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RESEARCH

Two New Species of the New World Genus *Rhinoleucophenga* (Diptera: Drosophilidae)

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ABSTRACT. The genus *Rhinoleucophenga* Hendel (1917) encompasses 21 described species but is still not well known as a taxon. Even the currently described species lack full descriptions, i.e., illustrations of the male genitalia are absent, which makes their identification difficult. This study describes two new species of *Rhinoleucophenga* with the illustration of their male genitalia.

Key Words: Brazil, Mato Grosso, male terminalia, Steganinae

The genus *Rhinoleucophenga* Hendel (1917), as currently recognized (Brake and Bächli 2004), presents 21 species, most of which were described until the 1950s (Thomson 1869; Loew 1872; Hendel 1917; Duda 1927, 1929; Patterson 1943; Malogolowkin 1946; Wheeler 1949; Costa Lima 1950). Its species occur in the Neotropical and the Nearctic regions and are distributed from Argentina to the United States. The known biological information about *Rhinoleucophenga* is restricted to isolated characterizations of different habits, such as parasitism and predation from hemipteran agricultural pests (Costa Lima 1950, Culik and Ventura 2009) and one species' emergence from the flowers of a bromeliad (Schmitz et al. 2009).

In our research group's samplings in the Brazilian Cerrado (M.S.G., unpublished data), some species of *Rhinoleucophenga* were attracted to baits of fermenting fruits or vegetables. Among the collected species, we observed *Rhinoleucophenga punctulata* Duda, 1929, *Rhinoleucophenga obesa* (Loew, 1872), *Rhinoleucophenga lopesi* Malogolowkin, 1946, and two other undetermined species. One of the unknown species was similar to *R. obesa*, but the male genitalia were different. The second of the unknown species resembled *Rhinoleucophenga stigma* Hendel, 1917. To assess the identity of these unknown species, we visited the Coleção Entomológica do Instituto Oswaldo Cruz (CEIOC) in Rio de Janeiro, Brazil, to compare the specimens we collected with the type species records of the *Rhinoleucophenga* species commonly found in Brazil. On the basis of this assessment, we concluded that the specimens represented two different new species. Unfortunately, we could not access and examine the *R. stigma* type species material, but there are significant differences between the external morphology of the specimens that we collected and the description of the external morphology that is provided by Hendel (1917).

New data illustrating the diversity of this genus contribute to the understanding of the patterns of distribution and richness and are important for the elucidation of its evolutionary patterns. Therefore, our study aims to describe these two new Brazilian species of *Rhinoleucophenga*, adding information about the diversity of this little-known genus.

Materials and Methods

The specimens used for the descriptions were collected in Tangará da Serra, Mato Grosso, Brazil (14° 39′05″ S, 57° 25′25″ W), in 2007 and 2009, with traps prepared according to Tidon and Sene (1988). The attractive bait used to catch *Rhinoleucophenga montensis* sp.n. was fermented banana, whereas fermented banana or pepper baits were used to capture *Rhinoleucophenga tangaraensis* sp.n.

The measurements and indices used in the descriptions followed Bächli et al. (2004) and were obtained using a stereomicroscope coupled to a millimeter-scaled reticule. The dissection of the terminalia was performed in glycerin after treatment of the abdomens of the male specimens with 10% potassium hydroxide and coloring with GAGE (0.16% acid fuchsin, hydrochloric acid 0.32%) according to Wheeler and Kambysellis (1966), modified by Kaneshiro (1969). Illustrations of the male terminalia, mounted on slides with Canada balsam, were performed with an optical microscope in conjunction with a grid reticule in different increments. Photomicrographs were obtained using a Zeiss Discovery V.20 stereomicroscope or a digital camera coupled with a stereomicroscope.

The microvials containing the type series in 70% ethanol and the slides with the disarticulated terminalia are deposited in the Coleção Entomológica of the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (CEIOC).

