

A New *Chilicola* Spinola from Colombian Páramo (Hymenoptera: Colletidae: Xeromelissinae)

VICTOR H. GONZALEZ AND CHARLES D. MICHENER

Entomology Program, Department of Ecology and Evolutionary Biology and Entomology Division, Natural History Museum and Biodiversity Research Center, University of Kansas, Lawrence, Kansas 66045, USA; email: vhgonza@ku.edu and michener@ku.edu

Abstract.—*Chilicola* (*Anoediscelis*) *paramo* Gonzalez and Michener, n. sp., from a Páramo in the Eastern Andes of Colombia is described. The new species is not a close relative of other known species and is not considered a member of the primarily Andean group of *C. ashmeadi*. *Chilicola paramo* differs from other species in such a way that Michener's (2002) key to Andean subgenera of *Chilicola* requires modification; a new key is therefore provided here. Aspects of the nesting biology of the new species are also given.

Resumen.—*Chilicola* (*Anoediscelis*) *paramo* Gonzalez and Michener, n. sp., es descrita de un Páramo de la cordillera Oriental de Colombia. La nueva especie no está relacionada a ninguna otra especie conocida y no es considerada un miembro del grupo principalmente andino de *C. ashmeadi*. *Chilicola paramo* es bien diferente de las otras especies del grupo de tal manera que la clave de Michener (2002) para los subgéneros andinos de *Chilicola* necesita ser modificada; una clave nueva es presentada aquí. También se presentan notas sobre la biología de nidificación de la especie.

Recently, Michener (2002) revised the tropical Andean species of *Chilicola* Spinola, that is those that occur from Perú to Venezuela above 1000 m. Such Andean species were grouped in three subgenera: *Anoediscelis* Toro and Moldenke, *Hylaeosoma* Ashmead and *Oroediscelis* Michener; the Andean species of the first consisting of the group of *C. ashmeadi* (Crawford). This paper is a supplement to that revision since the new species described herein differs considerably from other known species in such a way that Michener's (2002) key to Andean subgenera requires modification. Therefore, one objective is to correct that key. Aspects of the nesting biology for the new species are also discussed.

