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## On the identities of nine Neotropical species of *Hirtodrosophila* (Diptera, Drosophilidae)

CARLOS R. VILELA<sup>1</sup> & GERHARD BÄCHLI<sup>2</sup>

The following nine nominal species of South American *Hirtodrosophila* are analyzed and redescribed: *H. gilva* (Burla, 1956); *H. levigata* (Burla, 1956); *H. magnarcus* (Frota-Pessoa, 1951) [= *H. caxiensis* (Cordeiro, 1952), **new synonym**; = *H. paralevigata* (Burla, 1956), **new synonym**]; *H. mendeli* (Mourão, Gallo & Bicudo, 1965); *H. morgani* (Mourão, Gallo & Bicudo, 1967); *H. pleurostrigata* (Burla, 1956); *H. subgilva* (Burla, 1956). Illustrations (line drawings and photomicrographs) of male terminalia and of some external structures are included. Seven out of the nine analyzed species show unique features in the external morphology and male terminalia, allowing us to confirm their status of good species, although in a pair of them (*H. gilva* and *H. mendeli*) there are but subtle differences. An updated list of the extant New World species of *Hirtodrosophila* is also provided.

Keywords: *Hirtodrosophila*, male terminalia, redescrptions, synonyms, Brazil.

### INTRODUCTION

During the second semester of 2000, while identifying 250 specimens of the collection of Drosophilidae housed in the Instituto Superior de Entomologia (INSUE, San Miguel de Tucumán, Argentina), the first author faced problems regarding the identification of three male specimens belonging to three species of the genus *Hirtodrosophila*. This was mainly due to the difficulties in interpreting illustrations of the terminalia of closely related species, prepared by different authors and often depicted in different views, which make them inadequate for an accurate identification. By comparing the original descriptions of two pairs of apparently closely related nominal species (*H. gilva* vs. *H. mendeli* and *H. subgilva* vs. *H. morgani*) he had a suspicion that, for each of those pairs, the latter taxon could be a junior synonym of the first. Moreover, Mourão et al. (1965b, 1967) clearly overlooked the paper of Burla (1956), as it was not cited in the references. He therefore identified and labelled two of the three *Hirtodrosophila* specimens of the INSUE collection as *H. gilva* and *H. subgilva* [unfortunately erroneously, as discussed below under the binomials *H. mendeli* and *H. morgani*, respectively]. In the present paper we had the opportunity to analyze and make a detailed comparison of the type series of the four above-mentioned species, in addition to those of other poorly known South American nominal species of the same genus.

The taxon *Hirtodrosophila*, originally coined in 1923 by Duda (1923: 41–43), but neither diagnosed nor ranked, was subsequently (Duda, 1924:203) considered a subgenus of *Drosophila*. Later raised to the generic status by Malloch (1934: 291), and again reduced to the subgenus rank by Sturtevant (1942: 27), it was more recently (Grimaldi, 1990: 117) elevated once again to the generic status. Being mostly mycophagous, the species belonging to this genus are rarely attracted to fruit-

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baited traps and only accidentally collected by this traditional way of sampling drosophilids. So, the safest method to collect those flies consist in aspirating and/or net-sweeping them directly over fungi. As most species of *Hirtodrosophila* are not reared in the usual culture media, and the conventional method of collecting drosophilids by setting fruit-baited traps is still widely used, specimens belonging to this genus are relatively rare in the drosophilid collections and accordingly poorly known.

A total of 37 nominal species (36 extant plus 1 fossil) of the cosmopolitan genus *Hirtodrosophila* are known to occur in the New World. The sole known fossil species is represented by *H. paleothoracis*, described by Grimaldi (1987a) from amber specimens found in the Dominican Republic. Of those 36 extant species, 8 have been collected exclusively in the Nearctic region, 25 exclusively in the Neotropical region, and the remaining 3 are to be found in both regions. An updated list is presented at the end of this paper.

As most of the species of *Hirtodrosophila* described from South America are only known from their original and sometimes inadequate descriptions, and considering that we had the opportunity to analyze some of the type series, we felt that, to be properly identified, they should be redescribed. Eight out of the nine nominal species analyzed in the present paper were originally described in the *Drosophila* subgenus *Hirtodrosophila*, and one, *H. pleurostrigata*, in the genus *Zygothrica*.

#### MATERIAL AND METHODS

A total of 43 type specimens (36 ♂♂, 7 ♀♀) and 8 non-type specimens (7 ♂♂, 1 ♀) belonging to 4 collections were analyzed in the present study, although not all of them were used in the redescriptions, as specified in “material examined” and “comments” under each binomial. They are deposited in the four following institutions: Instituto Superior de Entomologia, San Miguel de Tucumán, Argentina (INSUE), Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (MZSP), National Museum of Natural History, Washington, D.C., United States (USNM) and Zoologisches Museum, Universität Zürich-Irchel, Zürich, Switzerland (ZMUZ).

The type specimens used by Mourão et al. (1965b, 1967) in the description of two Neotropical drosophilids then belonging to the subgenus *Hirtodrosophila* of *Drosophila* are in bad condition, as can be assessed in the following statement quoted from do Val (1982: 316): “All of Mourão’s types were originally preserved in medicine empty bottles [sic] with rubber stoppers which were subsequently dissolved by the fixative (Barber) and impregnated the specimens”. More details about those specimens, which are deposited in the MZSP, will be given under each binomial.

Most type specimens used by Burla (1956) in his paper on Neotropical species of the genus *Zygothrica* and of the subgenus *Hirtodrosophila* of *Drosophila* were not preserved as pinned flies but as permanent microscope slide mounts instead, which are housed in the slide collection of the ZMUZ. Each permanent mount bears one label with a specimen identification number given by Burla [labels are red for holotypes and white for paratypes], and another label with the collection site and a provisional identification, to which an additional number, preceded in most cases by the letter P [standing for “Präparat”, meaning “microscope slide mount”], was added in the early eighties. These latter numbers were added (based on Burla’s lab notes) by the second author of the present paper, to individualize each slide, because

more than one mount may be associated to the same specimen. Additionally, a third number usually cited only in Burla's lab notes is also present in some labels.

Except for *H. pleurostrigata* (to be discussed under its redescription), for each microscope slide mount there is also in the pinned collection of the ZMUZ one corresponding, individually labelled, empty pin. The type identification numbers are cited in the present paper, because they have been published in the original publication (Burla, 1956). The slide numbers are also cited in "material examined" and/or "comments" under each binomial, as they may be useful for localizing the microscope slides in further studies.

As we had difficulties at first to dismount Burla's permanent mounts, (one for each species, to disarticulate the structures of terminalia), it seems worthwhile to detail both his method and how we solved the problem.

According to Burla (1956:192), after being treated with KOH [10 %], stained with a Safranin solution, and disarticulated in creosote, the specimen was transferred to a drop of cyclonlack (a kind of varnish) on a microscope slide. With [the aid of a thin insect pin #00 and] the use of small pieces of broken coverglass plunged in the varnish the structures were oriented in the desired position, and then instantaneously dried with a drop of chloroform. Once dried, the slide was then rapidly plunged into xylene before Canada balsam was added, followed by the placement of a coverglass.

We have designed and successfully used the following method to dismount the material prepared by Burla (1956): after plunging the microscope slide mount into water, placed in a petri dish, and allowing enough time for the labels to be taken off, dismounting had to be done in two steps, each using a different solvent. Xylene was first added along the borders of the coverglass and the slide placed for ca. 24 h in a glass petri dish, allowing the coverglass and adjacent upper layer of Canada balsam to be removed. During that process, with the aid of a piece of filter paper, the partly dissolved balsam was removed every 4 h, and additional drops of xylene were added to the borders of the coverglass. Once the coverglass was removed, a drop of creosote was poured over the mount and remained there ca. 24 h until the varnish was dissolved, freeing the structures. They were then transferred to a depression slide containing a drop of varnish-free creosote, allowing their disarticulation and further remounting of the sclerites on different slides using Canada balsam. Later, the new microscope slides were dismounted once again using xylene as a solvent; this step may take up to 12 h. The freed sclerites were then transferred to a depression slide containing a drop of creosote, where they remained also for up to 12 h, then to ethanol 100 % for ca. 2 min, to a microvial filled with glycerin and finally kept in the pinned collection fixed by the stopper together with the original labels. The time required for each step may vary according to the hardness of the balsam. To avoid air bubbles in the structures during the second dismounting process it is advisable, after the ethanol 100 % step, to pour a drop of glycerine over this liquid before transferring them to the microvial containing pure glycerine.

Our redescriptions of the species described by Burla (1956), except for *H. pleurostrigata*, were mostly based on just one type specimen (either holotype or paratype), but in the case of *H. levigata* four male non-type pinned specimens were also used as they were available in the ZMUZ collection. They were dissected and their terminalia analyzed to assure their identities. Most of the measurements were obtained from those pinned specimens, because of the difficulties in getting them directly from the types, which are preserved as microscope slides. Those four specimens, together with three additional males previously misidentified by Burla as *H.*



*gilva* (listed in “comments” under its redescription) were formerly preserved in ethanol 70 % and later dried and pinned by the second author.

Label data attached to each type specimen are cited in full with a slash indicating a label change. A true slash within the text is indicated by a backslash [\\]. Our own notes or interpretations are included in brackets (also concerning other items throughout the text).

For preparations of microscope slides, illustrations, measurements, indices as well as morphological terminology see Vilela & Bächli (2000). Unless two scale bars are shown in the same plate, all figures are drawn and enlarged to the same magnification. We use the plus sign [+], e.g. as in gonopod+paraphysis (Fig. 7 D), to denote a fusion of the sclerites.

### Genus *Hirtodrosophila* Duda, 1923

#### *hirticornis* species group Burla, 1956: 261

*Species included.* About 70 species, mostly from the Oriental region.

*Diagnosis.* See Bächli (1974).

*Comments.* The Neotropical species included in this group, even bearing some diagnostic group characteristics, are very different regarding the terminalia and might better be included in a separate subgroup or even in a new species group. However, as long as no phylogenetic analysis of the obviously paraphyletic genus *Hirtodrosophila* is available, we hesitate to take further decisions. Four out of the nine nominal species analyzed in the present paper are included in this group, as follows:

#### *Hirtodrosophila gilva* (Burla, 1956)

(Figs 1, 2, 13J, K)

*Drosophila* (*Hirtodrosophila*) *gilva* Burla, 1956: 263 (description, in German); Wheeler (1959, 1962, 1970, 1981); do Val et al. (1981).

*Material examined* (6 ♂, deposited in ZMUZ). Paratype ♂ Nr. 451: partially disarticulated with its terminalia originally removed by Burla, who mounted the specimen on a single microscope slide, labelled “451 [white label] / amar [amarela = Portuguese word meaning yellow] ♂ A83 A?[within a circle] P[Präparat]765”. The microscope slide was dismounted by us, the terminalia completely disarticulated and mounted in Canada balsam for preparing the drawings and taking the photomicrographs, and then dismounted again. This male paratype is now preserved in glycerin in a microvial pinned by the stopper to one pin labelled with the original pin labels (“R. [Rio] de Janeiro – DF.[then Distrito Federal] Brasil XII.53 H. Burla coll / 451 [violet label] / Fly B[?] No. 451 / slide No. 765) plus the following additional labels “PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli 2004 / ♂”, and those labels originally on the microscope slide, as specified above. The remaining 5 ♂♂, all belonging to the type series, and preserved as permanent mounts, are detailed under “comments”.

*Type locality.* Rio de Janeiro city [above the Botanic Garden], State of Rio de Janeiro, Brazil.

*Diagnosis.* Generally yellowish flies, pleura with a brown stripe from below postpronotum to below wing base; abdominal tergites with diffuse brown marginal bands, darker towards tip; aedeagus arrow-shaped, when seen in dorsal or ventral views, and very similar but distally narrower, not invaginated, and more pointed than that of *H. mendeli*.

*Redescription* ♂ (except for the terminalia, based only on Burla, 1956). Frons, antennae, gena, mesonotum and halteres brownish-yellow; face, thoracic pleura and

legs pale yellow; frontal index = 1.0; or2 closer to or1 than to or3; or1 / or3 ratio = 1.1–1.2; or2 / or1 ratio = 0.4–0.5; flagellomere 1 covered with fine setulae which are about 45 % of its width; length to width ratio = 1.4; arista with 4 dorsal branches. Cheek index about 6–9. Eye index = 1.3. Thoracic pleura with a brown stripe extending from below postpronotum to below scutellum, widened backwards; 6–8 rows of acrostichal setulae; dc index = 0.6; scut index = 0.7; sterno index = 0.5. Wings yellowish, without markings. Indices: C = 1.7; ac = 3.2–3.6; hb = 0.41–0.49; 4v = 2–2.1; 5x = 2.1–2.3. Tergites with diffuse brownish marginal bands.

♂ *Terminalia* (Figs 1, 2, 13J, K). Extremely similar to those of *H. mendeli*, but differing in some minor details, especially by having a distally sharp aedeagus as seen from dorsal and ventral views. Unlike most sibling species of Drosophilidae, they can hardly be told apart only on basis of their aedeagi's lateral view. Epandrium posteriorly microtrichose with about 9 lower, and 5 upper setae; ventral lobe neither microtrichose nor covering surstylus. Cercus anteriorly connected to epandrium by membranous tissue, partially microtrichose and devoid of a typical ventral lobe, although ventromedially each plate is slightly projected downwards and bears a brush of dense, short setulae. Surstylus not microtrichose, bearing a concave row of 5 peg-like prensisetae, ca. 9 inner setae, which gradually increase in size from the ventralmost to the dorsalmost, and no outer setae; dorsalmost prensiseta is preceded by a large crescent process (Fig. 1A, B), which is slightly sclerotized and therefore looks like an ostiole when seen from posterior view (Fig. 1B). Decasternum as in Fig 1B. Hypandrium as long as epandrium, anterior margin rounded; posterior hypandrial process looks like a Gauss-shaped curve; dorsal arch absent; gonopod mostly fused to paraphysis, bearing one seta near the median inner margin. Aedeagus fused to aedeagal apodeme, distally convex, and arrow-headed (narrower than in *H. mendeli*) in dorsal view, medially with a pair of lateral, outwards directed spurs, which are distally slightly serrated; gonopore elliptical; dorsal cleft ca. 1/4 length of aedeagus. Aedeagal apodeme as long as aedeagus, rod-shaped, slightly expanded anteriorly. Ventral rod short, bifid, and distally membranous. Paraphysis mostly fused to gonopod, partially microtrichose, anteriorly bearing ca. 5 setulae on dorsal margin, connected to distal margin of aedeagal apodeme by membranous tissue.

*Distribution.* Brazil (state of Rio de Janeiro).

*Biology.* Unknown.

*Comments.* The male holotype specimen (Nr. 446) of *H. gilva* from Rio de Janeiro city, State of Rio de Janeiro, and five additional male paratypes from the same locality (Nr. 447–451) were preserved as slide preparations, which were analyzed but just one of them (paratype Nr. 451) was dismantled and used in the redescription of the terminalia (see material examined). Except for the latter one, they are respectively labelled as follows. Holotype: “446 / HOLOTYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / amar. [amarela = yellow] A [within a circle] ♂ aus A83 T[typus = holotype] P760”. Paratypes: “447 / PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / H.[*Hirtodrosophila*] amarela A [within a circle] ♂ aus A83 P761”; “448 / PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / amar. ♂ A83 A [within a circle] P762”; “449 / PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / amar ♂ A83 A? [within a circle] C? [within a circle] P763”; “450 / PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / amar ♂ A83 A? [within a circle] P764”.

