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Revision of the genus *Bryodemina* Hull (Diptera, Bombyliidae, Lomatiinae) with descriptions of two new Neotropical species

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Abstract

The New World genus *Bryodemina* Hull is revised. Two new species are herein described and illustrated: *Bry. enigmatica* **sp. nov.** from Brazil and *Bry. ayalai* **sp. nov.** from Venezuela. The results of a detailed morphological study, based on types and material deposited in many collections of the world, shows that *Brachydemia* Hull should be considered as a junior synonym of *Bryodemina* Hull, **syn. nov.** and *Bra. latisoma* Hull as junior synonym of *Bra. hedickei* (Paramonov), **syn. nov.** Illustrations of the external morphology of adults and male and female terminalia for all valid species are presented. A distribution map including all examined records, an identification key to species together with a preliminary biogeographic discussion are also added.

Key words: *Bryodemina*, *Brachydemia*, New World, new synonym, new species, taxonomy, bee flies

Introduction

The Bombyliidae, or bee flies, is one of the most species-rich and widespread family of parasitoid flies in lower Brachycera (Diptera), comprising 17 subfamilies, over 250 genera and over 5,000 described species (Li *et al.* 2021). Despite this great diversity, the Neotropical Region is still poorly studied with only 641 recorded species (Evenhuis & Pape 2024).

The adults of most species have large wings in proportion to the body (Hull 1973), making them powerful and agile fliers, rivaling the syrphid flies in their ability to hover and move in all directions while in flight (Evenhuis & Greathead 1999). Adults (except the few genera with nonfunctional mouthparts such as *Oestranthrax* Bezzi) are nectar feeders and females are obligate pollen feeders, obtaining pollen from anthophilous plants as a necessary requirement for the nourishment of developing ova. As a result of this pollen and nectar feeding, bombyliids are often the major pollinators of many flowering plants, especially those occurring in the more desertic regions of our planet (Evenhuis & Greathead 1999).

Immatures are poorly known as a whole, yet of those that have been reared, most are primarily parasitoids on the immatures of holometabolous insects (Yeates & Greathead 1997). Bee flies are of economic importance as well as an attractive group of insects for studies on biodiversity and evolution (Evenhuis & Greathead 1999).

The New World genera *Bryodemina* Hull, 1973 and *Brachydemia* Hull, 1973 include large and conspicuous flies, which are similar in appearance to some bee species of the genus *Bombus* Latreille (Hymenoptera, Apidae). Hull (1973) classified both genera within the Lomatiinae based on shared features such as an indentation on the hind margin of the eye, a short bisecting line dividing the facets and a concave occiput. Additionally, the separation of R_{2+3} from R_{4+5} at an acute angle far proximal to the *r-m* crossvein supported this placement. Since Hull's work in 1973, the definition of the Lomatiinae has undergone refinement, as noted by Bowden (1980) and Yeates (1990, 1994). Despite these stricter boundaries, Yeates (1994) identified synapomorphies supporting the monophyly of the

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subfamily that are also present in *Bryodemina* and *Brachydemia* species, corroborating their classification among the Lomatiinae. These include a flat face (not swollen), a clypeus that reaches the antennae, and a male epandrium featuring a complex median notch on the posterior margin.

Hull (1966) noted the unique appearance of these flies and erected the genus *Bryodema* to include the "giant, thick-bodied, very robust bee flies hitherto going under the name *Ogcodocera valida*, Wiedemann." Hull (1973), noting his genus *Bryodema* was preoccupied by *Bryodema* Fieber, 1853 proposed the new replacement name *Bryodemina* and presented the first morphological description for it. In the same work Hull also divided *Bryodemina* in two subgenera: *Bryodemina* (*Bryodemina*) and *Bry*. (*Brachydemia*). Within the former nominal subgenus *Bryodemina*, the author placed the North and Central American species *Anthrax valida* Wiedemann, 1830 (synonym of *Anisotamia eximia* Macquart, 1850) and *Anisotamia fasciata* Williston, 1901; and in the subgenus *Brachydemia* placed two South American species: *Oncodocera hedickei* Paramonov, 1930 and *Bry.* (*Bra.*) *latisoma* Hull, 1973. According to Hull (1973), the new subgeneric placement proposed for *Bry*. (*Bra*.) *hedickei* was based on the fact that this species is much more robust than the other species included in *Ogcodocera* Macquart, 1840.

Painter *et al*. (1978) subsequently raised the subgenus *Brachydemia* to genus status, which was subsequently followed by Evenhuis & Greathead (1999).

After the study of a large series of specimens, comparing the original descriptions and checking characters with the type-material, the authors concluded that the nominal genera *Bryodemina* and *Brachydemia* are congeneric and the species *Brachydemia hedickei* and *Brachydemia latisoma* are conspecific. Two new species, one from Brazil (Goiás and São Paulo) and one from Venezuela (Aragua and Guárico) are described and illustrated and the three valid previously known species are herein redescribed and illustrated. The known geographic range of all valid species are expanded and plotted and an identification key is also presented.

Material and methods

The studied material derives from or is deposited in the following institutions:

AMNH—American Museum of Natural History, New York, United States;
CNC—Canadian National Collection, Ottawa, Canada;
MNHN—Muséum National d'Histoire Naturelle, Paris, France;
MNRJ—Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil;
MZUSP—Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil;
NHMUK—Natural History Museum of United Kingdom, London, United Kingdom;
NHW—Naturhistorische Museum Wien, Wien, Austria;
OUMNH—Oxford University Museum of Natural History, Oxford, United Kingdom;
SAMC—South African Museum, Cape Town, South Africa;
UFMS—Universidade Federal de Mato Grosso do Sul, Mato Grosso do Sul, Brazil;
USNM—National Museum of Natural History, Washington, United States;
ZMHB—Museum für Naturkunde, Humboldt-Universität, Berlin, Germany.

The male and female terminalia were macerated in 10% KOH at room temperature for one day to remove soft tissue, then rinsed in distilled water, dehydrated in an increasing ethanol series (30%, 50%, 70% and 95%) and dissected in glycerine. Genitalia preparations were placed in glycerine in a genitalia vial mounted on the pin beneath the specimen. Morphological descriptive terminology follows Cumming & Wood (2017) except for male and female terminalia where we prefer to follow Yeates (1994). Species distribution data were compiled in a MS Excel database using specimen labels. Records without geographic coordinates were georeferenced using online gazetteers. A distribution map was prepared using ArcGIS 10.1.

The photographs were taken with a stereomicroscope Carl Zeiss, DV 20, with the software AxionVision and mounted with CombineZP. The photos were treated in Adobe Photoshop CS4. Drawings were made under camera lucida and redrawn using Adobe Illustrator CS6.

Results

Identification key to the known species of *Bryodemina* Hull.

1 All abdominal tergites with dark brown bristles on basal ¾ and yellow on apical ¼ forming bands (Figs 51, 53, 89) . . . . . *Bry. hedickei* (Paramonov), **comb**. **nov.**

\- Abdominal tergites mainly covered with black bristles, not forming pattern of bands on all tergites (Figs 83–88) 2

2 Face and frons with yellowish white bristles on males and females (Figs 38, 39); cell r_5 either closed on wing margin or very slightly opened (Figs 40, 41) . . . . . *Bry. fasciata* (Williston)

\- Face and frons with dark brown bristles on males and yellowish white on females; cell r_5 variable 3

3 Abdomen entirely covered with dark brown bristles (males) or with dark brown bristles except tergite 4 with yellow bristles, forming yellow band dorsally on abdomen (males and females) (Figs 83–85). Yellow band slightly separated in middle in some specimens; wing with cell r_5 open at wing margin 4

\- Abdomen predominantly covered with dark brown bristles, except for two dorsolateral subtriangular areas extending from tergites 3 or 4 to 7 (Figs 87, 88); wing with cell r_5 closed at wing margin (Fig. 73) . . . . . *Bry. valida* (Wiedemann)

4 Wing hyaline with dark brown infuscated area basally including following cells: from base to apex of costal (*c*), basal ½ r_1, basal 1/3 of r_{2+3}, all basal radial (*br*) and paler on basal ½ of discal medial (*dm*), all basal medial (*bm*), basal 1/3 of m_4, extreme base of *cua* and alula (Figs 7, 8); males with abdominal tergites entirely covered with dark brown bristles (Fig. 83); females with dark brown bristles on abdominal tergites 1–3 and 5–7; tergite 4 with long, thin yellow bristles, except for short, thin dark brown bristles on central 1/3 (Fig. 84) . . . . . *Bry. ayalai*, **sp. nov.**

\- Wing hyaline except for yellowish orange areas on basal costal cell (*bc*), *c*, *bm* and yellowish brown alula (Fig. 24); male and female abdominal tergites 1–3 and 5–7 with long, thin dark brown bristles; tergite 4 with long, thin yellow bristles, except for short, thin dark brown bristles at center (Fig. 85) . . . . . *Bry. enigmatica*, **sp. nov.**

Taxonomy

Bryodemina Hull, 1973

Bryodema Hull, 1966: 227. Type species: *Anthrax valida* Wiedemann, 1830, by original designation. [Preoccupied by Fieber, 1853.]—Evenhuis, 1983: 396; Evenhuis, 1991: 23.

Bryodemina Hull, 1973: 314 (new replacement name for *Bryodema* Hull, 1966). Type species: *Anthrax valida* Wiedemann, 1830, automatic.—Painter *et al*., 1978: 24; Evenhuis, 1983: 396; Evenhuis, 1991: 23; Evenhuis & Greathead, 1999: 251.

Brachydemia Hull, 1973: 306, 314 (as subgenus of *Bryodemina* Hull). Type species: *Bryodemina latisoma* Hull, 1973, by original designation.—Painter *et al*., 1978: 25; Evenhuis, 1983: 396; Evenhuis, 1991: 23; Evenhuis & Greathead, 1999: 250; Lamas & Evenhuis, 2014: 88; **new synonym**.

Brachydemina, incorrect original spelling of *Brachydemia* (Hull, 1973: 316).

Diagnosis. *Bryodemina* are robust flies easily separated from other Lomatiinae by the elongate postpedicel, notopleuron and postalar wall with row of dense long and strong dark brown bristles, thorax and abdomen with dense bristles; wings with two submarginal cells; lateral margin of tergites with dense tuft of long bristles, which may present color variation between dark brown and yellow.

Redescription. Male. Body length: 13.0–21.1 mm; Wing length: 13.5–20.6 mm. **Head:** holoptic, posterior margin of eye sinuous, conspicuous indentation with small black triangle area without ommatidia; scape cylindrical, twice as wide and same length as pedicel; antenna dark brown, gray pollinose; postpedicel laterally compressed in dorsal view; palpus not extending beyond oral margin; short, thin white bristles on margin of occiput. **Thorax:** notopleuron with 4 long and very strong black bristles; anterior ½ of postalar wall with tuft of very long, strong black bristles. **Legs:** dark brown pollinose. **Wing:** costal vein with dense dark brown bristles, longer near base and shorter at posterior margin; *r-m* crossvein obliquely positioned at apical 1/3 of cell *dm*; margin of alula with medium length, thin bristles; wing three times longer than wide. **Abdomen:** with dense long, thin bristles; lateral margin of tergites with dense tufts of long, thin bristles. **Male terminalia, lateral view:** gonocoxa elongate; gonostylus pointed with hook shaped apex; **dorsal view:** lateral aedeagal apodeme short, not surpassing gonocoxal apodeme margins; distiphallus short, not surpassing apex of posterior process of gonocoxa.

Female. Body length: 14.7–20.0 mm; wing length: 14.3–19.4 mm.

Similar to male, except for: **Head:** eyes dichoptic; separated by two times ocellar tubercle width; face and frons with thin bristles on upper half and spatulate bristles on lower half; face with spatulate bristles. **Female terminalia:** acanthophorite (tergite 9+10) divided in two separate sclerites; acanthophorite spines 1.5 times length of cerci.

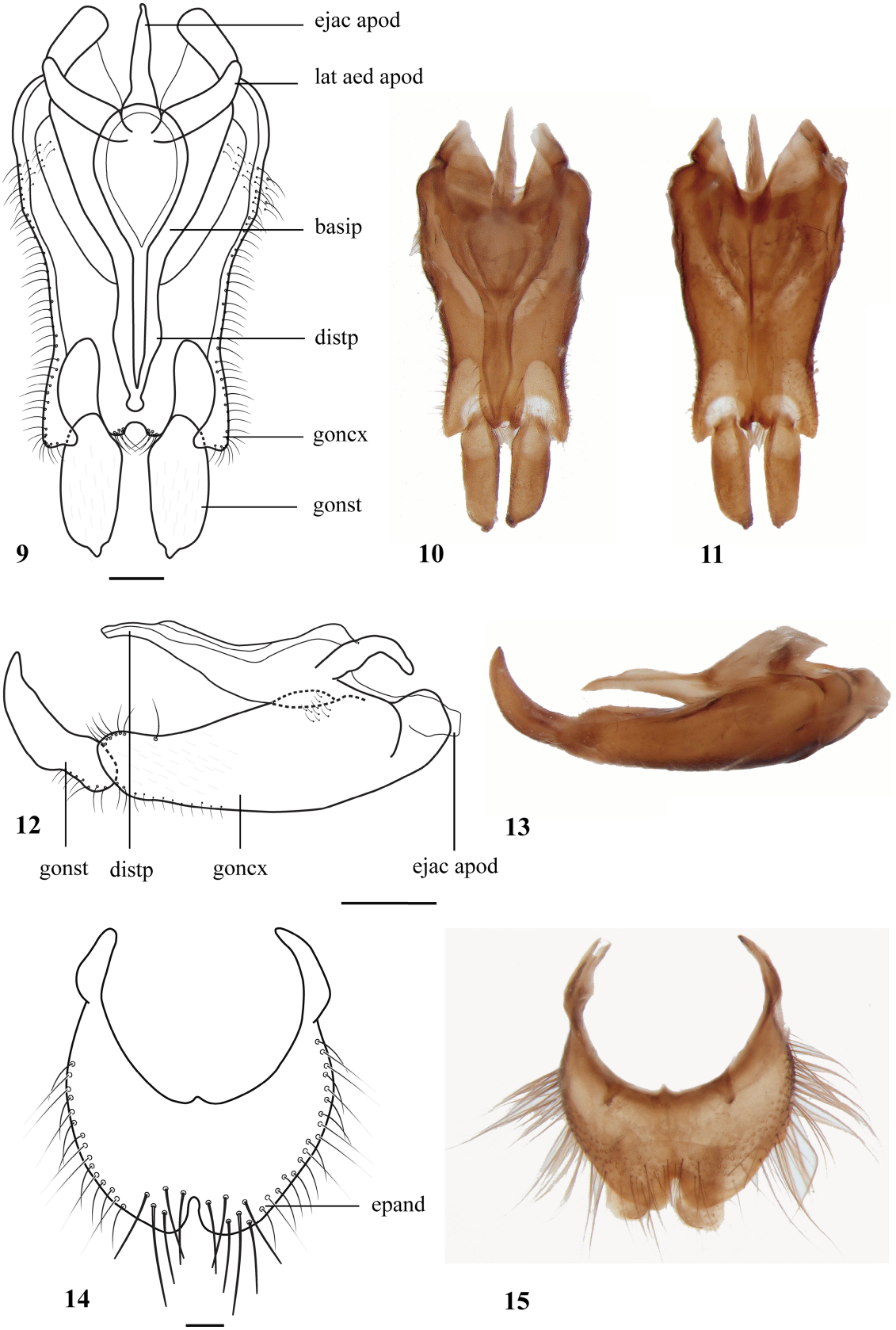
Spermatheca short, with well-developed, pear-shaped or guitar-shaped spermathecal bulb; two weakly sclerotized collars, developed on apical and basal ends of sperm pump.

