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Objektyp: **Article**

Zeitschrift: **Mitteilungen der Schweizerischen Entomologischen Gesellschaft = Bulletin de la Société Entomologique Suisse = Journal of the Swiss Entomological Society**

Band (Jahr): **82 (2009)**

Heft 3-4

PDF erstellt am: **10.08.2024**

Persistenter Link: <https://doi.org/10.5169/seals-402987>

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## Redescriptions of three South American species of *Rhinoleucophenga* described by Oswald Duda (Diptera, Drosophilidae)

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*Rhinoleucophenga stigma flaviceps* Duda, 1929, *Rhinoleucophenga punctulata* Duda, 1929, and *Rhinoleucophenga subradiata* Duda, 1929 are redescribed based on their holotypes, all collected in the province of Santa Cruz, Bolivia and deposited in the Staatliches Museum für Naturkunde, Stuttgart, Germany. Illustrations and photomicrographs of the male terminalia of the latter two species are included. A proposal is made to raise to specific rank the first taxon, which was originally described as a variety (and later on considered a subspecies) of *Rhinoleucophenga stigma* Hendel, 1917, from the province of La Paz, Bolivia. *Rhinoleucophenga punctulata* is recorded for the first time from Argentina (province of Formosa). Doubt is cast on the occurrence of *Rhinoleucophenga bivisualis* (Patterson 1943) in South America.

Keywords: Argentina, Bolivia, Brazil, illustrations, male terminalia.

### INTRODUCTION

The Drosophilidae collected by Dr. Erwin Lindner during the German expedition to the South American semiarid biome named Chaco from September 1925 through November 1926 were analyzed by Dr. Oswald Duda. The results were published in a paper (Duda 1929), where four out of the eleven species identified were described as new to science, one in the genus *Leucophenga* and three in the genus *Rhinoleucophenga*. The description of the *Leucophenga* species was based on a large series of three males and 12 females, whereas the descriptions of the three species of *Rhinoleucophenga* were based on single specimens.

The New World genus *Rhinoleucophenga* as currently recognized (Brake & Bächli 2008) comprises 18 species. As yet, the identity of most of them is uncertain because the following eight species are apparently only known from female specimens: *Rhinoleucophenga angustifrons* Malogolowkin, 1946, *Rhinoleucophenga bezzii* Duda, 1927, *Rhinoleucophenga brasiliensis* (da Costa Lima, 1950), *Rhinoleucophenga brevipilumata* Duda, 1927, *Rhinoleucophenga fluminensis* (da Costa Lima, 1950), *Rhinoleucophenga lopesi* Malogolowkin, 1946, *Rhinoleucophenga nigrescens* Malogolowkin, 1946, and *Rhinoleucophenga stigma* Hendel, 1917. It should be pointed out that only a part of the female internal reproductive organs (the spermathecae) of *R. brasiliensis* and *R. fluminensis* were depicted by da Costa Lima (1950), who omitted to state the sex of the type specimens he used in his descriptions. On the other hand, out of the remaining ten species known also (or

just) from males, the male terminalia [internal and/or external, sensu Bächli *et al.* 2004: 14] have been illustrated for just seven, namely *Rhinoleucophenga americana* (Patterson, 1943) ([as *Gitona*], see Hsu 1949: 125 [fig. 2]; Wheeler & Takada 1971: 230, [figs 8a–d]), *Rhinoleucophenga bivisualis* (Patterson, 1943) ([as *Gitona*], see Grimaldi 1990: 73 [fig. 406], 75 [fig. 420]), *Rhinoleucophenga gigantea* (Thomson, 1869) (see Vilela 1990: 501 [figs 1–7], 502 [figs 8–12]), *Rhinoleucophenga obesa* (Loew, 1872) (see da Costa Lima 1935: 62 [fig. 3]; Malogolowkin 1946: 419 [figs 2–7]; Wheeler & Takada 1971: 227 [figs 4a–e]), *Rhinoleucophenga pallida* (Hendel, 1917) (see Duda 1927: 44 [fig. 13] [syntype, according to Bächli 1988: 142]; Grimaldi 1990: 73 [fig. 404], 75 [fig. 422] [provenance not stated]), *Rhinoleucophenga personata* Malogolowkin, 1946 (see Malogolowkin 1946: 423 [figs 12, 13]), and *Rhinoleucophenga sonoita* (Wheeler, 1949) ([as *Gitona*], see Hsu 1949: 125 [fig. 1]). We are convinced that only their redescrptions, including detailed analyses of the male terminalia, will permit to clarify their identities and to understand their relationships with the species currently included in the Old World and Australian genus *Gitona*. Thus, the main goal of the present paper is to redescrcribe three of them (one being so far considered a subspecies), which are up to now only known from their type localities in the province of Santa Cruz, Eastern Bolivia.

#### MATERIAL AND METHODS

The redescrptions were based on the male holotypes of *Rhinoleucophenga punctulata* Duda, 1929 and *Rhinoleucophenga subradiata* Duda, 1929, and on the female holotype of *Rhinoleucophenga stigma flaviceps* Duda, 1929, all of them on loan from the Staatliches Museum für Naturkunde, Stuttgart (SMNS), Germany. Additional ordinary specimens of *R. punctulata*, housed in the collections of the Instituto Superior de Entomologia (INSUE), Universidad Nacional de Tucumán, San Miguel de Tucumán, Province of Tucumán, Argentina (10 ♂♂, 5 ♀♀), and of the Museu de Zoologia (MZSP), Universidade de São Paulo, São Paulo, state of São Paulo, Brazil (1 ♂), were used only for distributional purposes.

Label data attached to each type specimen are cited in full with a backslash indicating a label change. Our own notes or interpretations are included in brackets (also in other items throughout the text).

Preparations of microscope slides were made following Wheeler & Kamby-sellis (1966) and Kaneshiro (1969). The abdominal sclerites, including the dis-articulated male terminalia, are preserved in microvials filled with glycerin and attached by the stopper to the pin of the respective specimen. Refer to Vilela & Bächli (2000) and Bächli *et al.* (2004) for further details.

Male terminalia were drawn using a camera lucida (1.4x) attachment on a compound microscope under a 40x objective. They were photographed with a photomicroscope under a 6.3x objective.

Nine drawings of the male terminalia were made for each species as follows: posterior and left lateral view of the epandrium and associated structures, and of the hypandrium and associated structures, five aspects (clockwise from dorsal through ventral) of the aedeagus and associated structures. Photomicrographs were taken of the male terminalia in dorsal and left lateral view. For *Rhinoleucophenga subradiata* an additional photomicrograph of the male terminalia in posterior view was

taken under a 16x objective. Whenever in the same plate, all figures were drawn to the same scale and all photomicrographs were taken and enlarged to the same magnification, unless otherwise indicated.

For measurements and indices see Vilela & Bächli (1990); for morphological terminology see Vilela & Bächli (2000) and Bächli *et al.* (2004).

### *Rhinoleucophenga* Hendel, 1917

*Rhinoleucophenga* Hendel, 1917: 44 [description]; Duda 1924: 179 [key]; Malloch & McAtee 1924: 27 [key], 33 [description]; Duda 1925: 151 [key]; Duda 1927: 14 [key]; Duda 1929: 42 [key]; Curran 1934: 327 [key]; Duda 1934: 16 [key]; Schulze *et al.* 1936: 3033 [list]; Neave 1940: 44 [list]; Malogolowkin 1946: 415 [description]; Wheeler 1952: 165 [key], 193 [type species]; Box 1953: 51, 83 [host species]; Hardy 1965: 18, 33 [affiliation]; Wheeler 1965: 762 [Nearctic catalog]; Takada 1966: 43 [description]; McAlpine 1968: 515, 517, 518 [affiliation, taxa included]; Speight 1969: 400 [description]; Cole 1970: 405 [key]; Wheeler 1970: 79.5 [Neotropical catalog]; Wheeler & Takada 1971: 225 [status]; Throckmorton 1975: 429 [phylogeny]; Ashburner 1981: 400, 401 [ecology, also under *Gitona*]; Val *et al.* 1981: 153 [taxa included]; Wheeler 1981a: 29 [World catalog, status, taxa included]; Wheeler 1981b: 112 [status]; Wheeler 1987: 1016 [key]; Grimaldi 1988: 185 [taxa included]; Okada 1989: 394 [phylogeny], 397 [key]; Grimaldi 1990: 109, 113 [phylogeny]; Remsen & O'Grady 2002: 254, 256, 257 [phylogeny]; Ashburner *et al.* 2005: 1127, 1129 [phylogeny], 1186 [status].