The corresponding empty pins are labelled as follows. Holotype: “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 446 / Fly B No. 446 / slide No. 760 / HOLOTYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / ♂”. Paratypes:

*gilva*

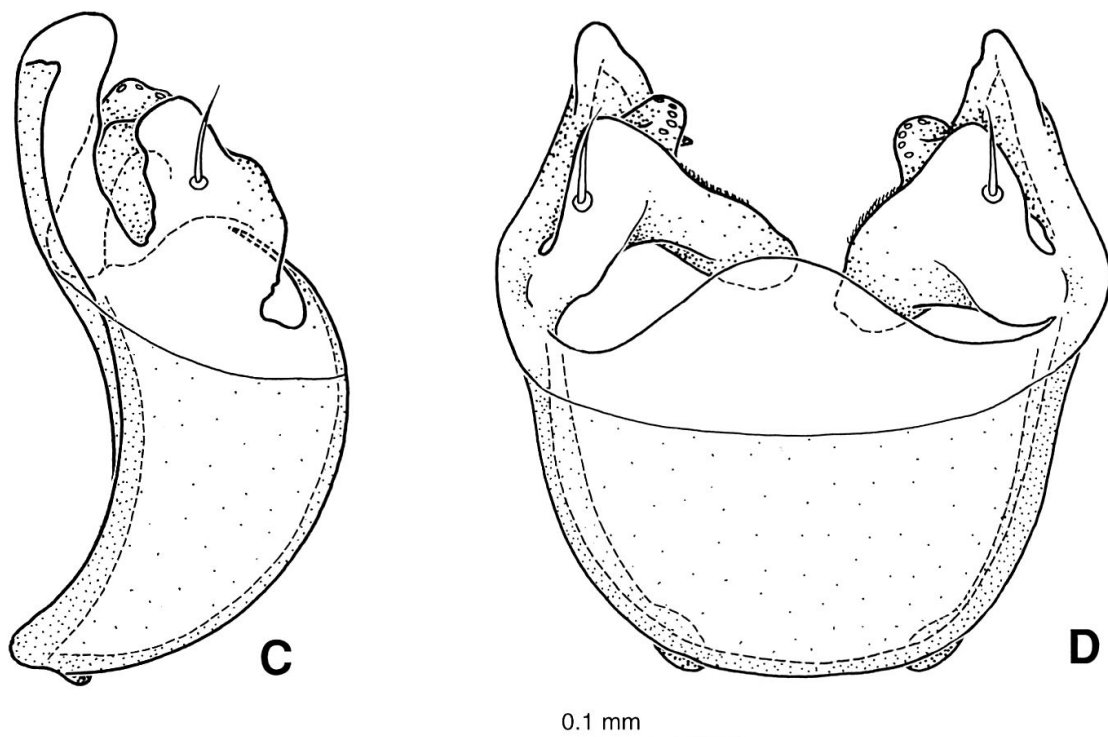
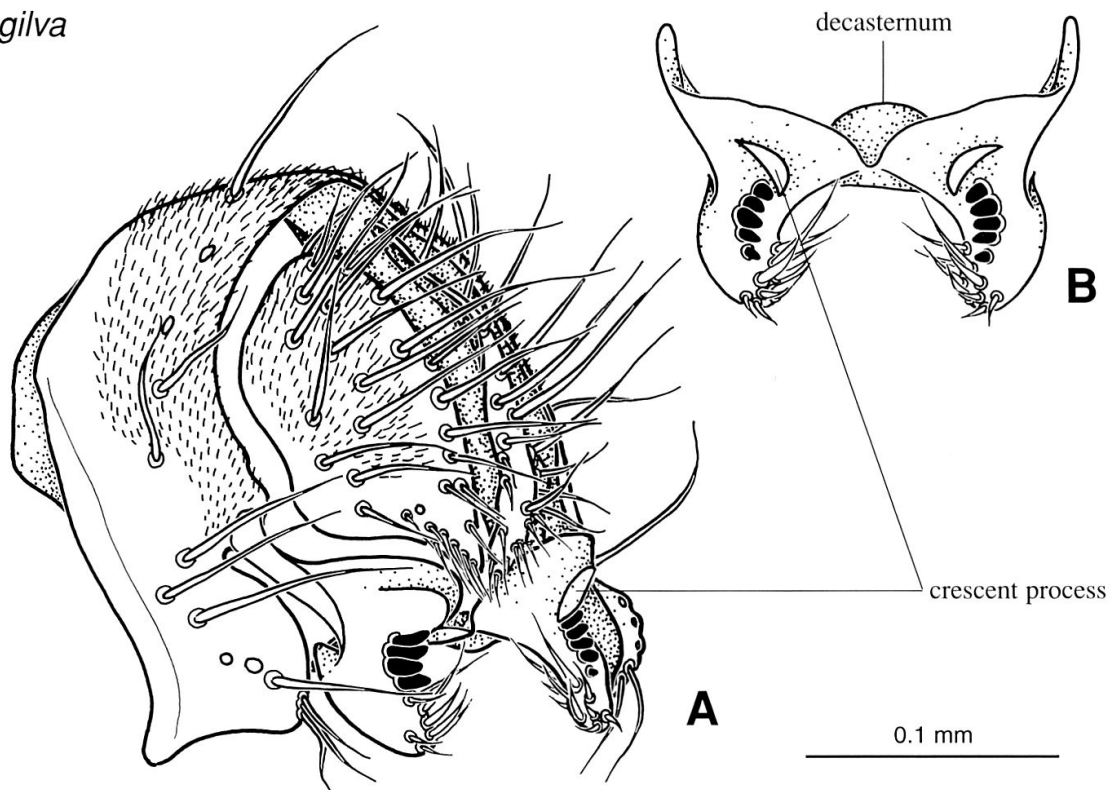


Fig. 1. *Hirtodrosophila gilva* (Burla, 1956), paratype ♂, Nr. 451. A, epandrium, cerci, and surstyli+decasternum, oblique posterior view. B, surstyli+decasternum posterior view. C, hypandrium and gonopods+paraphyses, left lateral view. D, idem, posterior view.

“R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 447 / Fly B No. 447 / slide No. 761 / PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / ♂”; “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 448 / Fly B No. 448 / slide No. 762 / PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / ♂”; “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 449 / Fly B No. 449 / slide No. 763 / PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / ♂”; “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 450 / Fly B No. 450 / slide No. 764 / PARATYPE / *Hirtodrosophila gilva* (Burla) Vilela & Bächli det. / ♂”.

*gilva*

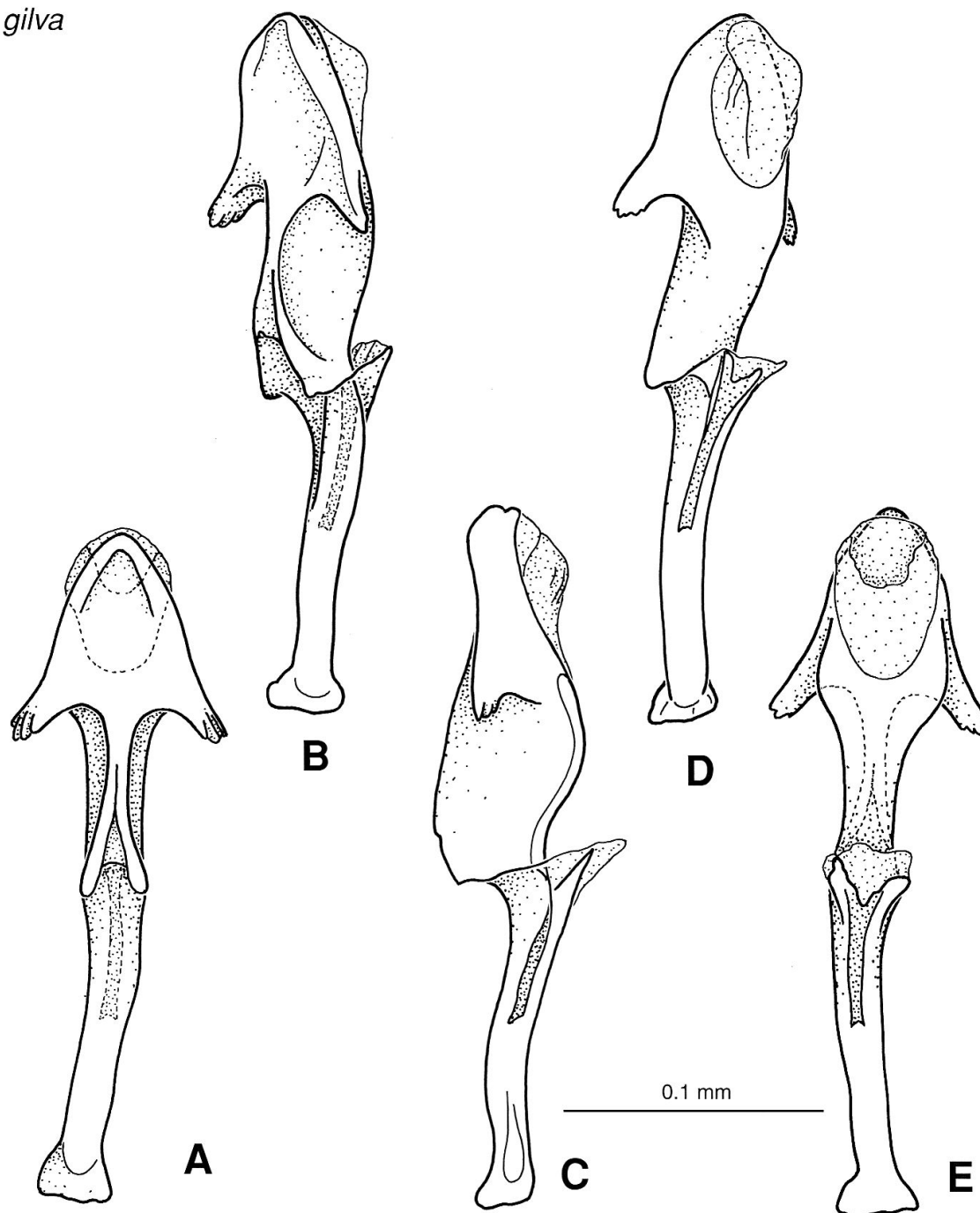


Fig. 2. *Hirtodrosophila gilva* (Burla, 1956), paratype ♂, Nr. 451. A–E, aedeagus+aedeagal apodeme, several views from dorsal through ventral.

Two non-type specimens, double-mounted with minuten pins and identified by Burla as *gilva*, were found in the ZMUZ collection. Originally kept in ethanol 70 %, together with Burla's labels, those two specimens were subsequently dehydrated and pinned. They were dissected and proved to belong to two undescribed species (both labelled "Brasilia [Brazil] Rio de Janeiro [city, Parque da Cidade] V.1953 H. Burla leg.") and will be subject of a forthcoming paper. One third specimen kept among those identified as *D. gilva*, but not labelled as such, belongs in fact to *H. morgani* and was used in its redescription and is cited under that binomial.

***Hirtodrosophila mendeli* (Mourão, Gallo & Bicudo, 1965)**

(Figs 3, 4, 13G, H)

*Drosophila mendeli* (nomen nudum) – Mourão et al., 1965a:160.

*Drosophila mendeli* Mourão et al., 1965b: 577 (description, in Portuguese); Mourão et al. (1967); Wheeler (1970, 1981); Wheeler & Hamilton (1972); do Val et al. (1981); do Val (1982).

*Material examined* (5 ♂♂, 2 ♀♀). Three ♂♂ and one ♀ paratypes (one ♂ dissected), labelled: "*Drosophila mendeli* det. [blank] / PARATIPO [red label] / [male or female label] / *Hirtodrosophila mendeli* Mour. et al. Vilela & Bächli 2004", deposited in MZSP. They are all in poor condition due to the improper way of preserving, as detailed above in the item "material and methods". The specimens are mostly covered by scattered patches of dark material, and their original color turned to dark brown or black. Regarding the ♀ holotype and ♂ allotype, see "comments". Pinned non-type specimen (INSUE, dissected): 1 ♂ "R.A. [Republica Argentina] Misiones Panambi [by the Uruguay river] 24–XI–951 Monrós-Willink / *Hirtodrosophila gilva* ♂ C. Vilela det. 2000 [misidentification] / *Hirtodrosophila mendeli* Mour. et al. – Vilela & Bächli 2004".

*Type locality.* Mirassol, State of São Paulo, Brazil.

*Diagnosis.* Externally very similar to *H. gilva*; from which it differs but subtly with respect to the male terminalia, especially the aedeagus' outline, which is distally slightly invaginated and more rounded as seen in dorsal and ventral views.

*Redescription* ♂ (in part based on Mourão et al., 1965, especially regarding colors, because of the poor condition of the types). Head. Frons dark brown, dull, frontal length 0.30 mm; frontal index = 1.06, top to bottom width ratio = 1.24. Frontal triangle about 56 % of frontal length; ocellar triangle dark brown, prominent, about 40 % of frontal length. Orbital plates about 78 % of frontal length. Orbital setae in a line, equidistant; distance of or3 to or1 = 70 % of or3 to vtm, or1 / or3 ratio = 1.29, or2 / or1 ratio = 0.44, postocellar setae = 56 %, ocellar setae = 56 % of frontal length; vibrissal index = 0.23. Face almost flat, shiny. Carina short, narrow, not very prominent, not sulcated. Cheek index about 6–7. Eye index = 1.18. Antennae pale brown. Flagellomere 1 brown, covered with dense setulae, length to width ratio = 1.67. Arista with 4 dorsal, 1(–2) ventral branches, plus terminal fork. Palpus pale yellow, with 1 long and 2 short setae.

Thorax length 0.74 mm. Scutum yellowish-brown, subshiny, 6–8 irregular rows of acrostichal setulae; h index = 1.00. Transverse distance of dorsocentral setae about 230 % of longitudinal distance; dc index = 0.59. Distance between apical scutellar setae about 125 % of that of apical to basal one; scut index = 0.67. Pleura yellowish-brown, with a darker stripe from below postpronotum to below wing base; sterno index = 0.56. Legs yellow, preapical seta on hind tibia, ventral apical seta on mid tibia.

Wing faintly yellowish, length 1.89 mm, length to width ratio = 2.16. Indices: C = 1.71, ac = 3.40, hb = 0.59, 4C = 1.42, 4v = 2.25, 5x = 1.80, M = 0.75, prox. x = 0.58.

Abdomen yellowish, shiny, tergites 2–5 with dark marginal band.



