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Article in *Zootaxa* · February 2019

DOI: 10.11646/zootaxa.4559.3.8

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Male description of *Horcomutilla projectifrons* (Cresson, 1902) (Hymenoptera, Mutillidae) and the first host record for the genus

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Velvet ants (Mutillidae) are solitary wasps whose larvae act as ectoparasitoids of encapsulated immatures of other insects, especially other solitary Hymenoptera (Luz *et al.* 2016). The natural history of most mutillids is unknown; for example, only 2–3% of the species have their hosts reported (Brothers 1989). Apidae species, however, are among the hymenopterans most commonly parasitized by velvet ants, with over 30 recorded cases in literature involving different genera of both host and parasite (Luz *et al.* 2016).

Velvet ants are notorious for their bright color patterns and extreme sexual dimorphism, in which the females are wingless and the males are usually fully winged (Williams 2012). In fact, such extreme differences have caused many species to be described based on males or females only. Therefore, sexual associations are rare and difficult to achieve without molecular data, large series of both sexes collected in the same areas, or biological observations, such as couples captured *in copula* or males and females emerging from the same host (Pilgrim & Pitts 2006; Luz & Williams 2014; Cambra *et al.* 2015; Lopez *et al.* 2018).

Horcomutilla Casal (Sphaerophthalminae, Pseudomethocini) is a small genus of Neotropical mutillids. The distribution of the 14 species ranges from Costa Rica to Argentina (Nonveiller 1990; Quintero & Cambra 1996). Males of this genus were first described by Quintero & Cambra (1996) based on *H. krombeini* Casal and *H. maracayi* Fritz & Martinez; they can be easily distinguished from similar genera by their apically bifurcated parameres. This character seems highly derived not only within Mutillidae but also within the Aculeata, with only three sphecid genera having a similar feature (Quintero & Cambra 1996). Here we provide a description for the male of *H. projectifrons* (Cresson, 1902), the third male recognized in the genus, and the first host record for *Horcomutilla* based on a couple reared from an *Exomalopsis* (*Exomalopsis*) *auropilosa* Spinola (Apidae: Exomalopsini) communal nest in Mato Grosso do Sul state, Midwestern Brazil.

The nest was located at the Universidade Federal da Grande Dourados (UFGD) in Dourados, Mato Grosso do Sul, Brazil (22°11'42"S; 54°55'48"W) and was observed on multiple occasions from February to June, 2005. The *H. projectifrons* couple was identified by Dr. David Richard da Luz and housed at the Hymenoptera collection of the Museu da Biodiversidade at UFGD (MuBio-UFGD). The *E. auropilosa* specimens were identified by Dr. Alexsander Araújo Azevedo and Dr. Fernando Silveira; they are housed at the Laboratório de Sistemática e Ecologia de Abelhas (LSEA) of the Departamento de Zoologia at the Universidade Federal de Minas Gerais (UFMG). Terminology used for the description of the male of *H. projectifrons* follows that of Harris (1979) and Bartholomay *et al.* (2018).

Horcomutilla projectifrons (Cresson, 1902) (Figs. 1–14)

Mutilla projectifrons Cresson, 1902. Transactions of the American Entomological Society, 28: 1–82, p. 33, lectotype, ♀, Brazil, [Mato Grosso], Chapada [dos Guimarães] (Carnegie Museum of Natural History—CMNH).