Other Examined Specimens. The following were examined: the holotypes of *Rhinoleucophenga angustifrons* Malogolowkin, 1946; *R. lopesi*, *Rhinoleucophenga matogrossensis* Malogolowkin, 1946; and *Rhinoleucophenga nigrescens* Malogolowkin, 1946, as well as the type series of *Rhinoleucophenga personata* Malogolowkin, 1946; *Rhinoleucophenga brasiliensis* Costa Lima, 1950; *Rhinoleucophenga capixabensis* Culik and Ventura, 2009; *Rhinoleucophenga fluminensis* Costa Lima, 1950; and *Rhinoleucophenga joaquina* Schmitz et al., 2009. These specimens are deposited in the CEIOC, in the Museu de Ciências Naturais da Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre, RS, Brazil, and in the Museu Nacional, Rio de Janeiro, Brazil.

Nomenclature. This article and the nomenclature it contains have been registered in ZooBank (www.zoobank.org). The LSID number is urn:lsid:zoobank.org:pub:01BFF858-4E81-462A-AF20-0B87EBFFADDD.

Results

Rhinoleucophenga Hendel, 1917.

R. montensis sp.n. **Type Series.** Holotype: 1♂ labeled "*R. montensis*; HOLÓTIPO ♂; Brasil, Mato Grosso, Tangará da Serra. 14° 39′05″ S; 57° 25′25″ O, 24.iv.2009 col.: LTC Oliveira e MS Gonçalves,

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armadilha com isca de banana fermentada." Postabdomen was dissected and the terminalia were mounted with Canada balsam on a slide attached to the holotype specimen.

Type Locality. The holotype specimen was collected in a forest fragment situated near the campus of the Universidade do Estado do Mato Grosso, Tangará da Serra, Mato Grosso, Brazil (14° 39′05″ S; 57° 25′25″ W).

Diagnosis. Brown head, with ∼30 interfrontal setulae and inconspicuous frontal triangle. Thorax brownish yellow with 10 irregular rows of acrostichal setulae and 2 pairs of strong prescutellars. Tergites II–V have medially interrupted dark bands. Male terminalia are as shown in Figures 5–10.

Description. ♂. Head (Fig. 1). Brown frons; inconspicuous frontal triangle; ∼30 interfrontal setulae. Frons length = 0.80 mm; frontal index = 1.56; frontal tapering ratio = 0.88. Ocellar triangle prominent and ∼20% of frontal length. The or1/or3 ratio = 1.37; or2/or1 ratio = 0.56; vt index = 0.85; vibrissal index = 0.24. Brown face, carina conspicuous, and medially sulcate. Cheek index = 0.21; eye index = 1.62. Brown antennae, with plumose arista. Proboscis and palpi light brown.

Thorax (Figs. 2 and 3). Length = 1.92 mm. Scutum and scutellum brownish yellow; 10 irregular rows of acrostichal setulae. Two pairs of strong prescutellars. The ratio between inner and outer prescutellars = 1.5. One pair of proepisternals. Dorsocentral setae transverse distance is 3.94× the longitudinal distance; dc index = 0.44; scut index = 0.96; scut position index = 0.49. Basal scutellar setae divergent. Sterno index = 0.97. Only two sternopleural bristles. Whitish halteres. Light brown legs.

Wings (Fig. 4). Light; costal and marginal cells clouded. Sections II and III of the costa, R-M and dM-Cu clouded; R_{4+5} and M clouded at apex. Length = 3.03 mm; length to width ratio = 1.90. Indices: C = 2.76; ac = 1.14; hb = 0.50; 4C = 0.87; 4v = 1.97; 5× = 1.63; M = 0.80; prox. x = 0.65.

Abdomen (Fig. 5). Yellowish brown; medially interrupted dark bands on posterior margins of tergites II–IV; dark band on posterior margin of tergite V.

Body length 3.78 mm.