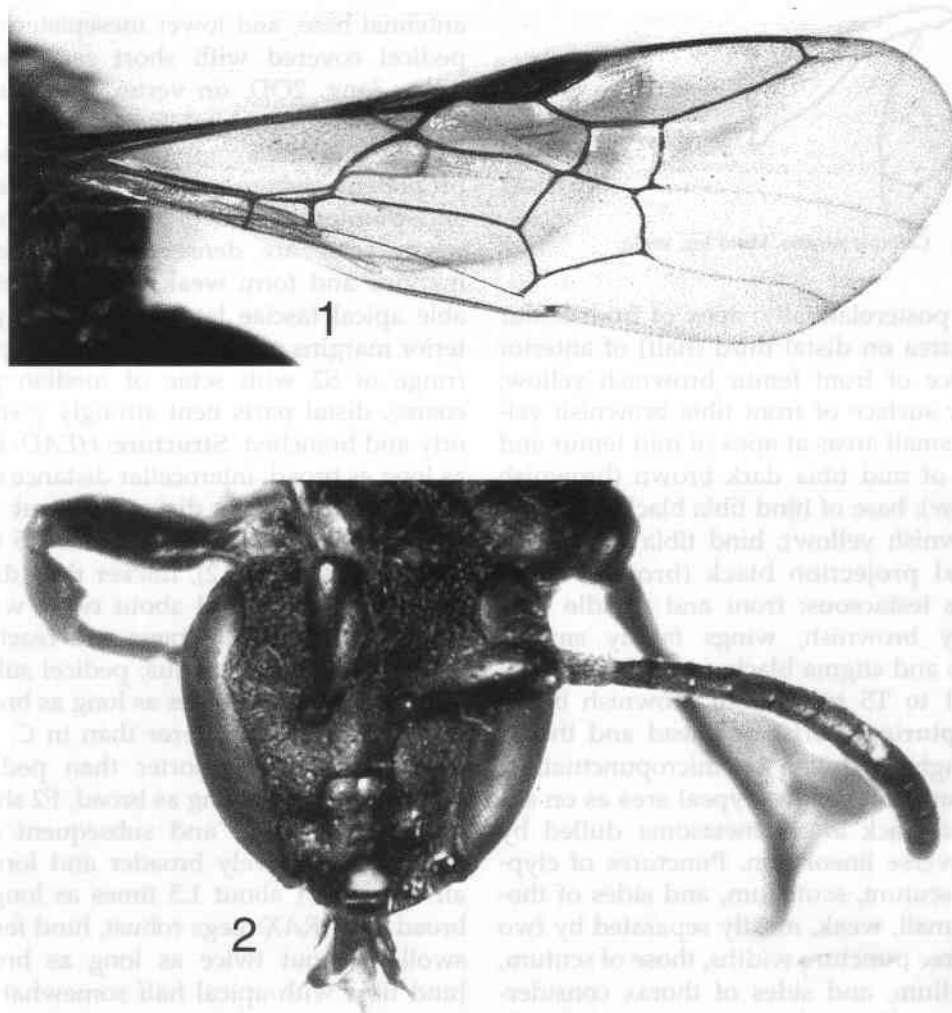
MATERIAL AND METHODS

Morphological terminology follows Michener (2000, 2002). Abbreviations used in descriptions are F, S, OD, and T for flagellar segment, metasomal sternum, ocel-

lar diameter, and metasomal tergum, respectively. Photomicrographs were prepared by Prof. Michael S. Engel using a Microptis ML-1000 Digital Imaging System. Type specimens are deposited in the following institutions:

- IAVH Instituto Alexander von Humboldt, Villa de Leyva, Boyacá, Colombia (J. E. Castillo).
- SEMC Entomology Division, Natural History Museum, University of Kansas, Lawrence, KS 66045–7523, USA (Z. Falin).

The field work was done by V.G. with the help of Paula Montoya. All nests of the new species were collected during cold, cloudy weather when the bees should have been in their nests, at the locality indicated below after the description, on August 23, 2003. This is during the transition from the rainy to the dry season.



Figs. 1-2. *Chilicola paramo*. 1, Forewing (photo of a paratype). 2, Face, holotype male.

Mean values are given with standard errors.

***Chilicola (Anoediscelis) paramo*
Gonzalez and Michener, n. sp.**

Figs. 1-8

Diagnosis.—Except as indicated under Group Characters below, this species agrees with the characterization of the *C. ashmeadi* group by Michener (2002). It differs from members of that group by the distal stigmal perpendicular crossing submarginal cells near first submarginal crossvein (Fig. 1) and especially by the

long, swollen scape (Fig. 2) and the swollen hind femur of the male (Fig. 3).

Male.—Body length 5.5 mm; forewing length 4.0 mm. **Coloration (paratype in parentheses):** Black, clypeus with small pale yellow spot (Fig. 2), larger than ocellus, on middle of lower clypeal margin (pale area extending nearly full width of lower margin of clypeus and in middle, up as acute point to two fifths of length of clypeus); mandible brown (pale yellow) except for narrow black base and black apex; flagellum black (under surface dark brown); tegula with vague brownish black

