other species with the malar area nearly as long being *Chilicola espeleticola* and *C. maculipes*. *C. bigibbosa* resembles *C. maculipes* in the presence of two large lobes on the ventral margin of the hind basitarsus of the male, but is unique in the femoral characters of the male described below. This species agrees with the description of *C. espeleticola* except as follows (see also the subgeneric description):

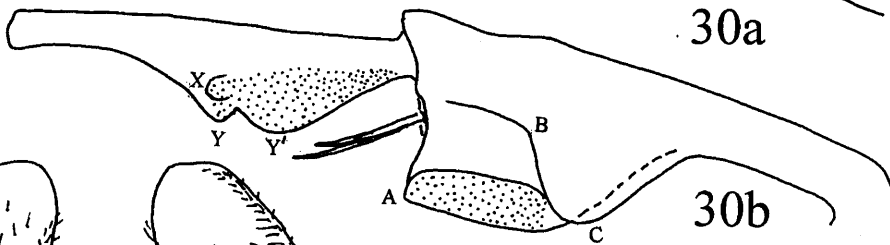
Male: Length 7.0 mm; forewing length 5.1 mm. Face about 1.19 times longer than broad. Clypeus with transverse subapical yellow lunule (in addition to yellow on paraocular area); clypeus with strong longitudinal median groove; malar area as long as wide. Antennal flagellum as described for *Chilicola cuzcoensis*. Thorax shining although microsculptured between punctures, which are strong and mostly separated by less than a puncture width. Longest hairs of scutum about half as long as scape, those of scutellum and sides and venter of thorax about two-thirds as long as scape, those of lower genal area longer than scape, dense. Distal stigmal perpendicular slightly beyond first submarginal crossvein. Front femur with strong, basal flat keel-like projection (Fig. 28b); mid femur with sharp protruding angle in same position, followed by emargination (Fig. 28a). Hind tibia over twice as long as greatest width, preapical brush almost absent, margin of inner crest and its apical tooth yellow, folded toward outer side as in *C. maculipes* and *C. espeleticola* (Fig. 27d); hind basitarsus about as long as tarsal segments two to four together, lower margin expanded to form two lobes, one near base, the other (larger) near middle of basitarsus (Fig. 27e); basal parts of these lobes (especially the middle basitarsal lobe) expanded a little beyond outline of basitarsus in ventral view, forming obtuse angle at midlength of basitarsus on its outer surface. Metasoma shining but microlineolate, with rather large punctures separated by a puncture width or more;

Figs. 26–29. 26: *Chilicola* (*Oroediscelis*) *cuzcoensis*, male. a, b, Genitalia, dorsal, ventral and lateral views; c, S8; d, S7. 27: *C. (O.) bigibbosa*, male. a, Genitalia; b, Apex of S8; c, Laterodistal part of S7, dorsal view; d, e, Posterior tibia and basitarsus in ventral and outer views. For further explanation, see account of subgenus. 28: *C. (O.) bigibbosa*, male, anterior views of middle (a) and front (b) femora. 29: *C. (O.) espeleticola*, male, anterior views of middle (a) and front (b) femora.