Terminalia (Figs. 6–11). Epandrium (Figs. 6 and 8) densely microtrichose, with ∼100 lower and 13 upper setae. Cerci small, linked to epandrium by a fine membranous tissue. Surstyli fused to epandrium, broader in ventral end, with a row of 17–18 peg-like prensisetae and 18 inner setae. Hypandrium strongly linked to epandrium, wider than long. Aedeagus (Figs. 7 and 9–11). Ring-shaped, longer than wide, dorsoventrally flattened, and concave with a dorsoposterior projection. Paraphyses long, erect, dorsoventrally flattened, shorter than aedeagus, and anteriorly pronounced, with six to seven tiny basal setulae. Aedeagal apodeme long, rod shaped, and linked to posterior margin of aedeagus.

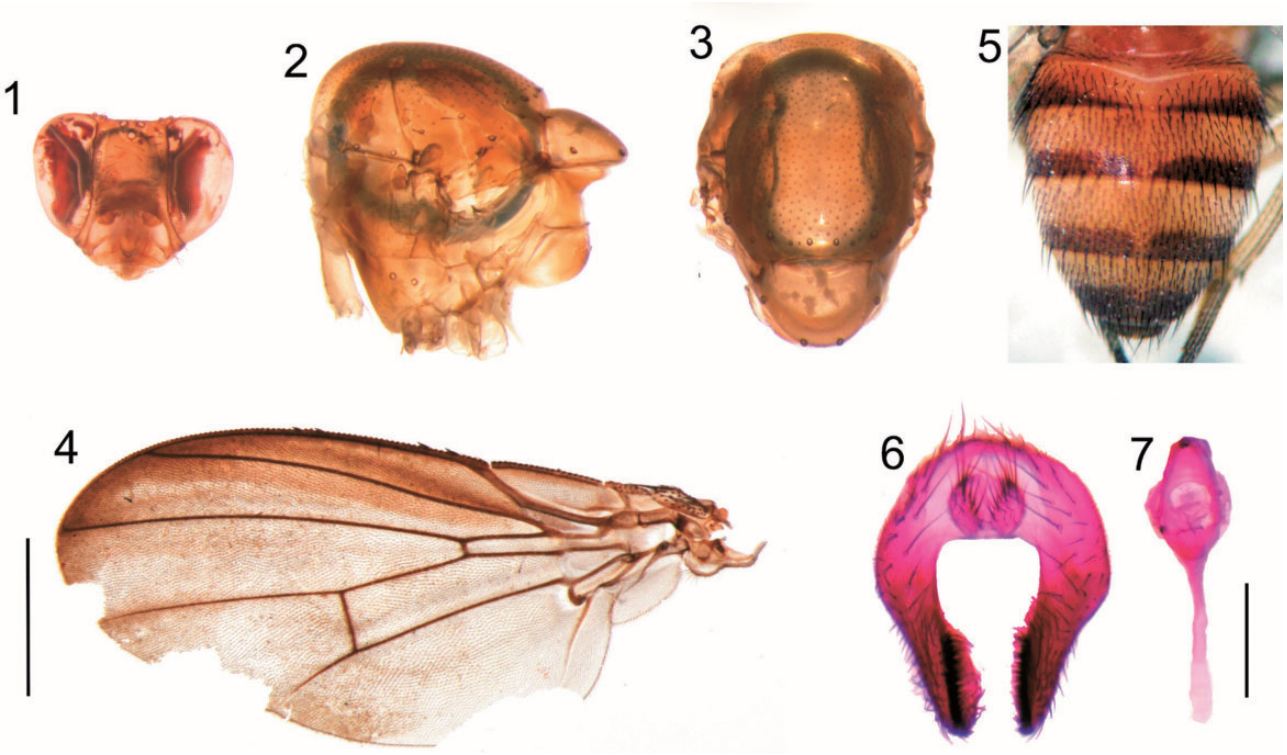
♀. Unknown.

Etymology. The species name is an allusion to the type locality, situated at the top of the Tapirapuã mountain range, and it is a derivation of the Latin word montem, which means "mountain range."

Distribution. The distribution is only known from type locality.

