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Revision of the bee genus *Chlerogella* (Hymenoptera: Halictidae), Part IV: A new species from southwestern Colombia

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Abstract. A new species of the diverse augochlorine bee genus *Chlerogella* Michener (Halictinae: Augochlorini) is described and figured from southwestern Colombia. ***Chlerogella anchicaya*** Engel, Gonzalez, & Hinojosa-Díaz, new species, is similar to *C. agaylei* Engel and *C. materdonnae* Engel, both occurring on the eastern slopes of the Andes in Ecuador. There are also some similarities with *C. eumorpha* Engel from the western Andean foothills in northern Ecuador, but differences in rostral length and male terminalia can distinguish these species. Revised couplets are provided to the South American species of *Chlerogella* to permit identification of the new species.

INTRODUCTION

One of the most vital and fundamental contributions toward a comprehensive understanding of any group of organisms is a revision and hypothesis as to the circumscription of its constituent species. Upon such a foundation are built our edifices of knowledge on everything from natural history, relationships, biogeography, ecology, and genetics. There is a long tradition of such revisions and species-level phylogenies among bees and such work is continually growing in interest and importance (Engel, 2011; Gonzalez *et al*., 2013), although it is understandable that many groups remain to be investigated in a modern context. Remarkably, for the bee tribe Augochlorini a number of genera have been revised, particularly during the last 20 years, and keys to the species provided – these include *Paroxystoglossa* Moure (Moure, 1960), *Ctenaugochlora* Eickwort (Engel, 1995a; Engel & Gonçalves, 2010), *Rhectomia* Moure *s.l.* (Engel, 1995b; Gonçalves, 2010b), *Chlerogelloides* Engel *et al*. (Engel *et al*., 1997; Engel &

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Table 1. Colombian species of *Chlerogella* Michener with the total known number of specimens (across the entire range of each species), elevational range, and collecting localities in Colombia (based on Engel, 2010b).

Species	Sex	Elevation (m)	Peruvian Localities
C. anchicaya, n. sp.	1♂	730	Valle del Cauca
C. cyranoi Engel	1♂	—	Porce, Antioquia
C. hypermeces Engel	9♂♂, 9♀♀	400–1100	Putumayo
C. picketti Engel	1♂	40	Nariño, Barbacoas
C. terpsichore Engel	5♂♂, 4♀♀	40	Nariño, Barbacoas
C. tychoi Engel	1♀	560	Valle del Cauca

Brooks, 1999b; Oliveira *et al*., 2012), *Xenochlora* Engel *et al*. (Engel *et al*., 1997), *Megaloptidia* Cockerell (Engel & Brooks, 1998), *Megaloptilla* Moure & Hurd (Engel & Brooks, 1999a), *Chlerogas* Vachal (Brooks & Engel, 1999; Engel *et al*., 2006; Engel & Gonzalez, 2009; Engel, 2009a, 2010a), *Ischnomelissa* Engel (Engel, 1997, 2013a; Brooks & Engel, 1998; Engel & Brooks, 2002), *Micrommation* Moure (Smith-Pardo & Engel, 2004), *Augochlorella* Sandhouse (Coelho, 2004), *Thectochlora* Moure (Gonçalves & Melo, 2006), *Rhynchochlora* Engel (Engel, 2007), *Chlerogella* Michener (Engel, 2009b, 2010b; Engel & Rasmussen, 2013), *Halictillus* Moure (Gonçalves, 2010a), *Ceratalictus* Moure (Coelho & Gonçalves, 2010), *Megommation* Moure (Gonçalves & Santos, 2010), *Rhinocorynura* Schrottky (Gonçalves & Melo, 2012), and *Cleptommation* Engel *et al*. (Engel, 2013b). In addition, several regional revisions have been completed for *Neocorynura* Schrottky (Smith-Pardo, 2005a, 2005b, 2010; Smith-Pardo & Gonzalez, 2009; Engel & Smith-Pardo, 2012), *Pseudaugochlora* Michener (Almeida, 2008), *Megalopta* Smith (Santos & Silveira, 2009; Gonzalez *et al*., 2010), *Caenaugochlora* Michener (Gonçalves & Engel, 2010; Engel, 2014), and *Augochlora* Smith (Dalmazzo & Roig-Alsina, 2011). It is fair to say that the systematics of these bees has undergone a true revival and it is hoped that this momentum shall be maintained for decades to come.