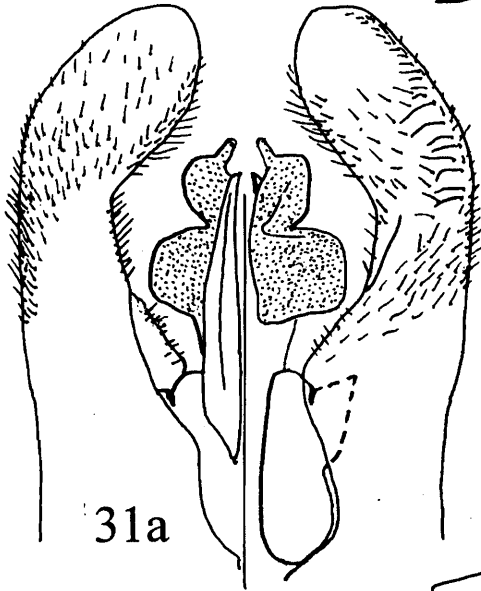




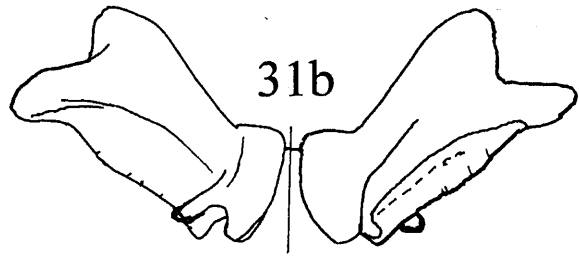
30a



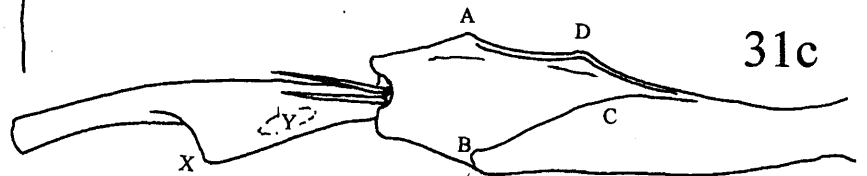
30b



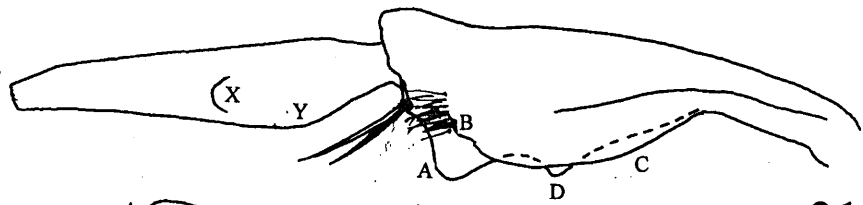
31a



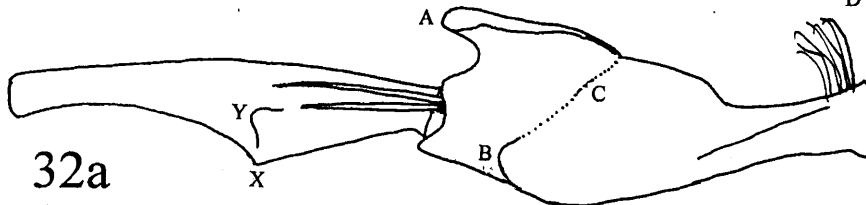
31b



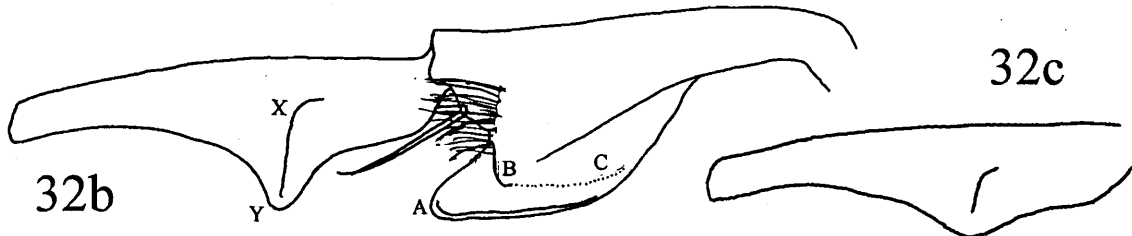
31c



31d



32a



32b



32c

S2 with subapical lateral bosses (as found in *C. espeleticola*) high, hairy, brown, and elongate longitudinally; S4 with pair of large preapical tapering tubercles (Fig. 21f), area between them bare, lineolate, area lateral to them with long, sparse hairs; posterior margin of S4 with apical fringe of long hairs; S5 with apical fringe of well spaced long hairs, much shorter medially, long lateral hairs of S5 sparse; S6 nearly flat, dull with microsculpturing, except for lateral elevation bearing dense tuft of yellowish hairs, apical margin with dense fringe of short, robust hairs that do not reach apex of narrow transparent lamella. Genitalia and hidden sterna similar to those of *C. simplex* but note more truncate margin of midlateral part of ventral apicolateral lobe of S7 (Fig. 27c), longer hairs and deeper emargination of S8 (Fig. 27b) and different distribution of ventral hairs on gonoforceps (Fig. 27a).

Female: Forewing length 4.7 to 5.0 mm. Agrees with description of male (as modified from that of *Chilicola espeleticola*) except for usual sexual features and the following: Face about 1.28 times as long as broad, without yellow. Malar area slightly longer than broad, lower ocular tangent above middle of clypeus. First flagellar segment about 1.5 times as long as broad. Punctuation of thorax as described for male of *C. espeleticola*. Legs without yellow. Hairs of thorax worn but apparently similar to those of male. Punctuation of metasomal terga as described for male of *C. espeleticola*.

Holotype male: PERU: [Junín]: Acolla (near Jauja), 3460 m, 24 Feb. 1955 (F. Blancas, Lawrence). One male paratype, same data as holotype but 26 Feb. 1955 (F. Blancas, Lima). Five female paratypes, same data but May 1953 (three specimens), Apr. 1950, and Apr. 1952 (all F. Blancas, Lima). Two female paratypes: same data but April 1950 (Lawrence). The label on the holotype is handwritten; the labels on the paratypes are machine printed, and each of the specimens in Lawrence has an additional label, "Coleção Campos Seabra." Nonetheless the locality, elevation, and collector are the same as those of the holotype. These specimens must have gone by exchange or purchase to the Seabra collection in Rio de Janeiro, thence to the University of Kansas.

Additional material: One female, without associated males, is from PERU: [Junín]: Huancayo, 3217 m, 26 Mar. 1962 (R. Garcia, Lima). Four other females without associated males may belong to this species although they are smaller (length 5.5 mm). The one from Peru has the malar space slightly broader than long, those from Bolivia have this space about as long as broad. Probably, when males are known, these specimens will be recognized as one or two new species. The data are as follows: PERU: [Huanuco]: one female, 10 mi (16 km) southwest of Las Palmas, 1000 m, 26 Sept. 1954 (E. S. Ross, E. I. Schlinger, San Francisco). BOLIVIA: La Paz: two females, Coroico to Chulomani, 7 Mar. 1968 (Garcia and Porter, Los Angeles); one female, Sorata, 2700 m, 7 Apr. 1982 (M. Cooper, Lyme Regis). These are the only Bolivian records for the subgenus *Oroediscelis*.

Etymology: From *gibbosa*, Latin, protuberant, plus *bi-*, two, with reference to the two projections on the hind basitarsus of the male.

Chilicola (Oroediscelis) maculipes new species (Figures 21g, 30)

The two large lobes on the lower margin of the hind basitarsus of the male are not as large as in *Chilicola bigibbosa* and the basal lobe is much broader than the distal one, unlike *C. bigibbosa*. Nonetheless *C. maculipes* and *bigibbosa* are close relatives as indicated by the long malar space and the yellow on the inner hind tibial crest. This species agrees with the description of *C. espeleticola* except as described below (see also subgeneric description).

Male: Length 6 to 7 mm (estimated from specimens with apices of metasomas removed); forewing length 4.7 mm. Face about 1.16 times longer than broad. Clypeus with transverse apical yellow band (in addition to yellow on paraocular area); malar area as long as wide. Flagellar segments 9 and 10 about as long as broad, 11 distinctly longer. Thoracic punctuation and hairs about as described for *Chilicola bigibbosa* (hairs of paratype worn and matted). Dorsal surface of propodeum as long as scutellum. Wing venation as in *C. bigibbosa*. Hind tibia (Fig. 30a, b) about three times as long as broad, preapical brush absent, outer crest of under surface scarcely recognizable, inner crest strong, apical part folded toward outer side as in *C. bigibbosa*, ending in narrowly rounded tooth, this crest and tooth, and in paratype base of area between crests, yellow; hind basitarsus with two lobes on lower margin (Fig. 30b), smaller one in middle of basitarsus, basal one broadly convex and bare (with short hairs in *C. bigibbosa*), in ventral view basal half (actually more) of basitarsus thickened on outer side, distal half slender, much as in *C. bigibbosa*, outer side of lobes with large yellow area (Fig. 30a). Metasoma with punctuation and microsculpture much as in *C. espeleticola* but somewhat more shining; S2 with subapical lateral elevations rounded in lateral view and higher than

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Figs. 30–32. 30: *Chilicola (Oroediscelis) maculipes*, male. a, b, Posterior tibia and basitarsus in ventral and outer views. The genitalic and sternal structures are similar to those of *C. simplex* and *C. bigibbosa*. 31: *C. (O.) styliiventris*, male. a, Genitalia; b, S7; c, d, Posterior tibia and basitarsus, ventral and outer views. S8 is similar to that of *C. brooksi*. 32: *C. (O.) gibbosa*, male. a, b, Posterior tibia and basitarsus, ventral and outer views, specimen from Baños, Ecuador. c, Outer view of hind basitarsus of specimen from Rionegro, Colombia. The genitalia and sternal structures are similar to those of *C. simplex*. For further explanation, see account of the subgenus.

processes of S4, these projections on S2 longitudinally elongate and connected by strong, bare, transverse ridge; S3 with lateral bosses distinct; S4 with pair of preapical tubercles (Fig. 21g) not reaching posterior margin of sternum, area between tubercles bare; S4 and S5 with apical fringes, interrupted medially, of well spaced long hairs and without patches of long hairs laterally; S6 nearly flat with lateral tuft of yellowish dusky hairs, few short hairs apically not attaining apex of transparent rounded lamella. Genitalia and hidden sterna similar to those of *C. simplex*.