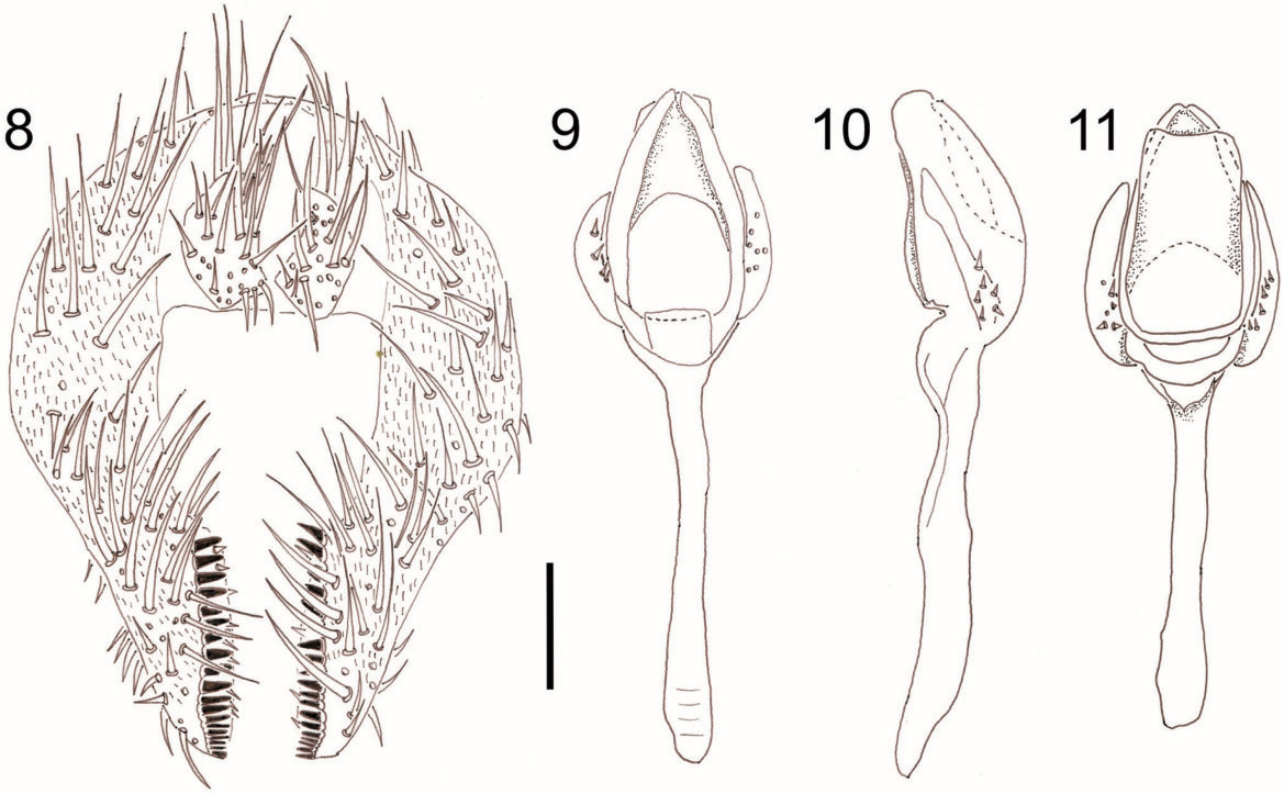
Rhinoleucophenga tangaraensis sp.n. **Type Series**. Holotype: 1♂ labeled "*R. tangaraensis*; HOLÓTIPO ♂; Brasil, Mato Grosso, Tangará da Serra. 14° 39′05″ S; 57° 25′25″ O, 9.ix.2008 col.: LTC Oliveira e MS Gonçalves, armadilha com isca de pimentão verde fermentado." Paratype: 1♂ labeled "*R. tangaraensis*; PARÁTIPO ♂; Brasil, Mato Grosso, Tangará da Serra. 8.vii.2007. col.: D.P. Lima, armadilha com isca de banana." The postabdomens of the holotype and paratype were dissected, and the terminalia were mounted with Canadian balsam on slides attached to the type specimens.