*Diagnosis.* Arista varying from plumose with large branches to microtrichose or even bare; numerous interfrontal setulae; eye bare; wing hyaline, crossveins clouded in a few species, cells bm and dm confluent; scutum with or without dark spots at base of setae and setulae; one fine but distinct proepisternal; one long pre-scutellar; 8th tergite, although narrow, apparently present in some species, not fused to epandrium; cerci linked to epandrium by membranous tissue; surstyli completely fused to epandrium, bearing a row of prenisetae in most species; decasternum in upper position, sometimes mostly membranous; hypandrium reduced and completely fused to gonopods, wider than long, in some species strongly linked to 7th sternite, which is externally concave; aedeagus dorsoventrally flattened in most species, proximally articulated with aedeagal apodeme, which is well developed, rod-shaped, posteriorly bifurcated, longer than aedeagus; one pair of paraphyses (outer paraphyses); inner paraphyses apparently either fused completely to aedeagus or partially fused to each other, then dorsally positioned over the aedeagus and proximally articulating with it and/or with the bifid posterior end of the aedeagal apodeme.

*Taxa included* (18). Deducing from Wheeler's Catalogue (1981a: 24, 29), the distinction between the genera *Gitona* Meigen and *Rhinoleucophenga* Hendel is not clear. Recently, following Bächli *et al.*'s (2004: 58) suggestion, all the 18 described New World species were combined into *Rhinoleucophenga* in the World Catalogue of Insects: Drosophilidae (Brake & Bächli 2008: 291). Thus, the genus *Gitona* is currently considered to be restricted to the species occurring in the Old World and Australia.

*Comments.* It seems that Basden (1966: 85) was the first to refer to a Caribbean species of an American *Gitona* (probably *fluminensis*) as a synonym of *Rhinoleucophenga*. However, Bock (1982: 21) had the opinion that perhaps the long-standing suspicion that the American species originally described in the genus *Gitona* are different from the species of *Gitona* described from Europe, Asia and Africa, originated from an error in McAlpine's (1968: 517) key in which the European

species key out following the couplet 10 (first [sic] basal and discal cells separated). As he stressed, there are no traces of a crossvein separating the second basal and discal wing cell in *Gitona distigma*. However, whether or not there are two non sympatric genera (*Gitona* and *Rhinoleucophenga*) or just one worldwide genus *Gitona* remains an open question. Synapomorphies that unite both taxa probably exist in the sclerites of male terminalia as they seem structurally very similar. Thus, comparative studies of such structures are strongly needed to address this question. As only a comprehensive revision of the species currently included in *Rhinoleucophenga* may allow a conclusion regarding their generic position, we therefore abstain from changing the affiliation of the three species redescribed below, in spite of good arguments for combining them with *Gitona*.

Regarding the ecological requirements of the species belonging to both genera, Ashburner (1981: 400, 401) mentioned that certain *Rhinoleucophenga* species are known as predators of some scale insects belonging to the superfamily Coccoidea of the order Hemiptera. However, although he questioned the possibility of the Palaearctic-Oriental *Gitona distigma* being an example of an aphidophagous species in the larval stage (preying on plant lice of the hemipteran superfamily Aphidoidea), we suggest that such a possibility should also be considered for some species currently included in the American genus *Rhinoleucophenga*.

***Rhinoleucophenga flaviceps* Duda, 1929, stat. nov.**

*Rhinoleucophenga stigma* Hendel var. *flaviceps* Duda, 1929: 43 [key], 46, 47 (description); Malogolowkin 1946: 417 [key]; Wheeler 1970: 79.5 [Neotropical catalog]; Wheeler 1981a: 29 [World catalog, as a subspecies]; Brake & Bächli 2008: 292 [World catalog, as a variety].

*Rhinoleucophenga flaviceps* Duda, 1929; Bächli 1990: 3 [type material, as a synonym of *R. stigma*].

**Diagnosis.** Similar to but having half the length of *Rhinoleucophenga stigma*. Tip of ocellar triangle not black. Scutum and scutellum completely yellow. Both dorsal and ventral branches of the arista long and of almost equal length.

**Material examined** (1 ♀). Holotype ♀ (deposited in SMNS), labelled «Sa. [Santa] Rosita. Chiq [Chiquitos] 1–3.X.[19]26 Lind. [Erwin Lindner collegit] D. [Deutsche] Chaco-Exped [back side reads Suto [?] ] \ [yellow label] \ Type [red label] \ R. [Rechter] Flügel fotogr. [green label] \ *Rhinoleucophenga stigma flaviceps* Duda n. sp. Type ♀ 1929 [red marked label divided into 2 parts] \ *Rhinoleucophenga flaviceps* D. [Duda] Holotype ♀ G. Bächli det. 1988 \ *Rhinoleucophenga flaviceps* Duda Bächli & Vilela det. 2007.»

**Type locality.** [Santa Rosita] 60 km N of San José de Chiquitos, province of Santa Cruz, Bolivia.

**Redescription.** ♀.

Head. Frons golden yellow, covered with about 20 interfrontal setulae in lower half, frontal length 0.45 mm; frontal index = 1.26, top to bottom width ratio = 1.17. Frontal triangle indistinct, about 62 % of frontal length; ocellar triangle (around the 3 ocelli) prominent, blackish along the inner margins of the ocelli, about 31 % of frontal length. Orbital plates parallel to the eye margin, about 66 % of frontal length. Orbital setae black, almost in a line, or2 closer to or1 than to or3, distance of or3 to or1 = 125 % of or3 to vtm, or1 / or3 ratio = 1.00, or2 / or1 ratio = 0.63, postvertical setae convergent, about 21 % of frontal triangle, ocellar setae = 62 % of frontal length; vibrissal index = 0.36. Face yellowish. Carina narrow, somewhat nose-