***Bryodemina ayalai* sp. nov.**
(Figs 1–17)
urn:lsid:zoobank.org:act:05896A89-B2E2-4561-A84C-88620E3CCB7B

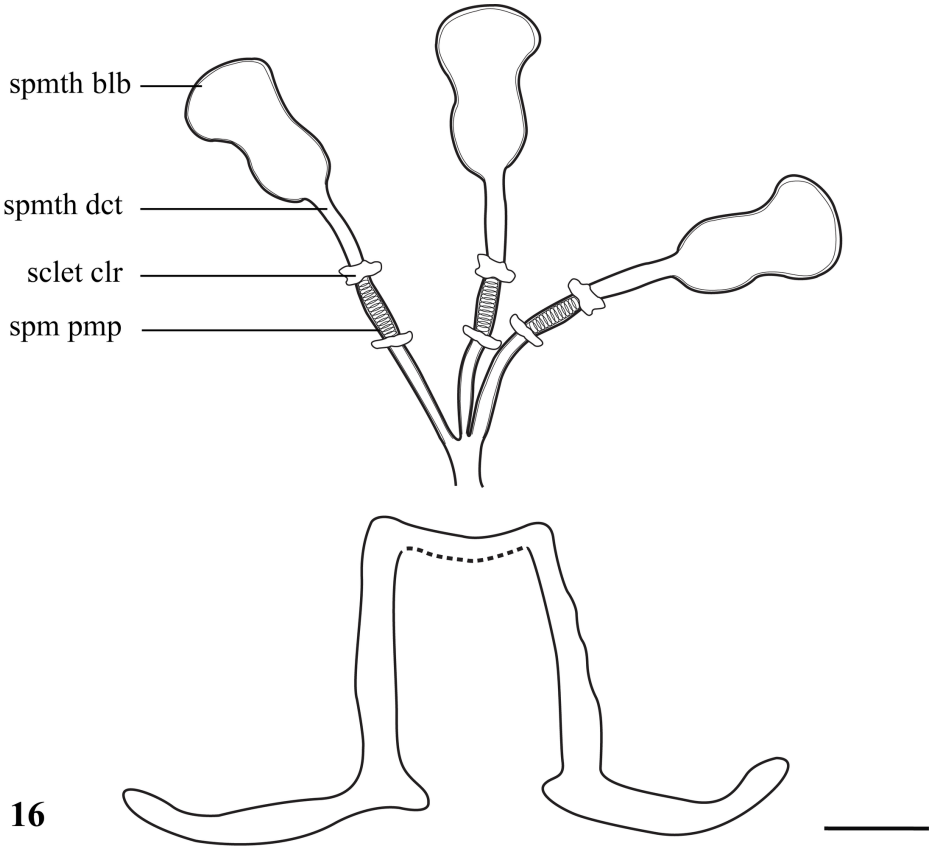
Diagnosis. Bristles on face presenting sexual dimorphism, males with dark brown and females with white bristles; wing hyaline with light brown infuscated area on the corner of anterior ½ and proximal 3/5; male abdomen completely covered with dark brown bristles; female tergite 4 with yellow bristles except on middle 1/3, dense tufts of dark brown bristles on lateral margin of tergites; spermathecal bulb guitar-shaped.

Description. Male. Body length: 12.5 mm; Wing length: 14.0 mm; Head width: 3.2 mm. **Head:** frons brown, gray pollinose, with yellow central area above antennae, with sparse short, proclinate and thin dark brown bristles; face dark brown, with long, thin dark brown bristles (Fig. 5); antenna dark brown, gray pollinose; scape cylindrical, twice as wide and long as pedicel, with dense tufts of long dark brown bristles on ventral surface; pedicel with short and thin dark brown bristles; postpedicel less than three times as long as pedicel, with apical stylus, laterally compressed in dorsal view; labellum oval with short, delicate and sparse dark brown bristles; palpus short, dark brown, gray pollinose; occiput dark brown, gray pollinose, with short, thin dark brown bristles mainly into lateral sinuosity of compound eye; with short yellow bristles on foramen margin; ocellar tubercle dark brown, with sparse proclinate, long and thin dark brown bristles on anterior half. **Thorax:** dorsal view (Fig. 1): scutum velvety dark brown on center and reddish brown on lateral and posterior margins, with short, thin and sparse dark brown bristles on anterior third, dense, medium length and thin dark brown bristles laterally; notopleuron dark brown with long, thin dark brown bristles; 2 long and very strong dark brown prealar bristles; postalar wall with medium and thin light brown bristles on lower half and dark brown on upper, with row of more than 5 very long, strong dark brown bristles; scutellum reddish brown, with thin, sparse dark brown bristles longer on posterior margin; lateral view (Fig. 2): postpronotal lobe with medium and thin dark brown bristles; anepisternum light brown, gray pollinose, with long, dense dark brown bristles on upper half, and medium, thin dark brown bristles on lower half; katepisternum light brown, gray pollinose, with sparse, short and thin dark brown bristles, stronger and denser on lower corner; anepimeron glossy light brown with long, thin dark brown bristles on posterior 3/4; meron dark brown, golden pollinose, bare; mediotergite glossy light brown with dense long, thin dark brown bristles; laterotergite light brown with long, thin dark brown bristles; metepisternum dark brown, golden pollinose; metepimeron light brown with medium, thin light brown bristles on upper half; stalk of halter dark brown; knob yellow with dark brown margin. **Legs:** dark brown; trochanters with golden pollinosity, with short, thin dark brown bristles; tarsus with short, strong dark brown bristles; first tarsomere longer than others; pulvillus smaller than claws; fore leg: coxa with medium, strong and dense dark brown bristles on anterior surface; femur with short shiny brown scales and medium, thin light brown bristles on posteroventral surface; tibia with short, strong dark brown bristles on anterodorsal, dorsal, ventral, posterior and posteroventral surfaces; mid leg: coxa with long, strong dark brown bristles; femur with short shiny brown scales and medium, thin dark brown bristles on posterior surface; tibia with short and delicate shiny dark brown scales, with row of short dark brown bristles on anterodorsal, anteroventral, posterodorsal and posteroventral surfaces; hind leg: coxa with long, strong dark brown bristles; femur with short shiny brown scales, with row of long, strong dark brown bristles and long, thin light brown bristles on ventral surface; tibia with short and delicate shiny dark brown scales, with rows of short, strong dark brown bristles on anteroventral, anterodorsal, posteroventral and posterodorsal surfaces; strong dark brown bristles around apex. **Wing:** hyaline with light brown infuscated area from base to apex of costal (*c*), basal ½ of r_1, basal 1/3 of r_{2+3}, all basal radial (*br*) and lighter basal ½ of discal medial (*dm*) cell, basal medial (*bm*) cell, basal 1/3 of m_4, extreme base of *cua* and alula; costal vein (*C*) with dense dark brown bristles longer near base and diminutive at posterior margin; tegula dark brown with medium dark brown bristles; R_4 strongly sinuate; cell r_5 open on wing margin; *CuA* and *CuP* meeting at wing margin, cell *cua* closed; alula light brown with dark brown margin, with medium and thin light brown bristles on margin; wing three times longer than wide (Fig. 7). **Abdomen:** dark brown pollinose; tergites 1–7 with long, thin dark brown bristles, longer laterally (Figs 1, 83); sternites with long, thin light brown bristles. **Male terminalia:** dorsal view (Figs 9, 10): ejaculatory apodeme short, ending at same level of gonocoxal apodeme limits; distiphallus short, not surpassing apex of posterior process of gonocoxa, with truncate apex; gonostylus conspicuously developed, hook-shaped;

FIGURES 1–8. *Bryodemina ayalai* **sp. nov. 1.** Holotype male habitus, dorsal view (Scale bar, 2.0 mm); **2.** Holotype male habitus, lateral view (Scale bar, 2.0 mm); **3.** Paratype female habitus, dorsal view (Scale bar, 1.0 mm); **4.** Paratype female habitus, lateral view (Scale bar, 2.0 mm); **5.** Male head, frontal view (Scale bar, 1.0 mm); **6.** Female head, frontal view (Scale bar, 1.0 mm); **7.** Male right wing, dorsal view (Scale bar, 1.0 mm); **8.** Female right wing, dorsal view (Scale bar, 1.0 mm).



FIGURES 9–15. *Bryodemina ayalai* **sp. nov.**, holotype, male terminalia. **9.** Dorsal view (epandrium removed), line drawing (Scale bar, 0.2 mm); **10.** Dorsal view; **11.** Ventral view; **12.** Lateral view, line drawing (Scale bar, 1.0 mm); **13.** Lateral view; **14.** Epandrium, dorsal view, line drawing (Scale bar, 0.1 mm); **15.** Epandrium, dorsal view. Abbreviations: ejac apod = ejaculatory apodeme; lat aed apod = lateral aedeagal apodeme; basip = basiphallus; distp = distiphallus; epand = epandrium; goncx = gonocoxa; gonst = gonostylus.



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FIGURES 16–17. *Bryodemina ayalai* **sp. nov.**, paratype, female terminalia. **16.** Spermathecae and furca, line drawing (Scale bar, 0.2 mm); **17.** Spermathecae, furca, tergite 8 and acanthophorites (tergites 9+10). Abbreviations: spmth blb = spermathecal bulb; spmth dct = apical spermathecal ducts; sclet clr = sclerotized collar; spm pmp = sperm pump.

ventral view (Fig. 11): gonocoxites fused, with central ridge marking line of fusion on basal ⅔ of gonocoxa; apical ⅓ smoothly fused with only discrete line visible; lateral view (Figs 12, 13): gonocoxa elongate; basiphallus wide and distiphallus thin with truncate apex; gonostylus elongate, hook-shaped with pointed apex; epandrium cap visor-shaped with small central protuberance on anterior margin and deep notch on posterior margin (Figs 14, 15).

Female. Body length: 11.5–14.3 mm; Wing length: 14.0–15.7 mm; Head width: 3.3–3.5 mm. Similar to male, except for: **Head:** eyes dichoptic, separated by twice ocellar tubercle width; frons with sparse short, proclinate and thin white bristles; face with long, thin white bristles (Fig. 6); scape with dense tufts of long white bristles on ventral surface; pedicel with short, thin mixed white and dark brown bristles; postpedicel more than three times longer than pedicel; ocellar tubercle with sparse proclinate, long and thin dark brown bristles. **Thorax:** 3–4 long, very strong dark brown prealar bristles; lateral view: stalk of halter dark brown; knob dark brown on dorsal surface and yellow on ventral (Figs 3, 4). **Legs:** mid and hind femora with row of medium strong dark brown bristles on anterior surface. **Wing:** fully infuscated but lighter basally than in males; *CuA* and *CuP* almost touching at wing margin, cell *cua* narrowly open in wing margin (Fig. 8). **Abdomen:** tergites 1–3 and 5–7 with long, thin dark brown bristles, longer laterally; tergite 4 with long, thin yellow bristles, except for short, thin dark brown bristles on central 1/3 (Figs 3, 84). **Female terminalia:** acanthophorite (tergite 9+10) short in length, with 1/4 width of tergite 8; acanthophorite spines very thin, spatulate, 1.5 times length of cerci (Fig. 17). **Spermathecae:** spermathecal bulb guitar-shaped, longer than wide, two times longer than sperm pump; basal spermathecal duct thinner than apical duct; sperm pump placed at ½ of spermathecal duct, with sclerotized collars, equally developed on apical and basal ends of sperm pump; furca U-shaped, with membranous base, not projected; lateral bars parallel with right angle median fold; bar apexes divergent and curved upwards (Figs 16, 17).

Type material. HOLOTYPE ♂: **Venezuela:** GUÁRICO, San José de Tiznados, Hacienda La Esperanza (9.38 / -67.56), 16.x.1965. J.M. Ayala col. (MZ002361) (MZUSP). **PARATYPES: Venezuela:** unknown locality, 1899, F. Geay col. (1 ♀, MNHN); ARAGUA, Maracay, La Floresta (10.27 / -67.58), viii.1986, J.M. Ayala col. (MZ002362) (1 ♀, MZUSP); ARAGUA, Maracay, Universidad Central de Venezuela (UCV) (10.27 / -67.60), 14.v.1983, J.M. Ayala col. (MZ002363) (1 ♀, MZUSP).

Etymology. Named after José Manuel Ayala Landa who collected and kindly donated three specimens of the type-series of *Bry*. *ayalai* **sp**. **nov.** to the MZUSP collection.

Geographical records. Venezuela (Guárico and Aragua).

Bryodemina enigmatica **sp. nov.**

(Figs 18–33)

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Diagnosis. Bristles on face presenting sexual dimorphism, males with dark brown bristles and females with yellow bristles; wing hyaline, slightly darker yellowish orange areas near base and anterior margin; abdomen with dark brown bristles, tergite 4 with sparse yellow bristles on center, dense tufts of yellow bristles on lateral margin of tergites; spermathecal bulb pear-shaped.