Type Locality. The holotype and paratype specimens were collected in a forest fragment situated near the campus of the Universidade do Estado do Mato Grosso, Tangará da Serra, Mato Grosso, Brazil (14° 39′05″ S; 57° 25′25″ W).

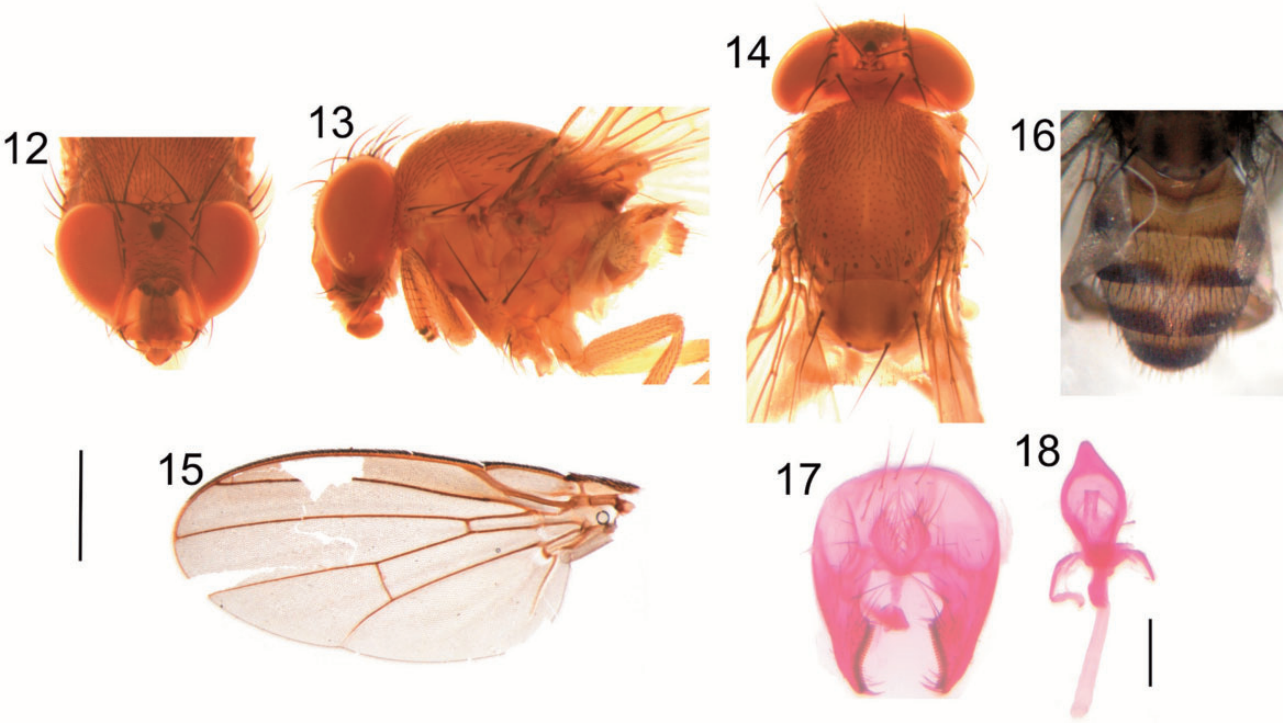


Figs. 1–7. Holotype of *R. montensis* sp.n. ♂. (1) Head, frontal view. (2) Thorax, lateral view. (3) Thorax, dorsal view. (4) Wing. (5) Abdomen, dorsal view. (6) Epandrium, cerci and surstyli, posterior view. (7) Aedeagus, apodema of aedeagus and parameres. Figures 1–5, left bar = 1 mm; figures 6–7, right bar = 0.1 mm.