Ephuta (*Ephuta*) *projectifrons*: André, 1902, p. 63 (new combination)

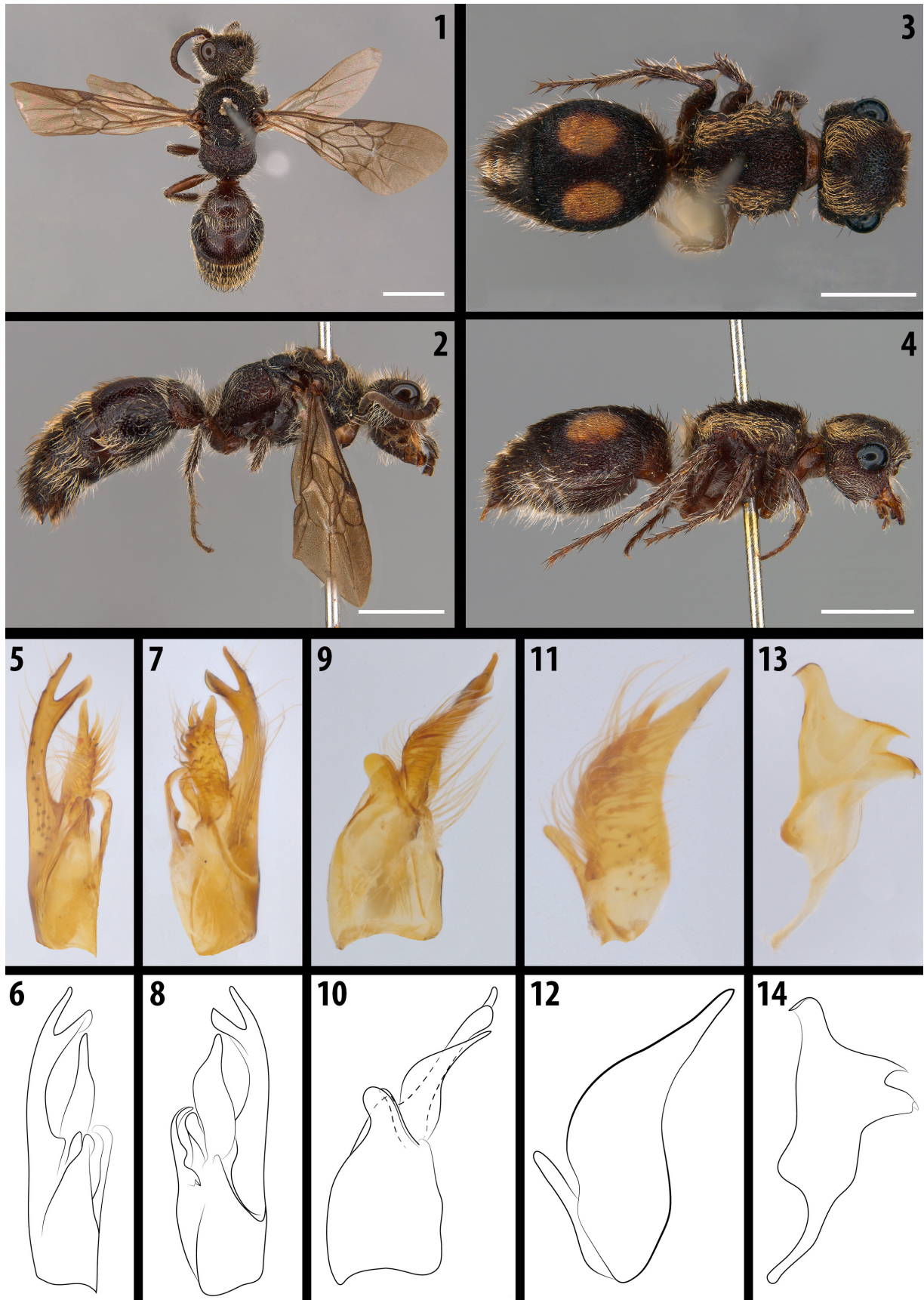
Horcomutilla projectifrons: Casal 1962, p. 64 (new combination)

Diagnosis. FEMALE. Females of this species are recognized by the entirely black body, conspicuous blunt tubercle projecting at the medio-lateral margins of mesosoma, and yellowish integumental spots on T2. MALE. Males of this species can be recognized by the black clypeus and elongated cuspis that is conspicuously tapered apicad.