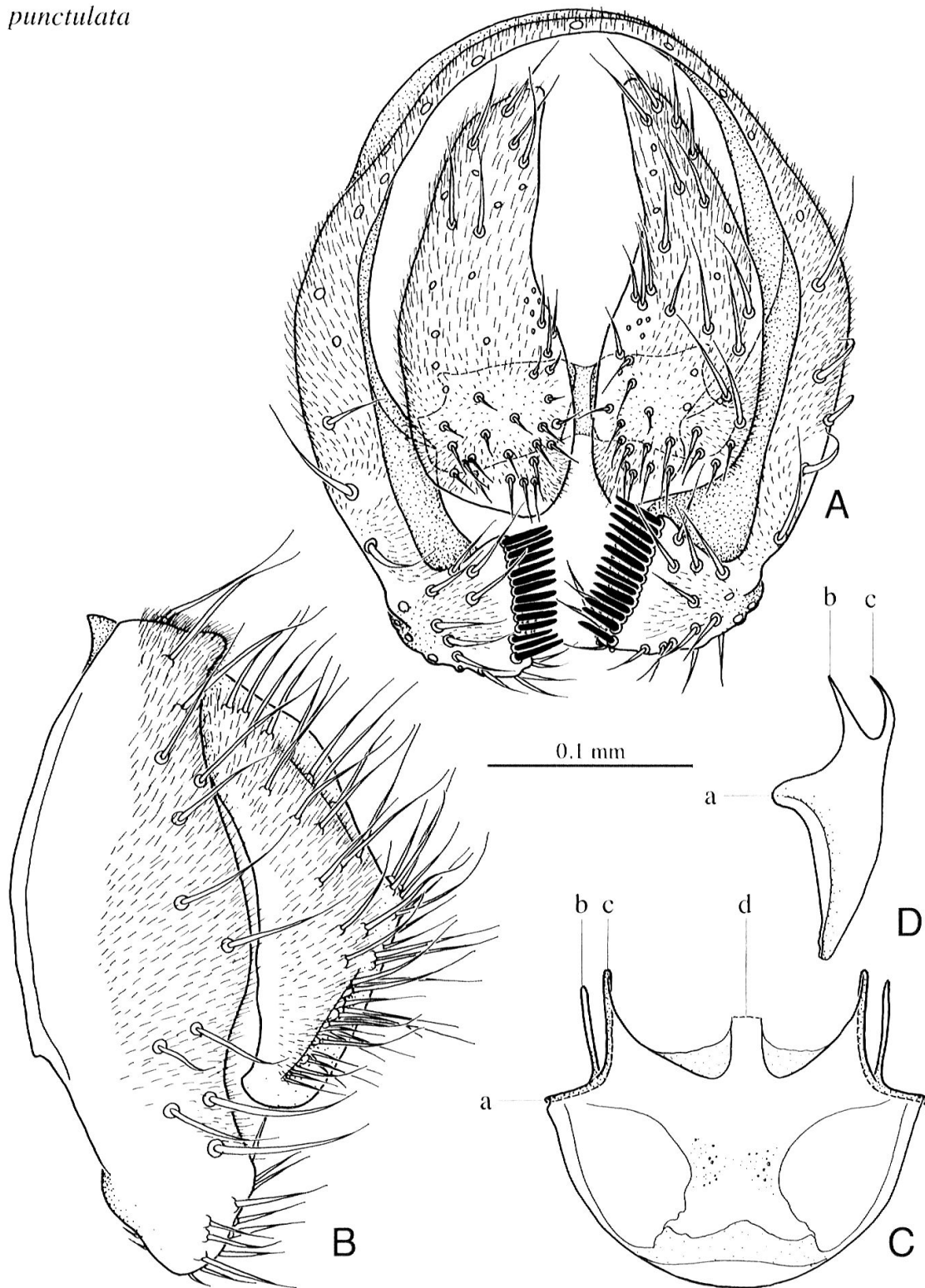
*punctulata*

Fig. 1. *Rhinoleucophenga punctulata* Duda, male holotype. A, epandrium+surstyli, cerci, and decasternum, posterior view. B, epandrium+surstylus, and cercus, left lateral view. C, hypandrium+gonopods, ventral view. D, idem, left lateral view. The lowercase letters in the hypandrium figures indicate articulation points with other sclerites: a (epandrium), b (dorsal arch), c (paraphysis), and d (aedeagal apodeme).

like, dorsally flat. Cheek whitish, index about 9. Eye index = 1.13. Antenna brownish-yellow. Flagellomere 1 covered with slightly elongated setulae, length to width ratio = 1.57. Arista with 6 dorsal, 4 ventral and about 4–5 small inner branches, plus short terminal fork. Proboscis yellow. Palpus broad, flat, yellow, apically darkened.

Thorax brownish-yellow, length 1.50 mm. 8 rows of acrostichal setulae. Transverse distance of dorsocentral setae 300 % of longitudinal distance; dc index = 0.59. One pair of prescutellar setae, index = 0.90. Scutellar setae nearly equidistant; basal setae divergent; scut index = 1.00. Pleura brownish below wing base, sterno index = 0.96, median katepisternal seta about 35 % of the anterior one. Halter white. Legs yellowish, preapical setae on tibiae 2 and 3, apical seta on tibia 2.

Wing hyaline, veins  $R_{4+5}$  and M parallel, crossvein dM-Cu oblique, length 2.66 mm, length to width ratio = 2.11. Indices: C = 3.06, ac = 1.78, hb = 0.44, 4C = 1.23, 4v = 3.08, 5x = 2.29, M = 1.23, prox. x = 1.00.

Abdomen. Yellowish, with blackish-brown bands at posterior margins: narrow and medially interrupted on tergite 2, medially narrowed on tergite 3, medially enlarged on tergite 5, completely covering tergite 6.

*Distribution.* Bolivia (province of Santa Cruz).

*Comments.* Duda (1929: 43) distinguished *R. flaviceps* from *R. stigma* in particular by the missing black spot covering the tip of the ocellar triangle, which is present in the latter species. Besides many other differences, there is a considerable size difference between the two species – *R. stigma* is about double the size of *R. flaviceps* – which was overlooked by Duda. Neither Hendel (1917) nor Duda (1927) gave any statement about the size of the *R. stigma* specimens. A green label attached to the holotype of *R. flaviceps* (see material examined) stated that the right wing was photomicrographed, but an image was not included in the original paper. Even though represented by the female holotype only, we are now (contrary to Bächli 1990) convinced that *R. flaviceps* is not conspecific with *R. stigma*.

### ***Rhinoleucophenga punctulata* Duda, 1929** (Figs 1, 2, 5A, B)

*Rhinoleucophenga punctulata* Duda 1929: 43 [key, description (wrongly cited as a female)]; Malogolowkin 1946: 417 [key]; Wheeler 1970: 79.5 [Nearctic catalog]; Wheeler 1981a: 29 [catalog]; Bächli 1990: 3 [type material]; Brake & Bächli 2008: 292 [World catalog].

*Diagnosis.* Scutum and scutellum covered with small brownish spots at bases of setae and setulae. Ocellar triangle prominent; each ocellus surrounded by a conspicuously black crescent along the inward-directed margin. Arista with 6 short dorsal, 4 short ventral and about 5 small inner branches, plus small terminal fork; dorsal branches mildly s-shaped and slightly longer than ventral ones, which are straight. Aedeagus dorsoventrally flattened, probably completely fused to inner paraphyses, tip pointed and remarkably curved dorsad in lateral view, dorsal cleft ellipsoid; aedeagal apodeme rod-shaped, bifid at posterior end, twice as long as aedeagus; outer paraphysis half the length of aedeagus, bearing one submedian setula.

*Material examined* (1 ♂). Holotype ♂ (dissected, deposited in SMNS), labelled: «Sa. [Santa] Rosita. Chiq [Chiquitos] 1–3.X.[19]26 Lind. [Erwin Lindner collegit] D. [Deutsche] Chaco-Exped \ [yellow label] \ Type [red label] \ *Rhinoleucophenga punctulata* Duda n. sp. [left half] Type Duda 1929 [right half] [red marked