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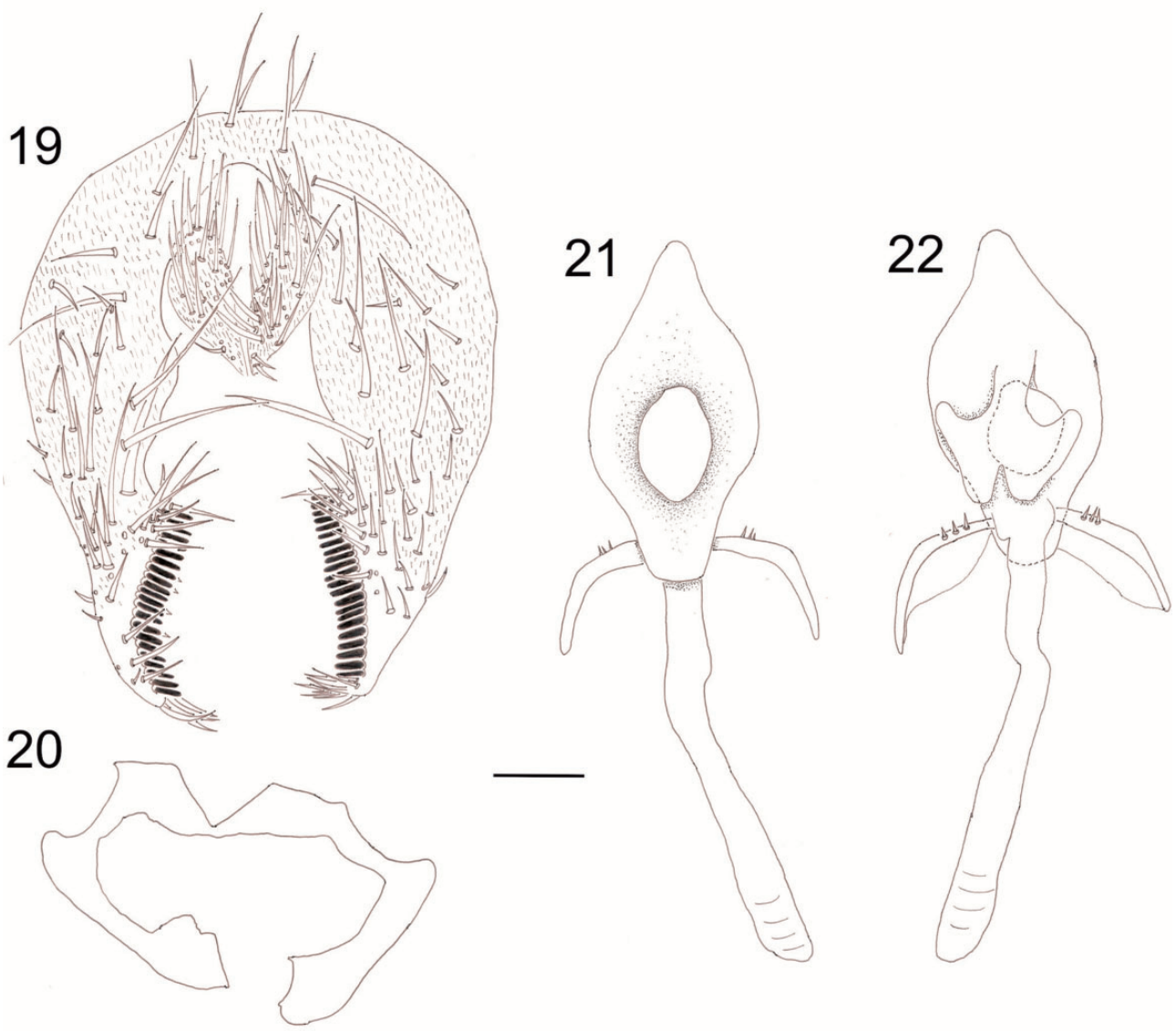


Figs. 8–11. Male terminalia of holotype of *R. montensis* sp.n. ♂. (8) Epandrium, cerci and surstyli, posterior view. (9) Aedeagus, apodema of aedeagus and paraphysis, ventral view. (10) Aedeagus, apodema of aedeagus and paraphysis, lateral view. (11) Aedeagus, apodema of aedeagus and paraphysis, dorsal view. Bar = 0.1 mm.