♂ *Terminalia* (Figs 3, 4, 13G, H). Extremely similar to those of *H. gilva*, but differing in some minor details, especially by having a distally rounded aedeagus as seen from dorsal and ventral views. Unlike most sibling species of Drosophilidae, they can hardly be told apart only on basis of their aedeagi's lateral view. Epandrium not microtrichose with about 9 lower, and 5 upper setae; ventral lobe neither microtrichose nor covering surstylus. Cercus anteriorly connected to epandrium by

*mendeli*

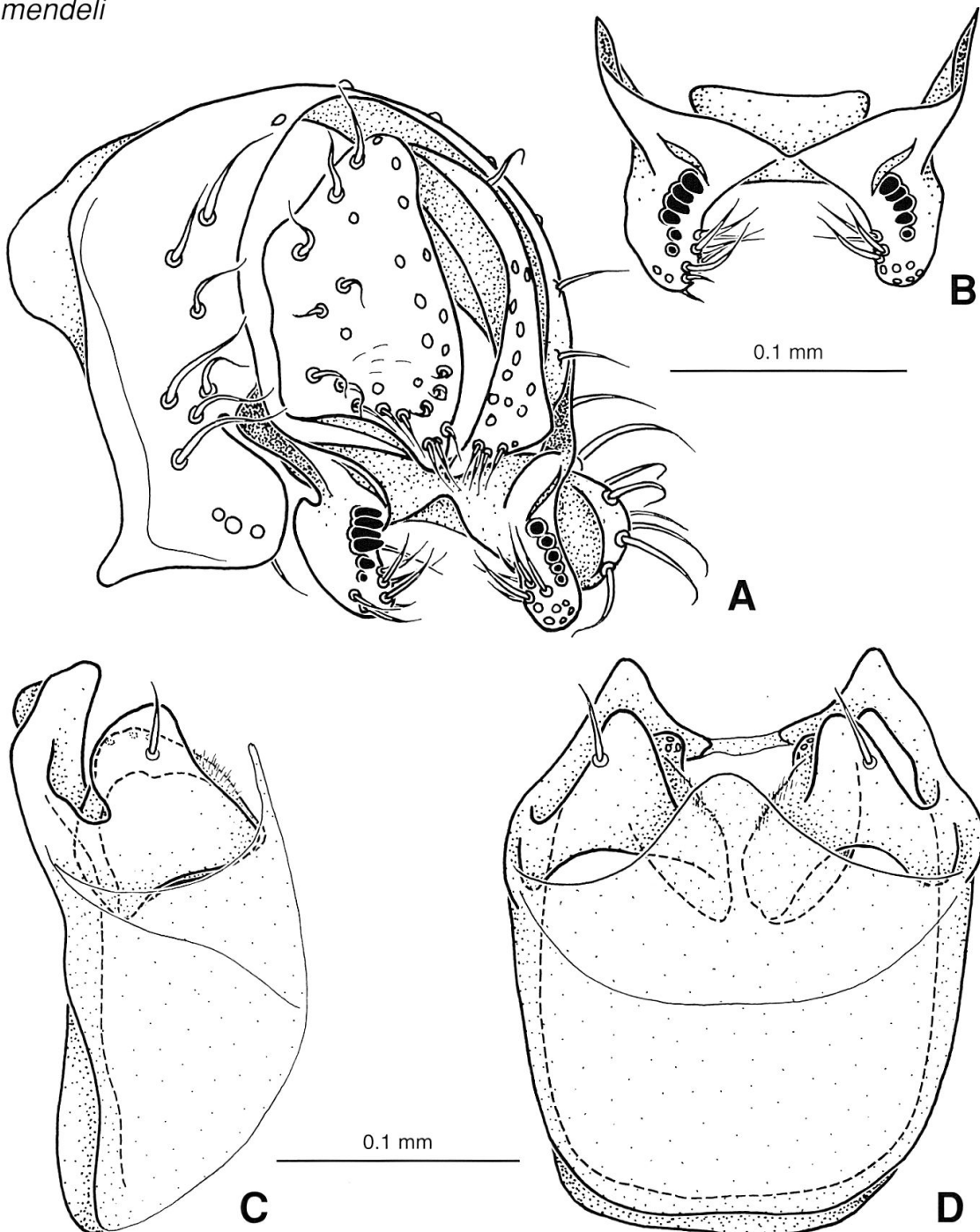


Fig. 3. *Hirtodrosophila mendeli* (Mourão, Gallo & Bicudo, 1965), paratype ♂. A, epandrium, cerci, and surstyli+decasternum, oblique posterior view. B, surstyli+decasternum, posterior view. C, hypandrium and gonopods+paraphyses, left lateral view. D, idem, posterior view.

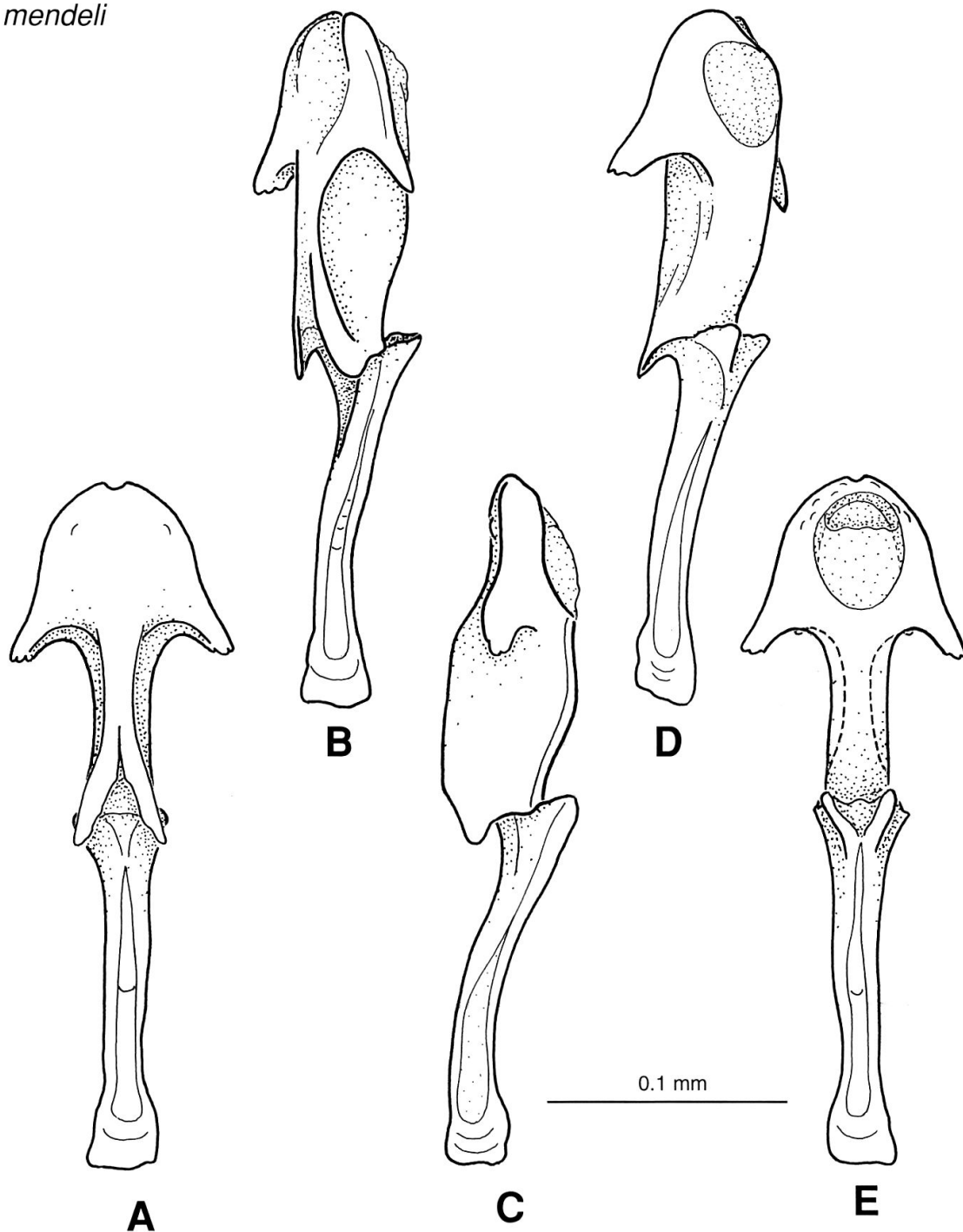
*mendeli*

Fig. 4. *Hirtodrosophila mendeli* (Mourão, Gallo & Bicudo, 1965), paratype ♂. A–E, aedeagus+aedeagal apodeme, several views from dorsal through ventral.

membranous tissue, partially microtrichose and devoid of a typical ventral lobe, although ventromedially slightly projected downwards, and each plate bears a brush of dense, short setulae. Surstylus (Fig. 3A, B) not microtrichose, bearing a concave row of ca. 5 peglike prensisetae, ca. 10 inner setae, and no outer setae; dorsalmost prensiseta apparently preceded by an ostiole (Fig. 3B) which, based on the analysis of its sibling *H. gilva*, could be in fact an weakly sclerotized, and crescent process

(Fig. 3A) when seen from posterior view. Decasternum as in Fig. 3B. Hypandrium as long as epandrium, anterior margin rounded; posterior hypandrial process looks like a Gauss-shaped curve, membranous; dorsal arch absent; gonopod fused to paraphysis, bearing one seta near the median inner margin. Aedeagus fused to aedeagal apodeme, distally convex, slightly invaginated, and arrow-headed (more rounded and wider than in *H. subgilva*) in dorsal view, medially with a pair of lateral, outwards directed spurs, which are distally slightly serrated; gonopore elliptical; dorsal cleft ca. 1/4 length of aedeagus. Aedeagal apodeme as long as aedeagus, rod-shaped, slightly expanded anteriorly. Ventral rod short, bifid. Paraphysis fused to gonopod, partially microtrichose, distally bearing ca. 3 setulae on dorsal margin, connected to distal margin of aedeagal apodeme by membranous tissue. By comparing with the terminalia of *H. gilva*, which seem to be more microtrichose, one could suppose that most microtrichia of the terminalia of the illustrated male paratype of *H. mendeli* have been sheared off the specimen due to the original unsuitable preserving method (see do Val, 1982).

**Distribution.** Brasil (State of São Paulo), and Argentina (Province of Misiones, NEW RECORD).

**Biology.** It seems to be a mycophagous species. According to the original description the type and several additional specimens were collected on [sporophores of] the gelatinous fungus *Auricularia fuscusuccinea* (Mont.) Far. (Basidiomycetes, Auriculariaceae). Apparently no voucher specimen of the fungus has been preserved.

**Comments.** According to do Val (1982:316), the 6 specimens belonging to the type series of *H. mendeli*, were preserved in fixative; however, they were probably exsicated by her after the publication of the cited paper. Moreover, there are 3 ♂♂ and 1 ♀ paratypes and not 2 ♂♂ and 2 ♀♀ as she stated. The holotype female and the allotype male (both analyzed but neither dissected nor used in the redescription) are also in bad condition and, unlike the pinned paratypes, they are preserved together as dried specimens inside one small glass vial, labelled: “*Drosophila mendeli*, holótipo fêmea, alótipo macho / *Hirtodrosophila mendeli* Mourão et al Vilela & Bächli det.”; deposited in MZSP.

One male specimen collected in Misiones (Argentina) and housed in the INSUE collection clearly belongs to *H. mendeli*, according to the sketches of the aedeagus found in the lab notebook of the first author, but was not used in this redescription. However, it should be noted that previously (in 2000) it was misidentified and labelled as *H. gilva* by the first author, who at that time regarded these two sibling species as synonymous.

### ***Hirtodrosophila morgani* (Mourão, Gallo & Bicudo, 1967)**

(Figs 5, 6, 13A–D)

*Drosophila morgani* (nomen nudum) – Mourão et al., 1965a:160.

*Drosophila morgam* [sic] (nomen nudum) – Mourão et al., 1965b:582.

*Drosophila morgani* Mourão et al., 1967: 160 (description, in Portuguese); Wheeler (1970, 1981); Wheeler & Hamilton (1972); Takada (1976); do Val et al. (1981); do Val (1982).

**Material examined** (3 ♂♂, 3 ♀♀). Paratypes: 2 pinned ♂♂ [dissected] labelled: “*Drosophila morgani* det. [blank] / PARATIPO [red label] / [♂] / *Hirtodrosophila morgani* Mour. et al. Vilela & Bächli 2004”, deposited in MZSP. As in *H. mendeli*, all specimens are in poor condition, the original colors turned to dark brown or black, and they are mostly covered by scattered patches of dark material, due to the improper way of preserving (refer to do Val, 1982: 316 for details). Regarding ♀ holotype, ♂ allotype, and two additional ♀♀ paratypes, see “comments”. Pinned non-type specimen (ZMUZ, originally identified erroneously as *gilva*, dissected): 1 ♂ “Brasília

[Brazil] \ S.P. [State of São Paulo] L.633 São Sebastião P. [Praia = Beach] Mares [Maresias] 18.III.1986 v.[von] Tschirnhaus leg / *Hirtodrosophila morgani* Mour. et al. Vilela & Bächli 2004".

*Type locality.* Mirassol, state of São Paulo, Brazil.

*Diagnosis.* Externally very similar to *H. subgilva*; from which it differs mainly by having a quite distinct aedeagus, which is deeply bifid distally, as seen in dorsal and ventral views, and conspicuously covered with tiny scales in the anterolateral areas.

*Redescription* ♂ (partly based on Mourão et al., 1967, especially regarding colors, because of the poor condition of the types). Head. Frons dull brownish; frontal length 0.23 mm; frontal index = 1.06–1.19, top to bottom width ratio = 1.06–1.22. Frontal triangle greyish yellow, about 58 % of frontal length; ocellar triangle greyish yellow, about 37–42 % of frontal length. Orbital plates greyish yellow, about 74–79 % of frontal length. Orbital setae black, almost in a line; distance of or3 to or1 = 50–71 % of or3 to vtm, or1 / or3 ratio = 1.00–1.25, or2 / or1 ratio = 0.20–0.30, postocellar setae = 42–47 %, ocellar setae = 42–58 % of frontal length; vibrissal index = 0.27–0.29. Face almost flat. Carina short, narrow, not very prominent. Cheek index about 6–9. Eye index = 1.08–1.13. Antennae yellowish, darker towards apex, flagellomere 1 covered with setulae which are about half as long as its width, length to width ratio = 1.83–2.00. Arista with 5 long dorsal, 1 long ventral and about 2 short inner branches, plus long terminal fork.

Thorax length 0.91–1.05 mm. Scutum brownish yellow, slightly darker towards scutellum, (6–) 8 rows of acrostichal setulae; h index = 1.00. Transverse distance of dorsocentral setae 225–317 % of longitudinal distance; dc index = 0.47–0.50. Scutellum brownish, darker towards tip, distance between apical scutellar setae about 110 % of that of the apical to the basal one; basal ones divergent; scut index = 0.64. Pleura yellowish, with a rather indistinct horizontal stripe below postpronotum, faintly reaching to below wing base; sterno index = 0.50. Halter pale yellow.

Wing hyaline, length 1.75–1.90 mm, length to width ratio = 2.25. Indices: C = 1.78–1.83, ac = 4.50, hb = 0.56–0.61, 4C = 1.38, 4v = 2.15, 5x = 1.80, M = 0.68, prox. x = 0.54–0.85.

Abdomen yellowish brown, tergites with diffuse darker marginal bands which are medially slightly broadened.

♂ *Terminalia* (Figs 5, 6, 13A–D). Epandrium dorsoposteriorly microtrichose with about 6 lower, and 3 upper setae; ventral lobe neither microtrichose nor covering surstylus. Cercus well-developed, anteriorly connected to epandrium by membranous tissue, mostly microtrichose, devoid of ventral lobe, ventromedially with a brush of dense, short setulae. Surstylus not microtrichose, bearing 5 peglike prensisetae arranged in a slightly convex row, ca. 11 inner setae, and no outer seta; dorsalmost prensiseta is preceded by a tiny crescent process. Decasternum as in Fig. 5B. Hypandrium longer than epandrium, rectangle-shaped; posterior hypandrial process present, membranous; dorsal arch absent; gonopod connected to paraphysis by membranous tissue, bearing one seta near the median inner margin, posteriorly slightly wrinkled and bearing a tiny cone-shaped process. Aedeagus fused to aedeagal apodeme, distally slightly bifid in dorsal and ventral views, anterolaterally conspicuously bearing tiny scales, submedially with a pair of tiny, anteriorly directed lobes in the ventral region, and dorsally bearing a tiny pair of scaled processes in the median surface; gonopore circular (Fig. 6D); dorsal cleft (Fig. 6B) reduced to an anterior opening, adjacent to the fusion line (Fig. 6C) between aedeagus (Fig.