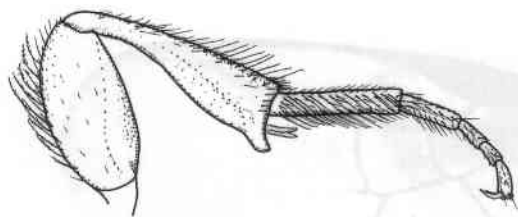
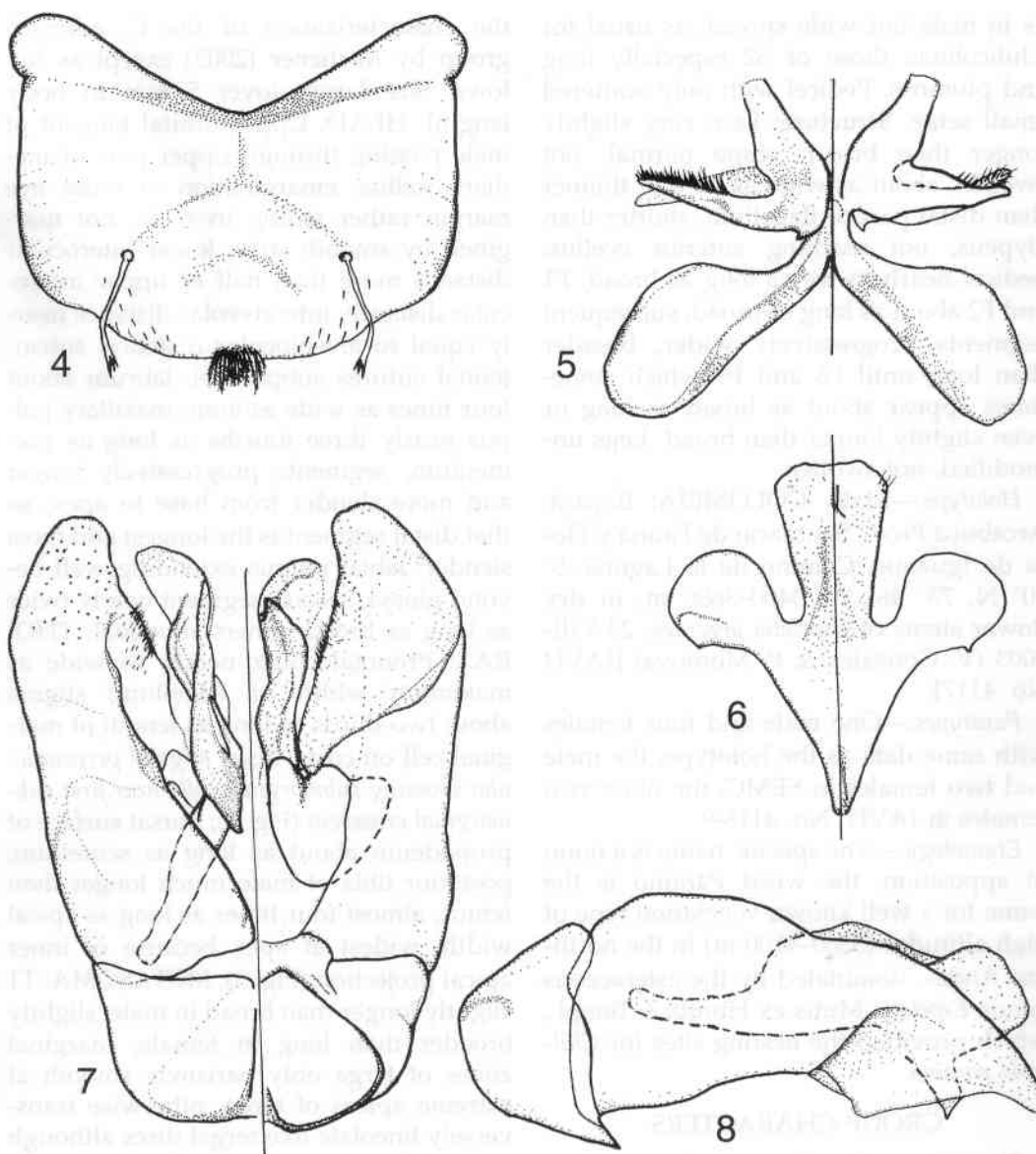


Fig. 3. *Chilicola paramo*. Hind leg, male.