Figs. 12–18. Holotype of *R. tangaraensis* sp.n. ♂. (12) Head, frontal view. (13) Thorax, lateral view. (14) Thorax, dorsal view. (15) Wing. (16) Abdomen, dorsal view. (17) Epandrium, cerci and surstyli, posterior view. (18) Aedeagus, apodema of aedeagus and paraphysis. Figures 12–16, left bar = 1 mm; figures 17–18, right bar = 0.2 mm.

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Figs. 19–22. Male terminalia of holotype of *R. tangaraensis* sp.n. ♂. (15) Epandrium, cerci and surstyli, posterior view. (16) Hypandrium, posterior view. (17) Aedeagus, apodema of aedeagus and paraphysis, ventral view. (18) Aedeagus, apodema of aedeagus and paraphysis, dorsal view. Bar = 0.1 mm.

Diagnosis. Brown head, with ~60 interfrontal setulae. Triangular spot in the anterior apex of the ocellar triangle, in front of the middle ocellus. Light brown thorax, with scutellum lighter than scutum. Ten irregular rows of acrostichal setulae. Three pairs of strong prescutellars. Yellowish brown abdomen with dark bands in posterior margin of tergites II–V, medially interrupted in tergites II–IV. Male terminalia are as shown in Figures 17–22.

Description. ♂ (Holotype). Head (Fig. 12). Brownish yellow to brown frons, with a triangular spot in the anterior apex of ocellar triangle, in front of the middle ocellus; 26 interfrontal setulae. Length of frons = 0.64 mm; frontal index = 0.80; frontal tapering ratio = 1.25. Ocellar triangle prominent and ~25% of frontal length. The or1/or3 ratio = 0.82; or2/or1 ratio = 0.68; vt index = 1.32; vibrissal index = 0.50. Brownish yellow face, carina conspicuous, and medially sulcate. Cheek index = 0.19; eye index = 1.39. Antennae with yellow scapes, brownish yellow pedicels, and flagellomeres; aristae with 7 dorsal, 5 ventral, and 8 inner branches. Proboscis and palpi brownish yellow. Each palpus has two prominent bristles and ~10 smaller bristles.

Thorax (Figs. 13 and 14). Length = 2.32 mm. Scutum brownish yellow, with scutellum lighter than scutum, 10 irregular rows of acrostichal setulae. Three pairs of strong prescutellars. One proepisternal setula. Transverse distance of dorsocentral setae 3.26× the longitudinal distance. Scutellars broken. Scut position index = 1.00. Basal scutellar setae divergent. Sterno index = 1.04; only two sternopleural bristles. Halteres whitish; legs yellow.

Wings (Fig. 15). Light, with clouded costal and marginal cells, brownish venation, length = 3.30 mm, length to width ratio = 2.04. Indices: C = 3.75; ac = 1.30; hb = 0.52; 4C = 0.72; 4v = 1.73; 5× = 1.78; M = 0.67; prox. x = 0.63.

Abdomen (Fig. 16). Yellowish brown with dark bands in the posterior margins of tergites II–V, medially interrupted bands in tergites II–IV. Posterior margin dark band medially narrower in tergite II and medially broader in tergites III and IV.

Body length = 4.05 mm.

Terminalia (Figs. 17–22). Epandrium (Figs. 17 and 19) microtrichose, with ~100 lower and 7 upper setae. Cerci small, fused to epandrium. Surstyli fused to epandrium, broader in ventral end, with a row of ~22 peg-like prensisetae and 18 inner setae. Hypandrium wider than long (Fig. 20). Aedeagus (Figs. 18, 21, and 22) ring-like, longer than wide, dorsoventrally flattened, concave, with a large bilobed dorsal

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process. Paraphyses long, erect, dorsoventrally flattened, shorter than aedeagus, with three tiny basal setulae. Aedeagal apodeme long, rod-shaped, linked to posterior margin of aedeagus.