*punctulata*

0.1 mm

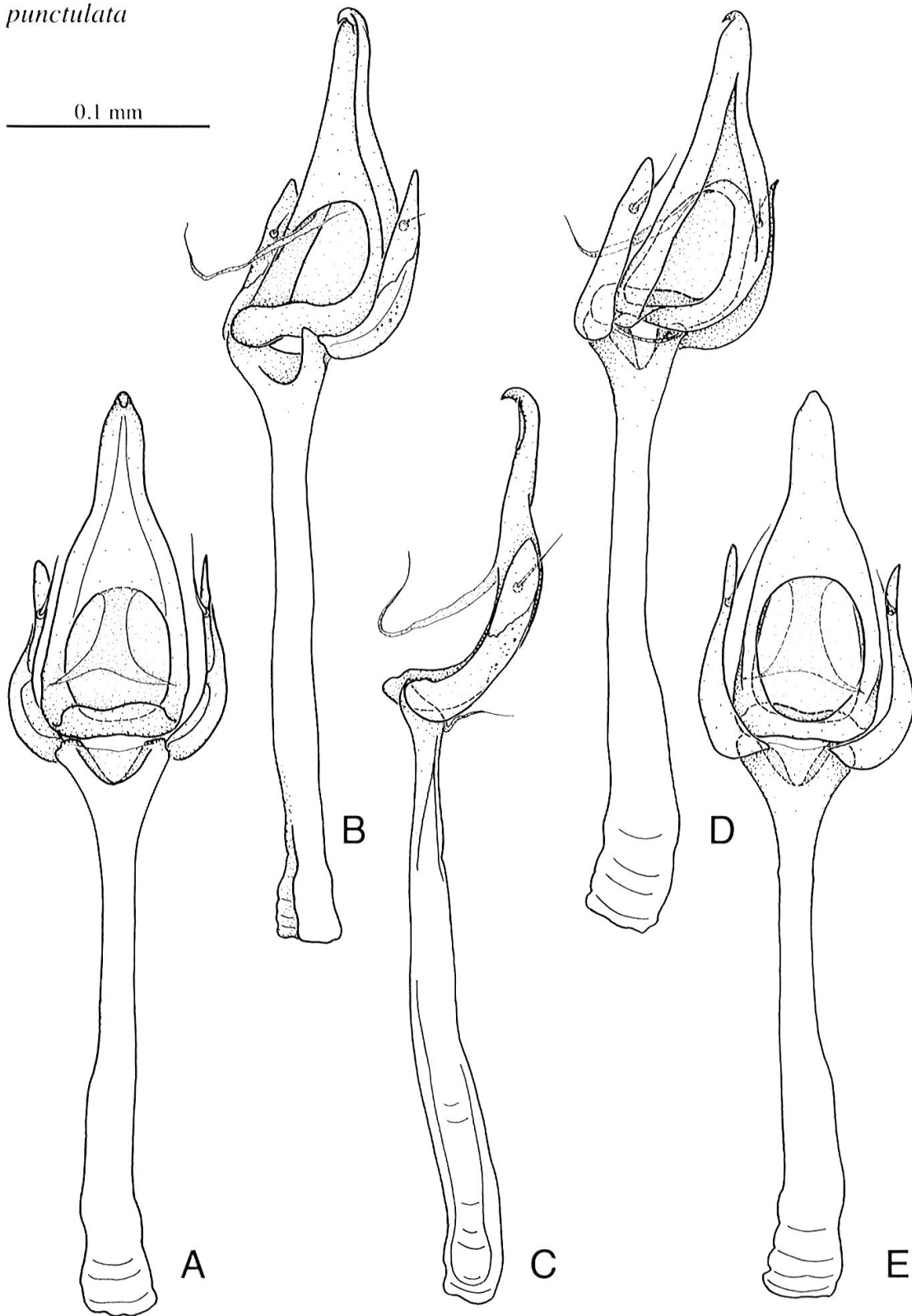


Fig. 2. *Rhinoleucophenga punctulata* Duda, male holotype. A–E, aedeagus, aedeagal apodeme and paraphyses, several aspects from dorsal through ventral.



label divided into 2 parts] \ *Rhinoleucophenga punctulata* Holotype ♂ G. Bächli det. 1988 \ *Rhinoleucophenga punctulata* Duda Bächli & Vilela det. 2007.»

*Type locality.* [Santa Rosita] 60 km N of San José de Chiquitos, province of Santa Cruz, Bolivia.

*Redescription.* ♂ (based on the holotype).

Head. Frons brownish-yellow, with about 20 interfrontal setulae covering the lower half, frontal length 0.37 mm; frontal index = 1.29, top to bottom width ratio = 1.18. Frontal triangle indistinct, about 64 % of frontal length; ocellar triangle (around the 3 ocelli) prominent, about 50 % of frontal length. Orbital plates parallel to eye margin, whitish microtrichose, about 91 % of frontal length. Orbital setae black, almost in a line, each with a dark brown patch around base, or2 slightly closer to or1 than to or3; distance of or3 to or1 = 220 % of or3 to vtm, or1 / or3 ratio = 1.10, or2 / or1 ratio = 0.73, postvertical setae fine, convergent, about 23 % of frontal length, ocellar setae = 50 % of frontal length; vibrissal index = 0.56. Face pale yellow. Carina narrow, slightly noselike. Cheek whitish, index about 7. Eye with dispersed, short pile, index = 1.22. Antenna brownish, length to width ratio of flagellomere 1 = 1.50. Both dorsal and ventral branches of the arista relatively short, dorsal branches mildly s-shaped and slightly longer than ventral ones, which are straight; length of dorsal ones about 1/2 of width of flagellomere 1; both branches apparently longer than those estimated from plate I in Patterson (1943) for *G. bivisualis*, but just slightly shorter than those shown by Duda (1927: 46) for *R. brevipumata*, where both dorsal and ventral branches seem to be mildly s-shaped. Proboscis and palpus yellowish.

Thorax yellowish, greyish pollinose, with scattered, small brownish spots, mostly at bases of setae and setulae, length 1.05 mm. Acrostichal setulae partly destroyed. Distance between apical scutellar setae about 90 % of that between apical and basal one, basal setae divergent; scut index = 1.00. Pleura yellowish, with a diffuse brownish median stripe, katepisternum also slightly brownish, sterno index = 1.12, median katepisternal seta about 26 % of the anterior one. Halter yellow. Legs pale yellow, preapical setae on tibiae 2 and 3, apical seta on tibia 2.

Wing hyaline, veins  $R_{4+5}$  and M parallel, crossvein dM-Cu oblique, length 1.92 mm, length to width ratio = 2.20. Indices: C = 2.75, hb = 0.50, 4C = 1.71, 4v = 4.00, 5x = 2.00, M = 1.43, prox. x = 1.57.

Abdomen with yellow ground color, tergite 2 medially and laterally brownish, tergites 3 to 6 each with a broad, dark brown band which is medially interrupted and laterally broadened; the bands are distant from hind margin and gradually enlarged towards tip of abdomen.

Terminalia (Figs 1, 2, 5A, B). Epandrium distally microtrichose with about 28 upper+lower setae, mostly distally positioned, anteroventrally folded over itself forming a double wall (its inner part probably representing the inner wall of the surstylus), anteriorly not fused but linked by membranous tissue to a narrow 8th tergite; ventral lobe not recognizable. Cercus large, anteriorly connected to epandrium by membranous tissue, mostly microtrichose, devoid of ventral lobe; apparently connected anteroventrally to decasternum (proximal sclerite of Vilela 1990: 501 [figs 1, 2], 502); ventral margin straight. Surstylus completely fused to epandrium, microtrichose over central area, with a straight row of ca. 14 evenly spaced, long, peg-like prensisetae; outer and inner setae not recognizable. Decasternum rectangle-shaped, positioned high up behind cerci (Fig. 1A). Hyandrium reduced, shorter