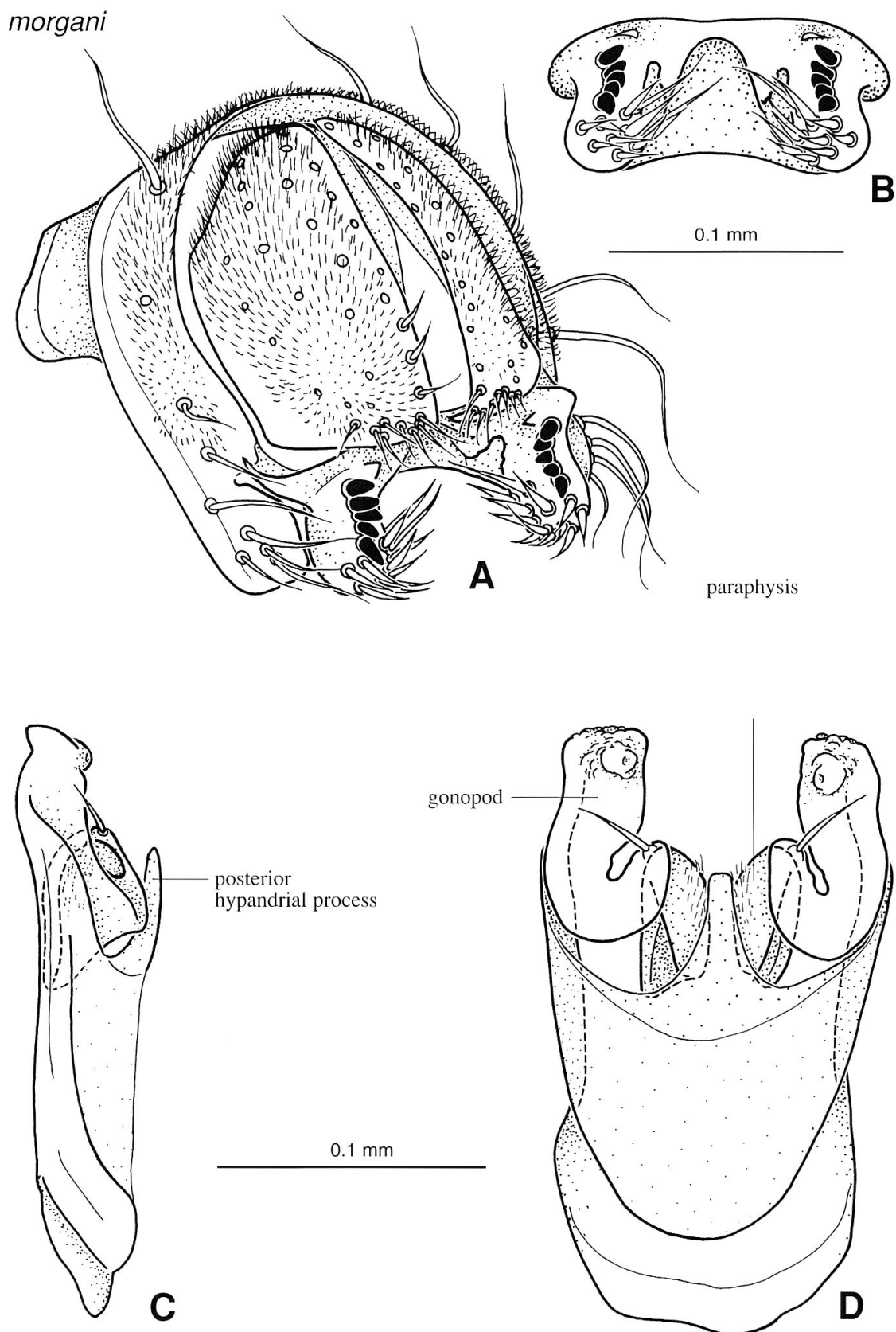


Fig. 5. *Hirtodrosophila morgani* (Mourão, Gallo & Bicudo, 1967), paratype ♂. A, epandrium, cerci, and surstyli+decasternum, oblique posterior view. B, surstyli+decasternum, posterior view. C, hypandrium, gonopods and paraphyses, left lateral view. D, idem, posterior view.



6D) and aedeagal apodeme (Fig. 6E). Aedeagal apodeme longer than aedeagus, rod-shaped. Ventral rod absent. Paraphysis slightly microtrichose, connected to distal margin of aedeagal apodeme by membranous tissue and bearing two tiny setulae.

*Distribution.* Brasil (state of São Paulo).

*Biology.* It seems to be a mycophagous species. According to the original description the type specimens were collected on [sporophores of] two species of fungi: the gelatinous *Auricularia fuscossuccinea* (Mont.) Far. (Basidiomycetes,

*morgani*

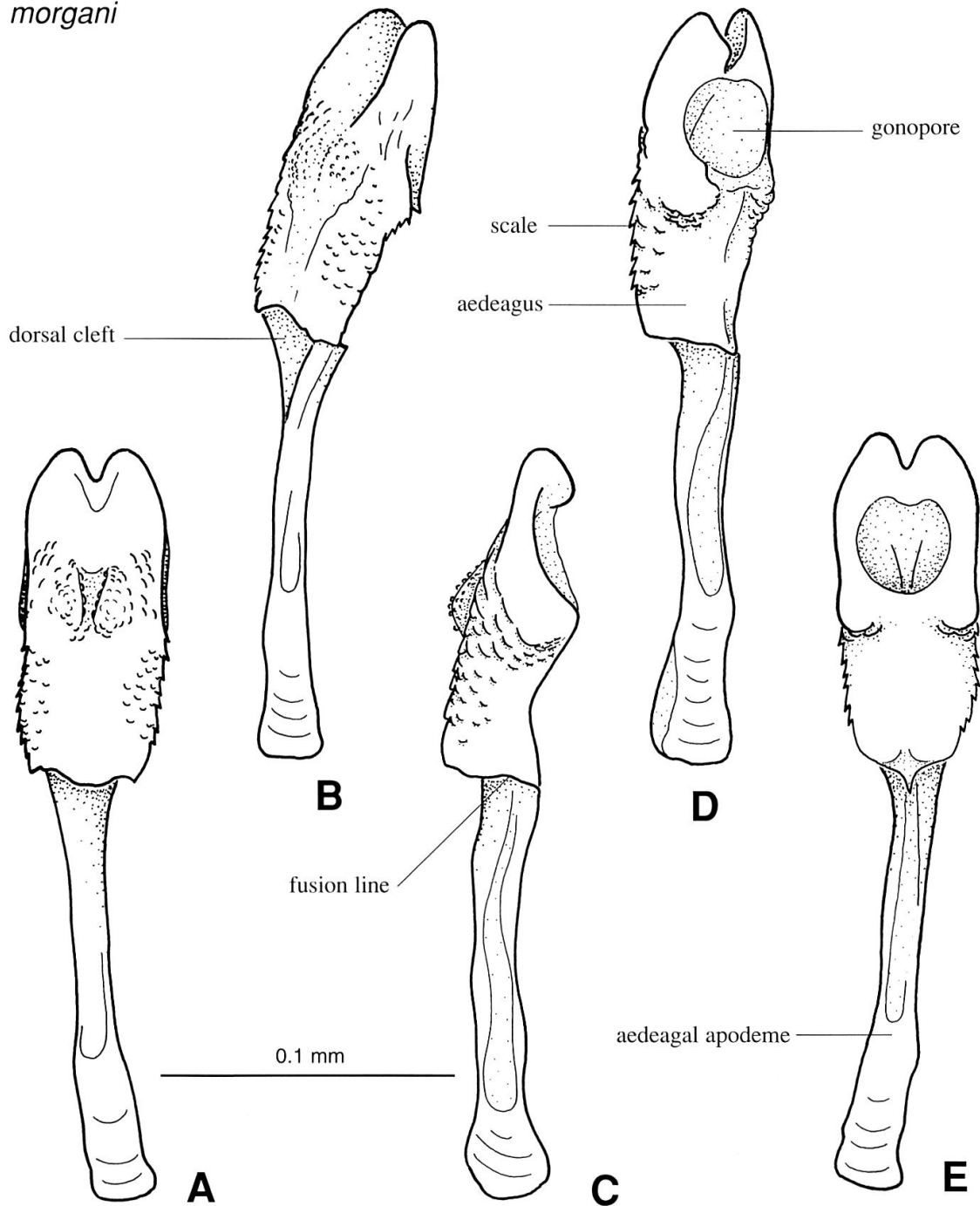


Fig. 6. *Hirtodrosophila morgani* (Mourão, Gallo & Bicudo, 1967), paratype ♂. A–E, aedeagus+aedeagal apodeme, several views from dorsal through ventral.

Auriculariaceae) and the fleshy *Favolus brasiliensis* (Fr.) Fr. [currently *Polyporus tenuiculus* (Beauv.) Fr.] (Basidiomycetes, Polyporaceae). Apparently no voucher specimens of the fungi have been preserved.

*Comments.* According to do Val (1982:316), the 6 specimens (holotype ♀, allotype ♂, 2 ♂♂ paratypes, 2 ♀♀ paratypes) belonging to the type series of *H. morgani* were preserved in fixative; however, they were probably exsiccated by her after the publication of the cited paper. In addition to the two pinned male paratypes, cited above under “material examined”, there are 2 pinned female paratypes and one pin with remains of wings of at least two specimens of unknown sex, glued to a cardboard; all of them bear the same labels, and are deposited in the MZSP, but just the male paratypes were used in the redescription. The holotype female and the allotype male (both analyzed but neither dissected nor used in the redescription) are also in bad condition and, unlike the pinned paratypes, they are preserved together as dried specimens inside one small glass vial, labelled “*Drosophila morgani*, holótipo fêmea, alótipo macho / *Hirtodrosophila morgani* Mourão et al Vilela & Bächli det.”, deposited in MZSP. It should be noted that one non-type specimen collected in Panambi, Misiones, Argentina and deposited in the INSUE collection was dissected and analyzed in 2000 by the first author, before the current redescription of the *H. morgani* had been prepared. He misidentified it as *H. subgilva*, to which it clearly does not belong. However, it is very similar to *H. morgani*, except for some subtle differences mostly regarding its male terminalia, which he sketched only in his lab notebook. As there is a possibility that it belongs to a sibling species of *H. morgani* we decide to postpone its new identification until we have the opportunity to check it once again.

### ***Hirtodrosophila subgilva* (Burla, 1956)**

(Figs 7, 8, 13L, M)

*Drosophila (Hirtodrosophila) subgilva* Burla, 1956: 263 (description, in German); Wheeler (1959, 1970, 1981); do Val et al. (1981).

*Material examined* (6 ♂♂). Paratype ♂ Nr. 457: partially disarticulated with its terminalia originally removed by Burla, who mounted the specimen on a single microscope slide, labelled “457 [white label] / amar [amarela = Portuguese word meaning yellow] ♂ A83 B? [within a circle; ?] K [? Präparat]771”. The microscope slide was dismounted by us, the terminalia disarticulated and mounted in Canada balsam for preparing the drawings and taking the photomicrographs and then dismounted again. This male paratype is now preserved in glycerin in a microvial pinned by the stopper to one pin labelled with the original pin labels: “R. [Rio] de Janeiro - DF. [then Distrito Federal] Brasil XII.53 H. Burla coll / 457 [violet label] / Fly B [?] No. 457 / slide No. 771” plus the following three labels “PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli 2004 / ♂”, and those labels originally on the microscope slide, as specified above. Data on remaining specimens are under “comments”.

*Type locality.* Rio de Janeiro city, State of Rio de Janeiro, Brazil.

*Diagnosis.* Externally similar to *H. gilva* and *H. morgani*. It differs from the first in having a posteriorly bifid (in dorsal view) and anteriorly slim (in lateral view) aedeagus (compare Figs 13 L, M with J,K), and from the latter mainly because its aedeagus is relatively longer, devoid of scales in the anterolateral areas, distally more pointed when seen in dorsal and ventral views, and dorsally devoid of a pair of scaled processes (compare Figs 13 L, M with A–D).

*Redescription* ♂ (based, except for the terminalia, only on Burla, 1956). According to him no reliable external differences to *H. gilva*, except of: tip of abdomen less darkened; or3 closer to or1; pleural stripe visible only below post-pronotum; 8 rows of acrostichal setulae; body length 2.4 mm; wing length 2.3 mm.

Indices: frontal index = 1.1, or1 / or3 ratio = 1.1–1.2, or2 / or1 ratio = 0.4–0.5, cheek index about 7, eye index = 1.1, flagellomere 1 covered with fine setulae which are slightly shorter than its width, length to width ratio = 2.4, dc index = 0.6, scut index = 0.7–0.8, sterno index = 0.5, C = 1.7–1.9, ac = 3.3–3.7, hb = 0.42–0.57, 4v = 1.8–2.0, 5x = 2.1–2.4.

*subgilva*

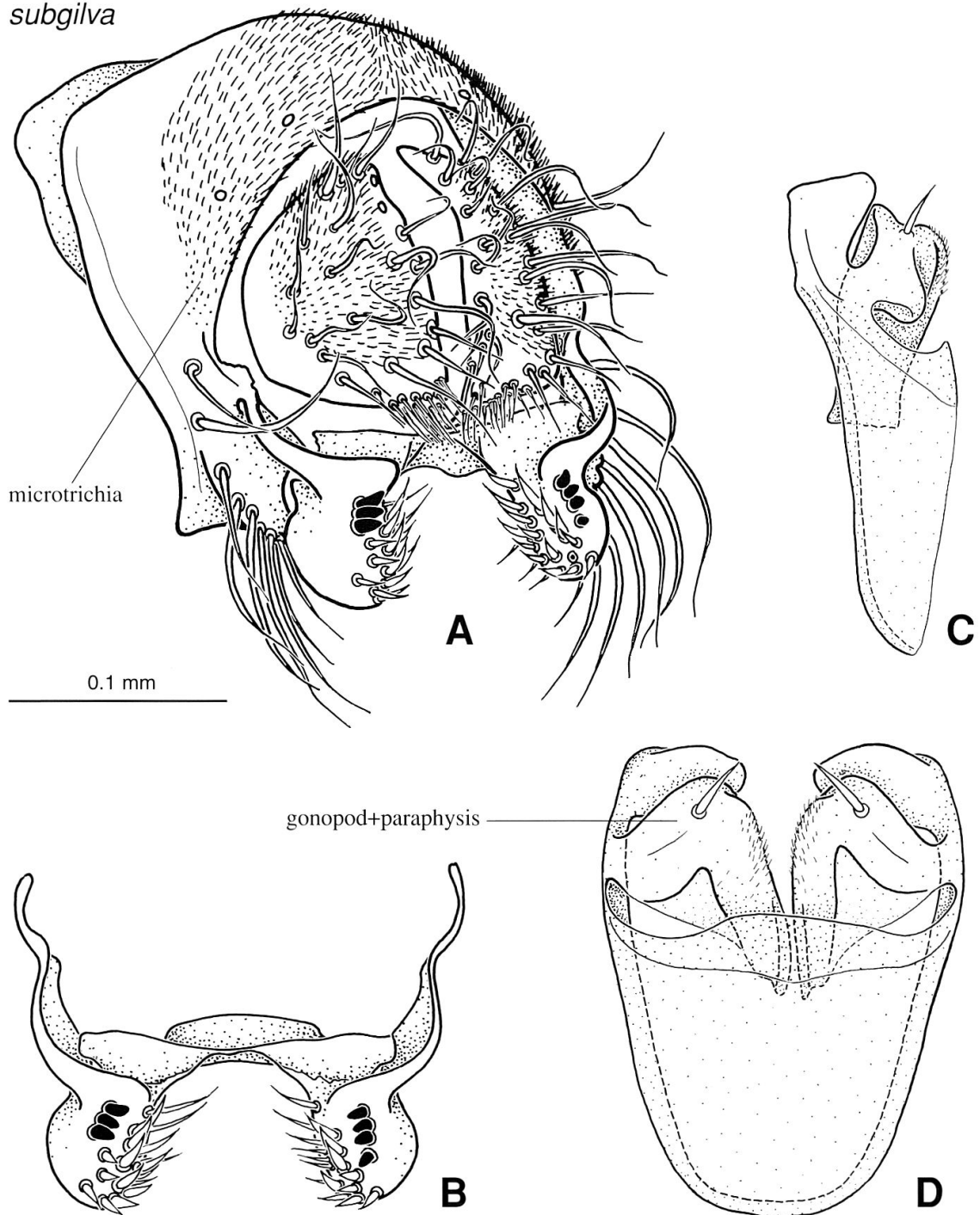


Fig. 7. *Hirtodrosophila subgilva* (Burla, 1956), paratype ♂, Nr. 457. A, epandrium, cerci, and surstyli+decasternum, oblique posterior view. B, surstyli+decasternum, posterior view. C, hypandrium and gonopods+paraphyses, left lateral view. D, idem, posterior view.

♂ *Terminalia* (Figs 7, 8, 13L, M). Epandrium dorsoposteriorly microtrichose with about 8 lower, and 2 upper setae; dorsoanterior margin remarkably straight, ventral lobe neither microtrichose nor covering surstylus. Cercus anteriorly connected to epandrium by membranous tissue, mostly microtrichose, devoid of ventral lobe, ventromedially with a brush of dense, short setulae. Surstylus not microtrichose, bearing ca. 3 peglike prensisetae, ca. 16 inner, and no outer setae. Decasternum as in Fig. 7B. Hypandrium shorter than epandrium, anteriorly rounded; posterior hypandrial process absent; dorsal arch absent, although lateral arms of hypandrium are expanded inwards posteriorly; gonopod fused to paraphysis, bearing one seta near the median inner margin. Aedeagus fused to aedeagal apodeme, distally slightly bifid, subapically narrow in lateral view, submedially bearing a pair of short, outwards directed spurs in the lateral region, and medially with a pair of saw-toothed processes ventrally; dorsal cleft half the length of aedeagus. Aedeagal apodeme shorter than aedeagus, curved, rod-shaped. Ventral rod short. Paraphysis partially microtrichose, bearing two tiny setulae dorsodistally (not seen in the figures), connected to distal margin of aedeagal apodeme by membranous tissue.