Herein we provide a fourth installment to the earlier revision of *Chlerogella* (Engel, 2009b, 2010b), and its supplement (Engel & Rasmussen, 2013). The present account documents a further new species from the Andes of Colombia (Fig. 1), and provides modifications to existing keys that will permit its recognition from close congeners. This is the sixth species hitherto recorded from Colombia (Table 1), and it is likely that several more exist within undisturbed forests in the mountains of the Andes.

MATERIAL AND METHODS

The holotype of the new species discussed herein is deposited in the Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia (UNCB), and was compared with other species of *Chlerogella* deposited in the Division of Entomology, University of Kansas Natural History Museum, Lawrence, USA. Morphological terminology follows that of Eickwort (1969), Engel (2001, 2009b), and Michener (2007), while the format for the description follows that of Engel (2003a, 2003b, 2009b, 2010b) and Engel & Rasmussen (2013). Measurements were prepared with an ocular micrometer on an Olympus SZX-12 stereomicroscope and photographs prepared with a Canon EOS 7D digital camera attached to an Infinity K-2 long-distance microscope lens.

Figure 1. Photomicrograph of holotype male of *Chlerogella anchicaya*, new species.

SYSTEMATICS

Genus *Chlerogella* Michener

Chlerogella anchicaya Engel, Gonzalez, & Hinojosa-Díaz, new species

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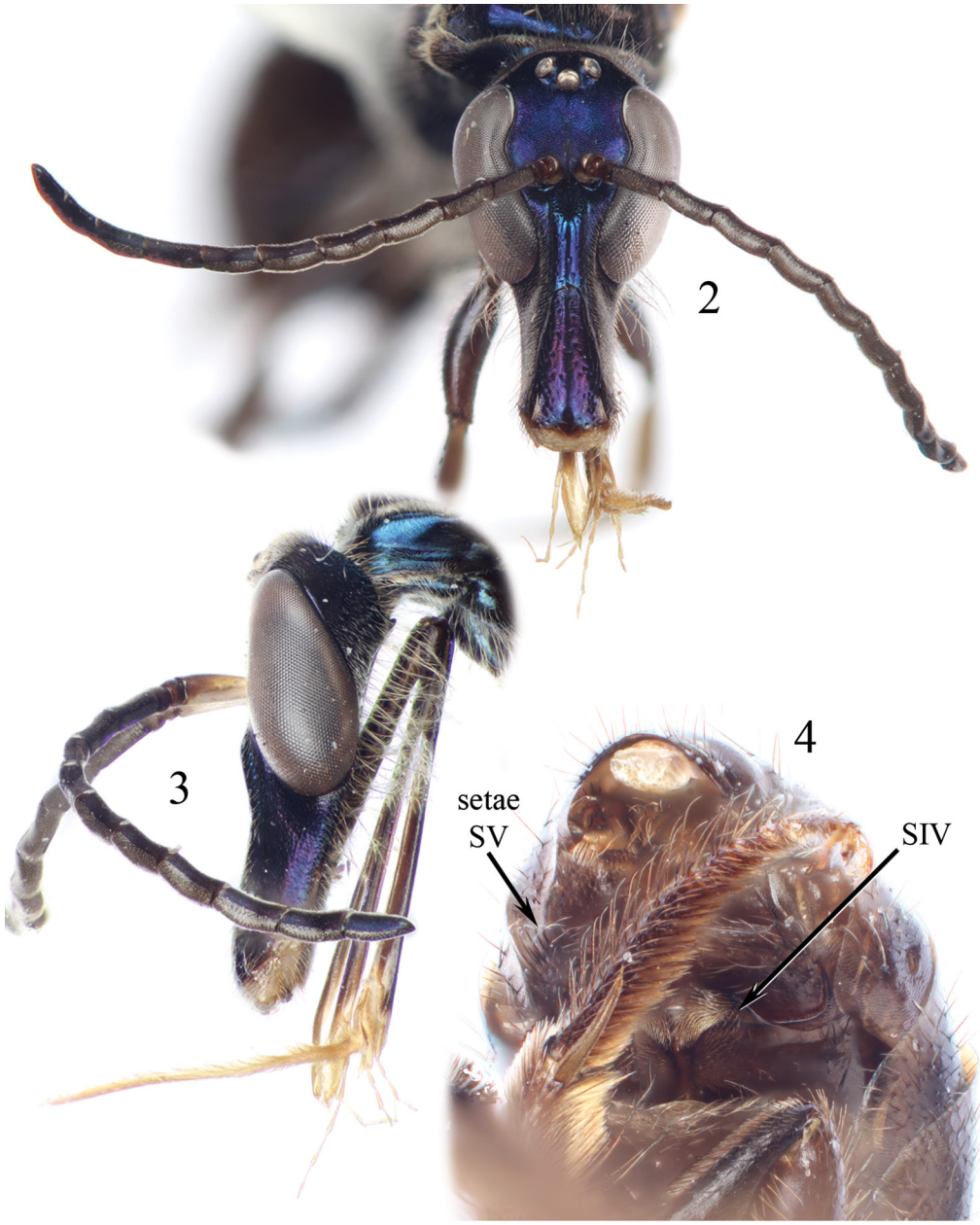
(Figs. 1–8)