Description. Male. Body length: 14.7–16.5 mm; Wing length: 16.1–18.4 mm; Head width: 3.2–3.5 mm. **Head:** frons dark brown, gray pollinose, with long, proclinate and thin dark brown bristles; face dark brown, gray pollinose, with long, thin dark brown bristles (Fig. 22); antenna dark brown, gray pollinose; scape cylindrical, twice as wide and long as pedicel, with dense tufts of long, spatulate dark brown bristles and tufts of white spatulate bristles on ventral surface; pedicel with short, thin dark brown bristles; postpedicel five times longer than pedicel, with apical stylus, laterally compressed in dorsal view; labellum oval with short, delicate and sparse light brown bristles; palpus short, light brown on base and dark brown on apical 3/4, gray pollinose; occiput dark brown, gray pollinose, with short, thin dark brown bristles mainly restricted to hind indentation of compound eye; with short white bristles on margin; ocellar tubercle dark brown pollinose, with proclinate, long and thin light brown bristles on anterior half. **Thorax:** dorsal view (Fig. 18): scutum velvety dark brown on center and reddish brown on lateral and posterior margins, with short, thin and sparse dark brown bristles on anterior third, dense, medium length and thin dark brown bristles laterally; notopleuron light brown with long, thin dark brown bristles; row of 3–4 long and very strong dark brown prealar bristles; postalar wall with medium, thin light brown bristles on anterior half, and medium, thin dark brown bristles laterally, and row of 4–5 very long, strong dark brown bristles; scutellum reddish, with thin, sparse

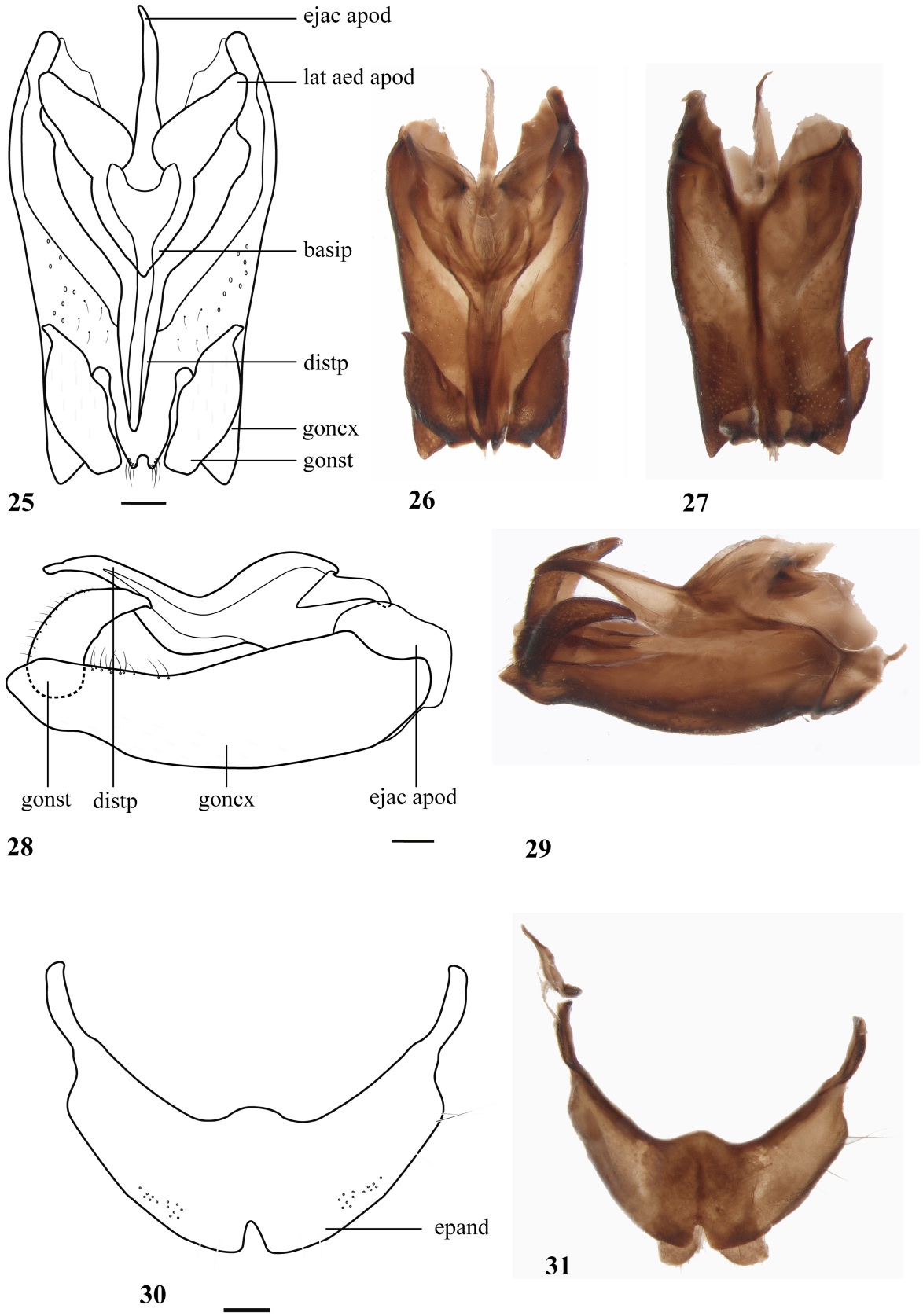
dark brown bristles longer on margin; lateral view (Fig. 19): postpronotal lobe light brown with medium, thin dark brown bristles; anepisternum light brown with long, dense dark brown bristles on upper half, and medium, thin light brown bristles on lower half; katepisternum light brown with short, thin light brown bristles except on lower and anterior halves; anepimeron shiny light brown with long, thin dark brown bristles on posterior 3/4; meron light brown, bare; mediotergite shiny light brown, with dense long, thin dark brown bristles; laterotergite light brown with long, thin dark brown bristles; metepisternum light brown with short, thin light brown bristles on upper third; metepimeron light brown with medium, thin dark bristles on posterior half; stalk of halter light brown; knob dark brown on dorsal surface and yellow on ventral surface. **Legs:** dark brown pollinose; trochanters golden pollinose, with short, thin dark brown bristles; tarsus with short, strong dark brown bristles; first tarsomere longer than others; pulvillus smaller than claws; fore leg: coxa with dense medium sized and strong dark brown bristles on anterodorsal surface; femur with short shiny brown scales, row of short, strong dark brown bristles on middle 1/3 of anterior surface, and medium, thin light brown bristles on posteroventral surface; tibia with short, strong dark brown bristles on anterodorsal, dorsal, ventral, posterior and posteroventral surfaces; mid leg: coxa with long, strong dark brown bristles; femur with short shiny brown scales, row of short, strong dark brown bristles on middle 1/3 of anterior surface, and medium, thin dark brown bristles on posterior surface; tibia with short and delicate shiny dark brown scales around, and row of short dark brown bristles on anterodorsal, anteroventral, posterior and dorsal surfaces; strong dark brown bristles around apex; hind leg: coxa with long, strong dark brown bristles; femur with short shiny brown scales, row of long, strong dark brown bristles on ventral surface, and long, thin light brown bristles on ventral surface; tibia with short and delicate shiny dark brown scales around, and row of short, strong dark brown bristles on anteroventral, anterodorsal, posteroventral and posterodorsal surfaces; strong dark brown bristles around apex. **Wing:** hyaline, except for yellowish orange areas at basal costal (*bc*) cell, costal (*c*), basal medial (*bm*) cell, basal ½ of basal radial (*br*) cell and yellowish brown alula; costal vein with dense dark brown bristles longer near base and diminutive at posterior margin; tegula dark brown with medium dark brown bristles; R_4 strongly sinuate; cells r_5 and *cua* narrowly open at wing margin; alula with medium and thin light brown bristles on margin; wing three times longer than wide (Fig. 24). **Abdomen:** dark brown pollinose; tergites 1–3 and 5–7 with long, thin dark brown bristles, longer laterally; tergite 4 with long, thin yellow bristles, longer laterally, except for short, thin dark brown bristles on center; sternites with long, thin light brown bristles (Fig. 18). **Male terminalia:** dorsal view (Figs 25, 26): ejaculatory apodeme long, slightly surpassing gonocoxal apodeme limits; distiphallus short, not surpassing apex of posterior process of gonocoxa; gonostylus conspicuously developed, hook-shaped; ventral view (Fig. 27): gonocoxites fused, with central ridge marking line of fusion evident along entire length of gonocoxa; lateral view (Figs 28, 29): gonocoxa elongate; basiphallus wide and distiphallus thin with truncate apex; gonostylus slender, hook-shaped with pointed apex; epandrium cap visor-shaped with regular anterior margin, except for convex central area, and deep notch on posterior margin (Figs 30, 31).

Female. Body length: 16.8–18.2 mm; Wing length: 14.9–18.2 mm; Head width: 3.6–4.4 mm. Similar to male, except for: **Head:** eyes dichoptic, separated by distance of 2.5 times ocellar tubercle width; frons with long, thin yellowish to orange bristles on upper half and spatulate yellowish bristles on lower half; face with spatulate yellowish bristles (Figs 20, 21, 23); scape with dense tufts of long, spatulate yellowish bristles; pedicel with short, thin yellowish bristles; postpedicel six times longer than pedicel. **Female terminalia:** acanthophorite (tergite 9+10) short in length, with 1/4 width of tergite 8; acanthophorite spines very thin, 1.5 length of cerci (Fig. 33). **Spermathecae:** spermathecal bulb pear-shaped, almost as long as wide, two times longer than sperm pump; basal spermathecal duct thinner than apical duct; sperm pump at middle 1/3 of spermathecal duct, with sclerotized collars, equally developed on apical and basal ends of sperm pump; furca U-shaped, with membranous base, dorsally projected; lateral bars divergent, with delicate median fold; bar apexes curved upwards (Figs 32, 33).

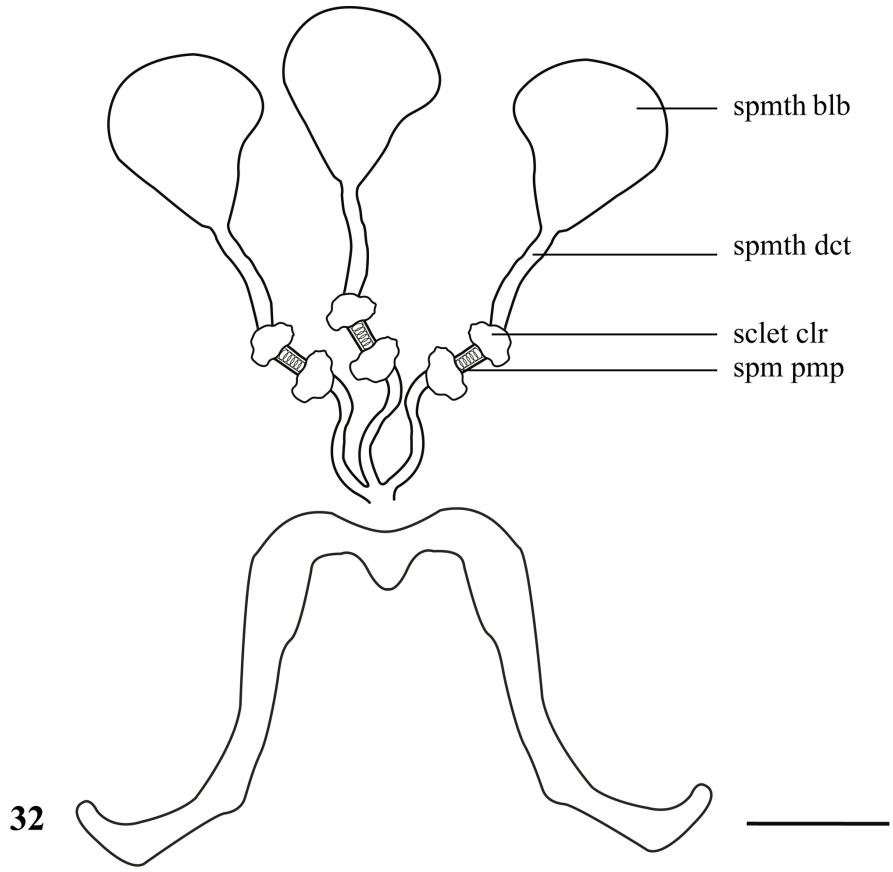
Type material. HOLOTYPE ♂: **Brazil:** GOIÁS (-16.68 / -49.25), xii.1937 (old catalog number: 26652) (MZ001274) (MZUSP). **PARATYPES:** Brazil, GOIÁS (-16.68 / -49.25), xii.1937, (old catalog number: 26653) (MZ001275) (2 ♂, MZUSP; 1 ♀, USNM); Aragarças (-15.90 / -52.24), i.1955, F.M. Oliveira col. (1 ♀, MNRJ); SÃO PAULO, Tamoio [probably Tamoio Plant, near city of Araraquara] (-21.95 / -48.17), xii.1944, (old catalog numbers: 26654 and 26656) (MZ001276), M. Barreto col. (2 ♀, MZUSP); MINAS GERAIS, Pedra Azul (-15.99 / -41.27), xi.1972, Seabra and Oliveira col (1 ♀, MNRJ).

Additional examined material. Without data label (old catalog numbers: 62669 and 62653) (MZ001277) (1 ♂, 1 ♀, MZUSP).

FIGURES 18–24. *Bryodemina enigmatica* **sp. nov. 18.** Holotype male habitus, dorsal view (Scale bar, 2.0 mm); **19**. Holotype male habitus, lateral view (Scale bar, 2.0 mm); **20.** Paratype female habitus, dorsal view (Scale bar, 2.0 mm); **21.** Paratype female habitus, lateral view (Scale bar, 2.0 mm); **22.** Male head, frontal view (Scale bar, 1.0 mm); **23.** Female head, frontal view (Scale bar, 1.0 mm); **24.** Male right wing, dorsal view (Scale bar, 1.0 mm).



FIGURES 25–31. *Bryodemina enigmatica* **sp. nov.**, paratype, male terminalia. **25.** Dorsal view (epandrium removed), line drawing (Scale bar, 0.1 mm); **26.** Dorsal view; **27.** Ventral view; **28.** Lateral view, line drawing (Scale bar, 0.1 mm); **29.** Lateral view; **30.** Epandrium, dorsal view, line drawing (Scale bar, 0.2 mm); **31.** Epandrium, dorsal view. Abbreviations: ejac apod = ejaculatory apodeme; lat aed apod = lateral aedeagal apodeme; basip = basiphallus; distp = distiphallus; epand = epandrium; goncx = gonocoxa; gonst = gonostylus.