*Distribution.* Brazil (state of Rio de Janeiro).

*Biology.* Unknown.

*Comments.* The male holotype specimen (Nr. 452) of *H. subgilva* from Rio de Janeiro city, State of Rio de Janeiro, and five additional male paratypes from the same locality (Nr. 453–457) are deposited in the ZMUZ, and all of them are preserved as slide preparations, which were analyzed, but just one of them (paratype Nr. 457) was dismantled and used in the redescription of the terminalia (see material examined). Except for the latter one, they are respectively labelled as follows. Holotype: “452 / HOLOTYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / amarela ♂ B [within a circle] aus A83 K766”. Paratypes: “453 / PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / amar ♂ A83 B [within a circle] K767”; “454 / PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / amar ♂ A83 B [within a circle] K768”; “455 / PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / amar ♂ A83 B [within a circle] K769”; “456 / PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / amar ♂ A83 B? [within a circle] K770”.

The corresponding empty pins are respectively labelled as follows. Holotype: “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 452 / Fly B No. 452 / slide No. 766 / HOLOTYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / ♂”. Paratypes: “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 453 / Fly B No. 453 / slide No. 767 / PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / ♂”; “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 454 / Fly B No. 454 / slide No. 768 / PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / ♂”; “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 455 / Fly B No. 455 / slide No. 769 / PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / ♂”; “R. de Janeiro – DF. Brasil XII.53 H. Burla coll / 456 / Fly B No. 456 / slide No. 770 / PARATYPE / *Hirtodrosophila subgilva* (Burla) Vilela & Bächli det. / ♂”.

### ***magnarcus* species group Frota-Pessoa, 1951: 411**

*Species included* (2): *H. levigata* (Burla, 1956), *H. magnarcus* (Frota-Pessoa, 1951).

*Diagnosis.* Generally yellowish-brown flies; frons yellowish, with large, glossy frontal triangle; carina sharp, short, only visible in dorsal half of the face;

*subgilva*

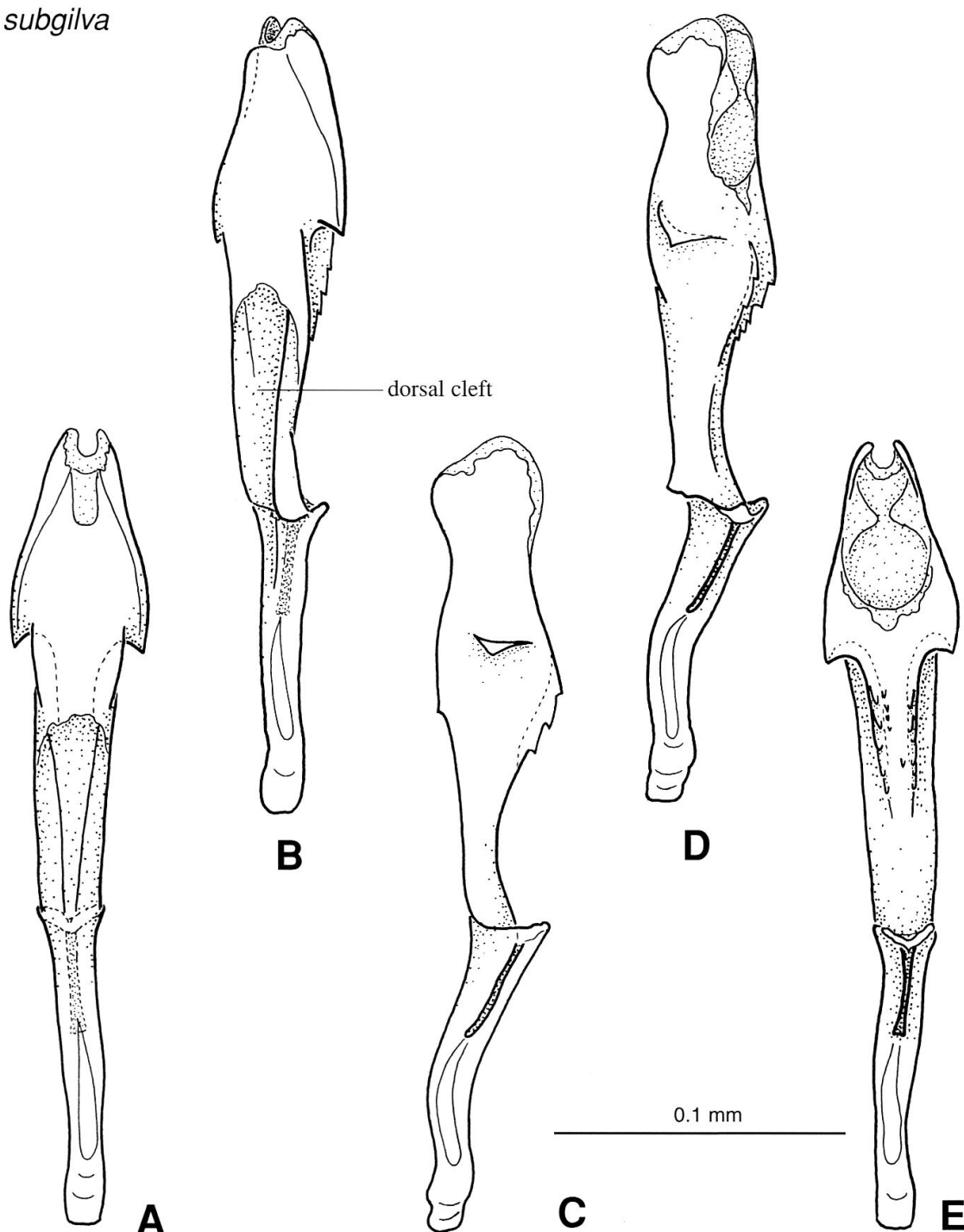


Fig. 8. *Hirtodrosophila subgilva* (Burla, 1956), paratype ♂, Nr. 457. A–E, aedeagus+aedeagal apodeme, several views from dorsal through ventral.

arista with one ventral branch just behind the terminal fork; abdominal tergites dark brown, with diffuse darker marginal bands; epandrium usually elongate and bearing in the inner margin of ventral lobe a finger-shaped process, which is partially or completely concealed by surstylus; aedeagus dorsally bearing a conspicuous pair of long, ribbon-shaped processes.



*Comments.* Frota-Pessoa (1951) originally included *H. magnarcus* and *H. glabrifrons* (Duda, 1925) in this group. The latter species, on the other hand, was later combined by Burla (1956) with *H. levigata* (Burla, 1956) and *H. paralevigata* (Burla, 1956), into a new species group, the *glabrifrons* group, excluding *H. magnarcus* from it. However, *H. glabrifrons*, as shown by Vilela & Bächli (1990), has quite different male terminalia and, in spite of some external similarities, cannot belong to the same species group as *D. magnarcus*. Based on the similarities of the male terminalia, we have decided to include both nominal species *H. levigata* and *H. paralevigata* in the *magnarcus* species group.

As already mentioned by Burla (1956: 261), the females of both species currently included in the group are much alike and cannot be separated.

### *Hirtodrosophila levigata* (Burla, 1956)

(Figs 14A, C, 15C)

*Drosophila* (*Hirtodrosophila*) *levigata* Burla, 1956: 261 (description, in German); Wheeler (1959, 1970, 1981); do Val et al. (1981).

*Material examined* (9 ♂♂, deposited in the ZMUZ). Paratype Nr. 435 (body parts were originally disarticulated by Burla and mounted on a single microscope slide), labelled "435 [white label] / PARATYPE [red label] / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / *H. glabrifrons* ♂ A [type A of *glabrifrons* ?] (D) [?] Ita [Parque Nacional do Itatiaia] P [Präparat] 750 [blue ink] 435 [graphite]". The correspondent empty pin is labelled: "Itatiaia VII.54 H. Burla coll / 435 / Fly B No. 435 / slide No. 750 / PARATYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli 2004 / ♂". No permanent slide mount of this species has been dismounted. The photomicrographs were taken directly from the original microscope slide. The remaining 4 ♂♂, all belonging to the type series and preserved as permanent mounts, are detailed under "comments". Pinned non-type specimens, double-mounted with minuten pins, and previously identified by Burla (dissected): 3 ♂♂ "Brasilia [Brazil] Rio de Janeiro [city, Parque da Cidade] V.1953 H. Burla leg. / *Hirtodrosophila levigata* (Burla) Vilela & Bächli 2004 / ♂"; 1 ♂ Brasilia [Brazil] Cantareira [Parque Estadual da Cantareira, São Paulo city] \ S.P. VIII.1954 H. Burla leg. / *Hirtodrosophila levigata* (Burla) Vilela & Bächli 2004 / ♂".

*Type locality.* Parque Nacional do Itatiaia, State of Rio de Janeiro, Brazil.

*Diagnosis.* Generally shares the group characters; however, it has a quite distinct aedeagus, which bears a pair of conspicuously long, wide, and ribbon-shaped processes, and is devoid of a pair of ventral spurs in the posteroventral region, which is present in *H. magnarcus* (see Figs 10B, 13I).

*Redescription* ♂. Head. Frons yellowish, frontal length 0.20–0.26 mm; frontal index = 0.76–0.90, top to bottom width ratio = 1.12–1.33. Frontal triangle pale yellowish, glossy, extremely large, laterally convex, broadly reaching to anterior margin, ocellar triangle brownish, microtrichose, somewhat prominent, about 38–46 % of frontal length. Orbital plates narrow, microtrichose, almost not diverging from eye margin, about 80–92 % of frontal length. Orbital setae brown, or2 close to and outside of or1, distance of or3 to or1 = 37–50 % of or3 to vtm, or1 / or3 ratio = 0.80–1.20, or2 / or1 ratio = 0.33–0.50, postocellar setae = 50–54 %, ocellar setae = 62–77 % of frontal length; vibrissal index = 0.13–0.25. Carina narrow, sharp, about half as long as face. Cheek index about 6–9. Eye roundish, index = 1.10–1.16. Antennae (Fig. 14A) yellow, somewhat elliptical. Flagellomere 1 brownish, covered with prolonged setulae which are about 55 % of its width, length to width ratio = 1.60. Arista with 4–5 dorsal, 1 ventral and about 6 inner branches, plus terminal fork. Proboscis yellow.

Thorax length 0.62–0.78 mm. Scutum yellowish-brown, subshiny, medially darker brownish in some specimens, 6 (6–8) rows of acrostichal setulae; h index =

0.88–1.00. Transverse distance of dorsocentral setae 188–214 % of longitudinal distance; dc index = 0.58–0.71, distance between apical scutellar setae about 114–133 % of that of the apical to the basal one; scut index = 0.63–0.80. Pleura pale brownish, slightly darker below postpronotum, sterno index = 0.40–0.54, mid katepisternal almost absent. Halter brownish. Legs yellowish, preapical seta on hind tibia, ventral apical seta on mid tibia.

Wing (Fig. 15C) hyaline, length 1.50–1.79 mm, length to width ratio = 1.44. Indices: C = 1.55–2.00, ac = 3.20–4.00, hb = 0.35–0.53, 4C = 1.06–1.60, 4v = 1.63–2.40, 5x = 1.50–2.67, M = 0.56–0.80, prox. x = 0.44–0.60.

Abdomen predominantly yellow, tergites 2–5 with a diffuse brownish marginal band.

♂ *Terminalia* (Fig. 14C). Very similar to those of *H. magnarcus*, including the unusually broad dorsal region of epandrium, from which they differ in the shape and size of the conspicuous pair of dorsal, long, curved, ribbon-shaped processes in the subapical region of aedeagus, which in *H. levigata* is much more sclerotized, longer and twice as wide. Diagnostically it also lacks the conspicuous pair of short, outward directed, subapical spurs that *H. magnarcus* carries on the aedeagus ventrally (Fig. 10B). Refer to the description by Burla (1956) for drawings and further details.

*Distribution.* Brazil (states of Rio de Janeiro and São Paulo).

*Biology.* Unknown.

*Comments.* The male holotype (Nr. 433) of *H. levigata* from Parque Nacional do Itatiaia (State of Rio de Janeiro) and four additional male paratypes, being 2 from Parque Nacional do Itatiaia, state of Rio de Janeiro (Nr. 434, 435), and 2 from Parque Estadual da Cantareira, São Paulo city, state of São Paulo (Nr. 436, 437) are deposited in the ZMUZ, and all of them are preserved as slide preparations, which were all analyzed but only one of the paratypes (Nr. 435) was used for taking photographs of wing, antenna and terminalia (see material examined). Except for the latter one, they are respectively labelled as follows. Holotype: “433 / HOLOTYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / glabrifrons-like Hirt. ♂ aus A130 (Ita) A [within a circle] P748”. Paratypes: “434 / PARATYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / glabr. ♂ Ita[Parque Nacional do Itatiaia] A [within a circle] 434 P749”; “436 / PARATYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / glabr. ♂ Cant. [Parque Estadual da Cantareira] A [within a circle] 436 P751”; “437 / PARATYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / glabr. ♂ Cant. A [within a circle] 437 P752”.

The corresponding empty pins are respectively labelled as follows. Holotype: “Itatiaia VII.54 H. Burla coll / 433 / Fly B No. 433 / slide No. 748 / HOLOTYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / ♂”. Paratypes: “Itatiaia VII.54 H. Burla coll / 434 / Fly B No. 434 / slide No. 749 / PARATYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / ♂”; “São Paulo XI.54 H. Burla coll / 436 / Fly B No. 436 / slide No. 751 / PARATYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / ♂”; “São Paulo XI.54 H. Burla coll / 437 / Fly B No. 437 / slide No. 752 / PARATYPE / *Hirtodrosophila levigata* (Burla) Vilela & Bächli det. / ♂”.

### ***Hirtodrosophila magnarcus* (Frota-Pessoa, 1951)**

(Figs 9, 10, 13I, 14B, 15B)

*Drosophila* (*Hirtodrosophila*) *magnarcus* Frota-Pessoa, 1951:407 (description, in Portuguese); Burla (1956); Wheeler (1959, 1970, 1981); Mourão et al. (1965b, 1967); do Val et al. (1981).

*Drosophila (Hirtodrosophila) caxiensis* Cordeiro, 1952:304 (description, in English and Portuguese); Wheeler (1959, 1970, 1981); Mourão et al. (1965b, 1967); do Val et al. (1981); **new synonym**. *Drosophila (Hirtodrosophila) paralevigata* Burla, 1956: 261 (description, in German); Wheeler (1959, 1970, 1981); do Val et al. (1981); **new synonym**.

*Material examined* (8 ♂♂). Holotype male of junior synonym *H. caxiensis* (dissected), labelled: "Caxias [do Sul], R.G.S. [state of Rio Grande do Sul], Brasil / HOLOTYPE [red label] / *Drosophila caxiensis* Cordeiro / *Hirtodrosophila magnarcus* (Frota-Pessoa) Vilela & Bächli det.", deposited in the USNM, and holotype male (Nr. 438) of junior synonym *H. paralevigata* (body parts were originally disarticulated by Burla and mounted on a single microscope slide), labelled [labels glued on slide] "438 [red label] / HOLOTYPE [red label] / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli 2004 / glabrifrons ♂ Cantar [Parque Estadual da Cantareira, São Paulo city, State of São Paulo] B [within a circle; type B of glabrifrons ?] T [Typus = holotype] P [Präparat, German word meaning permanent mount] 753", deposited in the ZMUZ. The correspondent empty pin is labelled: "São Paulo XI.54 H. Burla coll / 438 / Fly B No. 438 / slide No. 753 / HOLOTYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / ♂ / *Hirtodrosophila magnarcus* (F.-P.) Vilela & Bächli 2004". No permanent slide mount of *H. paralevigata* has been dismounted. The photomicrographs were taken directly from the original permanent mount of the holotype. The remaining 6 ♂♂, all belonging to the type series of *H. paralevigata*, are detailed under "comments".