Holotype male, PERU: [Apurimac]: Curahuasi, 10 Feb. 1978 (P. M. Marsh, *Lawrence*). One male paratype, Cuzco: Limatambo, 21 Feb. 1978 (P. M. Marsh, *Washington*).

Etymology: *macula*, Latin, spot, plus *pes*, Latin, leg or foot, with references to the yellow areas on the hind tibiae and basitarsi. Such areas on the hind basitarsi are not found in any other species of the subgenus.

Chilicola (Oroediscelis) styliiventr (Friese)
(Figures 21h, 31)

Oediscelis styliiventr Friese, 1908:340, 424 or in reprint, 9, 93.
Chilicola styliiventr: Cockerell, 1926:218.

The male of this species is easily distinguished from all others by the long processes of S4 with slightly enlarged bilobed apices that reach the apex of the metasoma when the latter is retracted. Females are not reliably distinguished from those of *Chilicola transversaria*, *gibbosa*, and *brzoskai*, but have slightly longer malar areas and longer antennae with the middle flagellar segments about as long as wide. The dorsum of the thorax is more coarsely punctate in *brzoskai*. All of these characters seem to be variable and assignment of females not accompanied by males to species is dubious. *C. styliiventr* differs from the description of *C. espeleticola* as follows:

Male: Length 5.5 to 6.5 mm; forewing length 4.2 to 4.7 mm. Face about 1.09 times longer than broad. Clypeus with transverse yellow mark near lower margin, sometimes reduced to small yellow spot; lower paracocular area beside clypeus with yellow mark. Head less dull than in *Chilicola espeleticola* but sculpturing as described for that species. Malar space about half as long as broad; lower ocular tangent at lower third of clypeus. First flagellar segment about two-thirds as long as second, the latter nearly twice as long as broad; distal flagellar segments all distinctly longer than broad. Thorax with punctures mostly separated by less than a puncture width. Longest hairs of scutum about two-thirds as long as scape, those of scutellum as long as scape, those of sides of thorax and lower genal areas longer than scape. (Hairs evidently easily worn off, since some specimens lack all long hairs.) Distal stigmal perpendicular entering base of second submarginal cell. Hind tibia nearly three times as long as greatest width at preapical brush;

inner crest with elevation beyond middle of tibia (Fig. 31d) and apical acute or rounded tooth, separated by broad concavity; hind basitarsus little longer than next three tarsal segments together, basal half thickened on outer surface, forming in ventral view a right angular tooth at midlength of basitarsus (Fig. 31c), outer surface not concave. Metasoma shining, apical terga and basal parts of first three terga lineolate, punctures strong, mostly separated by about a puncture width, posterior margins of terga smooth, covered by weak pale hair fasciae at extreme sides. S2 with posterior half bare medially, moderately long hairs basally and laterally; S4 with projections long, apices expanded and briefly bilobed in lateral view (Fig. 21h), emargination between them deeper than wide, area between them with a few moderately long hairs, sparse very long hairs lateral to projections; S5 with apical fringe absent, very long hairs on lateral part of S5; S6 with lateral depressions less deep than in *C. espeleticola*. Genitalia and hidden sterna as in *C. brooksi* but ventral lateroapical lobes of S7 differently shaped (Fig. 31b), membranous posteriorly in both species; S8 with apical hairs commonly longer than in *C. brooksi*; apical membranous appendages of penis valves shorter than in *C. brooksi* (Fig. 31a).

Female: Agrees with description of male except for usual sexual features, and the following: Length 5 mm; forewing length 4.2 to 4.7 mm. Face about 1.17 times longer than broad. First flagellar segment about 1.5 times as long as broad. Longest hairs of scutum about half as long as scape, those of scutellum, sides of thorax, and lower genal area two-thirds or three-fourths as long as scape (all available females badly worn and these statements about hair lengths are not reliable). Metasomal terga lineolate, punctures finer than in male, mostly separated by more than puncture width; posterior marginal zones less strongly lineolate, covered by fasciae of white hairs at sides.

Lectotype female here designated: PERU, 1900, with orange label "Typus" and Friese's identification label dated 1907 (*New York*). Friese (1908) described this species in a paper on Argentine bees, and gave only the following locality information: "2 males and 2 females, von Peru durch Rolle erhalten"; this corresponds with the specimen designated as lectotype in New York. Material in Berlin consists of a female and a male, each with a handwritten label, Arequipa, Peru, and the notation XI (probably November). The label of the Berlin male also is marked "2500" (probably meters altitude). Each specimen also bears Friese's identification label, that for the female and a Washington male printed 1909, that for the Berlin male, 1907. The female has an orange "Typus" label; the Berlin male, a printed label "Coll. Friese," and the Washington male, a red label "cotype no. 13206 USNM." A search in June 1999, kindly made by Michael S. Engel, did not reveal additional material in Berlin. As the species was described in 1908,

the specimens with 1909 identification labels are probably not part of the type series, in spite of orange and red labels. Moreover, Friese presumably would have given the locality, Arequipa, if these specimens had been before him when he described the species. Because specific characters of females are almost lacking, it would have been desirable that the lectotype be a male, but unfortunately the female from New York labelled only "Peru, 1900" is the only specimen that appears to be part of the type series.