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FIGURES 32–33. *Bryodemina enigmatica* **sp. nov.**, paratype, female terminalia. **32.** Spermathecae and furca, line drawing (Scale bar, 0.2 mm); **33.** Spermathecae, furca, tergite 8 and acanthophorites (tergites 9+10). Abbreviations: spmth blb = spermathecal bulb; spmth dct = apical spermathecal ducts; sclet clr = sclerotized collar; spm pmp = sperm pump.

Etymology. The specific name is a noun in apposition and refers to the enigmatic identification of the series deposited in MZUSP in the early stages of this study.

Geographical records. Brazil (Goiás and São Paulo).

Remarks. A single female specimen (62669) has cell r_5 closed at the wing margin.

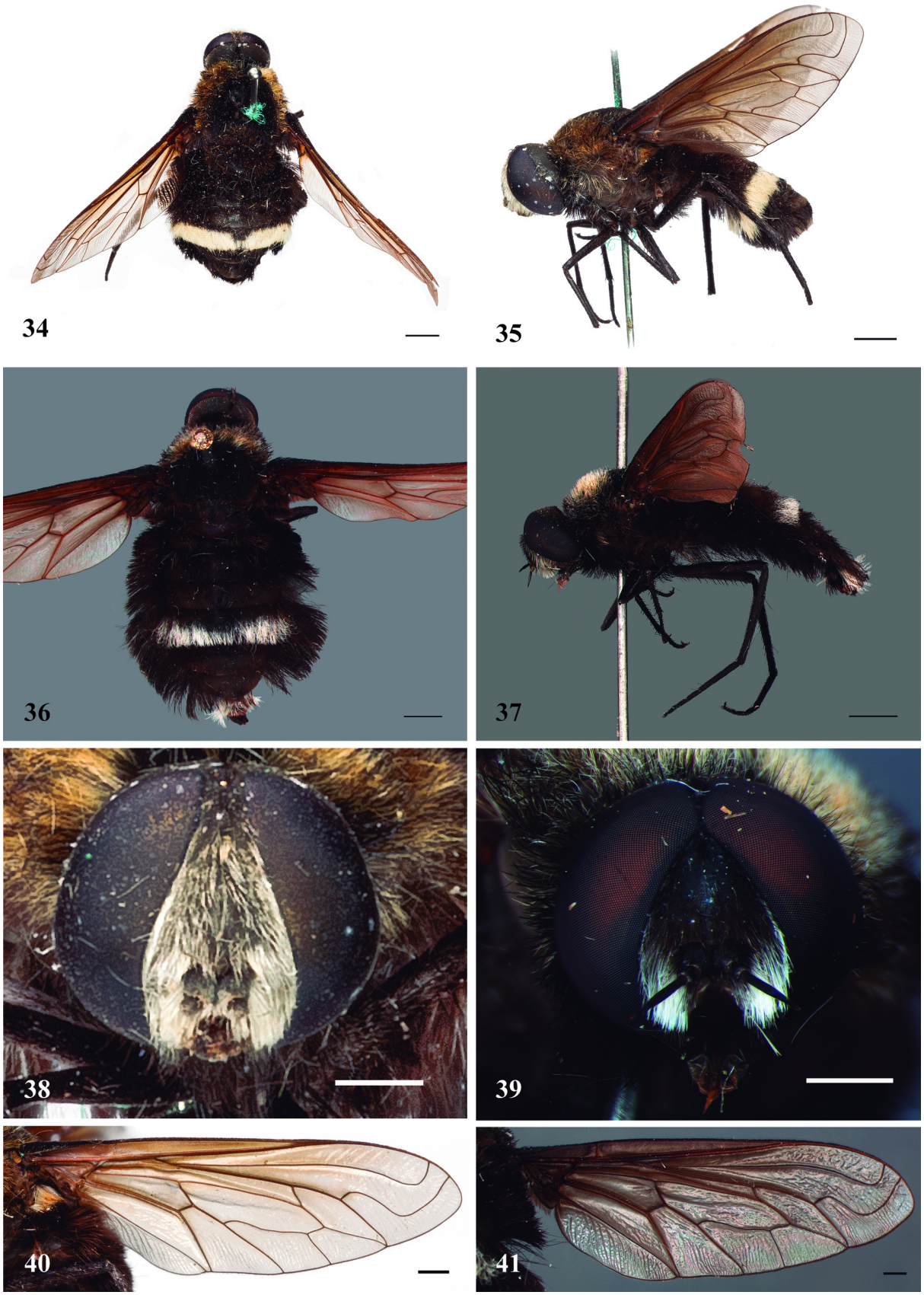
Bryodemina fasciata (Williston), 1901

(Figs 34–50)

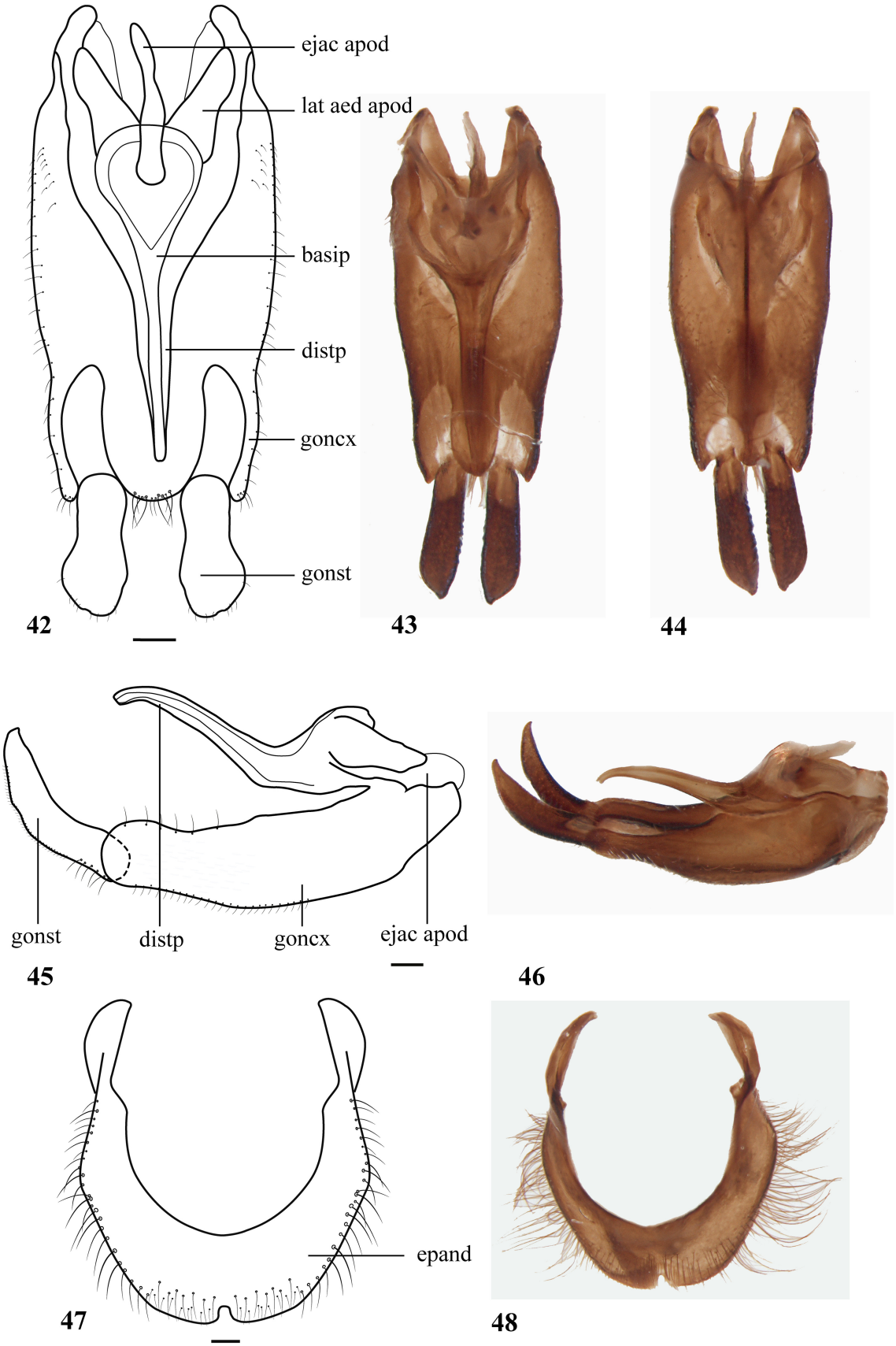
Anisotamia fasciata Williston, 1901: 284. Type locality: Mexico (Jalisco).
Oncodocera fasciata (Williston): Paramonov, 1930: 67(417); Hull, 1973: 316.
Ogcodocera fasciata (Williston): Painter & Painter, 1962: 62.

Diagnosis. Face of male and female with light yellow bristles on sides of compound eyes; wing hyaline, slightly brownish areas near base and anterior margin; abdominal segments with dark brown bristles on tergites 1–3, tergite 4 white on apical ½ and dark brown on basal ½, forming a white band; spermathecal bulb pear-shaped.

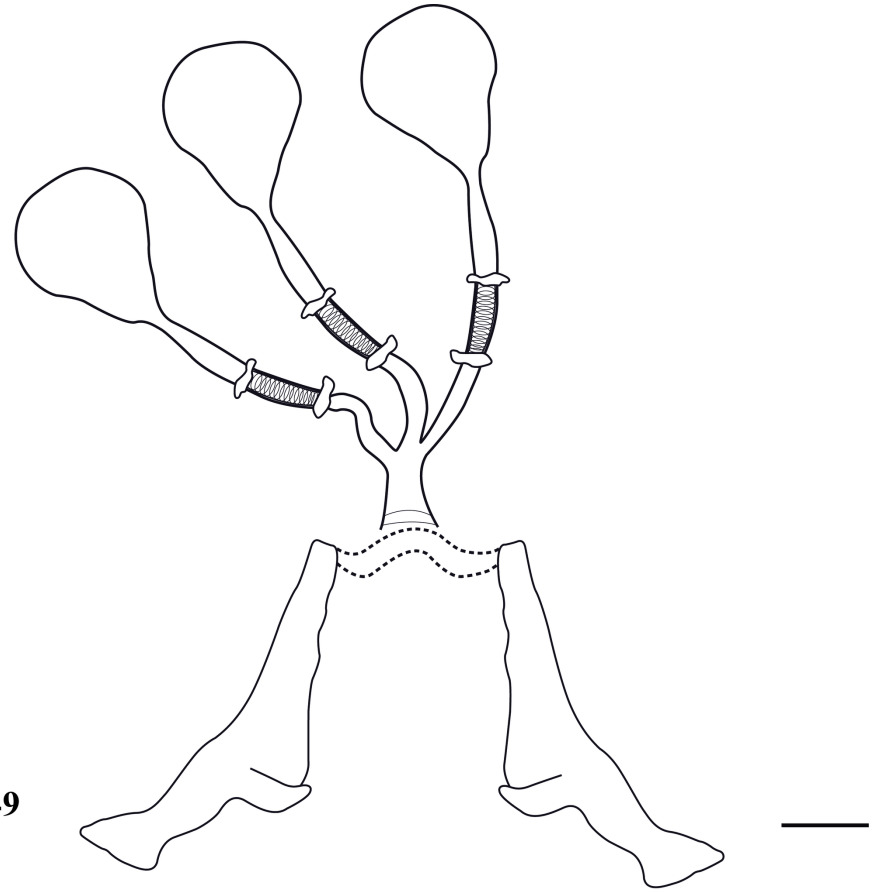
Redescription. Male. Body length: 18.5–19.0 mm; Wing length: 16.5–17.0 mm; Head width: 3.9–4.0 mm. **Head:** frons dark brown, gray pollinose, with long, thin dark brown bristles and dark brown scales; face glossy dark brown, gray pollinose, with spatulate white bristles; oral margin with white bristles (Fig. 38); antenna dark brown gray pollinose, with base inserted in facial groove; scape cylindrical, twice as wide and long as pedicel with short, thin dark brown bristles and longer white bristles on ventral surface; pedicel with short, thin dark brown bristles; postpedicel (missing on Holotype) seven times longer than pedicel, laterally compressed in dorsal view, with central longitudinal pit on inner surface; labellum oval, with short, delicate and sparse dark brown bristles; palpus short, dark brown with gray pollinosity, with short, thin and sparse light brown bristles; occiput dark brown, gray pollinose, with sparse, short light brown bristles and whitish hyaline scales, dense short yellowish white bristles on occipital foramen margin; ocellar tubercle dark brown, gray pollinose, with proclinate long and thin dark brown bristles (missing on Holotype). **Thorax:** dorsal view (Fig. 34): scutum velvety dark brown, with long, thin and sparse yellow bristles, white near anterior margin, on anterior third, sparse dark brown bristles on anterior and lateral margins, posterior margin of scutum with short, thin dark brown bristles; notopleuron gray pollinose with medium length, light yellow, spatulate bristles and dark brown bristles, row of 3 long and very strong dark brown prealar bristles and sparse strong dark brown bristles; postalar wall with medium, thin dark brown bristles on anterior half, medium length and thin light brown bristles laterally, row of 5–6 very long, strong dark brown bristles; scutellum dark brown, with short, thin dark brown bristles, longer and stronger at posterior margin; lateral view (Fig. 35): postpronotal lobe gray pollinose, with dense long, thin yellowish white mixed with dark brown bristles; anepisternum light brown, gray pollinose, with long, thin yellow bristles mixed with dark brown ones at upper half, and long, thin dark brown bristles on lower half, denser at posterior margin; katepisternum light brown, gray pollinose with dense medium length and thin dark brown bristles; anepimeron light brown, gray pollinose with long, thin dark brown bristles on area posterior to anepimeral ridge; meron light brown, gray pollinose, bare; mediotergite light brown, gray pollinose with long, thin dark brown bristles; laterotergite light brown, gray pollinose, with long, thin dark brown bristles; metepisternum and metepimeron light brown, gray pollinose, with medium length and thin dark brown bristles; stalk of halter light brown; knob yellow. **Legs:** dark brown, gray pollinose; all coxae dark brown with gray pollinosity, with long, thin dark brown bristles; all trochanters with dark brown bristles; all femora with dark brown scales; fore and mid tibiae with longitudinal row of dark brown bristles on anterodorsal, anteroventral, posteroventral and posterodorsal surfaces; all tibiae with row of bristles around apex; tarsus with short, strong dark brown bristles, first tarsomere longer than others; pulvillus smaller than claws; fore leg: femur with row of short, strong dark brown bristles on anteroventral surface; mid leg: femur with row of strong dark brown bristles on anteroventral and 2–3 bristles on apical third of posteroventral surface; hind leg: femur with row of dark brown bristles on anteroventral, ventral and posteroventral surfaces; tibia with row of dark brown bristles on anteroventral, anterodorsal and posteroventral surfaces and spurs around apex. **Wing:** hyaline, except for light brown areas at basal costal cell (*bc*), costal (*c*), basal medial (*bm*) cell and alula; costal vein (*C*) with dense dark brown bristles, longer near base and diminutive at posterior margin; tegula dark brown with short, thin dark brown bristles; R_4 slightly sinuate; cell r_5 closed on wing margin; cell *cua* open; alula with medium length and thin light brown bristles on margin; wing three times longer than wide (Fig. 40). **Abdomen:** glossy dark brown; lateral margin of tergites with dense tuft of



FIGURES 34–41. *Bryodemina fasciata*. **34.** Male habitus, dorsal view (Scale bar, 2.0 mm); **35.** Male habitus, lateral view (Scale bar, 2.0 mm); **36.** Female habitus, dorsal view (Scale bar, 2.0 mm); **37.** Female habitus, lateral view (Scale bar, 2.0 mm); **38.** Female head, frontal view (Scale bar, 1.0 mm); **39.** Male head, frontal view (Scale bar, 1.0 mm); **40.** Male right wing, dorsal view (Scale bar, 1.0 mm); **41.** Female right wing, dorsal view (Scale bar, 2.0 mm).