*Type locality*. *H. magnarcus*: Mogi das Cruzes, State of São Paulo, Brazil; *H. caxiensis*: near the city of Caxias do Sul, State of Rio Grande do Sul, Brazil; *H. paralevigata*: Parque Estadual da Cantareira, São Paulo city, State of São Paulo, Brazil.

*Diagnosis*. Generally shares the group characters; however, it has a quite distinct aedeagus, which bears two pairs of processes: the dorsal one, long and ribbon-shaped and the ventral one, much shorter and spur-shaped (Fig. 10B), which is absent in *D. levigata*.

*Redescription* ♂ (based on the three original descriptions as well as on the holotypes of *H. caxiensis* and *H. paralevigata*). Head. Frons generally brown to dark brown, shiny, frontal index = 1.33. Frontal triangle very large, laterally convex, about as long as frons, shiny; ocellar triangle prominent, with black patches on the inner side of the ocelli. less shiny than frons. Orbital setae almost in a row; or1 / or3 ratio = 0.89–1.00, or2 / or1 ratio = 0.25–0.50. Postocellar setae crossed, only 1 prominent vibrissal seta, vibrissal index = 0.30. Face dark brown. Carina short, narrow, slightly broadened downwards, dorsally sharp. Cheek index about 4–6. Eye index about 1.10. Pedicel pale brownish. Antenna (Fig. 14B), somewhat rectangle-shaped. Flagellomere 1 brown, apically darker, covered with long setulae ca. 1/3 to 1/2 width of flagellomere, length to width ratio = 1.67. Arista with 5–6 dorsal, 1 ventral and about 5 small inner branches, plus terminal fork. Proboscis brownish-yellow. Palpus with a distinct subapical seta.

Thorax brown, subshiny, pleura paler, length 0.80 mm, 6 (6–8) rows of acrostichal setulae; h index = 1.00. Transverse distance of dorsocentral setae 200 % of longitudinal distance; dc index = 0.67. Distance between apical scutellar setae about 112 % of that of the apical to the basal one; basal ones slightly divergent; scut index = 0.62. sterno index = 0.50–0.60, mid katapisternal seta minute or absent. Halter yellow to brown. Legs yellow, preapical setae fine, on fore and hind tibiae, ventral apical seta on mid tibia.

Wing (Fig. 15B) slightly yellow, veins brown, length about 2 mm, length to width ratio = 2.19 (2.08–2.32). Indices: C = 1.72 (1.65–1.79), ac = 3.79 (3.17–4.44), hb = 0.49 (0.40–0.58), 4C = 1.31 (1.19–1.41), 4v = 2.00 (1.81–2.22), 5x = 2.09 (1.70–2.50), M = 0.66 (0.57–0.78), prox. x = 0.51 (0.44–0.52).

Abdomen yellowish-brown to dark brown, shining, tergites 2–4 with a more or less broad, medially enlarged, dark marginal band, apical tergites predominantly dark.

*magnarcus*

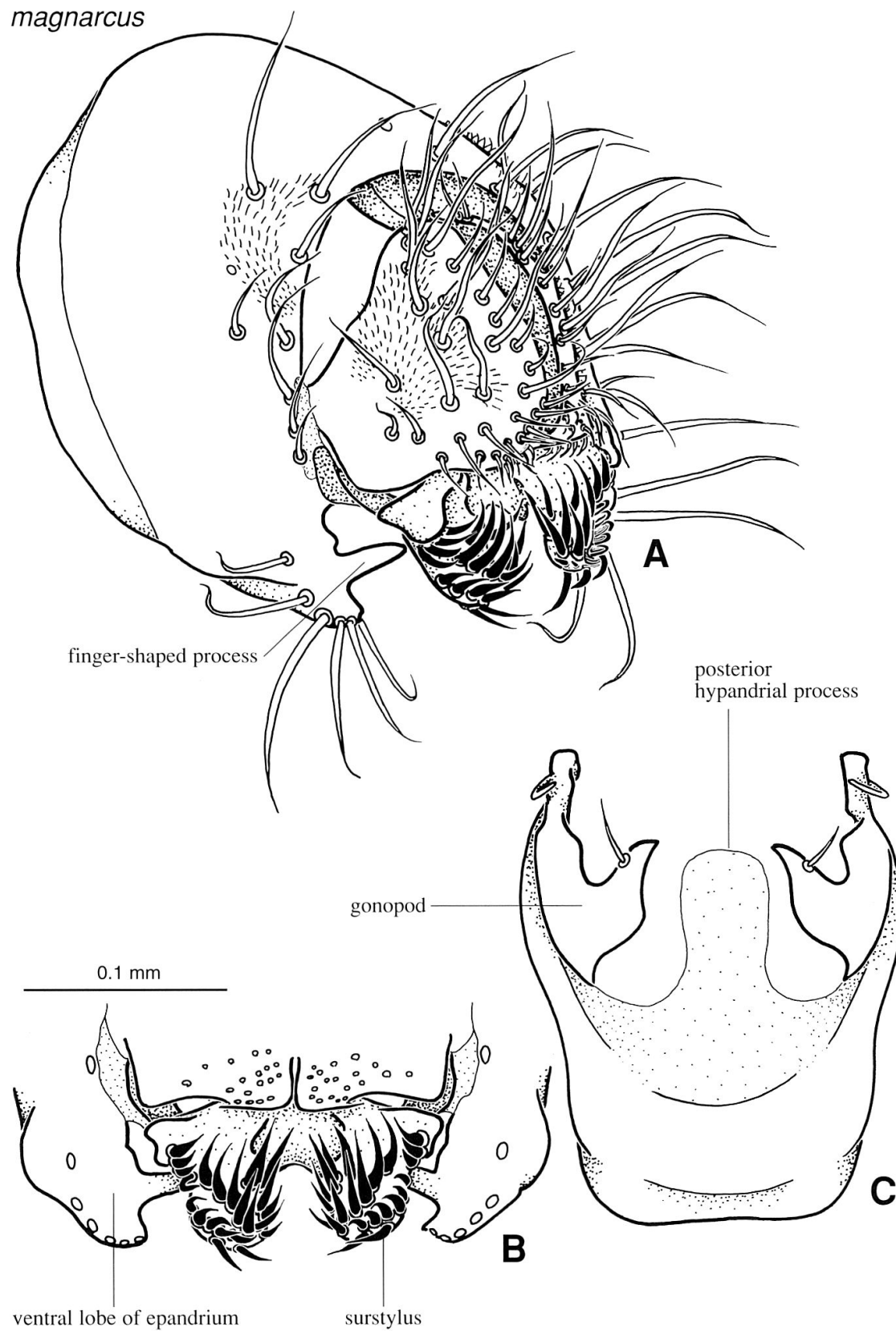


Fig. 9. *Hirtodrosophila magnarcus* (Frota-Pessoa, 1951), holotype ♂ of junior synonym *H. caxiensis* (Cordeiro, 1952). A, epandrium, cerci, and surstyli+decasternum, oblique posterior view. B, ventral lobes of epandrium, surstyli+decasternum, posterior view. C, hypandrium and gonopods, posterior view.

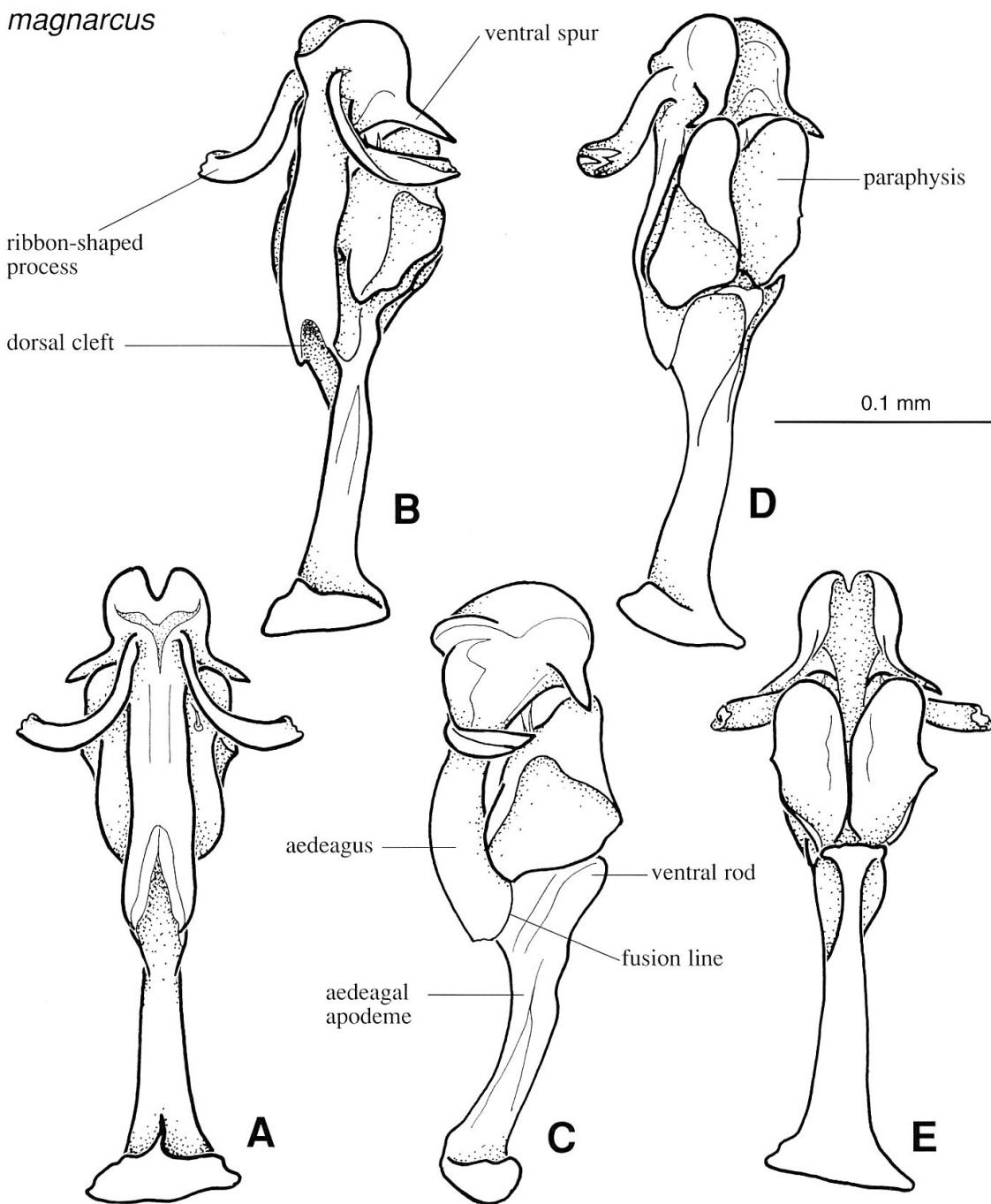


Fig. 10. *Hirtodrosophila magnarcus* (Frota-Pessoa, 1952), holotype ♂ of junior synonym *H. caxiensis* (Cordeiro, 1951). A–E, aedeagus+aedeagal apodeme, and paraphyses, several views from dorsal through ventral.

♂ *Terminalia* (Figs 9, 10, 13I). Epandrium unusually elongate, hence its epithet *magnarcus* (refer to Frota-Pessoa, 1951:409, fig. 5 for a lateral view, where this feature is better seen), posteriorly slightly microtrichose with about 6 lower, and 9 upper setae; ventral lobe posteriorly bearing a finger-shaped process, not microtrichose, and not covering surstylus, but partially covered by it instead. Cerci anteriorly connected to epandrium by membranous tissue, partially microtrichose, devoid of ventral lobe, ventromedially with a brush of dense, short setulae. Surstylus not



microtrichose, bearing ca. 23 setiform prensisetae, medial ones (5) larger and somewhat organized in a row. Decasternum as in Fig. 9B. Hypandrium shorter than epan-drium, slightly square-shaped, posteriorly wider; posterior hypandrial process present, wide, membranous; dorsal arch absent; gonopod connected to paraphysis by membranous tissue, bearing one seta near the median inner margin. Aedeagus fused to aedeagal apodeme, distally slightly bifid in dorsal view, subdistally bearing a conspicuous pair of long, apically serrate, ribbon-shaped processes in the dorsal region, subapically with a pair of short, outwards directed spurs in the ventral region, which reach apical margin of paraphysis; dorsal cleft short, ca. 1/4 length of aedeagus. Aedeagal apodeme as long as aedeagus, rod-shaped, anteriorly expanded. Ventral rod not well-defined, slightly shorter than paraphysis. Paraphysis well-developed, longer than wide, not microtrichose, connected to distal margin of aedeagal apodeme by membranous tissue and subdistally bearing 2 setulae on the dorsal margin.

*Distribution.* Brazil (states of Rio de Janeiro, São Paulo and Rio Grande do Sul).

*Biology.* Collected on mushrooms and supposed to be a fungus-feeder.

*Comments.* The male holotype specimen (Nr. 438) of the junior synonym *H. paralevigata* from Parque Estadual da Cantareira, São Paulo city, and six additional male paratypes, 2 from the type locality (Nr. 439, 440), and 4 from Parque Nacional do Itatiaia, state of Rio de Janeiro (Nr. 441–444) are deposited in the ZMUZ, and all of them are preserved as permanent mounts, which were analyzed but just the holotype, together with the holotype of another junior synonym (*H. caxiensis*, deposited in the USNM), was used in the redescription. Except for the former one (Nr. 438), they are respectively labelled as follows. Paratypes of *H. paralevigata*: “439 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / glabr. ♂ Cant B [within a circle] P754”; “440 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / glabr. ♂ Cant. B [within a circle] P755”; “441 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / *H. glabrifrons* ♂ Ita (Barth) [collector] P756”; “442 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / glabr. ♂ Ita. B [within a circle] P757”; “PARATYPE / 443 / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / glabr. ♂ Ita B [within a circle] P758”; “444 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / glabr. ♂ Ita B [within a circle] P759”.

The corresponding empty pins are respectively labelled as follows. Paratypes: “São Paulo XI.54 H. Burla coll / 439 / Fly B No. 439 / slide No. 754 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / ♂ / *Hirtodrosophila magnarcus* (F.-P.) Vilela & Bächli det.”; “São Paulo XI.54 H. Burla coll / 440 / Fly B No. 440 / slide No. 755 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / ♂ / *Hirtodrosophila magnarcus* (F.-P.) Vilela & Bächli det.”; “Itatiaia VII.54 H. Burla coll / 441 / Fly B No. 441 / slide No. 756 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / ♂ / *Hirtodrosophila magnarcus* (F.-P.) Vilela & Bächli det.”; “Itatiaia VI.54 H. Burla coll / 442 / Fly B No. 442 / slide No. 757 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / ♂ / *Hirtodrosophila magnarcus* (F.-P.) Vilela & Bächli det.”; “Itatiaia VI.54 H. Burla coll / 443 / Fly B No. 443 / slide No. 758 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / ♂ / *Hirtodrosophila magnarcus* (F.-P.) Vilela & Bächli det.”; “Itatiaia VI.54 H. Burla coll / 444 / Fly B No. 444 / slide No. 759 / PARATYPE / *Hirtodrosophila paralevigata* (Burla) Vilela & Bächli det. / ♂ / *Hirtodrosophila magnarcus* (F.-P.) Vilela & Bächli det.”.

The holotype of *H. magnarcus*, stated in the original description as deposited in the Museu Nacional do Rio de Janeiro, Rio de Janeiro city, Brazil, has not been analyzed. However, the original description of the latter nominal species is so clear, especially regarding the drawings of the male terminalia (Frota-Pessoa, 1951: 409, figs. 4, 5), that we are convinced that the three nominal species involved belong to the same biological species. Moreover, the type localities of the three nominal species are located within the same South American morphoclimatic domain (Atlantic Forest). Cordeiro (1952) probably overlooked the paper by Frota-Pessoa (1951), because his manuscript was received for publication on July 20th, 1952, while the paper by Frota-Pessoa had already been published seven months earlier (in December, 1951). However, it is not clear for us why Burla (1956), who discusses the paper of Frota-Pessoa (1951), described *H. paralevigata* as a new species, then in the genus *Drosophila*, and did not even consider both as belonging to the same group.