Additional material: PERU: [*Arequipa*]: one male, Arequipa, 2500 m, November (*Berlin*); five females, same locality, 2300 m, 2 July 1979 (C. Porter, A. Cerbone, *Lawrence*); two females, same locality, 23 Sept. 1963 (M. Alvarenga, *Lawrence*); one male, same locality, 2300 m, 28 Feb. 1984 (M. Cooper, *Lyme Regis*); five males, one female, same locality, Apr. 1922 (E. Escomel, *San Francisco and Logan*). [*Ayacucho*]: two males, Puquio (Cap. Lucanas), 3400 m, Apr. 1950 (F. Blancas, *Lima and Lawrence*). *Ancash*: one male, no exact locality, 5 Jan. 1969 (H. Picho, *La Molina*). *Cuzco*: Pisac, one male, 3 Feb. 1986 (A. Garcia, C. Porter, *Los Angeles*); six males, two females, Písaq (=Pisac), 3042 m, 1 May 1977 (R. Garcia, *Lima*); one male, Machu Picchu, 1900 m, 4-19 Sept. 1964 (C. C. Porter, *Los Angeles*); two males, Cuzco, 3800 m, 20 Sept. - 2 Oct. 1964 (C. C. Porter, *Los Angeles*). *Junín*: three males, one female, Tarma, 3000 m, 1 Dec. 1942 (*Lawrence*); thirteen males, four females, Tarma, 3500 m, 11° 25' 30" S, 75° 45' 24" W, 22 Oct. 1998 (R.W. Brooks, *Lawrence*); five females, La Victoria, Mantaro, 3252 m, 16 June 2000 (C. Rasmussen, *Aarhus*); one female, Huancayo, La Victoria, 10 Nov. 2000 (C. Rasmussen, *Aarhus*). Unidentified locality: one male, Yura, Peru (*New York*). ECUADOR: [*Tungurahua*]: one male, one female, Oriente to Ambato, 2600 m, Oct. 1956 (*Lawrence*).

An unassociated female from "Tingo," Peru (*Washington*), was recorded as *Chilicola styliiventrís* by Cockerell (1926); without associated males its identification is in doubt. Other females, probably of *C. styliiventrís* but without associated males, are those from La Victoria (two localities), cited above.

NESTS OF *CHILICOLA STYLIIVENTRIS*

The specimens from Tarma collected by R. W. Brooks were found in nests in dead stems of *Achyrocline alata* (Kunth) DC [Asteraceae]. The stems were more or less erect, the tops broken off, allowing access to the pith in which the bees had burrowed.

Stem diameters were 5 to 6 mm; the burrows were 2.5 to 3.0 mm in diameter. Nest No. 1, 10 cm deep, contained 9 male bees and three closed cells that produced males; thus the total progeny was 12 males. Nest No. 2, 11 cm deep, contained three (unworn) females and one male bee. Most of the cells were in bad condition from the emergence of the bees and perhaps from opening of the nest and the

number of cells was not clear, but two closed cells each contained a large dead larva (possibly living when collected) with feces, and one contained a dead adult female with wings not expanded. The broken cells included one nearly filled with larval feces, probably crowded into it by emerging adults, and two with old, uneaten provisions. The probable number of cells was nine; one produced a male, and four females. Obviously the bees that made and provisioned Nests 1 and 2 had disappeared, and the progeny had mostly matured but had not left the natal nests.

Nest No. 3 (depth unknown but seemingly less than Nos. 1 and 2) contained a single female and no cells. Presumably it was a young bee that had left its natal nest and was preparing a new nest.

Cells were 7.5 to 8 mm long, 2.5 mm in diameter, cylindrical with transverse ends, and made of very thin, delicate, transparent, cellophane-like membrane, in which some slender, unbranched fibers can be detected. When the membrane is torn, these fibers sometimes project free from the matrix of the membrane.

The membrane between cells is at least sometimes double, consisting of the closure of one cell and the base of the next, applied directly on the former. Thus both are transverse, hard to separate. The membrane of the base of a cell is not cup-shaped as in *Chilicola ashmeadi* (Crawford) (Eickwort, 1967), except that the lowermost cell, based on the concave surface of pith at the bottom of the burrow, has a cup-shaped base. The lateral walls of a cell are in contact with the pith walls of the burrow, but do not adhere firmly.

The feces of the larvae are short cylindrical, about 0.50 mm long and 0.22 mm in thickness, with rounded ends, and are packed into the base of the cell forming a yellow to dark brown, somewhat irregular plug about 1 mm thick, concave on its upper surface. The feces must be rather soft when fresh for while recognizable in the plug, they were obviously to some degree shaped by being pressed together. Occasionally two or three separate pellets were found at the upper end of a cell.

Chilicola (Oroediscelis) transversaria new species (Figure 21-i)

Males of this species and *Chilicola gibbosa* differ from all other *Oroediscelis* in the single, large, median projection from the lower margin of the hind basitarsus. *C. transversaria* differs from *C. gibbosa* in the pair of tubercles of S2 of the male which are flattened to form short transverse (actually somewhat oblique) ridges, appearing as sharp tubercles in profile. The sternal surface between and near these tubercles is hairy; it is bare in *C. gibbosa*.

Male: Agrees with description of *Chilicola espeleticola* except as follows: Length 6.0 to 6.5 mm; forewing length 4.8 mm. Face about 1.05 times longer than broad, all black

except one paratype (collected by G. E. Bohart) with yellow mark on lower paraocular area between lower end of eye and clypeus. Head sculpturing and structure as described for *C. brzoskai* but first flagellar segment about two-thirds as long as second on lower surface. Scutum and scutellum with punctures mostly separated by less than puncture width or much less laterally on scutum, ground dull with microsculpturing to rather smooth in holotype. Hair lengths of thorax as described for *C. brzoskai*; lower genal area with longest hairs only two-thirds as long as scape (shortest of any *Oroediscelis*). Stigma slightly less than two-thirds as long as marginal cell on wing margin, distal stigmal perpendicular entering base of second submarginal cell. Middle femur with well defined ventral concavity occupying basal third. Hind tibia about three times as long as greatest width at preapical brush, inner crest ending in broad, flattened, rounded projection whose plane is parallel to imaginary plane through bases of tibial spurs (at right angles to plane of equivalent flattened apical tooth of *C. brzoskai*); hind basitarsus with strong rounded projection slightly basal to middle of lower margin, projection of outer surface absent. Metasomal terga as described for *C. brzoskai*. S2 with bosses elevated to form short, obliquely transverse, shining ridges converging anteriorly, appearing as acute or right angular tubercles in lateral view; surface between and behind these ridges with some small punctures and short hairs. Projections of S4 small, apices blunt (Fig. 21i); otherwise S4, S5, S6 as in *C. brzoskai*, fringes of well spaced hairs on S4 and S5 conspicuous. Hidden sterna and genitalia similar to those of *C. simplex*, S8 with apical hairs longer and more numerous, about 14 on each side; ventral mesal lobe of gonoforceps with hairs longer and denser.