area posterolaterally; apex of front femur and area on distal third (half) of anterior surface of front femur brownish yellow; outer surface of front tibia brownish yellow; small areas at apex of mid femur and base of mid tibia dark brown (brownish yellow); base of hind tibia blackish brown (brownish yellow); hind tibia with inner apical projection black (brown); tibial spurs testaceous; front and middle tarsi partly brownish; wings faintly smoky, veins and stigma black; posterior margins of T1 to T5 translucent brownish black. **Sculpturing:** Surface of head and thorax throughout dulled by micropunctuation, the same on yellow clypeal area as on adjacent black areas; metasoma dulled by transverse lineolation. Punctures of clypeus, scutum, scutellum, and sides of thorax small, weak, mostly separated by two or three puncture widths, those of scutum, scutellum, and sides of thorax considerably smaller and weaker than in *C. ashmeadi*; punctures coarser and closer on rest of head, on frons as close as possible; punctures nearly absent or unrecognizable on metasoma; dorsal surface or basal area of propodeum granular with several irregular longitudinal carinae on anterior half (two fifths), posterior margin of dorsal surface marked by transverse arcuate ridge, reduced medially, that is largely smooth and shiny; posterior part of tegula partly smooth and shiny; marginal zones of T1 to T5 more shiny than discs but none the less transversely lineolate. **Pubescence:** Short, sparse, dull whitish, setae often dusky when viewed against white background; setae longest, 3OD or more, on scape, paraocular area and frons near

antennal base, and lower mesepisternum; pedicel covered with short setae; setae rather long, 2OD, on vertex, genal area, propleura, coxae, hind femur, outer surface of hind tibia, upper part of side of propodeum where setae are rather dense and plumose, sides of metasomal terga where setae are denser along posterior margins and form weak, scarcely noticeable apical fasciae laterally, and on posterior margins of metasomal sterna; apical fringe of S2 with setae of median part coarse, distal parts bent strongly posteriorly and branched. **Structure:** **HEAD:** Face as long as broad; interocellar distance subequal to ocellocular distance, about two OD; ocelloccipital distance about 1.5 OD; scape swollen (Fig. 2), thicker than distal part of flagellum and about twice width of F4, longer than clypeus and reaching middle of anterior ocellus; pedicel subcylindrical, about 1.5 times as long as broad; flagellum much slenderer than in *C. ashmeadi*, F1 slightly shorter than pedicel, about 1.5 times as long as broad, F2 shorter than others, F4 and subsequent segments progressively broader and longer, all except F11 about 1.5 times as long as broad. **THORAX:** Legs robust, hind femur swollen, about twice as long as broad, hind tibia with apical half somewhat enlarged (Fig. 3), with inner apical projection extending distad; hind tarsus longer than tibia, hind basitarsus parallel-sided. **METASOMA:** Sterna scarcely modified, S2 with basomedian tumescence, apical margin of S2 more convex than transverse margins of S3 and S4; S6 with posterior margin rounded, apicomedian fringe consisting of erect setae much longer than shown in Fig. 4 because much foreshortened in drawing, large sublateral seta easily broken off; S7, S8, and genitalia as in Figs. 5–8; S7 with distal lobe trifold, suggesting that of *C. venezuelana* Michener but with setae on only one branch (Fig. 5, compare with Fig. 8a of Michener, 2002).

Female.—Agrees with description of male except for usual sexual characters



Figs. 4–8. *Chilicola paramo*, male. 4, S6. 5, S7. 6, S8. 7 and 8, Genitalia. In divided figures, dorsal view is shown on left, ventral on right.

and the following: **Coloration:** Black except under side of flagellum dark brown; basal half of front tibia with brownish yellow on outer and sometimes anterior surfaces; extreme apex of front femur sometimes brownish yellow; tibial spurs testaceous. **Sculpturing:** Punctuation even weaker than in male, punctures of scutum, scutellum, and sides of thorax so incon-

spicuous as to be easily described as merely seta bases, on frons separated by about one puncture width and micropunctuation conspicuous. **Pubescence:** Setae of scape and adjacent face less conspicuously long than in male, but generally setae longer and denser than in male, especially scopal setae of hind femora and metasomal sterna, the latter not forming fringes

as in male but wide spread, as usual for Chilicolinae those of S2 especially long and plumose. Pedicel with only scattered small setae. **Structure:** Face very slightly longer than broad; scape normal, not swollen, about as wide as F2 and thinner than distal part of flagellum, shorter than clypeus, not reaching anterior ocellus; pedicel nearly twice as long as broad; F1 and F2 about as long as broad, subsequent segments progressively wider, broader than long until F8 and F9 which sometimes appear about as broad as long or even slightly longer than broad. Legs unmodified, not swollen.