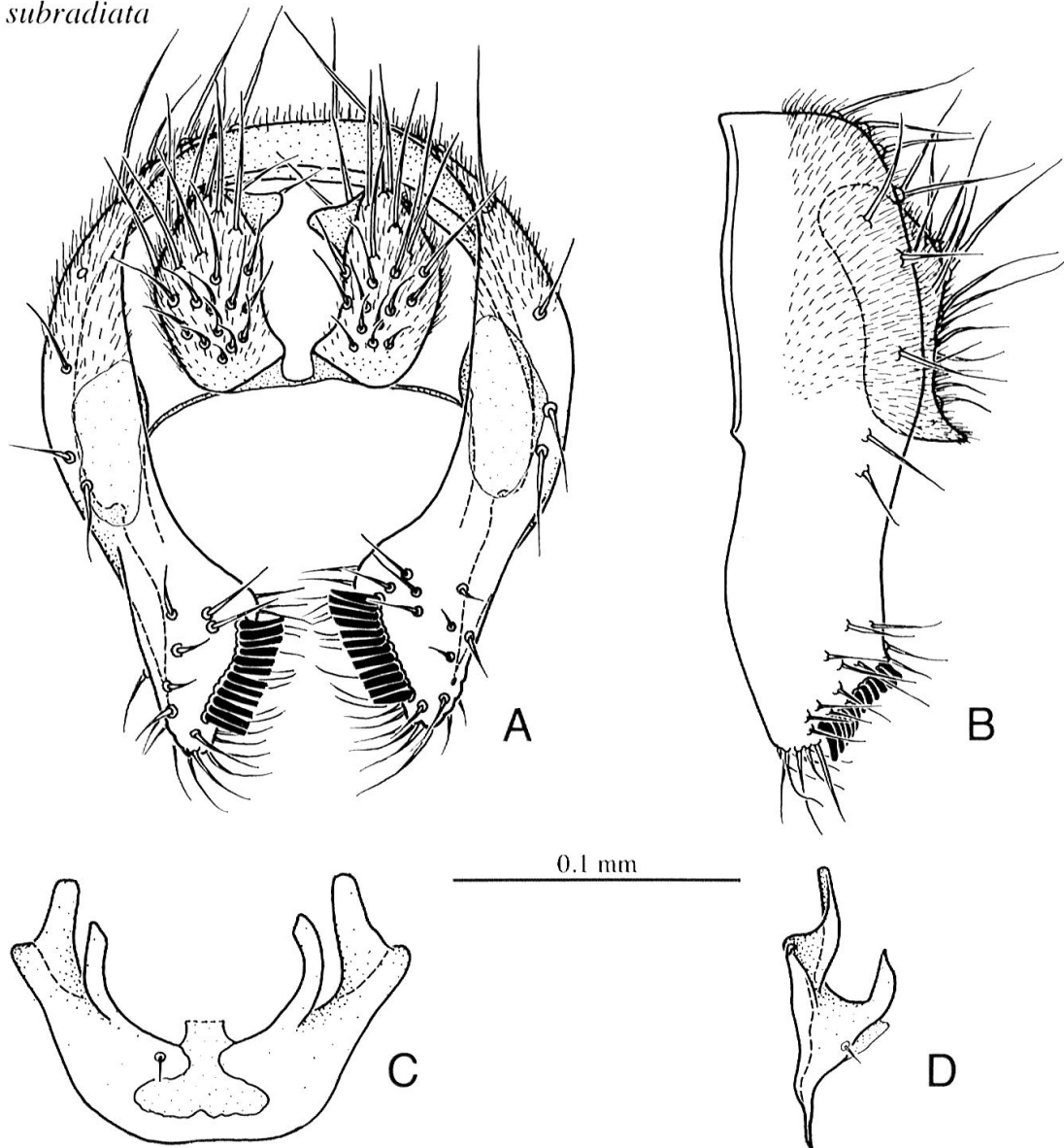
*subradiata*

Fig. 3. *Rhinoleucophenga subradiata* Duda, male holotype. A, epandrium+surstyli, cerci, and decasternum, posterior view. B, epandrium+surstylus, and cercus, left lateral view. C, hypandrium+gonopods, ventral view. D, idem, left lateral view.

than aedeagus, roughly semicircle-shaped in ventral view (Fig. 1C); anterior margin convex; posterior margin bearing two sublaterally positioned rod-shaped projections (lowercase letters b and c of Figs 1C, D) that connect the hypandrium with the membranous dorsal arch and paraphysis respectively; posterior hypandrial process present (lowercase letter d in Fig. 1C; connects hypandrium with aedeagal apodeme by membranous tissue, as shown in Fig. 2C); gonopod fused to posterior margin of hypandrium, devoid of seta. Aedeagus connected but not fused to aedeagal apodeme, dorsoventrally flattened, probably completely fused to inner paraphyses; somewhat triangle-shaped in dorsal and ventral views (Figs 2A, E); tip pointed and remarkably curved dorsad in lateral view; dorsal cleft ellipsoid (Figs 2A, B). Outer

*subradiata*

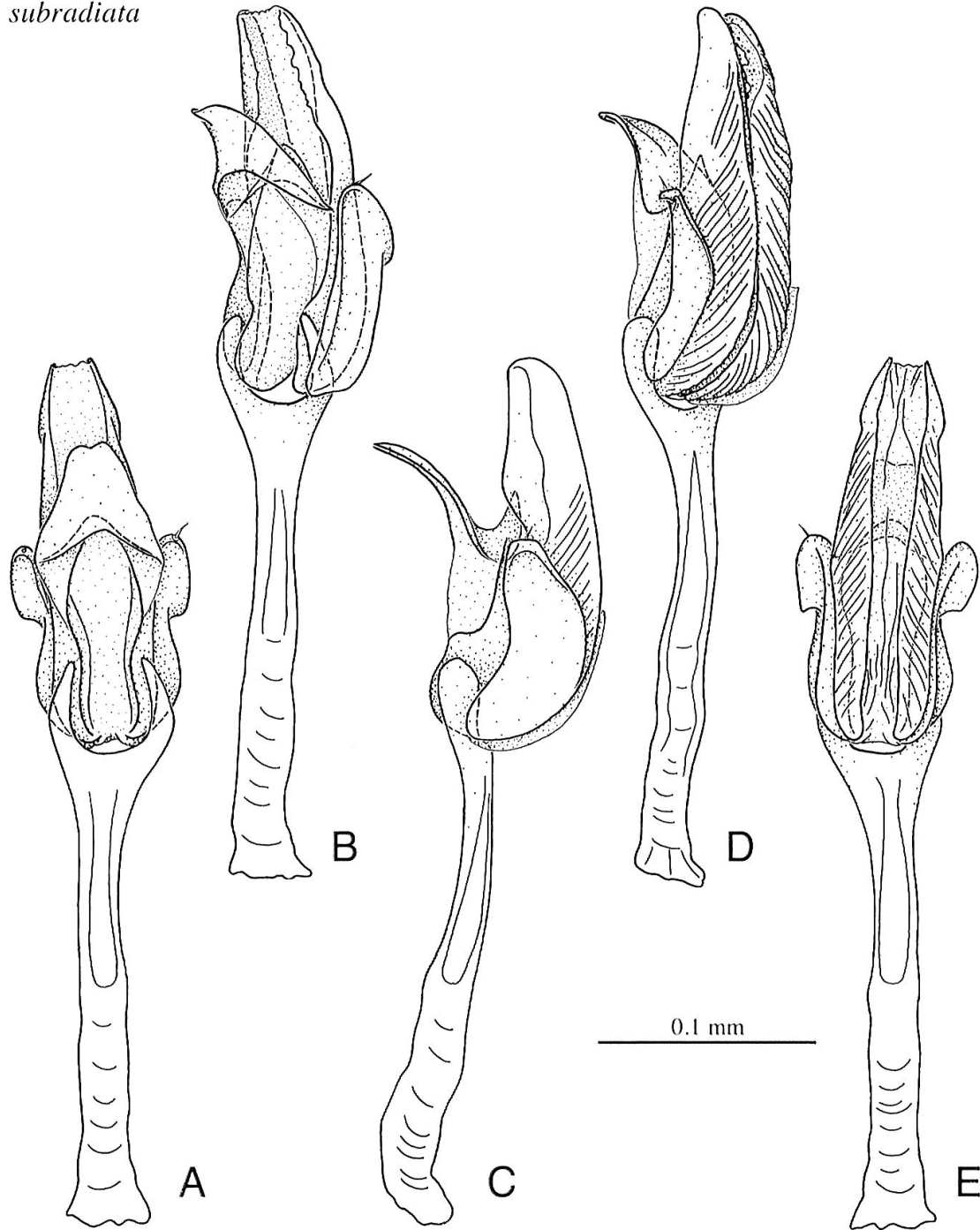


Fig. 4. *Rhinoleucophenga subradiata* Duda, male holotype. A-E, aedeagus, aedeagal apodeme and paraphyses, several aspects from dorsal through ventral.

paraphysis curved and pointed at tip, half the length of the aedeagus, bearing one submedian setula in the inner wall. Aedeagal apodeme twice as long as aedeagus, rod-shaped, dorsally bifid at posterior end.

Additional specimens analyzed [only for distributional purposes] (11 ♂♂, 5 ♀♀). Ten males [one dissected] and five females, labelled: «R.A. [Republica Argentina] Formosa [Province of] Ing. [Ingeniero Guillermo N.] Juarez 2/7-I-[1]949

coll: R. Golbach \ COLECCION INST. - FUND. M. LILLO (4000) - S.M. [San Miguel de] TUCUMAN, TUCUMAN – ARGENTINA [light green label] \ *Rhinoleucophenga punctulata* ♂ C. Vilela det. 2000», deposited in INSUE. One ♂ [dissected], labelled: «BRASIL GO [state of Goiás] sw. Parque Nacional das Emas 18°18' S, 52°58' W, M.B. Ramos Neto, E.M. Martin & R.L.P. Boulhosa coll. \ campo sujo próximo à Mata do Glória; isca de banana em fermentação [fermenting banana bait] 14–15.X.1982 \ *Rhinoleucophenga punctulata* ♂ C. Vilela det. 2009», deposited in MZSP.

*Distribution.* Bolivia (province of Santa Cruz), Brazil (state of Goiás), and Argentina (province of Formosa) [NEW RECORD].

*Comments.* Although aware that the larval breeding sites of *R. punctulata* remain undiscovered, we predict this species will be found all over central South America, a region comprised by mainly the Chaco and Cerrado biomes. Such a prediction is based on the known distribution records cited above and assumes some ecological fidelity of *R. punctulata* to those two biomes. The type locality, in the Bolivian province of Santa Cruz, is located in the Chaco biome, which extends southwards throughout the provinces of Chuquisaca (eastern part) and Tarija (eastern part) and also western Paraguay (provinces of Boquerón, Alto Paraguay and Presidente Hayes) and northern Argentina (provinces of Salta [eastern part], Chaco, Santiago del Estero, Santa Fé [northern part], in addition to the province of Formosa). The record from the state of Goiás is included in the Brazilian Cerrado biome, which is a vast tropical savanna ecoregion including the Federal District and the following states: Maranhão (southern part), Piauí (southern part), Tocantins, Minas Gerais, Bahia (western part), Mato Grosso (southern part), Mato Grosso do Sul (eastern part). We suspect this species is only accidentally attracted to fermenting fruit-baited traps, as is the case of the specimen collected at Parque Nacional das Emas (state of Goiás).