Female: Agrees with description of male as modified from that of *Chilicola espeleticola* except for usual sexual features and the following: Length 5.5 to 6.0 mm; forewing length 4.4 to 4.8 mm. Face about 1.17 times longer than broad. First flagellar segment slightly longer than broad. Mesepisternal punctures weak, not larger than those of scutum, surface dull. Longest hairs of scutum about half as long as scape (largely worn off of some specimens); hairs of lower genal area shorter than scape, sparse. Metasoma with punctures smaller than in male and widely spaced, broad impunctate areas especially on T1; posterior marginal areas of terga lineolate but shining, with very weak fasciae of pale hairs at extreme sides.

Holotype male: VENEZUELA: *Mérida*: 42.4 km northwest of *Mérida*, near La Carbonera, 8° 37' 38" N, 74° 21' 10" W, 2360 m, 25 May 1998, on flowers of *Rubus* (J. Ashe, R. Brooks, R. Hanley, *Lawrence*). Four male and three female paratypes: *Mérida*, 13 Sept. 1978 (B. Villegas, R. M. Bohart, *Logan* except one male, *Lawrence*); two male paratypes,

same locality, 17 Nov. 1972 (G. E. Bohart, *Logan*)

Additional material: VENEZUELA: *Mérida*: one female, Libertador, 3 July 1979 (R. W. Brooks, A. A. Grigarick, J. McLaughlin, R. O. Schuster, *Davis*); the locality supports the tentative identification of this specimen, which could also be *C. gibbosa* so far as size and morphology are concerned. The short first flagellar segment suggests that the following specimen may also be *C. transversaria*: COLOMBIA: *Norte de Santander*: one female, Oroque, 10 June 1965 (J. and B. Bechyne, *Maracay*).

Etymology: *transversaria*, Latin, transverse, with reference to the tubercles of S2 of the male.

Chilicola (Oroediscelis) gibbosa new species (Figures 21j, 32)

This species is very much like *Chilicola transversaria*; the characters of S2 of the male are the only ones that clearly separate this species from *C. transversaria*. It agrees with the description of that species except as follows:

Male: Length 6.5 mm; forewing length 4.6 mm. Ground between punctures on scutum shiny but minutely lineolate, on scutellum smooth. Hair of lower genal area longer than scape. Hind basitarsus with projection on outer side (X of Fig. 32a) only slightly developed in holotype but in specimens listed below from Ecuador it is distinct as in Figure 32a. S2 with bosses modified to form short, sharp, longitudinal, parallel ridges, appearing as gently rounded projections in lateral view; surface between and behind these ridges smooth, without punctures or hairs. Hidden sterna and genitalia as in *C. simplex*, apical hairs of S8 sometimes more numerous and longer, as in *C. brzoskai*.

Female: Forewing length 4.8 mm. Face about 1.13 times longer than broad. First flagellar segment about 1.5 times as long as broad. Lower genal hairs as long as scape.

Holotype male and one female paratype: COLOMBIA: *Caldas*: Pensilvania, 8000 feet (2427 m), 26 June 1978 (J. H. Cane, *Lawrence*). One female from the type locality, 24 June 1978 (J. H. Cane, *Lawrence*) is larger than the female paratype but probably the same species.

Additional material: COLOMBIA: *Antioquia*: two males and two females, La Selva, Rionegro, June, July, and Sept. 1975, females on *Bidens pilosa* and unidentified Asteraceae, males in dead stems (R. Añez, *Medellín*). One of the two males has the hind basitarsal ventral projection reduced as in Figure 32c (compare with Fig. 32b); other characters are the same. ECUADOR: *Tungurahua*: one male, Baños, 1820 m, 11 Nov. 1955 (E. I. Schlinger, E. S. Ross, *San Francisco*); one male, Baños, 2300 m, 4 Feb. 1984 (M. Cooper, *Lyme Regis*). *Manabí*: one male, Cojimies, 11 May 1949 (W. Clarke-Macintyre, *Washington*). *Manabí* province is on the coast, and this last specimen is doubtfully Andean. It is larger than the holotype, like the large female from the type locality, and the hind basitarsal projection as well as

the projections on S2 are stronger than those of the holotype. *Loja*: Loja, La Argelia, 4° 2.023' S, 79° 11.765' W, 20 Feb. 2001 (C. Rasmussen, *Aarhus*) likewise has the basitarsal and S2 projections stronger than in the holotype.

The following females from different areas are likely to be this species; the first flagellar segment seems slightly longer than in *Chilicola transversaria*. COLOMBIA: *Santander*: one female, Gámbita La Palma El Calvario, Alto de la Vieja; 2200 m, 1 Apr. 1994 (E. E. Pelacio, *Bogotá Humboldt*). *Risaralda*: one female, Pereira, Parque Regional Natural Ucumarí, 1800-2000 m, Mar. 1991 (L. Schneider, *Bogotá Humboldt*); one female, Estacion La Suiza, Municipio La Florida, Parque Regional Natural Ucumari, 2000 m, Dec. 1991 (L. Schneider, *Bogotá Univ.*). PERU: *Cuzco*: one female, Cuzco, 20 Dec. 1967 (G. E. Bohart, *Logan*); in absence of associated males, this could well be another species. VENEZUELA: *Apurei*: one male, 6 km west of Mantecal, 17 Mar. 1982 (G. F. and J. F. Hevel, *Washington*); this male differs from others in the strong transverse ridge between the projections of S2, as in *C. maculipes*. Possibly it represents another species.

Etymology: *gibbosa*, Latin, protuberant, with reference to the strong protuberance on the lower margin of the hind basitarsus of the male.