Holotype.—Male. COLOMBIA: Boyacá: Arcabuco Prov., Santuario de Fauna y Flora de Iguaque, Camino de la Laguna, 5° 70' N, 73° 46' W, 3400–3600 m, in dry flower stems of *Espeletia argentea*, 23-VIII-2003 (V. Gonzalez & P. Montoya) [IAVH No. 4117].

Paratypes.—One male and four females with same data as the holotype, the male and two females in SEMC, the other two females at IAVH. No. 4118-9

Etymology.—The specific name is a noun in apposition; the word Páramo is the name for a well known vegetation type of high altitudes (3500–4100 m) in the northern Andes, dominated by the asteraceous genus *Espeletia* Mutis ex Humb. & Bonpl., which provided the nesting sites for *Chilicola paramo*.

GROUP CHARACTERS

The new species, *C. paramo*, is a member of the subgenus *Anoediscelis* in the sense of Michener (2000, 2002). It agrees with

the characterization of the *C. ashmeadi* group by Michener (2002) except as follows: Size larger (over 5 mm in body length). HEAD: Upper orbital tangent of male passing through upper part of median ocellus; emargination of inner eye margin rather strong in male, not margined by smooth strip; lower interocular distance more than half of upper interocular distance; intervalveolar distance nearly equal to alveolocular distance; subantennal sutures subparallel; labrum about four times as wide as long; maxillary palpus nearly three fourths as long as prementum, segments progressively longer and more slender from base to apex, so that distal segment is the longest and most slender; labial palpus extending well beyond glossa, second segment nearly twice as long as broad, others subequal. THORAX: Pronotal collar nearly as wide as maximum width of flagellum; stigma about two thirds as long as length of marginal cell on costa; *distal stigmal perpendicular crossing submarginal cells near first submarginal crossvein* (Fig. 1); dorsal surface of propodeum about as long as scutellum; posterior tibia of male much longer than femur, almost four times as long as apical width, widest at apex because of inner apical projection (Fig. 3). METASOMA: T1 slightly longer than broad in male, slightly broader than long in female; marginal zones of terga only narrowly smooth at extreme apices of terga, otherwise transversely lineolate like tergal discs although more shiny than discs; penis valves with single dorsoapical diverging membranous processes (Fig. 7) (as in *C. ashmeadi*).

KEY TO THE TROPICAL ANDEAN SUBGENERA OF CHILICOLA

The problem, mentioned above, in the key to the subgenera of the tropical Andes (Michener, 2002: 8), is a result of the venational character italicized in the section on Group Characters in listing differences between *C. paramo* and the description of the *C. ashmeadi* group. The distal stigmal perpendicular crosses the submarginal cells near the first submarginal crossvein (Fig. 1), so that according to the first character of the first key couplet, *C. paramo* would be a species of the subgenus *Oroediscelis*. Other characters, however, show that *C. paramo* is not otherwise similar to *Oroediscelis* but is a species of *Anoediscelis*. The following is a corrected key:

- 1 Malar space one third as long as broad or more; S4 of male with pair of tubercles or projections; hind tibia and usually basitarsus of male swollen and modified *Oroediscelis*
- Malar space linear (= absent), rarely nearly one third as long as broad; S4 of male simple or nearly so; hind tibia and basitarsus of male slender, not modified, or distal part of tibia slightly enlarged and produced as in *C. paramo* (Fig. 3) 2
- 2 Head above antennal alveolus with depression (sometimes evanescent) extending up toward ocellocular region; S8 of male with apical process deeply bifid; body length usually 4.0 to 5.5 mm but as little as 3.0 mm in *C. smithpardoii* Michener *Hylaeosoma*
- Head without depression above antennal alveolus; S8 of male with apical process truncate (Fig. 6); body length usually 3.0 to 3.8 mm, but 5.5 mm in *C. paramo* *Anoediscelis*