We also suspect that the 164 specimens (sexes not stated) collected at the Paranã valley region (states of Goiás and Tocantins) in the Cerrado biome and identified as *Gitona bivisualis* by da Mata *et al.* (2008) may belong to *Rhinoleucophenga punctulata* because the two species with spotted thorax are somewhat similar regarding their external morphology, differing mainly with respect to the unusual divided type of eye of the first, apparently seen only when the flies are alive. Specimens of *Rhinoleucophenga punctulata* will run to *Rhinoleucophenga bivisualis* (cited as *Gitona*) in the two available keys (Wheeler 1949: 159; Wheeler 1952: 183) that include the latter but not the former species, which is most probably endemic to the South American Chaco and Cerrado biomes. *Rhinoleucophenga bivisualis* is apparently endemic to the Nearctic Region.

### ***Rhinoleucophenga subradiata* Duda, 1929** (Figs 3, 4, 5C–E)

*Rhinoleucophenga subradiata* Duda 1929: 43 [key], 45 [description]; Malogolowkin 1946: 417 [key]; Wheeler 1970: 79.5 [Neotropical catalog]; Wheeler 1981a: 29 [World catalog]; Bächli 1990: 3 [type material]; Brake & Bächli 2008: 292 [World catalog].

*Diagnosis.* Scutum brownish-yellow, scutellum whitish-yellow. Both dorsal and ventral branches of the arista very short and of almost equal length. Epandrium remarkably elongated ventrally; cercus small, upper-positioned, ventrally curved distad; decasternum consisting of two elliptical sclerites linked to each other by a

membranous strip; aedeagus shaped as a curved cylinder, remarkably bearing one anterodorsal sclerite distally curved dorsad.

*Material examined* (1 ♂). Holotype ♂ (dissected, deposited in SMNS), labelled: «S. [San] José de Chiq [Chiquitos] XI.[19]26 Lindner. [Erwin Lindner collegit] D. [Deutsche] Chaco-Exped \ [yellow label] \ Type [red label] \ Rhinoleucophenga subradiata Duda n. sp. Type ♂ 1929 [red-inked label divided into 2 parts] \ Rhinoleucophenga subradiata Holotype ♂ G. Bächli det. 1988 \ Rhinoleucophenga subradiata Duda Bächli & Vilela det. 2007.»

*Type locality.* San José de Chiquitos, province of Santa Cruz, Bolivia.

*Redescription.* ♂.

Head. Frons generally yellowish, frontal length 0.34 mm; frontal index = 1.33, top to bottom width ratio = 1.13. Frontal triangle laterally convex, about 55 % of frontal length; ocellar triangle (around the 3 ocelli) prominent, brownish, about 40 % of frontal length. Orbital plates whitish microtrichose, narrow, parallel to eye margin, about 80 % of frontal length. Orbital setae black, in a line, or2 distinctly closer to or1 than to or3, distance of or3 to or1 = 150 % of or3 to vtm, or1 / or3 ratio = 1.00, or2 / or1 ratio = 0.75, postvertical setae = 25 %, ocellar setae = 70 % of frontal length; vibrissal index = 0.44. Face yellowish. Carina narrow, dorsally flat. Cheek whitish, index about 11. Eye index = 1.28. Antenna brownish-yellow, covered with slightly prolonged microtrichia. Length to width ratio of flagellomere 1 about 1.60. Arista with 5 unusually short dorsal, 5 unusually short ventral and about 8 small inner branches, all of them shorter than width of gena, without distinct terminal fork. Proboscis yellow. Palpus yellow, medially slightly broadened.

Thorax length 0.92 mm. Scutum brownish-yellow, paler at postpronotum and towards scutellum, acrostichal setulae destroyed by the pin. Transverse distance of dorsocentral setae 271 % of longitudinal distance; scutellum whitish-yellow, distance between apical scutellar setae about 112 % of that between apical and basal one, basal setae divergent; scut index = 1.00. Pleura yellowish, sterno index = 1.06. Halter whitish. Legs pale yellowish, preapical setae on tibiae 2 and 3, apical seta on tibia 2.

Wing hyaline, veins  $R_{4+5}$  and M slightly divergent, crossvein dM-Cu oblique, wing length 1.78 mm, length to width ratio = 2.04. Indices: C = 2.91, ac = 0.85, hb = 0.82, 4C = 0.79, 4v = 4.07, 5x = 3.43, M = 1.71, prox. x = 1.07.

Abdomen generally yellowish, tergites 2 to 4 each with a broad, dark brown, medially interrupted marginal band, tergites 5 and 6 dark brown except at base.

Terminalia (Figs 3, 4, 5C–E). Epandrium remarkably elongated ventrally, dorsodistally microtrichose with about 9 upper and 27 lower setae (comprising outer and inner setae), mostly distally positioned, anteroventrally folded over itself, forming a double wall (probably the inner wall of the surstylus); ventral lobe not recognizable. Cercus small, less than half the height of epandrium, in upper position, anteriorly connected to epandrium by membranous tissue, microtrichose, in addition to usual setae, devoid of ventral lobe, ventrally curved distad. Surstylus completely fused to epandrium, not microtrichose, with a straight row of ca. 12 evenly spaced, long, blunt, peg-like prenisetae. Decasternum consisting of two elliptical sclerites lying on inner surface of posteromedian region of the epandrium, linked to each other by a membranous strip, which also connects the cerci ventrally (Fig. 3A). Hypandrium (Fig. 3C) reduced, as long as cercus, about half the length of aedeagus; anterior margin convex, posterior margin concave and bearing two sublaterally