Chilicola (Oroediscelis) brzoskai new species

(Figures 21k, 33)

This is one of the smallest species of the subgenus. The projections on S4 of the male are tapering tubercles, no more prominent than the longitudinal, keel-like projections on S2. *Chilicola gibbosa* and *C. simplex* are the only other species with these characters of S2; *C. gibbosa* differs from *C. brzoskai* in the large median projection on the hind basitarsus of the male, whereas *C. simplex* differs from *C. brzoskai* in the almost simple hind basitarsus. *C. brzoskai* differs from *C. espeleticola* as follows:

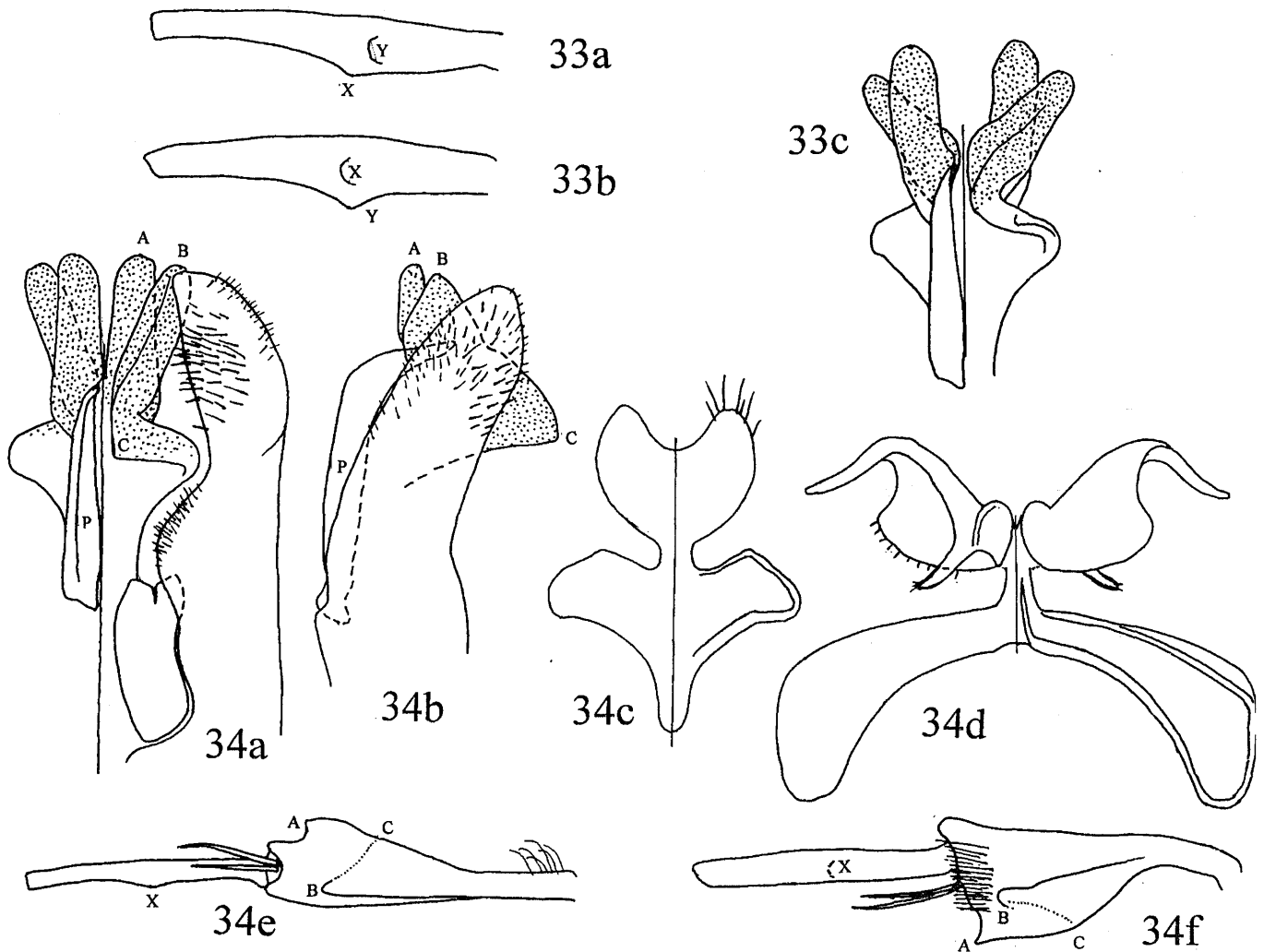
Male: Length 5.0 to 5.5 mm; forewing length 3.6 to 4.0 mm. Face about 1.08 times longer than broad, entirely black. Head surface below antennae with well separated strong punctures, largest, closest, and interspaces shining and smooth on lower two-fifths of clypeus; clypeus with longitudinal median depressed line; malar space half as long as broad; lower ocular tangent at lower quarter of clypeus. First flagellar segment about three-fourths as long as second on lower surface, about as long as second on upper surface, second segment little over 1.5 times as long as broad; last three segments each somewhat longer than broad. Scutum and scutellum with strong punctures mostly separated by half a puncture width of shining although minutely sculptured ground; mesepisternum similar but lower part with punctures larger and more widely separated; side of propodeum, in contrast, dull and minutely, densely strigose. Dorsal surface of propodeum almost as

long as scutellum. Longest hairs of scutum about two-thirds as long as scape, those of scutellum and sides of thorax about as long as scape, those of lower genal area longer than scape but not especially dense. Stigma about two-thirds as long as marginal cell on wing margin, distal stigmal perpendicular entering base of second submarginal cell. Middle femur with ventral concavity occupying basal two-fifths of femur. Hind tibia about three times longer than broad, inner crest ending in broad, flat, rounded apical tooth as in *Chilicola gibbosa*; hind basitarsus with convexity on lower margin near middle (Fig. 33b), convexity on outer surface weak. Metasoma shining, punctures strong, separated by two or more puncture widths of smooth or feebly lineolate ground dorsally, laterally surface dulled by lineolation; posterior marginal zones of terga smooth, lateral hair fasciae absent; S2 without bare median area and long lateral hairs, boss elevated to form strong longitudinal ridge, rounded in lateral view; projections of S4 strongly tapering but rounded tubercles (Fig. 21k), emargination between them about four times as wide as deep, area between them bare; S4 and S5 without abundant long lateral hairs, each with apical fringe of long, well spaced, suberect hairs, that of S4 less conspicuous and reduced medially; S6 with most of surface nearly flat, shining, minutely lineolate, but laterally with elevation bearing tuft of dense, slightly coppery hair. Genitalia and hidden sterna as in *C. simplex*; penis valves (Fig. 33c) differ from those shown for *C. simplex* primarily or entirely because they are undamaged.

Female: Agrees with description of male except for usual sexual features and the following: Length 5 mm; forewing length 4.0 mm. Face about 1.2 times longer than broad. First flagellar segment about 1.5 times as long as broad. Punctures of scutellum and median area of scutum separated by one or two puncture widths. Longest hairs of scutum half as long as scape, those of lower genal area about as long as scape. Posterior marginal zones of terga minutely lineolate but shining, laterally covered by weak fasciae of pale hairs.