FIGURES 42–48. *Bryodemina fasciata*, male terminalia. **42.** Dorsal view (epandrium removed), line drawing (Scale bar, 0.2 mm); **43.** Dorsal view; **44.** Ventral view; **45.** Lateral view, line drawing (Scale bar, 0.1 mm); **46.** Lateral view; **47.** Epandrium, dorsal view, line drawing; **48.** Epandrium, dorsal view. Abbreviations: ejac apod = ejaculatory apodeme; lat aed apod = lateral aedeagal apodeme; basip = basiphallus; distp = distiphallus; epand = epandrium; goncx = gonocoxa; gonst = gonostylus.



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FIGURES 49–50. *Bryodemina fasciata*, female terminalia. **49.** Spermathecae and furca, line drawing (Scale bar, 0.2 mm); **50.** Spermathecae, furca, tergite 8 and acanthophorites (tergites 9+10).

long, thin dark brown bristles; abdominal tergites with medium length and thin dark brown bristles, tergites 4 and 8 with medium length and thin white bristles on apical half, forming band; sternites dark brown, with dense long and thin dark brown bristles (Figs 34, 86). **Male terminalia:** dorsal view (Figs 42, 43): ejaculatory apodeme short not surpassing gonocoxal apodeme limits; distiphallus short, not surpassing apex of posterior process of gonocoxa; gonostylus conspicuously elongate, with pointed apex; ventral view (Fig. 44): gonocoxites fused, with central ridge marking line of fusion on basal ¾ of gonocoxa; apical ¼ smoothly fused with only discrete line visible; lateral view (Figs 45, 46): gonocoxa elongate; basiphallus wide and distiphallus thin with truncate apex; gonostylus slender and elongate, hook-shaped and pointed on apex, with serrations on medial surface; epandrium cap visor-shaped with regular anterior margin, without notch, and deep notch on posterior margin (Figs 47, 48).

Female. Body length: 20.7–21.3 mm; Wing length: 17.9–18.5 mm; Head width: 3.9–4.1 mm. Similar to male, except for: **Head:** eyes dichoptic; eyes separated by distance of two times ocellar tubercle width; frons dark brown, gray pollinose, with long, thin dark brown bristles except for white bristles and scales along eye margin and lateral to antennae (Fig. 39); oral margin with white bristles; scape with dorsal digitiform projection on apex; pedicel with short, thin yellowish white bristles on dorsal surface and dark brown bristles on ventral. **Thorax:** dorsal view (Fig. 36): scutum velvety dark brown, with long, thin and sparse yellow bristles anteriorly; lateral view (Fig. 37): katepisternum with dense medium length and thin yellow and dark brown bristles on upper third; anepimeron with long, thin dark brown bristles on area posterior to anepimeral ridge. **Legs:** mid leg: femur with 3–4 strong, dark brown bristles on apical third of posteroventral and on basal half of anteroventral surfaces. **Female terminalia:** acanthophorites (tergite 9+10) divided in two separate sclerites, with 1/3 of tergite 8 length; acanthophorite spines long, 1.5 length of cerci (Fig. 50). **Spermathecae:** spermathecal bulb pear-shaped, ¼ longer than wide, two times longer than sperm pump; basal spermathecal duct slightly thinner than apical duct; sperm pump placed at ½ of spermathecal duct, with sclerotized collars, equally developed on apical and basal ends of sperm pump; furca U-shaped, with membranous base, ventrally projected; lateral bars without well-defined contours and tenue median fold; bar apexes divergent, flattened and laterally pointed (Figs 49, 50).

Type material examined. HOLOTYPE. ♂: **México:** JALISCO (unknown locality) (BMNH).

Additional material examined. México: CHIAPAS, Arriaga (16.24 / -93.90), R.H. Painter & E.M. Painter, col. (1 ♂, USNM); COLIMA, Puebla Viejo (19.15 / -103.65), R. Dreisbach & K. Dreisbach, col. (1 ♀, USNM). **Costa Rica:** GUANACASTE, Santa Rosa, Cerro El Hacha (10.58 / -85.27), 13.vii.–3.viii.1985, D. Janzen col. (10 ♀, AMNH).

Geographical records. Mexico (Jalisco, Chiapas and Colima) and Costa Rica (Guanacaste).

Bryodemina hedickei (Paramonov), 1930 comb. nov.

(Figs 51–66)

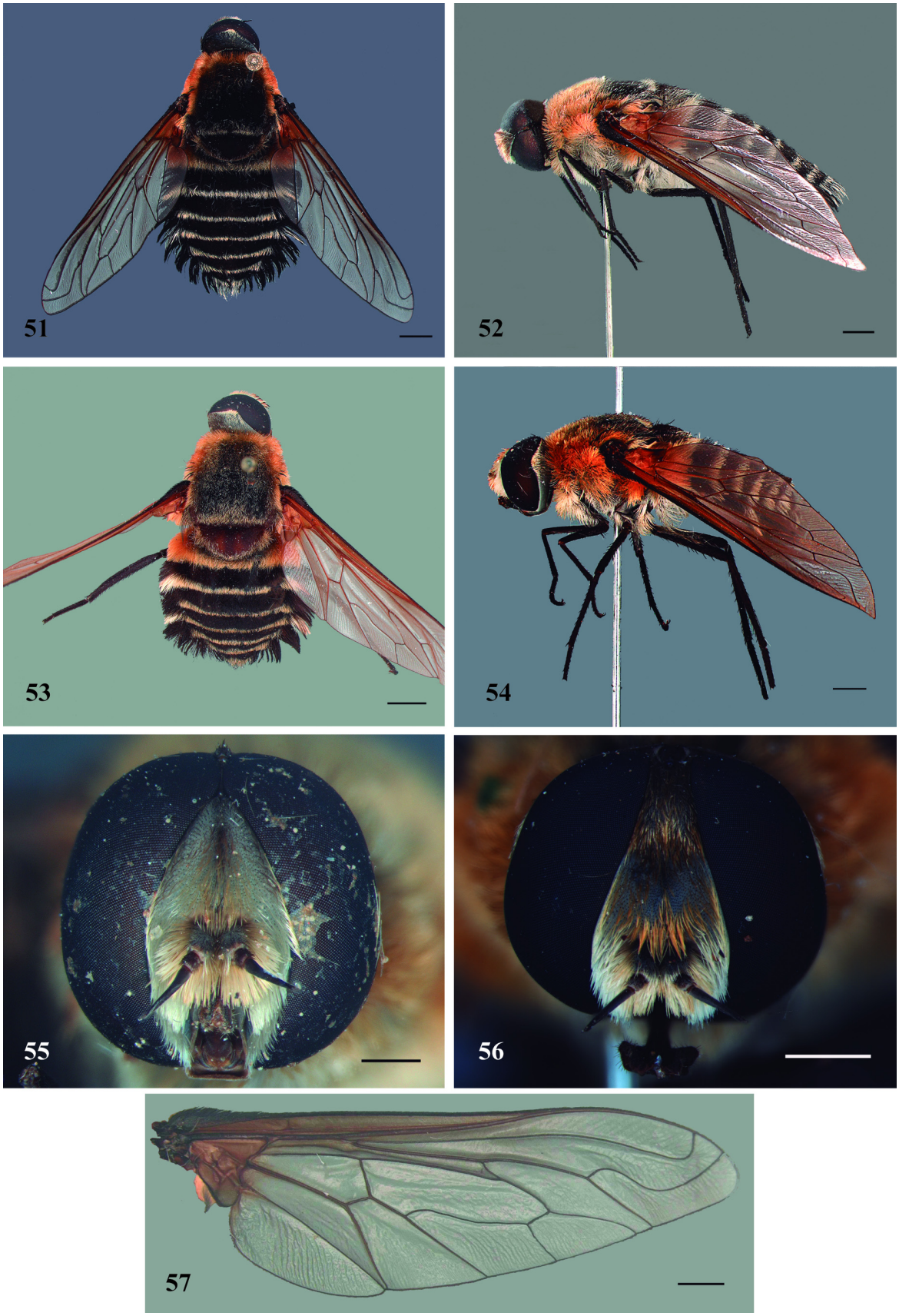
Oncodocera hedickei Paramonov, 1930: 67 (417). Type locality: Sara, Santa Cruz, Bolivia.; Hull, 1973: 316.
Bryodemina (*Brachydemia*) *latisoma* Hull, 1973: 314, 316. Type locality: unknown (probably Brazil, Mato Grosso, Chapada); **new synonym**.
Brachydemia latisoma (Hull): Painter *et al*., 1978: 25; Evenhuis & Greathead, 1999: 250.
Brachydemia hedickei (Paramonov): Painter *et al*., 1978: 25; Evenhuis & Greathead, 1999: 250; Lamas & Evenhuis, 2014: 91.

Diagnosis. Wing hyaline, slightly yellowish areas near base and at costal (*c*) cell; Abdominal segments with dark brown bristles on basal ¾ and yellow in apical ¼ forming bands; tergite 1 with tuft of long, thin orange bristles on each side of lateral margins; sternites 1–4 with dense, long and thin white bristles; sternites 5–7 with medium length and thin dark brown bristles; dense tufts of bristles on lateral margin of tergites; spermathecal bulb pear-shaped.

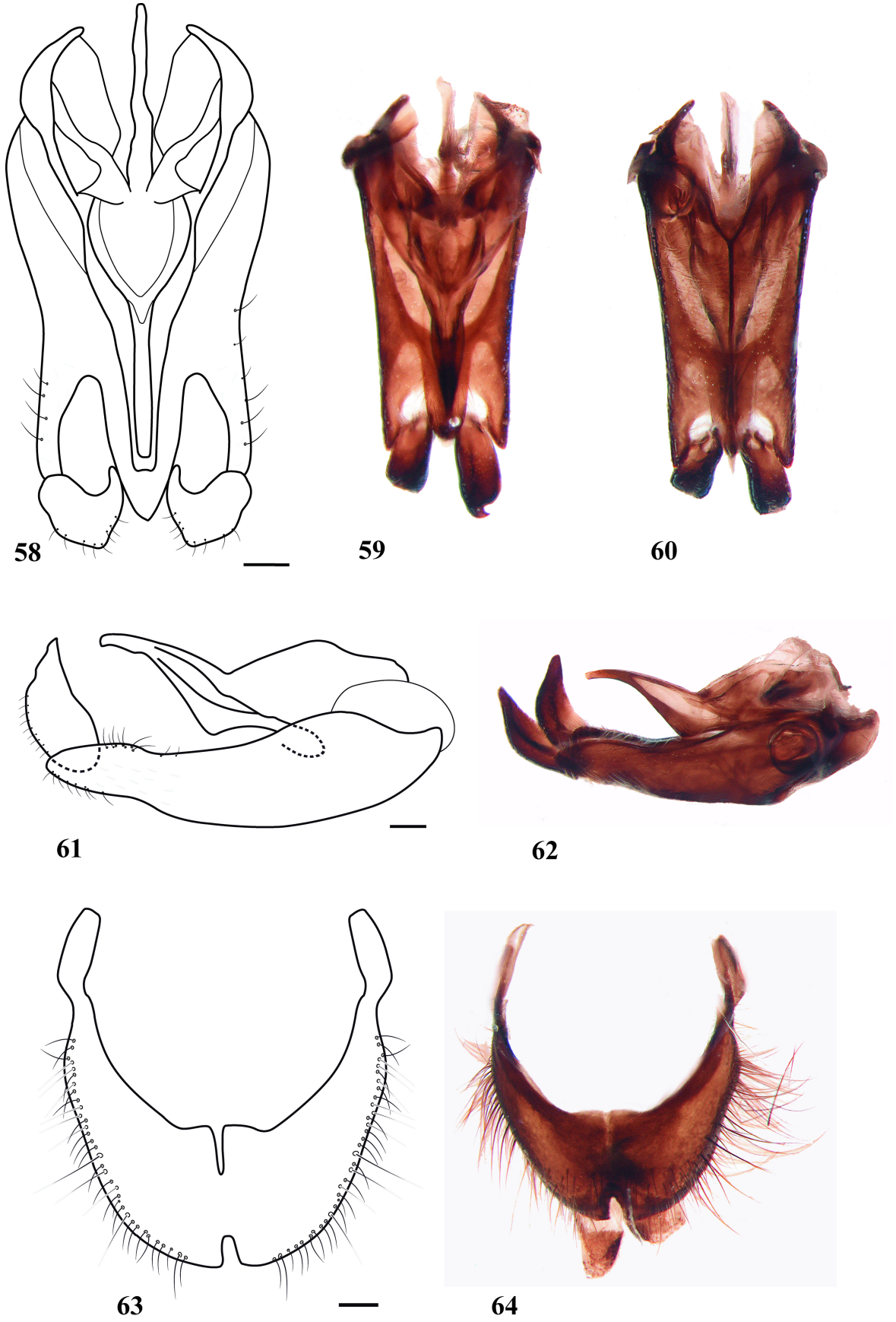
Redescription. Male. Body length: 13.0–21.1 mm; Wing length: 13.5–20.6 mm; Head width: 3.5–4.5 mm. **Head:** frons dark brown with gray pollinose, with long, thin dark brown bristles on upper half and spatulate yellowish white bristles on lower half; face glossy dark brown, gray pollinose, with yellowish spatulate white bristles; oral margin with white bristles (Fig. 55); antenna dark brown gray pollinose; scape cylindrical, twice as wide and same length as pedicel with short, thin dark brown bristles on dorsal surface and longer yellowish white bristles on ventral surface; pedicel with short, thin dark brown bristles; postpedicel five times longer than pedicel, laterally compressed in dorsal view; labellum oval, with short, delicate and sparse orange bristles; palpus short, dark brown with gray pollinosity, with short, thin and sparse light brown bristles; occiput dark brown, gray pollinose,