### ***thoracis* species group Grimaldi, 1987**

**Diagnosis.** Pleura pale yellowish with a blackish stripe from postpronotum to halter; flagellomere 1 with prolonged marginal setulae; ventral epandrial lobe large.

**Species included.** (5). *H. clypitata* (Grimaldi, 1987); *H. pleurostrigata* (Burla, 1956); *H. strigocula* (Burla, 1956); and *H. thoracis* (Williston, 1896). We are proposing to include *Hirtodrosophila jordanensis* (Frota-Pessoa, 1945), based on its original description, as discussed below under the item “comments”.

### ***Hirtodrosophila pleurostrigata* (Burla, 1956)**

(Figs 11, 12, 13E, F, 14D, 15A)

*Zygothrica pleurostrigata* Burla, 1956: 250 (description, in German, male terminalia, key).

*Drosophila* (*Hirtodrosophila*) *pleurostrigata* (Burla, 1956); Grimaldi, 1987b: 149 (proposed new combination and affiliation).

**Material examined** (3 ♂♂ and 2 ♀♀ type specimens, 1 ordinary ♀, deposited in the ZMUZ). Unlike most of the types of the species described by Burla (1956), only one male paratype (Nr. 406) of *H. pleurostrigata* is completely preserved as permanent mount. Male holotype Nr. 405: the specimen is double-pinned with some parts originally removed and placed by Burla in two permanent mounts. One mount containing proboscis and the terminalia [epandrium disarticulated from hypandrium plus aedeagus and associated structures; the epandrium being damaged in its right side, and the hypandrium in its left one, as depicted in the fig. 247 of Burla (1956:305)] is labelled “405 [red label] / *H. itapleuralis* [sic, nomen nudum] ♂ [words written in shorthand = “neu eingebettet”, meaning remounted] 554 [slide]”. Another mount with left antenna, left wing, left legs, and remains of tergites is labelled “405 [red label] / HOLOTYPE [red] / *Hirtodrosophila pleurostrigata* (Burla) Vilela & Bächli 2004 / *H. itapleuralis* [sic, nomen nudum] ♂ 410”. The first microscope slide was dismounted by us, the aedeagus+aedeagal apodeme disarticulated from hypandrium and associated structures and mounted in Canada balsam for preparing the drawings and taking the photomicrographs and then dismounted again. The terminalia and proboscis of the male holotype, which were originally mounted on a microscope slide [554], are now kept in glycerin in a microvial fixed by the stopper to the pin bearing most parts of the specimen, and which is labelled: “Itatiaia VI.54 H. Burla coll / 538 / *Zygothrica pleurostrigata* B. Holotype 405 G. Bächli det. 1983 / Fly B No. 405 / slide No. 410 / slide No. 554”, plus two additional labels “HOLOTYPE / *Hirtodrosophila pleurostrigata* (Burla) Vilela & Bächli 2004”, and the labels originally glued to mount 554, as stated above. The second permanent mount [410], with some parts of the holotype, was not dismounted. The drawing depicted in Fig. 11A, as well as the photomicrograph depicted in Fig. 14D, were prepared before dismounting the permanent mount 554 (holotype). Paratypes (pinned: 1 ♂♂ [not dissected], 2 ♀♀ [one not dissected]; permanent mount only: 1 ♂) respectively labelled: “Itatiaia VI.54 H. Burla coll / 590 / *Zygothrica pleurostrigata* B. Paratype 407

G. Bächli det. 1983 Fly B No. 407 / PARATYPE / *Hirtodrosophila pleurostrigata* (Burla) Vilela & Bächli 2004 / ♂ “[not dissected]; “Itatiaia VI.54 H. Burla coll / 591 / *Zygothrica pleurostrigata* B. Paratype 408 G. Bächli det. 1983 / Fly B No. 408 / PARATYPE / *Hirtodrosophila pleurostrigata* (Burla) Vilela & Bächli 2004 / ♀ [not dissected]”; “Itatiaia VI.54 H. Burla coll / 539 / *Zygothrica pleurostrigata* B. Paratype 409 G. Bächli det. 1983 / Fly B No. 409 / slide No. 411 / PARATYPE / *Hirtodrosophila pleurostrigata* (Burla) Vilela & Bächli 2004 / ♀” [previously dissected; slide containing left wing, left antenna, terminalia and remains of abdomen is labelled: “409 / PARATYPE / *Hirtodrosophila pleurostrigata* (Burla) Vilela & Bächli 2004 / H. itapleuralis ♀ 411”]. Empty pin (1 ♂ paratype): “Itatiaia VI.54 H. Burla coll / *Zygothrica pleurostrigata* B. Paratype 406 G. Bächli det. 1983 / Fly B No. 406 / slide No. 729 / PARATYPE / *Hirtodrosophila pleurostrigata* (Burla) Vilela & Bächli 2004 / ♂” [previously dissected and only preserved as permanent mount, labelled: “406 / PARATYPE / *Hirtodrosophila pleurostrigata* (Burla) Vilela & Bächli 2004 / H. itapleuralis ♂ N 589 tutti [meaning all parts of the specimen] P729”].

*Type locality.* Parque Nacional do Itatiaia, State of Rio de Janeiro, Brazil.

*Diagnosis.* Pleura pale yellow, with blackish-brown katepisternum and a blackish-brown stripe from postpronotum to base of halter; flagellomere 1 whitish; halter whitish; carina narrow, noselike, prominent in at least the upper two thirds of the face; basal scutellar setae divergent; ventral lobe of epandrium bearing a long finger-shaped process completely concealed by surstylus; surstylus well-developed, with scattered setiform prenisetae; cercus ventrally weakly sclerotized, aedeagus distally dilated and covered with tiny scales.

*Redescription* ♂ (based partially on Burla, 1956 and on his specimens Nr. 405 [holotype] and Nr. 407 [paratype]). Head. Frons greyish yellow, paler towards antennae, whitish microtrichose in frontal view, frontal length 0.31 mm; frontal index 0.90–0.95, top to bottom width ratio = 1.25–1.32. Frontal triangle more-or-less distinct, darker brownish, about 67–78 % of frontal length; ocellar triangle prominent, blackish, small, about 33 % of frontal length. Orbital plates narrow, distinctly diverging from eye margin, darker brownish, about 72 % of frontal length. Orbital setae in a row, equidistant, distance of or3 to or1 = 86 %, of or3 to vtm, or1 / or3 ratio = 1.00–1.13, or2 / or1 ratio = 0.33–0.44, postocellar setae = 44 %, ocellar setae = 61–67 % of frontal length; vibrissal index = 0.30–0.33. Face whitish, Carina narrow, noselike, length almost 70 % of face. Cheek index about 7–8. Eye dark purple, densely pilose. Eye index = 1.12–1.16. Pedicel pale grey, anteriorly brown. Flagellomere 1 dark grey, covered with fine setulae which are about half as long as its width. Arista with 4–5 long dorsal, 1 long ventral and about 5 short inner branches, plus long terminal fork. Palpus grey.

Thorax length 0.97–0.99 mm. Scutum microtrichose, brown, darker in posterior part, with diffuse stripes in midline and along the dorsocentral setae, 8 rows of acrostichal setulae; h index = 1.00–1.11. Transverse distance of dorsocentral setae 250 % of longitudinal distance; dc index = 0.54. Scutellum short, scutellar setae nearly equidistant; basal ones divergent; scut index = 0.79. Pleura yellowish, dark brownish in lower third (at least katepisternum very dark), and with a brownish stripe from below postpronotum to base of halter, sterno index = 0.38, mid katepisternal seta about 75 % of the anterior one. Halter whitish. Legs brownish yellow, fore coxa darker, preapical seta on hindleg, ventral apical seta on midleg.

Wing (Fig. 15A) pale brownish, veins brown, crossvein dM-Cu distinctly clouded, an additional, less distinct cloud covering R<sub>1</sub>, R-M and the area between them, R<sub>2+3</sub> and R<sub>4+5</sub> parallel, tips slightly darkened; length 1.19–1.21 mm, length to width ratio = 2.11–2.29. Indices: C = 1.34–1.48, ac = 3.57–4.30, hb = 0.52–0.72, 4C = 1.39–1.73, 4v = 1.89–2.33, 5x = 1.71–2.17, M = 0.67, prox. x = 0.37–0.44.

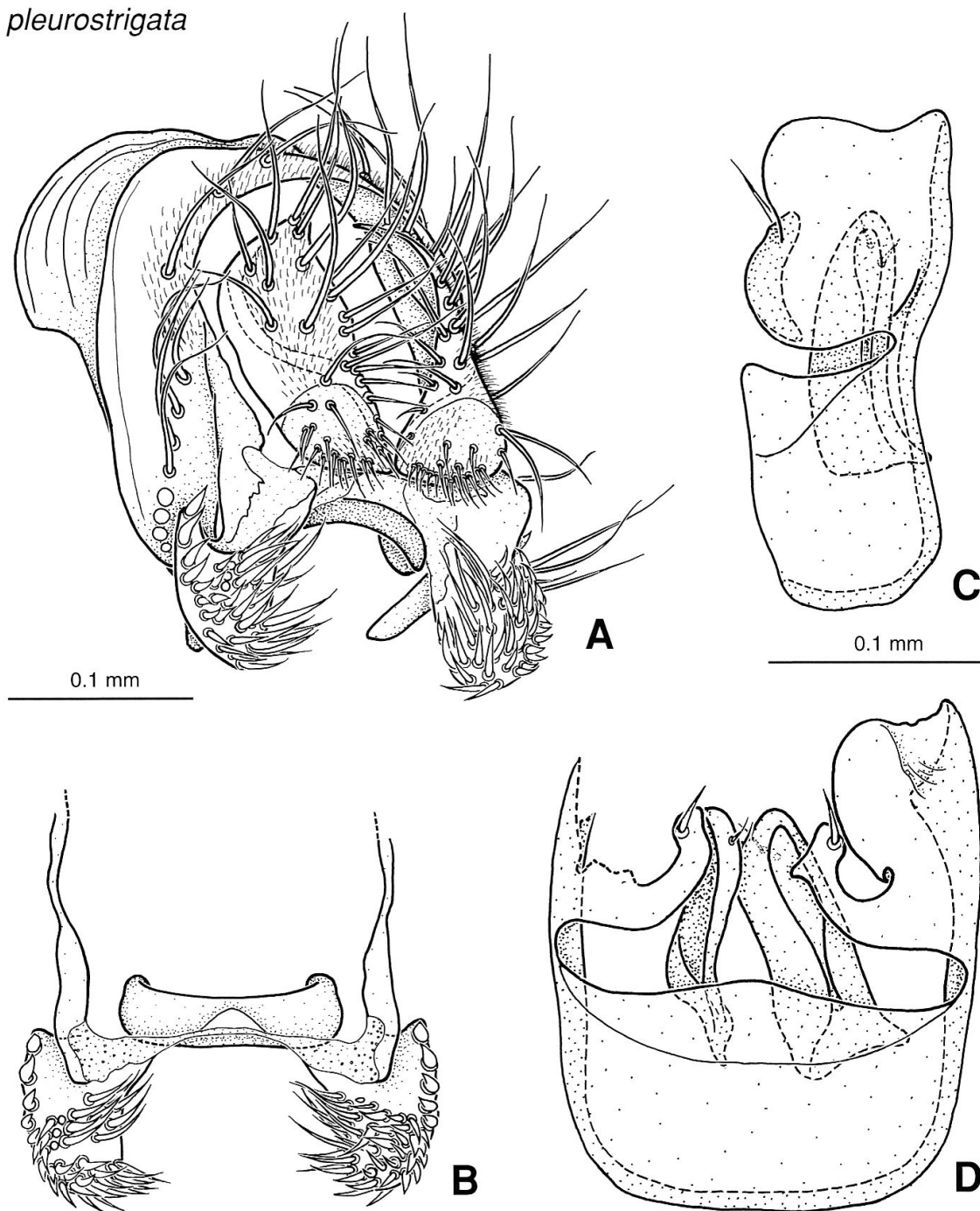
*pleurostrigata*

Fig. 11. *Hirtodrosophila pleurostrigata* (Burla, 1956), holotype ♂, Nr. 405. A, epandrium, cerci, surstyli+decasternum, oblique posterior view. B, surstyli+decasternum, posterior view. C, hyandrium, gonopods and paraphyses, right lateral view. D, idem, posterior view [already missing in the original slide were: posterior left arm of hyandrium and part of right side of epandrium].

Abdomen predominantly brown; tergites 5 and 6 blackish-brown and glossy; tergites 2 and 3 laterally dark brown, with a pale brown median triangular area, tergite 4 with a marginal band which is medially triangularly broadened.

♂ *Terminalia* (Figs 11, 12, 13E, F, 14D). Epandrium dorsoposteriorly slightly microtrichose with about 5 lower, and 6 upper setae; ventral lobe bearing a long finger-shaped process, not microtrichose, and unusually concealed by surstylus. Cer-

*pleurostrigata*

0.1 mm

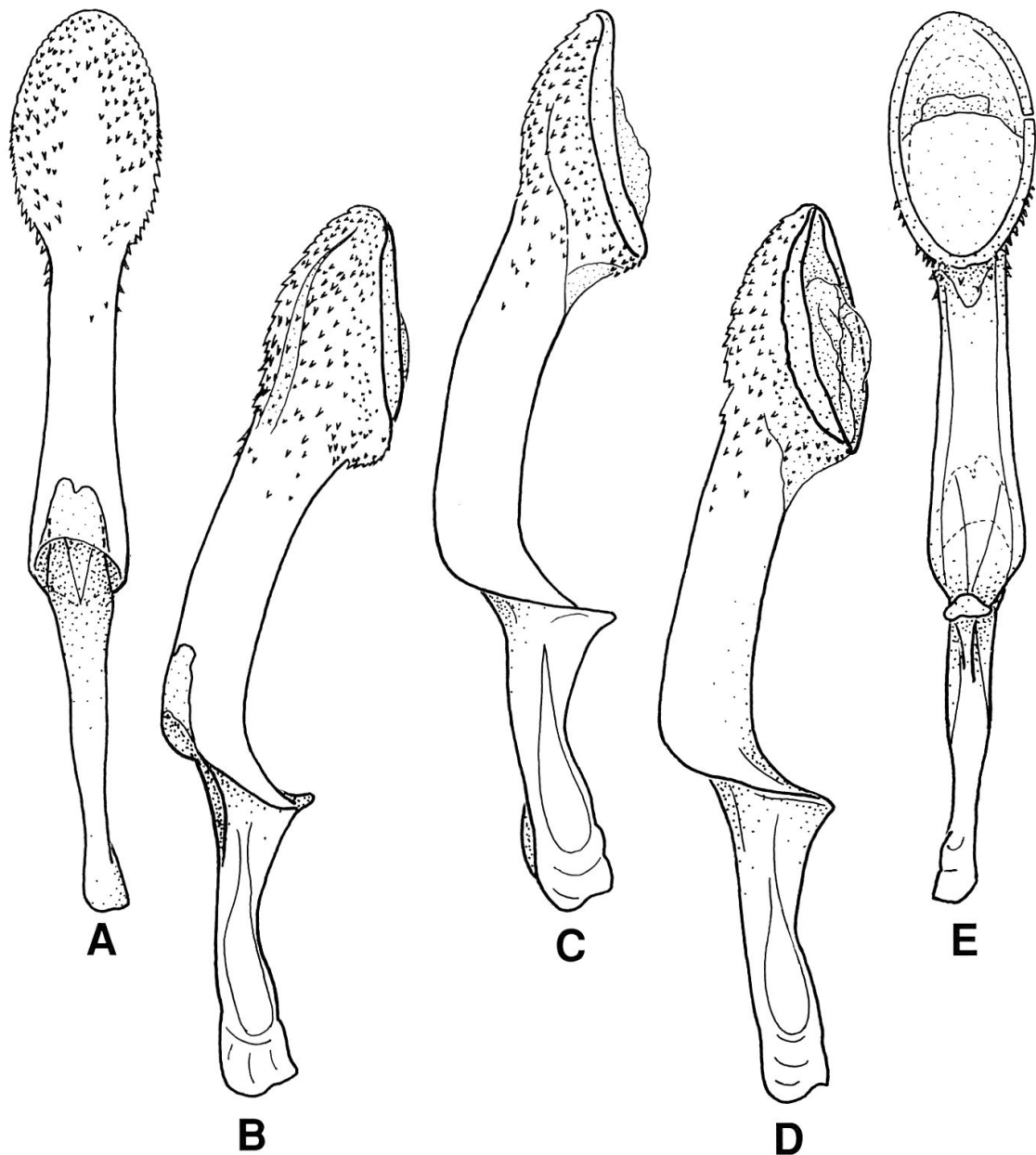


Fig. 12. *Hirtodrosophila pleurostrigata* (Burla, 1956), holotype ♂, Nr. 405. A–E, aedeagus+aedeagal apodeme, several views from dorsal through ventral.