Holotype male, one male and one female paratype: COLOMBIA: *Valle*: 10 km west of Cali, 1400 m, 19 Sept. 1976 (Bell, Breed and Michener, *Lawrence*). Two male paratypes: Summit west of Cali, 2000 m, 17 Sept. 1976 (Bell, Breed and Michener, *Lawrence*); one male paratype (headless), same locality, 20 Oct. 1976 (M. Breed, *Lawrence*). Three male paratypes: Pichinde, 1700 m, 28 Aug. 1967 (P. & B. Wygodzinsky, *New York*).

Additional material: One female perhaps of this species is from ECUADOR: [*Chimborazo*]: Moya, east of Alausi, 2500 m, Nov. 1970 (L. E. Peña, *São Paulo*). The locality suggests that this might be *Chilicola simplex* but the clypeus is not as shiny as in the specimens of that species. One male, lacking the metasoma, may represent a new related spe-



Figs. 33–34. 33: *Chilicola (Oreodiscelis) brzoskai*, male. a, b, Posterior basitarsus in ventral and outer views. The hind tibia is similar to that of *C. gibbosa*. c, Dorsal and ventral views of penis valves; genitalia and hidden sterna as in *C. simplex*. 34: *C. (O.) simplex*, male. a, b, Dorsoventral and lateral views of genitalia; c, S8; d, S7; e, f, Posterior tibia and basitarsus, ventral and outer views. For further explanation, see account of the subgenus.

cies; it is a little large for *C. brzoskai* and the apex of the inner crest of the hind tibia is pointed rather than rounded. It is from PERU: [Huanuco]: east side of Carpish Mountains, 74 km southwest of Tingo Maria, 2800 m, 17 Oct. 1954 (E. I. Schlinger, E. S. Ross, *San Francisco*).

Three other males from Peru (one without the metasoma) differ from the above description in the following particulars: Thorax less shining, scutum and scutellum with slightly smaller punctures, mostly separated by less than a puncture width of ground distinctly dulled by microsculpturing. Inner crest of hind tibia ending in flat, rounded projection that is narrower than that of Colombian *Chilicola brzoskai*. Bosses or protuberances of S2 bluntly right angular in lateral view, height over half of basal width

(in Colombian specimens, they are rounded, height less than half of basal width). Ventral apicolateral lobe of S7 with basal piece slightly broader than in Colombian *C. brzoskai*. Both the punctuation and the inner hind tibial crest vary among Colombian specimens, although not reaching the states described above. I tentatively consider these specimens to be variants of *C. brzoskai*. The locality data are as follows: PERU: [Junín]: two males, Huacapistana, Rio Tarma, 1-2 June 1920 (Cornell Univ. Exped., *Ithaca*). Pasco: one male, six females, Yanachaga-Chemillen National Park, 1550 m, 10° 16' 24" S, 75° 36' 48" W, 20 Oct. 1999. attracted to wet sand (R. Brooks, *Lawrence*, specimen numbers (male) 145611, (females) 146603, 145683, 145727, 145751, 145835, and 145829.

Etymology: This species is named for Dr. David W. Brzoska, enthusiastic bee collector and tiger beetle specialist who accompanied R. W. Brooks on the field trip on which the series from Pasco was collected.

Chilicola (Oroediscelis) simplex new species
(Figures 21-1, 34)

This species resembles *Chilicola brzoskai* in the small, tuberculate (tapering to rounded apices) projections of S4 of the male, but differs from that species as well as from other species of *Oroediscelis* in the almost unmodified hind basitarsi. The shiny clypeus of the two known specimens (both sexes) also distinguishes this species from its close relatives. *C. simplex* differs from *C. espeleticola* as follows:

Male: Length 5 mm (estimated from badly broken specimen); forewing length 3.5 mm. Face about 1.12 times longer than broad, entirely black. Head surface below antennae, especially clypeus, shining although upper half of clypeus faintly lineolate; head otherwise as described for *Chilicola brzoskai* except first flagellar segment perhaps shorter, about two-thirds as long as second on lower surface. Scutum with punctures mostly closer, separated by less than a puncture width; lower mesepisternum shining with smooth interspaces. Dorsal surface of propodeum as long as scutellum, shining. Longest hairs of scutum about half as long as scape, those of scutellum two-thirds as long as scape, those of lower side of thorax as long as scape, and those of lower genal area longer than scape but sparse. Wing as described for *C. brzoskai*. Hind tibia about three times longer than broad, distal end of inner crest right angular with slight acute tip; hind basitarsus slightly longer than remaining tarsal segments together, almost simple but basal half slightly thickened near middle of outer side (Fig. 34e). Metasomal terga as described for *C. brzoskai*; S2 with two preapical tubercles ("bosses") slightly longitudinally elongate, so reduced as to be invisible in lateral view, median area of sternum bare; subsequent sterna as in *C. brzoskai* except projections of S4 even more reduced, emargination between them five or six times as wide as deep, a few hairs on space between them, and fringes of both S4 and S5 reduced medially. Hidden sterna and genitalia as illustrated in Figure 34a-d.

Female: Agrees with description of male as modified from that of *Chilicola espeleticola* except for usual sexual features and the following: Forewing length 3.9 mm. Face about 1.2 times longer than broad. First flagellar segment 1.5 times longer than broad. Lower mesepisternal area dull, punctures weak and widely separated. Posterior marginal zones of terga minutely lineolate but shining, laterally covered by weak fasciae of pale hairs.

Holotype male: ECUADOR: [Chimborazo]: Alausi, 9450 feet [2907 m], 18 June 1914 (H. S. Parish, Lawrence). **Paratype female,** same data (*Ithaca*).

Etymology: *simplex*, Latin, simple, with reference to the almost unmodified hind basitarsi of the male.

PHYLOGENY OF THE SPECIES OF THE SUBGENUS *OROEDISCELIS*

The Andes are inhabited by only some of the species of *Anoediscelis* and *Hylaeosoma*; phylogenetic analysis of Andean members of these subgenera therefore seems inappropriate at this time. All species of *Oroediscelis*, however, are Andean and an analysis seems worth while. The characters selected and their states are listed in Table 4. The methods were the same as indicated for the phylogenetic analysis of subgenera. Outgroups were *Chilicola (Anoediscelis) inermis* (Friese) and *C. (Prosopoides) prosopoides* (Friese). The matrix of character states is shown in Table 5. Asterisks indicate variation among individuals of a species. Multiple state characters were treated as nonadditive. Analysis resulted in one tree (Fig. 35) with a length of 42, consistency index of 69, and retention index of 76.