NESTING BIOLOGY

As described for *C. espeleticola* Michener (Michener, 2002), nests of *C. paramo* were found in dead, dry, broken, pithy flowering stems of living plants of the Páramo species, *Espeletia argentea* Humb. & Bonpl. (Asteraceae). The stems containing nests had diameters of 5.5 to 7.0 mm ($X = 6.4 \pm 0.6$, $n = 8$) and were in varying positions from almost horizontal, lying on the ground, to erect and with the nest entrance 70 cm above the ground level. All occupied stems had broken ends where the bees had entered the pith. Nests consisted of unbranched tunnels through the axes of the stems. Tunnel diameters ranged from 2.5 to 3.5 mm ($X = 2.8 \pm 0.29$, $n = 7$); the variation in diameter suggests that at least some nests were probably in tunnels made by other insects. One tunnel, not included in the above statistics and not considered a nest, was 1.9 mm in diameter; it contained only a single female probably resting during cold weather. Lengths of four nests measured from entrances to the upper ends of the cells, i.e., lengths of open tunnels above the cells, were 8, 17, 50, and 60 mm. The cell series often occupied the lower ends of the tunnels, but in other cases the empty burrow extended below the cells. All the cells contained provisions or small larvae, no large larvae or pupae. The cells were cylindrical and averaged 6.4 mm in length (± 1.2 , $n = 10$) and about 3 mm in diameter. The cell membrane was similar to that of many other colletids, translucent and slightly

whitish, and was in contact with the pith walls of the tunnel except where it formed the ends of the cells and thus the partitions between cells. Cells in series were separated only by such partitions; spaces between cells were absent. The semiliquid food masses were dark brown and occupied about one third of the cell length; lengths of pollen masses $X = 2.2 \text{ mm} \pm 0.3$, $n = 4$. Five of the collected nests contained 1, 3, 3, 5 and 6 cells each. The shortest nest tunnel (8 mm) led to one cell. Two old nests were recognized by fragments of cell membrane; each contained an adult male *C. paramo*. Active nests (with cells) each contained also a single adult female. All the adults had unworn wings.

One female of the subgenus *Oroediscelis* was found in the same area but in a dead stem of *Rubus* Linnaeus (Rosaceae). In the absence of males, the species is not identified.

DISCUSSION

In view of the numerous characters differentiating *C. (Anoediscelis) paramo* from the species placed in the *C. ashmeadi* group, we believe that it should be excluded from that group. It does not, however, show a close relationship to any of the remaining (Chilean) species of the subgenus; for illustrations and descriptions of these species see Toro and Moldenke (1979) and for commentary see Michener (2002: 10, 11).

The new species is another example of a probably apomorphic taxon from the

high Andes which does not have an obvious affinity to any other known species, showing again the distinctiveness of the Andean fauna and perhaps the existence of more species groups within the Andean *Chilicola* fauna.

The nesting biology reported here for *C. paramo* does not differ significantly from that of other *Chilicola* species. According to what is known from other species, it is likely that *C. paramo* nests in diverse pithy sticks and branches available in the Páramo and is not likely to be specialized to *Espeletia argentea* inflorescences.

ACKNOWLEDGMENTS

We are indebted to Paula Montoya for her help in the field, Michael Engel for the photographic illustrations, Diana C. Arias and José E. Castillo from the Sección de Entomología of the Instituto de Investigación en Recursos Biológicos Alexander von Hum-

boldt, and El Sistema de Parques Nacionales Naturales de Colombia for their outstanding logistical support and for generously providing both permission to work in the park and lodging to V.G. during this study. Financial support for V.G. was provided by Ideawild and by NSF grant DBI-0096905 (to J. S. Ashe and M. S. Engel). This is contribution Nr. 3349 of the Division of Entomology, Natural History Museum and Biodiversity Research Center, University of Kansas.

LITERATURE CITED

- Michener, C. D. 2000. *The Bees of the World*. Johns Hopkins University Press; Baltimore, MD; xiv+[1]+913 pp.
- Michener, C. D. 2002. The bee genus *Chilicola* in the tropical Andes, with observations on nesting biology and a phylogenetic analysis of the subgenera (Hymenoptera: Colletidae, Xeromelissinae). *Scientific Papers, Natural History Museum, The University of Kansas* 26: 1-47.
- Toro H. and A. Moldenke. 1979. Revisión de los Xeromelissinae Chilenos. *Anales del Museo de Historia Natural, Valparaíso* 12: 95-182.