with short yellowish white scales mainly along lateral sinuosity of compound eye, with short white bristles on margin; ocellar tubercle glossy dark brown, with proclinate long, thin dark brown bristles. **Thorax:** dorsal view (Fig. 51): scutum velvety dark brown, with long, thin and sparse orange bristles on anterior third, dense medium length and thin orange and dark brown bristles laterally, posterior margin of scutum with short, thin light yellow bristles; notopleuron gray pollinose with spatulate, medium length, light yellow to orange bristles, row of 3–4 long, very strong dark brown prealar bristles and sparse strong dark brown bristles; postalar wall with medium length and thin dark brown bristles on anterior half, in sides medium length and thin light yellow bristles, with row of 4–5 very long, strong dark brown bristles; scutellum reddish brown, with short, thin dark brown bristles and short, thin and sparse light yellow bristles at posterior margin; lateral view (Fig. 52): postpronotal lobe gray pollinose, with dense, long and thin yellowish white to orange bristles; anepisternum gray pollinose, with long, thin yellowish white to orange bristles; katepisternum gray pollinose with dense medium length, thin and sparse yellowish white bristles; anepimeron gray pollinose with long, thin yellowish white to orange bristles on upper half, and medium length and thin light yellow bristles on lower half; meron gray pollinose, bare; mediotergite gray pollinose with dense, long and thin orange bristles; laterotergite gray pollinose with dense tuft of long, thin yellowish white bristles; metepisternum and metepimeron gray pollinose, with medium length and thin yellowish white bristles; stalk of halter light brown; knob yellow. **Legs:** dark brown pollinose; all coxae light brown with gray pollinosity, with long, thin yellowish white bristles, fore and mid coxae with dark brown bristles on anterior surface; all trochanters with yellow bristles; all femora with dark brown scales, except yellow scales on basal half of dorsal and posterior surfaces; fore and mid tibiae with longitudinal row of dark brown bristles on anterodorsal, anteroventral, posteroventral and posterodorsal surfaces; all tibiae with row of bristles around apex; tarsus with short, strong dark brown bristles, first tarsomere longer than others; pulvillus smaller than claws; fore leg: femur with short, thin and sparse dark brown bristles on posteroventral surface; mid leg: femur with row of strong dark brown bristles on middle third of anteroventral and posteroventral surfaces; hind leg: femur with dark brown bristles on anteroventral and posteroventral surfaces; tibia with row of dark brown bristles on anteroventral, anterodorsal and posteroventral surface and spurs around apex. **Wing:** hyaline, except for yellow areas at basal costal (*bc*) cell, costal (*c*), basal medial (*bm*) cell and orange brown alula; costal (*C*) vein with dense dark brown bristles, longer near base and diminutive at posterior margin; tegula light brown with short and thin dark brown and light yellow bristles; R_4 slightly sinuate; cell r_5 open on wing margin; *CuA* and *CuP* touching at wing margin, cell *cua* closed; alula with medium length and thin yellow shiny bristles on margin; wing three times longer than large (Fig. 57). **Abdomen:** glossy dark brown; lateral margin of tergites with dense tuft of long, thin dark brown bristles and yellow on tergites 2 and 4; segments of abdomen with dark brown bristles on basal ¾ of segment and yellow on apical ¼ forming stripes; tergite 1 with tuft of long, thin orange bristles on each side of lateral margins; sternites dark brown, sternites 1–4 with dense, long and thin white bristles; sternites 5–7 with medium length and thin dark brown bristles (Figs 51, 89). **Male terminalia:** dorsal view (Figs 58, 59): ejaculatory apodeme long, slightly surpassing gonocoxal apodeme limits; distiphallus short, not surpassing apex of posterior process of gonocoxa; gonostylus conspicuously developed, shaped like scorpion's telson and stinging apparatus; ventral view (Fig. 60); gonocoxites fused, with central ridge marking line of fusion evident along entire length of gonocoxa; lateral view (Figs 61, 62): gonocoxa elongate; basiphallus wide and distiphallus thin with truncate apex; gonostylus robust, abruptly pointed on apex; epandrium cap visor-shaped with regular anterior margin, without true notch, only line of suture weakly sclerotized and deep notch on posterior margin (Figs 63, 64).

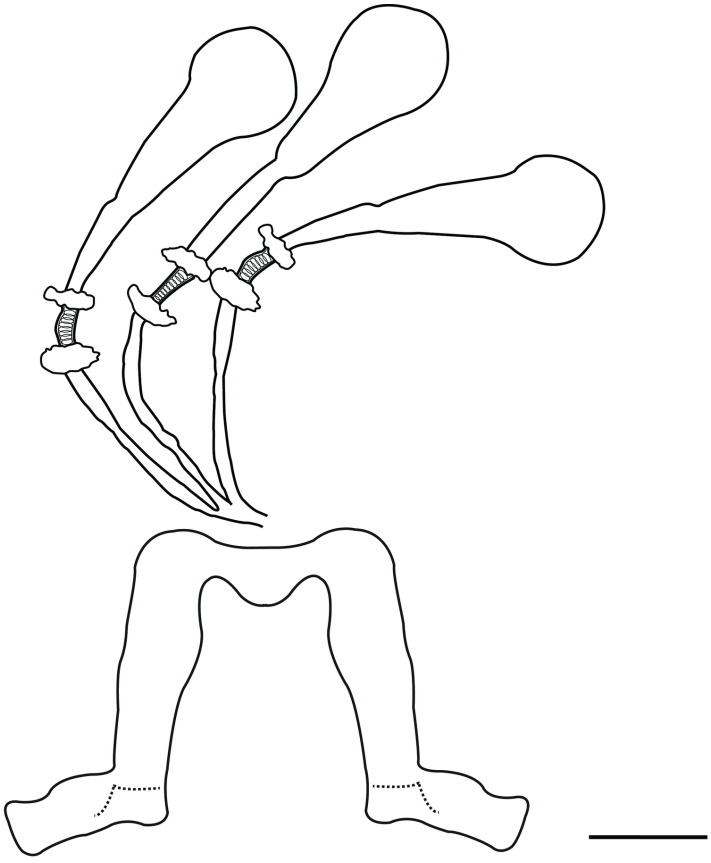
Female. Body length: 14.7–20.0 mm; Wing length: 14.3–19.4 mm; Head width: 3.4–4.6 mm. Similar to male, except for: **Head:** eyes dichoptic; eyes separated by distance of two times ocellar tubercle width; frons with long, thin yellowish dark brown bristles on upper half and spatulate yellow to oranges bristles on lower half (Fig. 56); scape with short, thin yellow to orange bristles on dorsal surface; pedicel with yellowish dark brown bristles. **Thorax:** lateral view (Fig. 54): knob of halter yellowish light brown. **Wing:** *CuA* and *CuP* almost touching at wing margin, cell *cua* open at wing margin. **Female terminalia:** acanthophorites (tergite 9+10) divided in two separate sclerites, 1/3 length of tergite 8; acanthophorite spines long, 1.5 times length of cerci (Fig. 66). **Spermathecae:** spermathecal bulb pear-shaped, two times longer than wide, three times longer than sperm pump; basal spermathecal duct thinner than apical duct; sperm pump placed at apical 1/2 of spermathecal duct, with sclerotized collars, equally developed on apical and basal ends of sperm pump; furca U-shaped, with membranous dorsally projected base; lateral bars slightly divergent with right angle fold near apex; bar apexes divergent and laterally pointed (Figs 65, 66).



FIGURES 51–57. *Bryodemina hedickei*. **51.** Male habitus, dorsal view (Scale bar, 2.0 mm); **52.** Male habitus, lateral view (Scale bar, 2.0 mm); **53.** Female habitus, dorsal view (Scale bar, 2.0 mm); **54.** Female habitus, lateral view (Scale bar, 2.0 mm); **55.** Male head, frontal view (Scale bar, 0.5 mm); **56.** Female head, frontal view (Scale bar, 1.0 mm); **57.** Female right wing, dorsal view (Scale bar, 1.0 mm).



FIGURES 58–64. *Bryodemina hedickei*, male terminalia. **58.** Dorsal view (epandrium removed), line drawing (Scale bar, 0.1 mm); **59.** Dorsal view; **60.** Ventral view; **61.** Lateral view, line drawing (Scale bar, 0.2 mm); **62.** Lateral view; **63.** Epandrium, dorsal view, line drawing (Scale bar, 0.2 mm); **64.** Epandrium, dorsal view.



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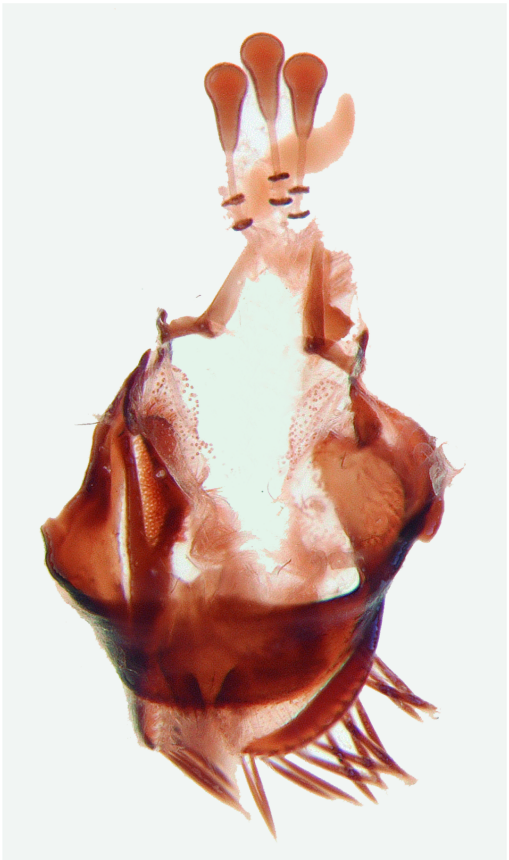

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FIGURES 65–66. *Bryodemina hedickei*, female terminalia. **65.** Spermathecae and furca, line drawing (Scale bar, 0.2 mm); **66.** Spermathecae, furca, tergite 8 and acanthophorites (tergites 9+10).

Type material examined. *Bryodemina latisoma*: **SYNTYPES.** 2 ♀: **Brazil:** MATO GROSSO: unknown locality (probably Brazil, Mato Grosso, Chapada dos Guimarães), Frank M. Hull collection (JSS numbers: 25696 and 25697) (CNC).

Additional material examined. Argentina: SANTA FE, Las Garzas (-28.83 / -59.52), ix.1903, E.R. Wagner col. (1 ♀, MNHN); JUJUY, Yuto (-23.63 / -64.47), 11.i.1966, H. Townes col. (1 ♀, USNM). **Bolívia:** EL BENI, San Ramon (-13.45 / -64.60); 1.xii.2003, D.J. Mann & C. Hamel (1 ♀, OUMNH); SANTA CRUZ, Nueva Moka (-17.32 / -63.55), ii.1950, A. Martins col. (MZ001288) (1 ♀, MZUSP); Buena Vista (-17.55 / -65.88), xi.1933, 1.iv.1933 (2 ♀, USNM). **Brazil:** BAHIA: São Desiderio (-12.37 / -44.87), Pq. Mun. da Lagoa Azul, 21–25.i.2009, Nihei, Figueiredo, Almeida and Cezar col. (MZ001284) (1 ♀, MZUSP; Caetité (-13.84 / -42.49), Faz. Quebra Braço, 28–30.i.2009, Nihei, Figueiredo, Almeida and Cezar col. (MZ001286) (1 ♂, MZUSP); Monte Santo (-9.97 / -38.90), Fazenda Frei Jesus, 02.xii.2010, Lopes et. al. col (MZ001294) (1 ♂, MZUSP); CEARÁ, Russas (-4.98 / -38.02), ii.1940, (old catalog number: 26658), Shannon and Alves col. (MZ001287) (1 ♂, MZUSP); GOIÁS: Jataí (-17.88 / -51.72), i.1955, M. Carrera, A. Machado, F. S. Pereira, E. Dente and Milgar Loureiro col. (MZ001283) (1 ♀, MZUSP); MATO GROSSO, Barra do Tapirapé (-10.83 / -50.67), 1–14.xii.1964, José Celio Pinheiros (1 ♀, MZUSP001295), 14.x.1964, B. Malkin col. (1 ♀, MZ001282) (MZUSP); Cáceres (-16.06 / -57.68), 4.xii.1984 (1 ♀), 9.i.1985 (1 ♂, 4 ♀), 7.ii.1985 (1 ♀), C. Elias leg (POLONOROESTE, DZUP); Cuiabá (-15.58 / -56.08), 4.xi.–12.xii.2011, (MZ001292) (2 ♂, MZUSP); Diamantino (-14.41 / -56.45), 10–14.ii.1965, S. Laroca leg (1 ♂, DZUP); Jacaré P.N. Xingú (-15.26 / -57.70), xi.1961, Alvarenga e Werner col. (2 ♂, 3 ♀, DZUP); Rondonópolis (-16.47 / -54,63), 7.xi.1950 (1 ♀), 8.xi.1950 (1 ♀) (MZ001289 and MZ001290) (MZUSP); MATO GROSSO DO SUL, Campo Grande (-16.17 / -56.27), 30.xi.2010 (1 ♂, UFMS), Pinhal, R. F. col.; Corumbá (-19.02 / -57.65), 19.ix.1929 (old catalog number: 62637) (MZ001278) (1 ♂, MZUSP); Porto Murtinho (-21.64 / -57.71), 09.xii.2012, Lamas and team col. (SISBIOTA, MZUSP001293) (12 ♀, MZUSP); Salobra (-20.17 / -56.52), 30.i.1942 (old catalog numbers: 26661, 26659, 26660) (3 ♀, MZ001280), 27–31.i.1941 (old catalog number: 62694), F. Lane col. (1 ♀, MZ001281) (MZUSP); RIO GRANDE DO NORTE, Macaíba (-5.85 / -35.35), iv.1939 (old catalog number: 26662), D. C. Alves col. (MZ001285) (1 ♀, MZUSP); iv.1933, D. Alves col. (1 ♂, 1 ♀, USNM); SÃO PAULO, Lussanvira/Pereira Barreto (-20.63 / -51.12) (old catalog number: 26657) (MZ001291) (1 ♀, MZUSP); MINAS GERAIS, Paraopeba (-18.83 / -45.18), 1.i.1991, Vital R. Souza col. (2 ♀, MNRJ). **Paraguay:** CONCEPCIÓN, Horqueta (-23.40 / -56.88), no date, A. Schulze col. (3 ♂, USNM).