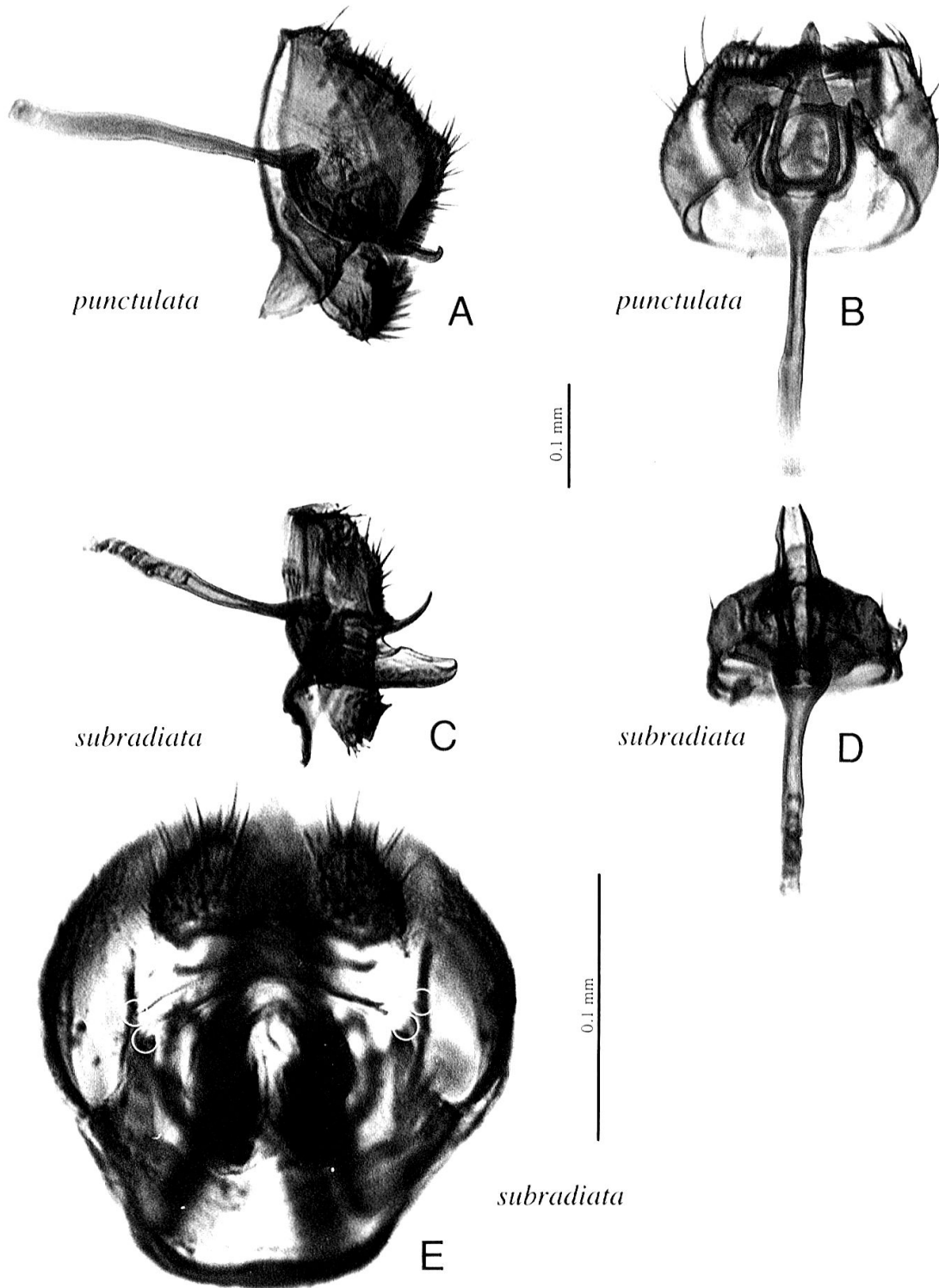


Fig. 5. Photomicrographs of male terminalia of two species of *Rhinoleucophenga*, A and C, left lateral view; B and D, dorsal view; E, posterior view. — A, B: *R. punctulata*, holotype, aedeagus not extruded. — C, D, E: *R. subradiata*, holotype, aedeagus semi-extruded. The white circles in the latter figure indicate the membranous connection between some sclerites: decaesternum and surstyli (upper circles), membranous dorsal arch and hypandrium (lower circles).

positioned projections that connect the hypandrium with the membranous dorsal arch (outer projection) and outer paraphysis (inner projection); posterior hypandrial process present, short (connects hypandrium with aedeagal apodeme); gonopod fused to posterior margin of hypandrium, bearing one setula. Aedeagus (Figs 4A–E) shaped as a curved cylinder, laterally sclerotized (upper surface smooth, lower surface pleated), dorsally and ventrally membranous; remarkably bearing one somewhat triangular mediadorsal sclerite (probably representing the fused inner paraphyses) distally curved dorsad; not fused to aedeagal apodeme. Outer paraphysis curved, round at tip, half the length of aedeagus, bearing one distal setula. Aedeagal apodeme longer than aedeagus, rod-shaped, posteriorly bifid, attached to aedeagus by membranous tissue.

*Distribution.* Bolivia (province of Santa Cruz).

*Comments.* Duda (1927: 46) described *Rhinoleucophenga brevipumata* based on a single female from Peru, having relatively short dorsal and ventral arisal branches, as is also found in *Rhinoleucophenga subradiata*. The identity of *R. brevipumata* remains unclear.

Based on the photomicrography of the male terminalia of the holotype of *subradiata*, in lateral view, it seems that this specimen died with the aedeagus in the semi-extruded state. As shown in Fig. 4C, the tips of both the aedeagus and the supposedly fused inner paraphyses are clearly separated from each other. We predict that in an unextruded state those tips will be parallel and closer to each other, because we suspect that their distal parts probably diverge as the extrusion proceeds, as it happens, for example, with *Drosophila melanogaster* (see Bächli & Vilela 2007: 242 [compare figs 50 and 52]).

#### ACKNOWLEDGMENTS

We are indebted to Pierre Brauchli for helping with digital image processing, to Dr. Hans-Peter Tschorsnig of the Staatliches Museum für Naturkunde, Stuttgart, for kindly loaning the three holotypes included in the present study, to Dr. Peter Sehnal of the Naturhistorisches Museum Wien for the facilities during our visit to Vienna to analyze the type series of *Rhinoleucophenga stigma*, to Dr. Guillermo L. Claps, from the Instituto Superior de Entomología «Dr. Abraham Willink» (INSUE), Universidad Nacional de Tucumán, Argentina, for sending to one of us (CRV) the Drosophilidae collection under his care to be identified, to Dr. Mario Barroso Ramos Neto, Eloy Moreira Martin and Ricardo Luiz Pires Boulhosa for collecting one male specimen of *Rhinoleucophenga punctulata* in the state of Goiás and donating it to the Universidade de São Paulo, and finally to two anonymous referees for corrections and suggestions.

#### REFERENCES

- Ashburner, M. 1981. Entomophagous and other Bizarre Drosophilidae. *In*: Ashburner, M., Carson, H.L. & Thompson, J.N. (eds), *The Genetics and Biology of Drosophila*, vol. 3a, pp. 395–429. — Academic Press, London.
- Ashburner, M., Golic, K.G. & Hawley, R.S. 2005. *Drosophila: A laboratory handbook*. Second edition. 1409 pp. — Cold Spring Harbor Laboratory Press.
- Bächli, G. 1988. Die Drosophiliden-Arten (Diptera) in der Sammlung des Naturhistorischen Museums Wien. — *Annalen des Naturhistorischen Museums in Wien* 90B: 131–148.
- Bächli, G. 1990. Type Specimens of Drosophilidae (Diptera) in the Naturkundemuseum Stuttgart, with Revisions of *Drosophila testacea* and *D. limbata* v. Roser. — *Stuttgarter Beiträge zur Naturkunde* 443(Ser.A): 1–9.
- Bächli, G. & Vilela, C.R. 2007. Photomicrographs of the male terminalia of Scandinavian Drosophilidae (Diptera). — *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 80: 231–246.