Description. MALE. (hitherto unknown). Body length 7.0 mm. *Coloration.* Head, mesosoma, metasoma and appendages black to brownish-black, except mandibles yellowish with reddish apex. Tibial spurs whitish. Forewing light brownish-hyaline, veins light brown, darker costad; hindwing overall lighter than forewing. Head with sparse erect and decumbent silvery-white setae, slightly denser on gena and malar space, and sparser on ventral head surface. Lateral pronotal face setae sparse decumbent silvery-white, mesopleuron setae dense decumbent and erect silvery-white; metapleuron and lateral propodeal face virtually aetose. Legs with dense erect and decumbent silvery-white setae, except femora with sparse erect silvery-white setae. Metasoma with sparse erect and decumbent and erect silvery-white setae except medially on T2 with reddish-black setae and T5-6 and S5-6 with interspersed black and silvery-white setae; lateral felt line of T2 with dense appressed silvery-white setae. *Head.* Transverse subrectangular, posterolateral angles rounded. Head slightly wider than pronotum. Eye strongly convex, slightly elongate longitudinally. Ocelli small; OOD $4.9 \times$ DLO, IOD virtually equal to DLO. Occipital carina distinct. Vertex and gena densely and finely punctate-reticulate to punctulate. Gena ecarinate. Antennal scrobe concave to eye margin, with well-defined dorsal transverse carina starting at eye margin and ending before antennal tubercles. Clypeus virtually flat throughout, anterior margin sinuous; finely and densely punctulate and sparsely setose, except for small anteromedial area impunctate and aetose; no projections or invaginations along lateral margins. Scape unicarinate ventrally. Flagellomere 1 $1.5 \times$ pedicel length; flagellomere 1.5 \times pedicel length. Mandible obliquely tridentate apically, medial tooth greatly reduced; lacking dorsal or ventral projections. *Mesosoma.* Epaulet conspicuous, well-defined, narrow, roundly projected from anterior margin of pronotum, disconnected from humeral carina. Pronotal dorsal and anterior sculpture coarsely contiguous but not equal, dorsal face densely foveolate-punctate, anterior face finely and sparsely punctulate; lateral face with posteromedial impunctate area, densely and finely punctulate anteroventrally. Tegula convex, glabrous and impunctate except for few punctures and short setae on antero-lateral margins. Mesoscutum and scutellum densely foveolate-punctate, sculpture denser and smaller on scutellum; notaulus absent; parapsis present. Scutellum slightly convex. Axilla with a short, laterally compressed, scale-like projection posterolaterally. Metanotum slightly narrower medially. Propodeum strongly convex, densely areolate throughout; posterior face with distinct narrow longitudinal area apically, delimited by a pair of longitudinal lateral carinae; posterolateral corners of dorsal face slightly pronounced in dorsal view, wider than metanotum; posterior face of propodeum slightly longer than dorsal face. Mesopleuron conspicuously and roundly swollen along mesopleural ridge; densely punctulate, punctures sparser posterad. Metapleuron virtually smooth, impunctate, except ventral fourth, above hind coxa, with few irregular sparse punctures. *Wings.* Forewing with moderately elongate sclerotized pterostigma; slightly longer than broad, truncate apically; three submarginal cells, basal veinlet of third cell obliterated. *Legs.* Simply setose, no strong spines discernible dorsally; spurs finely serrate on margins. *Metasoma.* T1 $0.7 \times$ T2 width. T2 length $0.7 \times$ width. T1-6 sparsely and finely punctate, punctures dense on T3-6, T7 with pygidial area undefined, irregularly and sparsely punctate. S1 nearly impunctate, sparsely and finely punctulate, with longitudinal and medially pronounced carina. S2 sparsely and finely punctate, punctures denser on S3-7; S7 transverse, subrectangular, slightly broader than long, posterior margin simply convex, without any notches or projections. *Genitalia.* Parapenial lobe not conspicuously pronounced, broadly concave and laterally compressed apically. Paramere free length $1.45 \times$ cuspis free length, evenly curved inward apicad in dorsal view and ventrally curved apicad in lateral view; terminating in bifid apex, inner arm of apex shorter and broader, laterally compressed; external arm of apex narrower, subacute apically; parameres with dense tuft of long setae on basal half and sparse setae laterally on apical half. Cuspis $2.3 \times$ digitus length, slightly sinuous in dorsal view and ventral view, curved ventrally apicad in lateral view; conspicuously and abruptly narrower on apical third; slightly laterally compressed, broader in lateral view than in dorsal view; densely setose throughout, setae sparse on outer surface, denser along inner margin; internodorsal margin with numerous thick, curved spine-like setae; paracuspis absent. Digitus very short, ending before apex of parapenial lobe, slightly upcurved in lateral view; aetose. Penis valve without any conspicuous concave or convex areas, aetose, with two strong teeth medioventrally; basal tooth longer and broader, apparently bifid apically; apical tooth short and narrow, acute apically; dorsoapical margin of penial valve with large projection, strongly and conspicuously curved externally apicad.