Diagnosis: The new species is most similar to *Chlerogella agaylei* Engel and *C. materdonnae* Engel, both from Ecuador. *Chlerogella anchicaya* differs from *C. materdonnae* in the azurite blue of the head and mesosoma (Figs. 1–3); the off-white mandible, labrum, and clypeal apex (Figs. 2, 3); the largely yellow scape (Fig. 3); the yellow inner surfaces of the protarsi (Fig. 1); and in details of surface sculpturing as described below. From *C. agaylei* the new species differs in the bigibbous mesoscutellum and details of surface sculpturing. The new species differs from both in the tuberculate subpleural signum, the much more elongate second flagellomere, and the form of the male terminalia (Figs. 5–8).

Description: ♂: Total body length 9.10 mm; forewing length 6.52 mm. Head length 3.13 mm, width 1.75 mm. Clypeus beginning well below lower tangent of compound eyes. Malar space 64% compound eye length (malar length 0.96 mm; compound eye length 1.50 mm) (Figs. 2, 3). Upper interorbital distance 0.79 mm; lower interorbital distance 0.42 mm. First flagellomere only slightly longer than pedicel, about as long as wide; second flagellomere four times length of first flagellomere; ventral surfaces of second through eleventh flagellomeres densely covered in placoid sensilla, placoid fields not disrupted. Upper portion of pronotum medially depressed, not elongate, medially less than 0.25 times ocellar diameter in length; ventral portion of preëpisternal



Figures 2–4. Details of holotype male of *Chlerogella anchicaya*, new species. **2.** Facial aspect. **3.** Lateral aspect of head. **4.** Ventral view of apical metasomal sterna (partially obscured by metatibial apex, metatarsus, and metapretarsus), showing setose pads on medioapical extension of sternum IV and apicolateral setae on sternum V.

sulcus not broad, similar to scrobal sulcus and upper portion of preëpisternal sulcus; intertegular distance 1.46 mm; subpleural signum tuberculate; mesoscutellum weakly bigibbous, with two low paramedian tubercles. Forewing with basal vein distad cu-a by two times vein width; 1rs-m distad 1m-cu by two times vein width; 2rs-m distad 2m-cu by seven times vein width, 2rs-m weakly arched, nearly straight; first submar-

Figures 5–8. Male terminalia of *Chlerogella anchicaya*, new species. **5.** Hidden sterna VII and VIII. **6.** Genital capsule, lateral view. **7.** Genital capsule, dorsal view. **8.** Genital capsule, ventral view.

ginal cell longer than combined lengths of second and third submarginal cells; second submarginal cell slightly narrowed anteriorly, anterior border of second submarginal cell along Rs about as along as that of third submarginal cell; posterior border of third submarginal cell about 2.5 times length of anterior border. Distal hamuli arranged 2-1-2. Inner metatibial spur serrate. Apical margin of SIII entire; apical margin of SIV with short, broad median projection, projection deeply concave medially (thereby resulting in form of two paramedial, lobe-like projections) (Fig. 4); apical margin of SV entire; apical margin of SVI emarginate; terminalia as depicted in figures 5–8.