Other examined material. Without data label (old catalog number: 26665) (MZ001279) (2 ♀, MZUSP).

Geographical records. Brazil (Bahia, Ceará, Goiás, Mato Grosso, Mato Grosso do Sul, Rio Grande do Norte and São Paulo), Argentina (Santa Fe and Jujuy), Bolívia (El Beni and Santa Cruz) and Paraguay (Concepción).

Bryodemina valida (Wiedemann), 1830

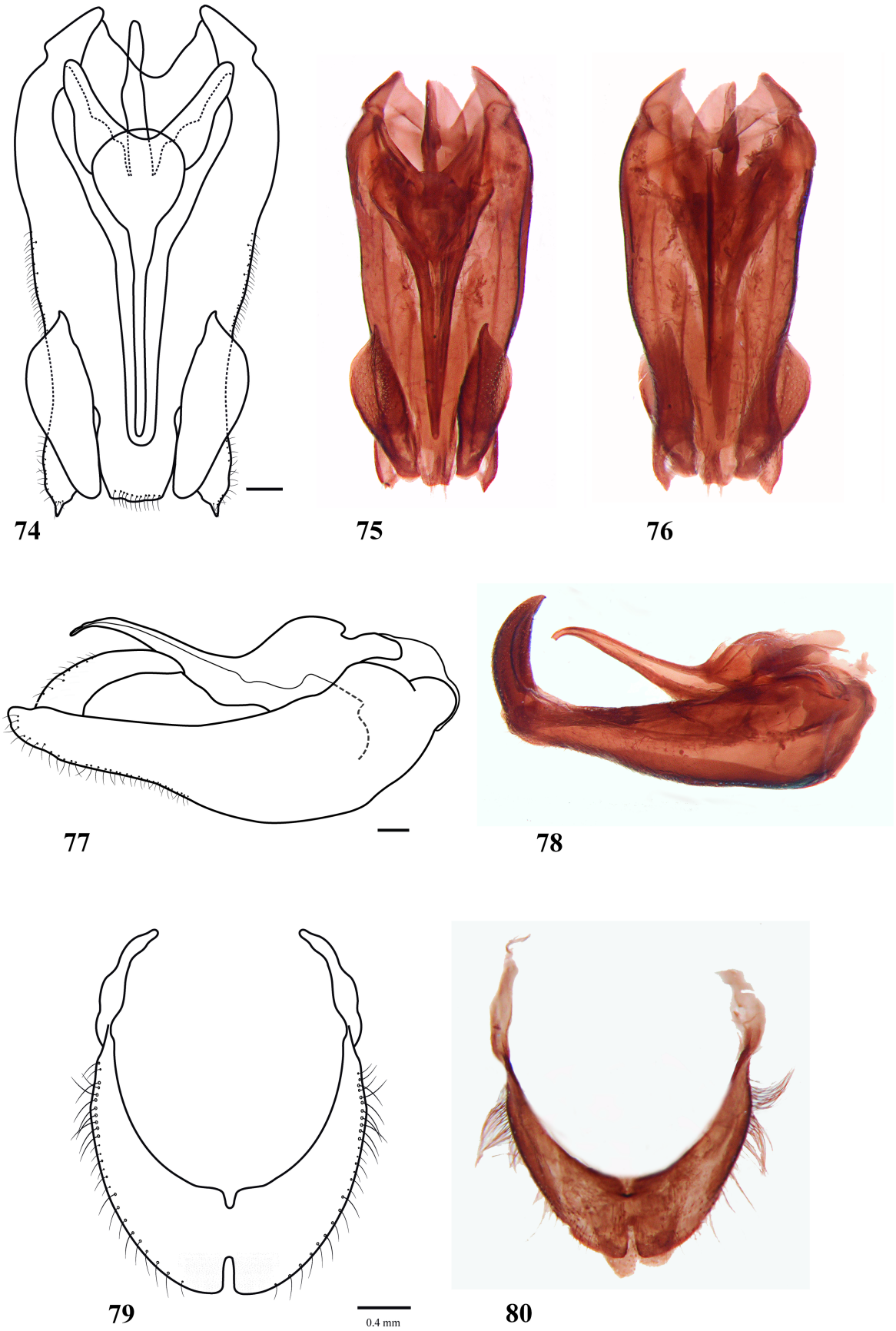
(Figs 67–82)

Anthrax valida Wiedemann, 1830: 636. Type locality: "Oaxara in Mexikanischen" [= Mexico (Oaxaca)]; Hull, 1973: 316.
Anisotamia eximia Macquart, 1850: 419 (115). Type locality: "Mexique"; Hull, 1973: 316.
Oncodocera valida (Wiedemann): Paramonov, 1930: 69 (419).
Ogcodocera eximia (Macquart): Painter & Painter, 1962: 62.
Ogcodocera valida (Wiedemann): Painter & Painter, 1962: 64; Hull, 1966: 227.
Bryodemina valida (Wiedemann): Painter *et al*., 1978: 25.

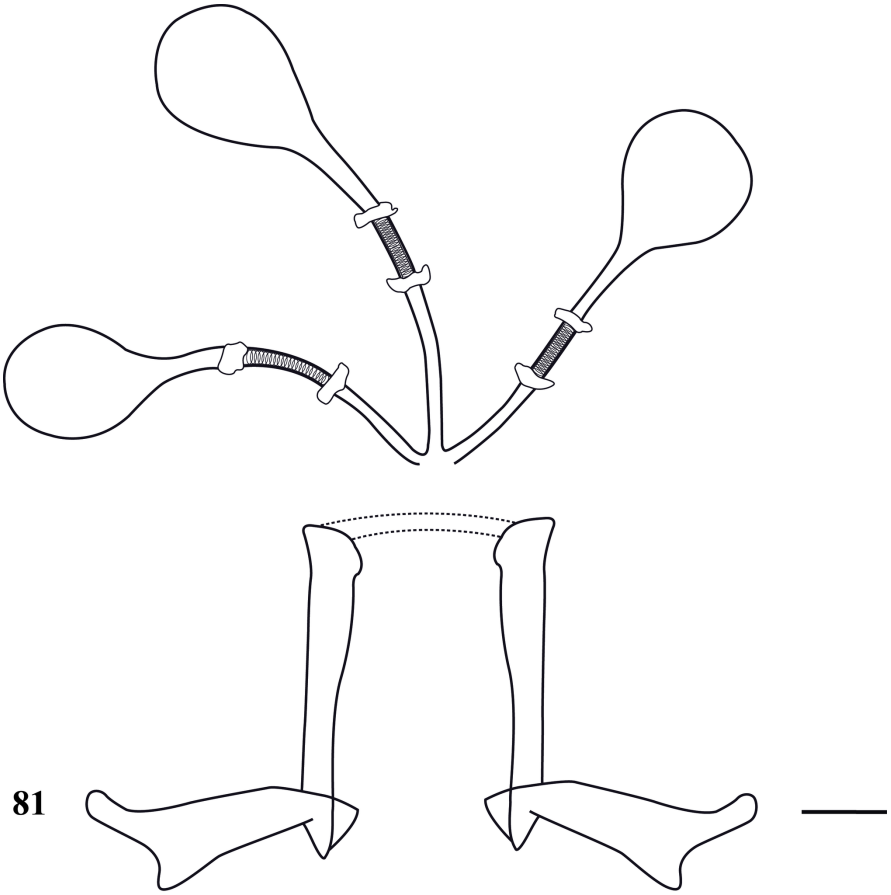
Diagnosis. Ground color dark brown; wing hyaline with light brown infuscated area on the corner of anterior 1/3 and proximal 3/5; body covered by dark brown bristles except for large triangular patches of yellow bristles on each side of the last abdominal tergum. These yellow patches present some polymorphism on its length and may extend from tergites 2–8 or 5–7; spermathecal bulb pear-shaped.

Redescription. Male. Body length: 12.5–22.5 mm; Wing length: 13.3–21.0 mm; Head width: 2.7–4.5 mm. **Head:** eyes holoptic, slightly approximate in upper ¼, posterior margin of eye sinuous, conspicuous indentation with small black triangle area, without ommatidium, on vertex; frons dark brown, gray pollinose, with long, thin dark brown bristles and dark brown scales; face glossy dark brown, gray pollinose, with yellowish spatulate white bristles; oral margin with dark brown bristles (Fig. 71); antenna dark brown gray pollinose, with base inserted on facial groove; scape cylindrical, twice as wide and long as pedicel with short, thin dark brown bristles and longer white bristles on ventral surface; pedicel with short, thin dark brown bristles; postpedicel seven times longer than

FIGURES 67–73. *Bryodemina valida*. **67.** Syntype male habitus, dorsal view; **68.** Male habitus, lateral view (Scale bar, 2.0 mm); **69.** Syntype female habitus, dorsal view; **70.** Female habitus, lateral view (Scale bar, 2.0 mm); **71.** Male head, frontal view (Scale bar, 0.5 mm); **72.** Female head, frontal view (Scale bar, 1.0 mm); **73.** Male right wing, dorsal view (Scale bar, 1.0 mm).



FIGURES 74–80. *Bryodemina valida*, male terminalia. **74.** Dorsal view (epandrium removed), line drawing (Scale bar, 0.2 mm); **75.** Dorsal view; **76.** Ventral view; **77.** Lateral view, line drawing (Scale bar, 0.1 mm); **78.** Lateral view; **79.** Epandrium, dorsal view, line drawing (Scale bar, 0.2 mm); **80.** Epandrium, dorsal view.



FIGURES 81–82. *Bryodemina valida*, female terminalia. **81.** Spermathecae and furca, line drawing; **82.** Spermathecae, furca, tergite 8 and acanthophorites (tergites 9+10).

pedicel, laterally compressed in dorsal view, with central longitudinal pit on inner surface; labellum oval, with short, delicate and sparse dark brown bristles; palpus short, dark brown gray pollinose, with short, thin and sparse light brown bristles; occiput dark brown, gray pollinose, with sparse short light brown bristles and whitish hyaline scales, dense short yellowish white bristles on occipital foramen margin; ocellar tubercle dark brown, gray pollinose, with proclinate long and thin dark brown bristles. **Thorax:** dorsal view (Fig. 67): scutum velvety dark brown, with long, thin dark brown bristles, longer on anterior and lateral margins, posterior margin of scutum with short, thin dark brown bristles; notopleuron gray pollinose with spatulate, medium length, light yellow bristles and dark brown bristles, row of 3 long and very strong dark brown prealar bristles and sparse, strong dark brown bristles; postalar wall with medium length and thin dark brown bristles on anterior half, medium length and thin light brown bristles laterally, row of 5–6 very long, strong dark brown bristles; scutellum light brown, with short, thin dark brown bristles, longer and stronger on posterior margin; lateral view (Fig. 68): postpronotal lobe gray pollinose, with dense, long and thin yellowish white mixed with dark brown bristles; anepisternum light brown, gray pollinose, with long, thin yellow bristles mixed with dark brown ones on upper half, long, thin dark brown bristles on lower half, denser at posterior margin; katepisternum light brown, gray pollinose with dense medium length and thin dark brown bristles; anepimeron light brown, gray pollinose with long, thin dark brown bristles on area posterior to anepimeral ridge; meron light brown, gray pollinose, bare; mediotergite light brown, gray pollinose with long, thin dark brown bristles; laterotergite light brown, gray pollinose, with long, thin dark brown bristles; metepisternum and metepimeron light brown, gray pollinose, with medium length and thin dark brown bristles; stalk of halter light brown; knob yellow. **Legs:** dark brown, gray pollinose; all coxae dark brown with gray pollinosity, with long, thin dark brown bristles; all trochanters with dark brown bristles; all femora with dark brown scales; fore and mid tibiae with longitudinal row of dark brown bristles on anterodorsal, anteroventral, posteroventral and posterodorsal surfaces; all tibiae with row of bristles around apex; tarsus with short, strong dark brown bristles, first tarsomere longer than others; pulvillus smaller than claws; fore leg: femur with row of short, strong dark brown bristles on anteroventral surface; mid leg: femur with row of strong dark brown bristles on anteroventral and 2–3 bristles on apical third of posteroventral surface; hind leg*:* femur with row of dark brown bristles on anteroventral, ventral and posteroventral surfaces; tibia with row of dark brown bristles on anteroventral, anterodorsal and posteroventral surfaces and spurs around apex. **Wing:** three times longer than wide, hyaline, except for light brown areas at basal costal (*bc*) cell, costal (*c*), basal medial (*bm*) cell and alula; costal (*C*) vein with dense dark brown bristles, longer near base and diminutive at posterior margin; tegula dark brown with short, thin dark brown bristles; R_4 slightly sinuate; cell r_5 closed at wing margin; *CuA* and *CuP* touching at wing margin, cell *cua* closed at wing margin; alula with medium length and thin light brown bristles on margin (Fig. 73). **Abdomen:** glossy dark brown; lateral margin of tergites with dense tuft of long, thin dark brown bristles; abdominal tergites with medium length and thin dark brown bristles, tergite 5–7 with triangular dark yellow lateral patches of thin bristles, forming longitudinal central dark brown stripe (Figs 67, 69, 87, 88); sternites dark brown, with dense, long and thin dark brown bristles. **Male terminalia:** dorsal view (Figs 74, 75): ejaculatory apodeme short not surpassing gonocoxal apodeme limits; distiphallus short, not surpassing apex of posterior process of gonocoxa; gonostylus conspicuously developed, inflated on posterior half, with pointed apex; ventral view (Fig. 76): gonocoxites fused, with central ridge marking line of fusion on basal ¾ of gonocoxa; apical ¼ smoothly fused without visible line; lateral view (Figs 77, 78): gonocoxa elongate; basiphallus wide and distiphallus thin with truncate apex; lateral aedeagal apodeme short, not surpassing gonocoxal apodeme margins; gonostylus elongate, pointed on apex; epandrium cap visor-shaped, with small notch on anterior margin and other 2 times deeper on posterior margin (Figs 79, 80).