Material examined. BRAZIL: Mato Grosso do Sul, Dourados, Campus 1, $22^{\circ}11'42''$ S $54^{\circ}55'46''$ W, 467m, 1♂, 17.IV.2005, Lima F. e equipe col., UFGD-MuBio, Hym-00401-M (UFGD); same label except for 1♀, UFGD-MuBio, Hym-00400-M (UFGD).

Host. *Exomalopsis* (*Exomalopsis*) *auropilosa* Spinola (Apidae, Apinae, Exomalopsini)



FIGURES 1–14. *Horcomutilla projectifrons* (Cresson). 1) Dorsal habitus, ♂, line 2mm; 2) Lateral habitus, ♂, line 2mm; 3) Dorsal habitus, ♀, line 2mm; 4) Lateral habitus, ♀, line 2mm; 5–6) Genitalia, dorsal view, ♂; 7–8) Genitalia, ventral view, ♂; 9–10) Genitalia (penis valve removed), lateral view, ♂; 11–12) Cuspis, lateral view, ♂; 13–14) Penis valve, lateral view, ♂.

Remarks. The males of *H. projectifrons* can be distinguished from the other two males known from *Horcomutilla* by their black to brownish-black clypeus, which is yellowish-white in both *H. maracayi* and *H. krombeini*. During the observation period, a male and a female of *H. projectifrons* emerged from the bee nest. The male emerged on April 17, 2005 and the female on April 26, 2005. Two other females of *H. projectifrons* were observed attempting to enter the *Exomalopsis* Spinola nest early in the morning (07:00–08:00) in March. In one of these cases, the *Horcomutilla* female was attacked by an *Exomalopsis* guarding the nest entrance whilst the second female managed to enter the host nest when there was no guard at the entrance.

Distribution. Brazil (Brazil (Bahia, Mato Grosso, Mato Grosso do Sul, Goiás)

The natural history of *Horcomutilla* Casal, 1962 is largely unknown and here we provide unpublished biological information for the genus. The previously unknown male of *H. projectifrons* (Cresson, 1902) is described and the first record for *Horcomutilla* based on a couple reared from an *Exomalopsis* (*Exomalopsis*) *auropilosa* Spinola (Apidae: Exomalopsini) communal nest in Midwestern Brazil is presented. Furthermore, we provide habitus photos for the couple, and photographs and illustrations of the male genitalia.

Acknowledgements

We are grateful to Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for constant financial support to RS. We also thank Alexsander Araújo Azevedo and Fernando Silveira for bee identification, David R. Luz for velvet ant identification, Rhainer Guillermo Ferreira for valuable comments on the manuscript, and Andre Rech for field assistance. We thank the HECOLAB researchers. PRB acknowledges the support of CAPES, Programa de Pós-Graduação em Entomologia of the Instituto Nacional de Pesquisas da Amazônia (PPG-ENT) and CNPq grant #141158/2017-4.

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