- Bächli, G., Vilela, C.R., Andersson Escher, S. & Saura, A. 2004. The Drosophilidae (Diptera) of Fennoscandia and Denmark. — *Fauna Entomologica Scandinavica*, vol. 39, 362 pp. Brill, Leiden.
- Basden, E.B. 1966. Systematics of Drosophilidae. *In*: Institute of Animal Genetics, University of Edinburgh, Research Report 1962–1965, p. 85. — University of Edinburgh.
- Bock, I.R. 1982. Drosophilidae of Australia. V. Remaining Genera and Synopsis (Insecta: Diptera). — *Australian Journal of Zoology*, supplementary series 89: 1–164.
- Box, H.E. 1953. List of Sugar-Cane Insects. A Synonymic Catalogue of the Sugar-Cane Insects and Mites of the World, and of their Insect Parasites and Predators, Arranged Systematically. — Commonwealth Institute of Entomology, London, 100 pp.
- Brake, I. & Bächli, G. 2008. Drosophilidae (Diptera). *In*: *World Catalogue of Insects* 9: 1–412. — Apollo Books, Stenstrup.
- Cole, F.R. 1970. The Flies of Western North America. 693 pp. — University of California Press, Berkeley.
- Curran, C.H. 1934. The Families and Genera of North American Diptera. 512 pp. — Ballou Press, New York.
- da Costa Lima, A. 1935. Um Drosophilideo predador de Coccideos. — *Chácaras e Quintas* 52: 61–63.
- da Costa Lima, A. 1950. Duas espécies de *Gitona* predadoras de Coccideos do gênero *Orthezia* (Diptera: Drosophilidae). — *Arthropoda* 1: 247–253.
- da Mata, R.A., Roque, F. & Tidon, R. 2008. Drosophilids (Insecta, Diptera) of the Paranã Valley: eight new records for the Cerrado biome. — *Biota Neotropica* 8(1): 55–60.
- Duda, O. 1924. Beitrag zur Systematik der Drosophiliden unter besonderer Berücksichtigung der paläarktischen u. orientalischen Arten (Dipteren). — *Archiv für Naturgeschichte* 90(A)3: 172–234.
- Duda, O. 1925. Die costaricanischen Drosophiliden des Ungarischen National-Museums zu Budapest. — *Annales historico-naturales Musei nationalis hungarici* 22: 149–229.
- Duda, O. 1927. Die südamerikanischen Drosophiliden (Dipteren) unter Berücksichtigung auch der anderen neotropischen sowie der nearktischen Arten. — *Archiv für Naturgeschichte* 91(A)11/12: 1–228 (1925).
- Duda, O. 1929. Die Ausbeute der deutschen Chaco-Expedition 1925/26 (Diptera). VI. Sepsidae, VII. Piophilidae, VIII. Cypselidae, IX. Drosophilidae und X. Chloropidae. — *Konowia* 8: 33–50.
- Duda, O. 1934. 58g. Drosophilidae. *In*: Lindner, E. (ed.), *Die Fliegen der palaearktischen Region*, vol. VI(58g), pp. 1–64. — Schweizerbart, Stuttgart.
- Grimaldi, D.A. 1988. Relicts in the Drosophilidae (Diptera). *In*: Lieberr, J.K. (ed.), *Zoogeography of Caribbean Insects*, pp. 183–213. — Cornell University Press, Ithaca.
- Grimaldi, D.A. 1990. A phylogenetic, revised classification of genera in the Drosophilidae (Diptera). — *Bulletin of the American Museum of Natural History* 197: 1–139.
- Hardy, D.E. 1965. Family Drosophilidae. *Insects of Hawaii*, vol. 12, Diptera: Cyclorrhapha II, Series Schizophora, Section Acalypterae I, 814 pp. — University of Hawaii Press, Honolulu.
- Hendel, F. 1917. Beiträge zur Kenntnis der acalyptraten Musciden. — *Deutsche entomologische Zeitschrift* 1917: 33–47.
- Hsu, T.C. 1949. The external genital apparatus of male Drosophilidae in relation to systematics. — *The University of Texas Publication* 4920: 80–142.
- Kaneshiro, K.Y. 1969. A Study of the Relationships of Hawaiian *Drosophila* Species Based on External Male Genitalia. — *The University of Texas Publication* 6918: 55–70.
- Malloch, J.R. & McAtee, W.L. 1924. Flies of the family Drosophilidae of the District of Columbia region, with keys to genera, and other notes, of broader application. — *Proceedings of the biological Society of Washington* 37: 25–42.
- Malogolowkin, C. 1946. Sobre o gênero «*Rhinoleucophenga*» com descrição de cinco espécies novas (Drosophilidae, Diptera). — *Revista Brasileira de Biologia* 6: 415–426.
- McAlpine, J.F. 1968. An annotated key to drosophilid genera with bare or micropubescent arista and a revision of *Paracacoxenus* (Diptera: Drosophilidae). *Canadian Entomologist* 100: 514–532.
- Neave, S.A. 1940. *Nomenclator zoologicus*. A list of the names of genera and subgenera in zoology from the tenth edition of Linnaeus 1758 to the end of 1935. Vol. IV, Q–Z. London. — The Zoological Society of London. 758 pp.
- Okada, T. 1989. A Proposal of Establishing Tribes for the Family Drosophilidae with Key to Tribes and Genera (Diptera). — *Zoological Science*, Tokyo 6: 391–399.
- Patterson, J.T. 1943. The Drosophilidae of the Southwest. — *The University of Texas Publication* 4313: 7–216 + 10 plates + 2 tables.
- Remsen, J. & O'Grady, P. 2002. Phylogeny of Drosophilinae (Diptera: Drosophilidae), with comments on combined analysis and character support. *Molecular Phylogeny and Evolution* 24: 249–264.
- Schulze, F.E., Kükenthal, W. & Heider, K. 1936. *Nomenclator animalium generum et subgenerum*. Fünfter Band, Q–Z, pp. 2989–3716. — Preussische Akademie der Wissenschaften, Berlin.



- Speight, M.C.D. 1969. The prothoracic morphology of Acalypterates (Diptera) and its use in systematics. — Transactions of the Royal Entomological Society of London 121: 325–421.
- Takada, H. 1966. Differentiation of the External Male Genitalia in the Drosophilidae. (in Japanese, with English summary). — Proceedings of the Kushiro Woman's College 1: 39–50, 131–132.
- Throckmorton, L.H. 1975. The Phylogeny, Ecology, and Geography of *Drosophila*. In: King, R.C., (ed.), Handbook of Genetics, vol. 3, pp. 421–469. — Plenum Press, New York.
- Val, F.C., Vilela, C.R. & Marques, M.D. 1981. Drosophilidae of the Neotropical Region. In: Ashburner, M., Carson, H.L. & Thompson, J.N. (eds), The Genetics and Biology of *Drosophila*, vol. 3a, pp. 123–168. — Academic Press, London.
- Vilela, C.R. 1990. On the identity of *Drosophila gigantea* Thomson, 1869 (Diptera, Drosophilidae). — Revista Brasileira de Entomologia 34(3): 499–504.
- Vilela, C.R. & Bächli, G. 1990. Taxonomic studies on Neotropical species of seven genera of Drosophilidae. — Mitteilungen der Schweizerischen Entomologischen Gesellschaft 63(Suppl.): 1–332.
- Vilela, C.R. & Bächli, G. 2000. Morphological and ecological notes on the two species of *Drosophila* belonging to the subgenus *Siphlodora* Patterson & Mainland, 1944 (Diptera, Drosophilidae). — Mitteilungen der Schweizerischen Entomologischen Gesellschaft 73(1–2): 23–47.
- Wheeler, M.R. 1949. Taxonomic studies on the Drosophilidae. — The University of Texas Publication 4920: 157–195.
- Wheeler, M.R. 1952. The Drosophilidae of the Nearctic Region exclusive of the genus *Drosophila*. — The University of Texas Publication 5204: 162–218.
- Wheeler, M.R. 1965. Family Drosophilidae. In: Stone, A., Sabrosky, C.W., Wirth, W.W., Foote, R.H. & Coulson, J.R. (eds), A Catalog of the Diptera of America north of Mexico, pp. 760–771. — U. S. Department of Agriculture.
- Wheeler, M.R. 1970. Family Drosophilidae. In: A Catalogue of the Diptera of the Americas south of the United States, pp. 79.1–79.65. — Museu de Zoologia, Universidade de São Paulo.
- Wheeler, M.R. 1981a. The Drosophilidae: A Taxonomic Overview. In: Ashburner, M., Carson, H.L. & Thompson, J.N. (eds), The Genetics and Biology of *Drosophila*, vol. 3a, pp. 1–97. — Academic Press, London.
- Wheeler, M.R. 1981b. Geographical survey of Drosophilidae: Nearctic species. In: Ashburner, M., Carson, H.L. and Thompson, J.N. (eds), The Genetics and Biology of *Drosophila*, vol. 3a, pp. 99–121. — Academic Press, London.
- Wheeler, M.R. 1987. Drosophilidae. In: McAlpine, J.F. et al. (eds), Manual of Nearctic Diptera, vol. 2, pp. 1011–1018. — Research Branch, Agriculture Canada, Monogr. 28.
- Wheeler, M.R. & Kambyzellis, M.P. 1966. Notes on the Drosophilidae (Diptera) of Samoa. — The University of Texas Publication 6615: 533–565.
- Wheeler, M.R. & Takada, H. 1971. Male Genitalia of Some Representative Genera of American Drosophilidae. — The University of Texas Publication 7103: 225–240.

(received June 30, 2009; accepted August 20, 2009)

NOTE ADDED IN PROOF:

After submitting this article for publication we realized that we had overlooked the following two recently published papers:

- Roque, F. & Tidon, R. 2008. Eight new records of drosophilids (Insecta; Diptera) in the Brazilian savanna. *Drosophila Information Service* 91: 94–98.
- Culik, M.P. & Ventura, J.A. 2009. New species of *Rhinoleucophenga*, a potential predator of pineapple mealybugs. *Pesquisa Agropecuária Brasileira* 44: 417–420.

The first paper records for the first time the occurrence of *Rhinoleucophenga punctulata* in Brazil. Unfortunately, there is no statement on the published table regarding either the number (and/or sex) of the collected flies or the state where the collection sites are located.

With the description of *R. capixabensis*, the second paper raises the number of species currently included in the genus *Rhinoleucophenga* to 20. Although this new species has been described based upon both sexes, the description is unfortunately poorly illustrated and therefore, in our opinion, does not allow the species identification by researchers other than the authors of the binomial themselves.