Female. Body length: 15.0–20.0 mm; Wing length: 15.1–22.0 mm; Head width: 3.2–4.5 mm. Similar to male, except for: **Head:** eyes dichoptic; eyes separated by distance of two times ocellar tubercle width; frons dark brown, gray pollinose, with long, thin dark brown bristles except white bristles and scales closer to eye margin and on area above antennae; oral margin with white bristles (Fig. 72); scape with dorsal digitiform projection on apex; pedicel with short, thin yellowish white bristles on dorsal surface and dark brown bristles on ventral. **Thorax:** dorsal view (Fig. 69): scutum velvety dark brown, with long, thin and sparse yellow bristles; lateral view (Fig. 70): katepisternum with dense medium length and thin yellow and dark brown bristles on upper third; anepimeron with long, thin dark brown bristles on area posterior to anepimeral ridge. **Legs:** mid leg: femur with 3–4 strong dark brown bristles on apical third of posteroventral and on basal half of anteroventral surfaces. **Female terminalia:** acanthophorites (tergite 9+10) divided into two separate sclerites, 1/3 of tergite 8 length; acanthophorite spines long and spatulate, 1.5 times length of cerci (Fig. 82). **Spermathecae:** spermathecal bulb pear-shaped, 1.5 times longer than wide, two times longer than sperm pump; basal spermathecal duct thinner than apical duct; sperm pump placed at apical 1/2

FIGURES 83–89. Abdomen pattern of *Bryodemina* species, dorsal view. **83.** *Bry. ayalai* **sp. nov.**, male (Scale bar, 1.0 mm); **84.** *Bry. ayalai* **sp. nov.**, female (Scale bar, 0.5 mm); **85.** *Bry. enigmatica* **sp. nov.**, male (Scale bar, 1.0 mm); **86.** *Bry. fasciata*, male (Scale bar, 1.0 mm); **87.** *Bry. valida*, male (Scale bar, 1.0 mm); **88.** *Bry. valida*, female (Scale bar, 1.0 mm); **89.** *Bry. hedickei*, male (Scale bar, 1.0 mm).

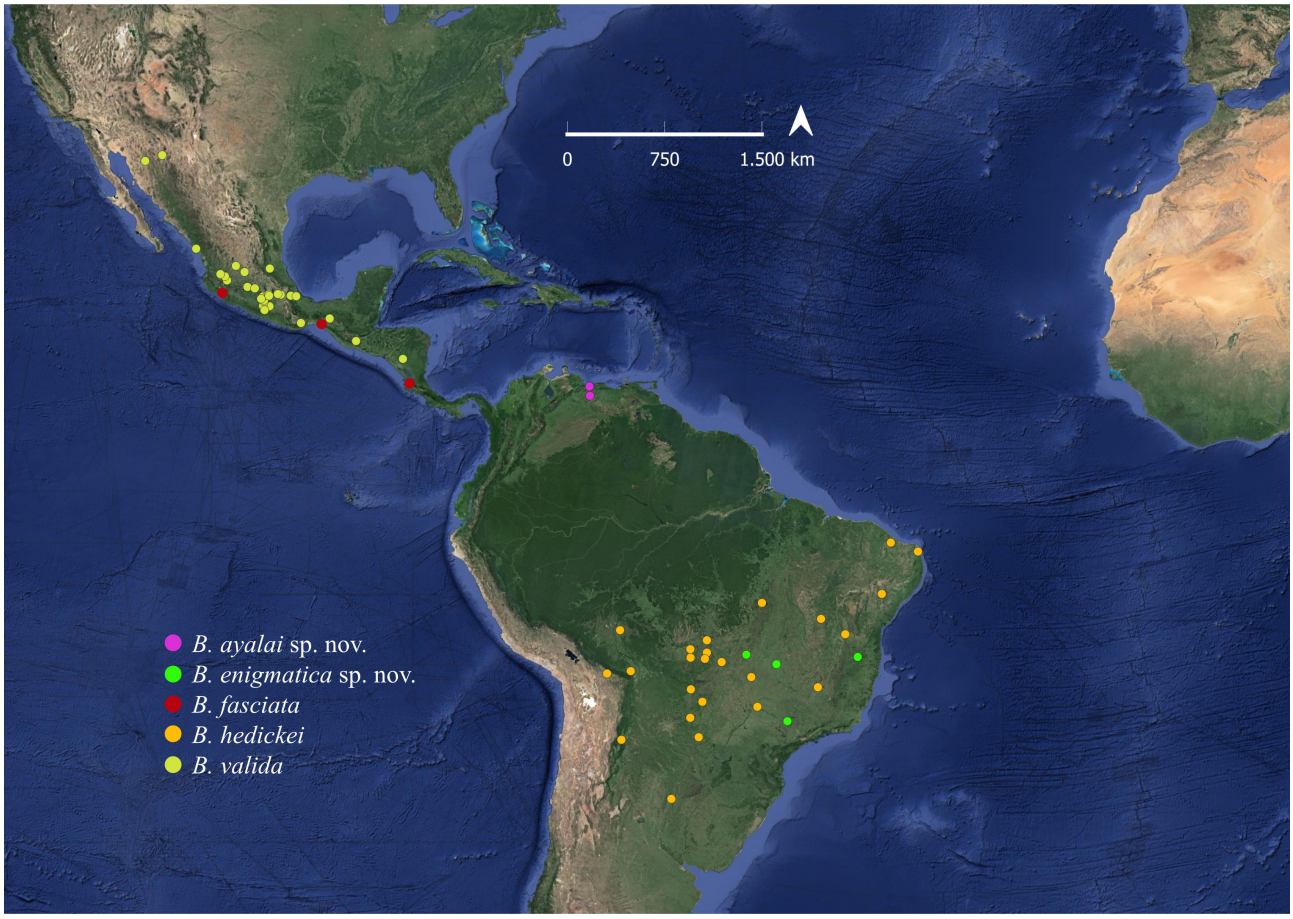


FIGURE 90. Geographic records of *Bryodemina* species in North, Central and South America.

of spermathecal duct, with sclerotized collars equally developed on apical and basal ends of sperm pump; furca U-shaped, with membranous base not projected; lateral bars parallel with contorted right angle median fold; bar apexes divergent and pointed upwards (Figs 81, 82).

Type material examined. SYNTYPES . 1 ♂, 1 ♀: **Mexico:** unknown locality, 1539 (♂ only), Deppe col. (ZMHB).

Additional material examined. Guatemala: GUATEMALA: Guatemala City (14.63 / -90.52), xi.1915, W.M Schauss col. (1 ♂, 1 ♀, USNM). **Mexico:** Unknown locality, (1883) (1 ♀, NHW), Winthem col. (1 ♀, NHW); unknown locality (1 ♀, OUMNH); GUERRERO: Taxco (18.48 / -99.55), 15.ix.1963, R.H. & E.M. Painter col. (1 ♀, USNM); Iguala (18.35 / -99.54), 31.viii.1959, R.H. & E.M. Painter col. (1 ♂, USNM); Chilpancingo (17.55 / -99.51), 31.viii.1959, R.H. & E.M. Painter col. (1 ♂, USNM); OAXACA: Oaxaca (16.34 / -95.93), 29.viii.1913, R.H. & E.M. Painter col. (1 ♂, USNM); same locality except, 5.ix.1959, R.H. & E.M. Painter col. (1 ♂, USNM); PUEBLA, Puebla (19.04 / -98.20), 14.viii.1972, G.F. & S. Hevel (1 ♂, USNM); VERACRUZ, Cotaxtla (18.84 / -96.40), 24.x.1957, W. Gibson col. (1 ♂, 3 ♀, USNM), Orizaba, 5.v.1871 (1 ♀, NHW); Palma Sola (22.18 / -98.01), 28.viii.1964, B. & D. Sigwalt col. (1 ♀, MNHN); SINALOA, Villa Union (23.19 / -106.22)(1 ♂, 2 ♀, USNM); MORELOS, Cuernavaca (18.93 / -99.23), 12.ix.1963, ix.1923, R.H. & E.M. Painter col. (1 ♀, USNM); same locality except, E.G. Smyth (1 ♂, 1 ♀, USNM); JALISCO, Guadalajara, 31.viii.1962 (1 ♀, USNM); same locality except, 15.vii.1962 (1 ♀, SAMC). **Nicaragua:** MATAGALPA: Matagalpa (12.93 / -85.92), 04.ix.1967, R.H. & E.M. Painter col. (2 ♂, 5 ♀, USNM). **USA:** ARIZONA: Douglas (31.34 / -109.55), 6.viii.1962, M.A. Cazier col. (1 ♂, USNM).

Geographical records. México (Guerrero, Oaxaca, Puebla, Veracruz, Sinaloa, Morelos and Jalisco), Nicaragua (Matagalpa), Guatemala (Guatemala) and United States of America (Arizona).

Discussion

Taxonomic comments

The description of *Bryodemina* provided by Hull (1973) lacks clarity regarding whether it was prepared with reference to the genus *Bryodemina*, its nominal subgenus, the subgenus *Brachydemia* or even the newly proposed species *Bry*. (*Bra*.) *latisoma*. Additionally, there is a notable absence of comparison with the previously known South American species *Bry*. (*Bra*.) *hedickei* (Paramonov).

After thoroughly examining the primary Diptera collections in Brazil, the authors were unable to locate any specimens of *Bra*. *hedickei*, except for an undetermined series of a distinct *Brachydemia* morphospecies found in the Diptera collection of MZUSP. Initially, it was assumed that this series might represent specimens of *Bra*. *hedickei*. However, upon comparing them with Paramonov's original description, it became evident that they belonged to a different species. Nonetheless, it was observed that *Bra*. *hedickei* and *Bra*. *latisoma* bear striking similarities. Given that Hull did not have access to the types of *Bra*. *hedickei*, there arose a possibility that Hull's new species, *Bra*. *latisoma*, could be considered a junior synonym of Paramonov's species. High-resolution images were shared with Dr. Ziegler (Museum für Naturkunde), who confirmed the distinction between the specimens of the undetermined series found in MZUSP and *Bra*. *hedickei* and that our *Bra*. *latisoma* series are, indeed, identical to the holotype of *Bra*. *hedickei*. Dr. Skevington (formerly of Canadian National Collection) graciously provided an excellent series of photographs of the syntype series of *Bra*. *latisoma* from the CNC collection, which conclusively supported the hypothesis of synonymy between the two described species. Additionally, samples of *Bry*. *ayalai* **sp**. **nov.** obtained during this study aided in delineating the species boundaries within *Bryodemina*. Consequently, both nominal genera are consolidated into synonyms, two new species are described and *Bry*. *latisoma* Hull is now regarded as a junior synonym of *Bry*. *hedickei* (Paramonov).

Biogeographic comments

Bryodemina Hull now comprises five species distributed in the seasonally dry tropical forests of the Neotropics, reaching the southern limits of the Nearctic Region (Fig. 90). Among these, *Bry*. *hedickei* exhibits the broadest known distribution, with records in the Caatinga, Cerrado and Chaco domains, across the South American dry diagonal, including the southernmost record of the genus in the province of Santa Fe, Argentina. The South American species *Bry*. *hedickei* and *Bry*. *enigmatica* **sp. nov.** share overlapping distributions within the Brazilian Cerrado, specifically in the state of Goiás. During the comprehensive survey conducted by the SISBIOTA-Diptera Project (Lamas *et al*. 2023), only specimens of *Bry*. *hedickei* were encountered in the states of Mato Grosso and Mato Grosso do Sul, suggesting that the distribution of *Bry*. *enigmatica* **sp. nov.** is likely more limited in scope, rather than being solely influenced by collection sample bias. Nevertheless, the presence of two isolated southeastern records in the states of São Paulo, within transition areas between the Cerrado and Atlantic Forest near the city of Araraquara, and Minas Gerais, within a high-altitude region (specifically, the city of Pedra Azul) of the Atlantic Forest biome, suggests a potentially wider distribution within the drier and higher altitude zones of this biome.

The species *Bry. valida* has the second widest distribution among *Bryodemina* species. It inhabits the dry areas of Central America and Mexico, extending northwards to the United States, specifically in the city of Douglas, Arizona, situated along the border with Mexico. This study marks the first record of the genus *Bryodemina* in the USA, establishing it as the northernmost known record of *Bryodemina* to date.

Although a cursory examination of the distributional patterns of *Bryodemina* species might imply congruence with the hypothesis proposed by Lamas *et al*. (2014) for the Bombyliinae genus *Heterostylum* Macquart, it is crucial to approach this assertion with caution as the origin of *Bryodemina* and the early diversification of the Lomatiinae lineages are not yet elucidated. As observed in *Heterostylum*, *Bryodemina* species are distributed across North, Central and South America (only east of the Andes). However, *Bryodemina* exhibits a notable diversification primarily within the Central American continental landmass, while being notably absent in the Caribbean islands. This stands in contrast to *Heterostylum* species, which are exclusively found in the islands and are absent from the continental landmass. Furthermore, a significant difference lies in the fact that *Bryodemina* displays an overlap between Central American and Nearctic species, a phenomenon not observed in *Heterostylum*.

An ongoing phylogenetic study of the Lomatiinae may provide valuable insights into this discussion. However, it is worth noting that the early diversifications of the Bombyliinae lineages occurred in the Late Cretaceous, with the oldest fossil record dating back to the Eocene, while those of the Lomatiinae took place in the Early Paleogene, with the oldest fossil record from the Oligocene (Wiegmann *et al*. 2003; Lamas & Nihei 2007). This hypothesis is further supported by Li *et al*. (2021) who, based on phylogenomic analysis, asserted that the crown clades of the three most species-rich subfamilies of Bombyliidae (Anthracinae, Bombyliinae and Lomatiinae) originated approximately 69–66 Ma, around the Cretaceous-Paleogene (K-Pg) boundary.

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