Clypeus and supraclypeal area smooth with coarse, shallow, faint punctures separated by 2–5 times a puncture width, sometimes closer along lateral borders; face with

minute punctures separated by a puncture width, more widely spaced in malar space, integument between punctures smooth; punctures of face blending to more widely spaced in ocellocular area and on vertex, punctures separated by 2–3 times a puncture width; gena smooth with minute punctures separated by 2–4 times a puncture width; postgena finely imbricate. Pronotum finely imbricate with minute sparse punctures; mesoscutum smooth with minute punctures separated by 1.5–3 times a puncture width, anteromedially punctures becoming exceedingly faint to absent; mesoscutellum as on mesoscutum; metanotum smooth with sparse minute punctures. Preëpisternum smooth with sparse minute punctures; mesepisternum smooth with sparse minute punctures separated by 3–6 times a puncture width; metepisternum smooth with minute punctures separated by 4–5 times a puncture width. Propodeum finely imbricate, more strongly so on dorsal-facing surface. Metasoma finely imbricate.

Mandible, labrum, apical margin of clypeus, and small spot apically in malar space off white to pale yellow; labiomaxillary complex dark brown except apicalmost portions, glossa, paraglossae, and palpi yellow; remainder of clypeus and head azurite blue with strong purple highlights (Fig. 2, 3). Antenna dark brown except scape pale yellow with brown dorsally in apical two-thirds. Mesosoma azurite blue, with purple highlights but weaker than those of head (Fig. 1), propodeum lighter blue than remainder of mesosoma; tegula dark brown. Wing membranes faintly infumate; veins brown to dark brown. Legs dark brown with scattered metallic blue highlights except inner surfaces of protarsi yellow. Metasoma dark brown.

Typical gender pilosity. Pubescence generally white except more golden apically on face, on legs, and on metasoma and more fuscous on meso- and metatarsi. Postgena with numerous elongate, sinuate setae, such setae with short apical branches; inner surfaces of trochanters, femora, and metatibia with elongate, apically-plumose setae except those on metatiba simple and apically sinuate. Apical margin of SIV with patches of dense, short fuscous setae on medial projection (Fig. 4); SV with apicolateral areas of more numerous, long, fuscous setae.

♀: Unknown.

HOLOTYPE: ♂, Colombia: Valle del Cauca, PNN [Parque Nacional Natural] Farallones de Cali Anchicaya, 3°26'N 76°48'W, 730 m, malaise, 16–31.x.2001 [16–31 October 2001], S. Sarria, leg., M2891 (UNCB).

ETYMOLOGY: The specific epithet is based on the name of the Anchicayá River, a watershed area known for its high biodiversity and whose origins are at the mountain Farallones de Cali in the Department of Valle del Cauca.

COMMENTS: This species belongs to a difficult group of metallic blue species with greatly elongate malar spaces more completely known from Peru and Ecuador (Engel, 2010b). This complex, here dubbed the '*azurea* complex', encompasses the species *C. azurea* (Enderlein), *C. rostrata* Engel, *C. dolichorhina* Engel, *C. cyranoi* Engel, *C. agaylei*, *C. materdonnae*, and now *C. anchicaya*. *Chlerogella fortunaensis* Engel from Panama should perhaps also be included in this complex. These species are, like virtually all *Chlerogella*, known from sparse samples and are exceedingly similar in structural features. Some may eventually be discovered to be synonyms (Engel, 2010b) but presently there is insufficient evidence to suggest anything other than a series of almost cryptically-similar species.

Engel (2014) noted some similarities between species of *Caenaugochlora s.l.* and those of *Chlerogella*. To this can be added a further interesting feature, albeit one restricted to isolated taxa within each of the genera. The subpleural signum is tuberculate in *C. anchicaya* and this is the same for *Caenaugochlora* (*Ctenaugochlora*) *donnae*

Engel and more weakly so in *C.* (*C.*) *perviridis* Engel & Gonçalves (Engel, 1995a; Engel & Gonçalves, 2010). The function of such a feature is unknown.

The present taxon will run to couplet 32 in the key to South American species of *Chlerogella* (Engel, 2010b). The following modified couplets will permit its incorporation into the aforementioned dichotomous key:

32(30). Mesoscutellum not bigibbous, gently convex 33
—. Mesoscutellum bigibbous, with two low paramedial tubercles 32a
32a(32). Second flagellomere about 4 times length of first flagellomere; scape pale yellow except largely brown dorsally; mandible, labrum, and clypeal apex off white; integument of head and mesosoma brilliant azurite blue with purple highlights; subpleural signum tuberculate (Colombia) ..... *C. anchicaya*, n. sp.
—. Second flagellomere about 2.4 times length of first flagellomere; scape brown; mandible, labrum, and clypeal apex brown; integument of head and mesosoma brilliant, shiny caerulean blue; subpleural signum not tuberculate (Ecuador) ..... *C. materdonnae* Engel

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