The groupings seem reasonable. I am doubtful that the *Chilicola maculipes-bigibbosa* group deserves such an isolated position as is indicated by the few characters used in the analysis. A problem is finding additional characters with discrete states.

Table 4. Characters and character states for analysis of the males of the species of *Oroediscelis*.

1. Clypeus with yellow area (0); without yellow (1).
2. Paraocular areas with yellow (0); without yellow (1).
3. Anterior tibia with anterior surface yellow (0); without yellow (1).
4. Inner crest of hind tibia with yellow (0); without yellow (1).
5. First flagellar segment shorter than second, at least on anterior surface (0); as long as second (1).
6. Hind basitarsus with one lateral and one ventral gibbosity, almost simple in *C. simplex* (0); with one lateral and two ventral gibbositities (1); simple (2).
7. Brush of hind tibia well developed (0); almost absent (1).
8. Outer crest on under side of hind tibia weak or absent distally, concavity of tibia short and little developed (0); outer crest well developed and concavity well developed (1); crest absent (2).
9. Inner crest on under side of hind tibia regularly reduced toward base of tibia (0); inner crest elevated near middle of tibia or in *C. simplex*, scarcely recognizable (1); inner crest absent (2).
10. Distal angle of inner crest on under side of hind tibia obtuse, little developed (0); angle projecting, about right angular (1); angle projecting acute (2); angle developed as broad mesal flap (3); strongly projecting but rounded (4); angle absent (5).
11. Hairs of apical fringe of S6 not attaining apex of translucent apical lamella of S6 (0); exceeding apex (1).
12. Processes of S4 long, emargination between them deeper than wide (0); processes of S4 short, emargination between them wider than deep (1); processes absent (2).
13. Malar space about half as long as broad, or in *C. cuzcoensis*, two-thirds as long as broad (0); malar space nearly as long as broad (1); malar space linear, i.e. absent (2).

Table 4. Continued.

14. Penis valves each with two, subapical membranous appendages (0); penis valves without or with only one such appendage (1).	16. S7 with broad basal part of ventral laterobasal lobe: relatively flat (0); part seemingly curled (1); part projecting as a broad, more or less erect lobe (2); part rather short and simple, hairy (3); part seemingly absent (4).
15. S7 with apex of ventral laterodistal lobe a slender process (0); lobe broad, partly membranous (1); lobe a hairy process (2).	

Table 5. Character states used in the analysis of species of the subgenus *Oroediscelis*.

Taxon	Character															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<i>C. brzoskai</i>	1	1	?	1	0	0	0	0	1	4	0	1	0	0	0	0
<i>C. maculipes</i>	0	0	0	0	0	1	1	0	1	3	0	1	1	0	0	0
<i>C. bigibbosa</i>	0	0	0	0	1	1	1	0	1	3	0	1	1	0	0	0
<i>C. simplex</i>	1	1	1	1	0	0	0	0	1	2	0	1	0	0	0	0
<i>C. cuzcoensis</i>	0	0	1	1	1	0	0	1	0	2	0	0	0	0	1	2
<i>C. quitensis</i>	1	?	1	1	1	0	0	1	1	2	0	0	0	1	1	1
<i>C. espeleticola</i>	1	0	1	1	1	0	0	1	1	3	0	1	1	0	1	2
<i>C. benoistiana</i>	1	0	1	1	0	0	0	1	1	1	1	0	0	1	1	1
<i>C. brooksi</i>	1	0	1	1	0	0	0	1	0	2	1	0	0	1	1	1
<i>C. styliventris</i>	0	0	1	1	0	0	0	1	1	0	0	0	0	1	1	1
<i>C. gibbosa</i>	1	1	1	1	0	0	0	1	1	4	0	1	0	0	0	0
<i>C. transversaria</i>	1	?	1	1	0	0	0	1	1	4	0	1	0	0	0	0
<i>C. prosopoides</i>	0	1	1	1	1	2	1	2	2	5	1	2	1	1	2	3
<i>C. inermis</i>	0	0	0	1	0	2	1	2	2	5	1	2	2	0	2	4

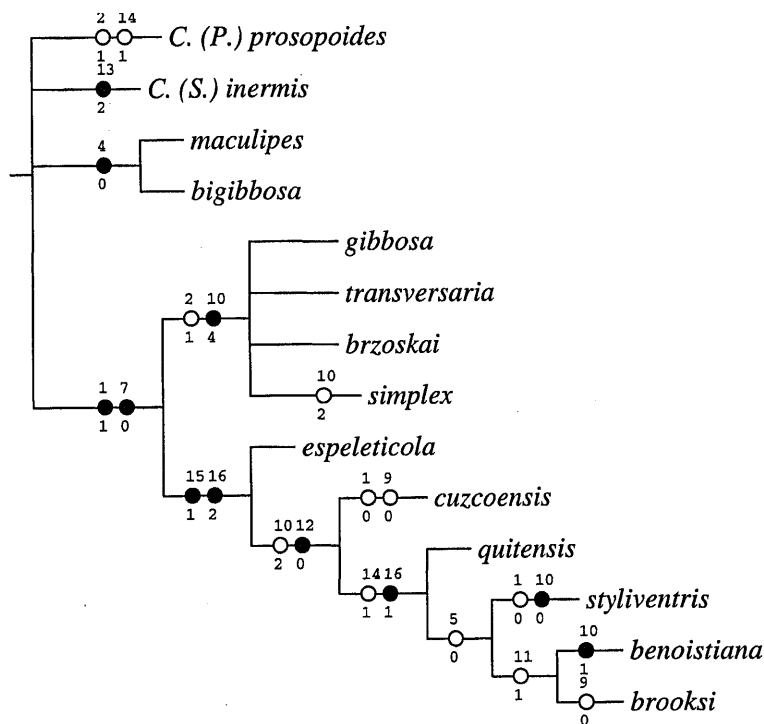


Fig. 35. Phylogenetic study of the species of the subgenus *Oroediscelis*. *Chilicola inermis* (Fries) of the subgenus *Anoediscelis* or *Stenoediscelis* and *C. prosopoides* (Ducke) of the subgenus *Prosopoides* are outgroups. All the other species belong to the subgenus *Oroediscelis*. The single resultant tree had a length of 42, CI 69, RI 76. Explanation as for Figure 2.

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