Description of paratype: The color pattern is the same as in the holotype. Below, we present the paratype measurements:

Head: length of frons = 0.68 mm; frontal index = 0.92; frontal tapering ratio = 1.12; ocellar triangle prominent and ~25% of frontal length; or1/or3 ratio = 0.80; or2/or1 ratio = 1.00; vt index = 1.00; vibrissal index = 0.52; cheek index = 0.23; eye index = 1.33. Thorax: length = 1.80 mm; 10 irregular rows of acrostichal setulae, three pairs of strong prescutellars. Ratio of inner and outer prescutellars = 2.12. One proepisternal setula. Transverse dorsocentral setae distance 3.60× longitudinal distance; dc index 0.75; scut index; scut position index = 1.13. Basal scutellar setae divergent. Sterno index = 1.16. Wing length = 3.20 mm, length to width ratio = 1.76. Indices: C = 2.04; ac = 1.15; hb = 0.53; 4C = 0.75; 4v = 1.70; 5x = 1.63; M = 0.65; prox. $x = 0.60$.

♀. Unknown.

Etymology. The species name is an allusion to the name of its type locality, the city of Tangará da Serra.

Distribution. The distribution is only known from type locality.

Discussion

R. montensis sp.n. and *R. tangaraensis* sp.n. were positioned in *Rhinoleucophenga* by the presence of strong prescutellar bristles and only two sternopleural bristles, divergent basal scutellar bristles, and a small gena (reflected by the low cheek index values). The traits of the male terminalia (the lateralized and anteriorly pronounced paraphyses and the ring-like aedeagus), as found in *R. obesa*, *R. joaquina,* and *R. personata*, were also important for elucidating the identities of *R. montensis* sp.n. and *R. tangaraensis* sp.n. and placing them in *Rhinoleucophenga*.

The two new species differ from *R. americana* (Patterson 1943), *R. bivisualis* (Patterson 1943), *R. brasiliensis*, *R. fluminensis*, *R. joaquina,* and *Rhinoleucophenga sonoita* (Wheeler 1949) by the arista morphology, which is plumose in the two new species and pubescent in the others. The color pattern of the thorax and abdomen is a distinctive feature among the two new species described here, and *Rhinoleucophenga bezzii* Duda 1927, *Rhinoleucophenga breviplumata* Duda 1927, *R. capixabensis*, *Rhinoleucophenga flaviceps* Duda 1929, *Rhinoleucophenga gigantea* (Thomson 1869), *R. lopesi*, *R. matogrossensis*, *R. nigrescens*, *R. obesa*, *Rhinoleucophenga pallida* Hendel 1917, *R. personata*, *R. punctulata,* and *Rhinoleucophenga subradiata*. *R. montensis* sp.n. and *R. tangaraensis* sp.n. are similar to *R. angustifrons* in the presence of the medial interruption in the tergite dark bands. However, the latter species differs from *R. tangaraensis* sp.n. in body length (two times smaller) and the absence of the dark spot in the anterior apex of the ocellar triangle. *R. montensis* sp.n. differs from *R. angustifrons* in body length and wing color pattern, with clouded costal and marginal cells occurring in the former. *R. angustifrons* also presents a narrowed frons, differing from the species described here, which have a nearly squared frons. *R. stigma* differs from *R. montensis* sp.n. and *R. tangaraensis* sp.n. in the presence of two brown spots on the scutum and the straight R_{4+5} (mentioned by Duda 1929 in the key to species), which is found in the former species. *R. tangaraensis* sp.n. and *R. stigma* share the presence of a stain in the previous apex of the ocellar triangle.

As the phylogenetic relationships of the species of *Rhinoleucophenga* have not been studied, it is difficult to determine which species may be closer to *R. montensis* sp.n. and *R. tangaraensis* sp.n. However, on the basis of the morphological similarity, we suggest that *R. obesa* and *R. gigantea* may be related to *R. montensis* sp.n. and that *R. stigma* may be related to *R. tangaraensis* sp.n.

Acknowledgments

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