cus anteriorly connected to epandrium by membranous tissue, posteriorly microtrichose, devoid of ventral lobe (although inner ventral tips are slightly pointed downwards; not seen in Fig. 11A), ventrally weakly sclerotized and bearing a brush of dense, short setulae. Surstylus well-developed, not microtrichose, bearing ca. 42 scattered setiform prensisetae. Decasternum as in Fig. 11B. Hypandrium shorter than epandrium, slightly square-shaped; posterior hypandrial process absent; dorsal arch absent; gonopod connected to paraphysis by membranous tissue, bearing one seta near lower inner margin. Aedeagus fused to aedeagal apodeme, distally slightly dilated, and covered with tiny scales on lateral and dorsal regions; dorsal cleft ca. 1/8 length of aedeagus. Aedeagal apodeme laterally flattened, twice as short as



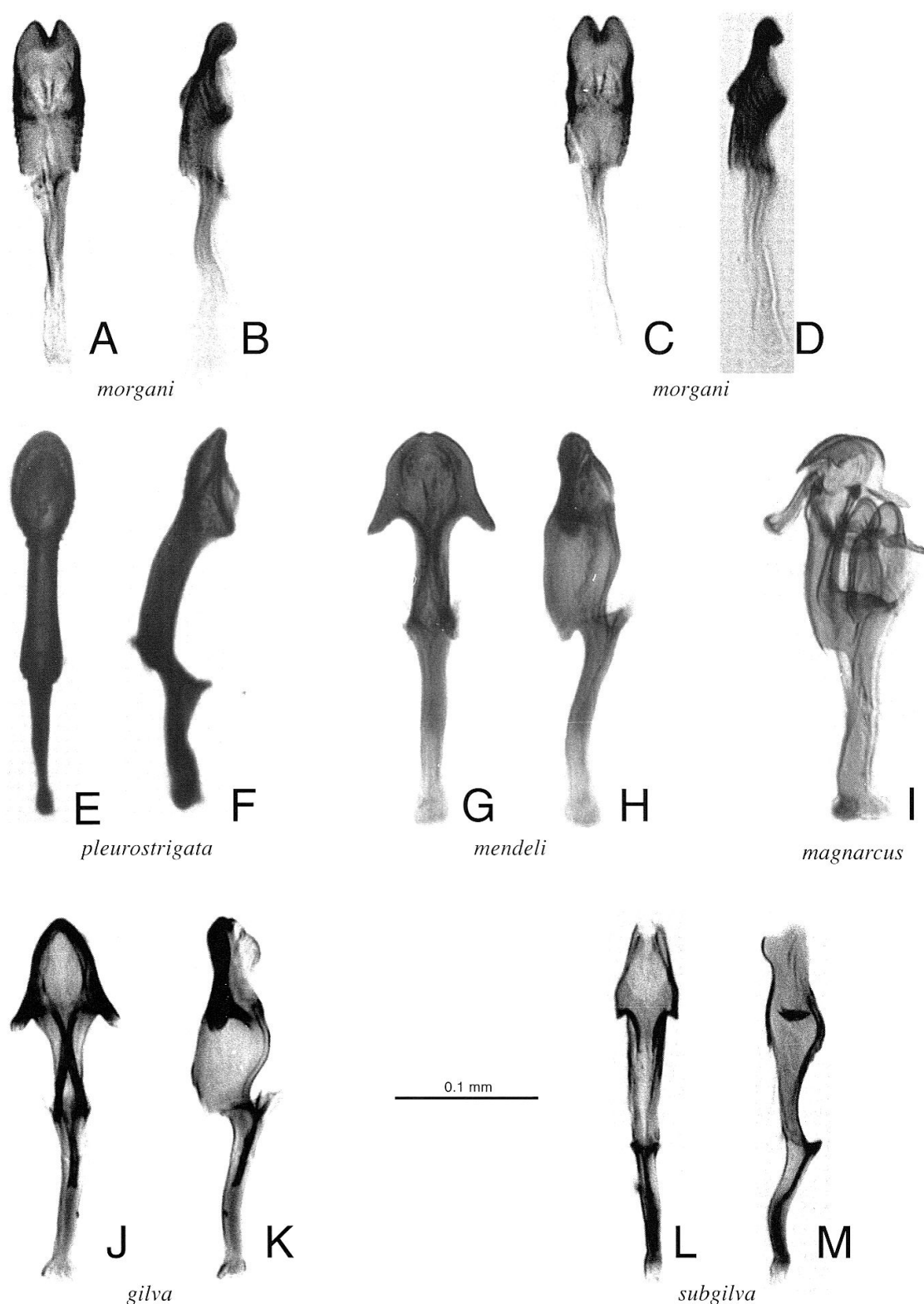


Fig. 13. Dorsal and left lateral views (except of I) of aedeagus+aedeagal apodeme of: A, B, paratype of *Hirtodrosophila morgani* (Mourão, Gallo & Bicudo, 1967); C, D, idem, but a another paratype; E, F, holotype Nr. 405 of *Hirtodrosophila pleurostrigata* (Burla, 1956); G, H, paratype of *Hirtodrosophila mendeli* (Mourão, Gallo & Bicudo, 1965); I, *Hirtodrosophila magnarcus* (Frota-Pessoa, 1951), holotype Nr. 438 of junior synonym *Hirtodrosophila paralevigata* (Burla, 1956), including paraphysis, oblique dorsal view; J, K, paratype Nr. 451 of *Hirtodrosophila gilva* (Burla, 1956); L, M, paratype Nr. 457 of *Hirtodrosophila subgilva* (Burla, 1956).



aedeagus. Ventral rod short. Paraphysis well-developed, longer than wide, not microtrichose, connected to distal margin of aedeagal apodeme by membranous tissue and subdistally bearing 2 setulae on dorsal margin.

♀ (based on Burla's paratypes Nr. 408 and Nr. 409). Measurements: Frontal length 0.29 mm; frontal index = 0.86–0.89, top to bottom width ratio = 1.29–1.32. Frontal triangle about 64–72 % of frontal length; ocellar triangle about 29–33 % of

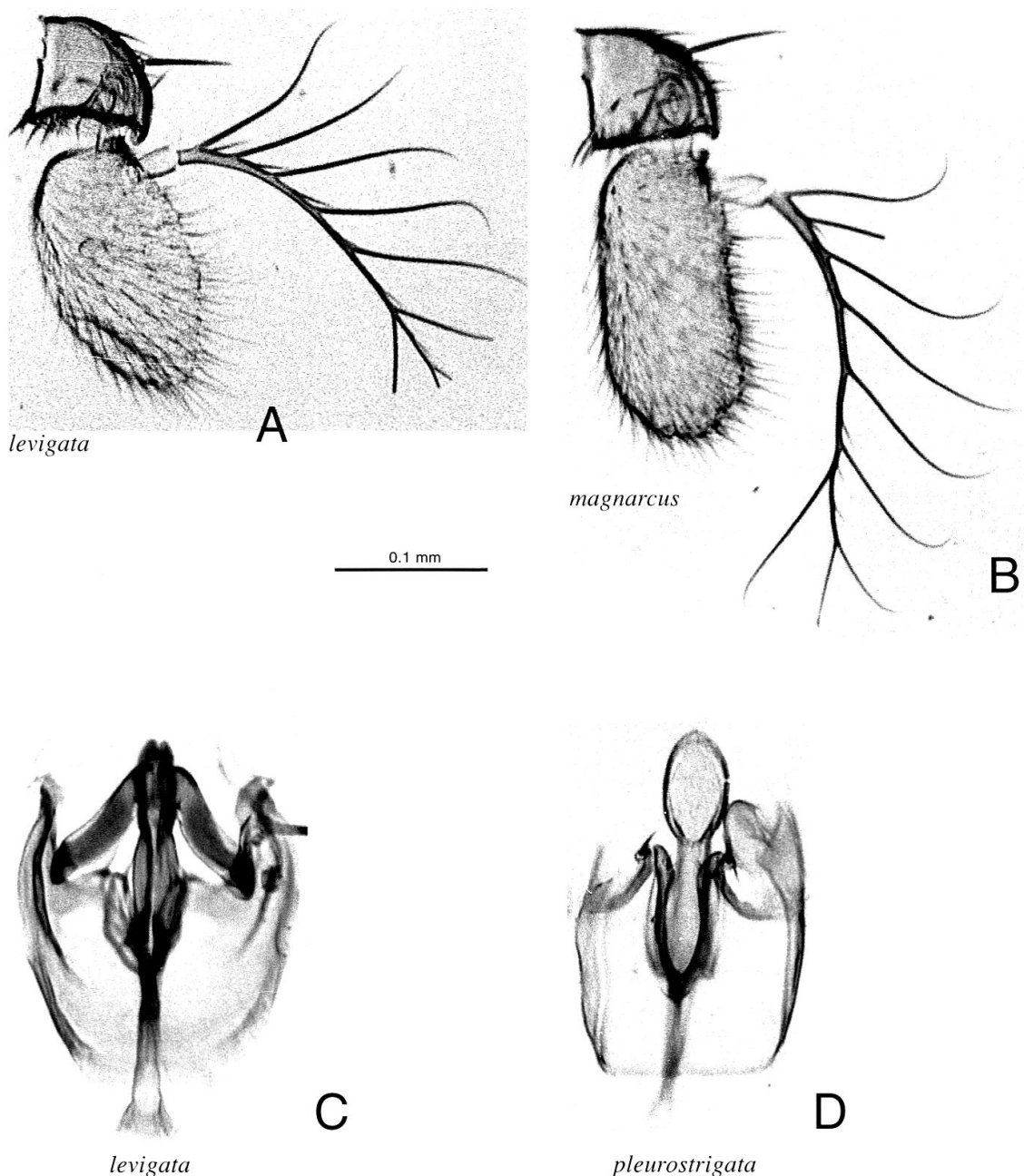


Fig. 14. A, B. Lateral view of antenna of A, *Hirtodrosophila levigata* (Burla, 1956), paratype ♂ Nr. 435, left one, inner view; B, *Hirtodrosophila magnarcus* (Frota-Pessoa, 1951), holotype ♂ Nr. 438 of junior synonym *Hirtodrosophila paralevigata* (Burla, 1956), right one, outer view. C, D. Hypandrium, paraphyses, gonopods, and aedeagus+aedeagal apodeme, ventral view, of: C, *Hirtodrosophila levigata* (Burla, 1956), paratype ♂ Nr. 435; D, *Hirtodrosophila pleurostrigata* (Burla, 1956), holotype ♂ Nr. 405. All photomicrographs were taken from the original microscope slides.

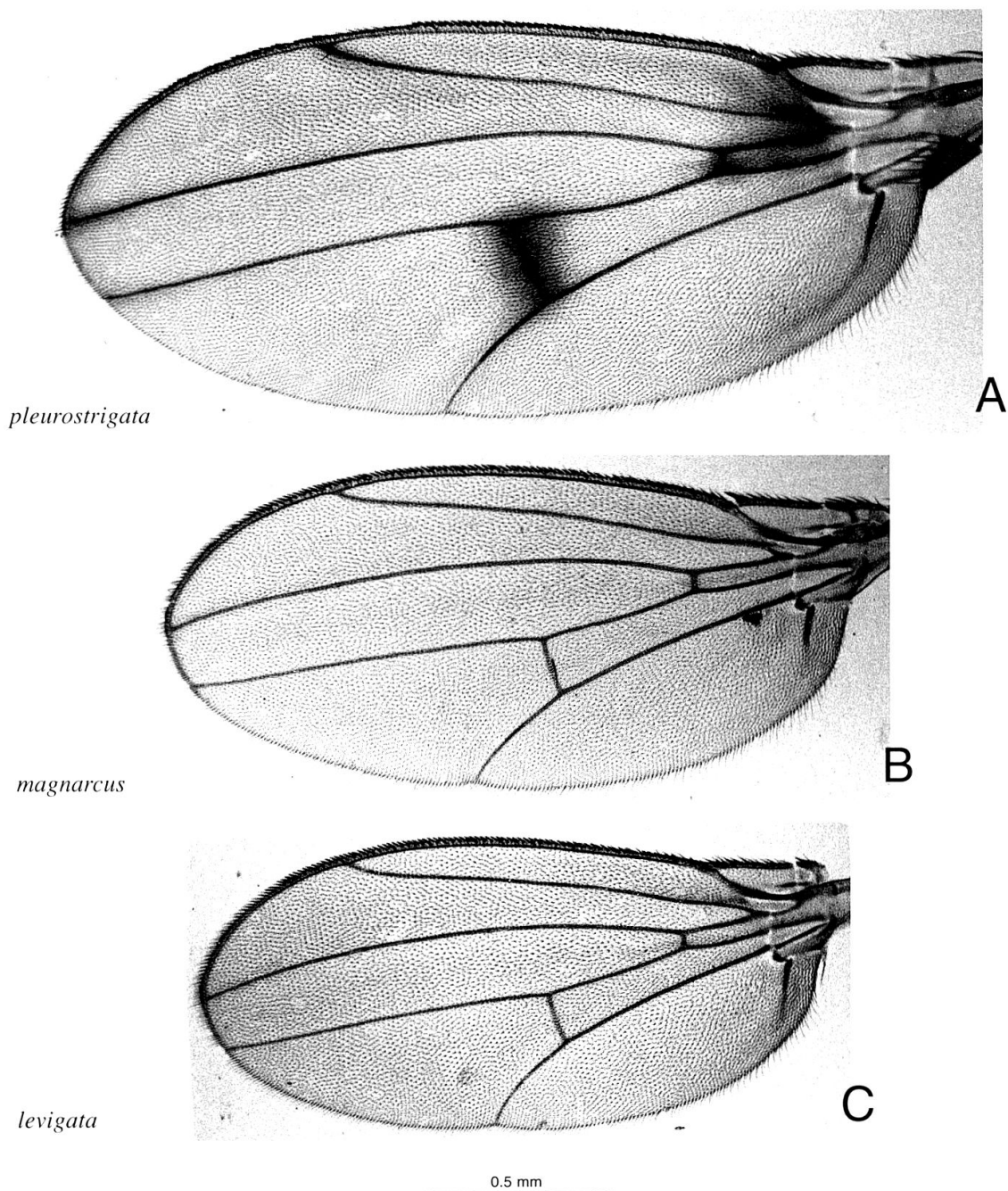


Fig. 15. Left wings, dorsal view, of: A, *Hirtodrosophila pleurostrigata* (Burla, 1956), holotype ♂ Nr. 405; B, *Hirtodrosophila magnarcus* (Frota-Pessoa, 1951), holotype ♂ Nr. 438 of junior synonym *Hirtodrosophila paralevigata* (Burla, 1956); C, *Hirtodrosophila levigata* (Burla, 1956), paratype ♂ Nr. 435.

frontal length. Orbital plates about 70–78 % of frontal length. Distance of or3 to or1 = 75–86 % of or3 to vtm, or1 / or3 ratio = 1.11–1.33, or2 / or1 ratio = 0.25–0.40, postocellar setae = 53–56 %, ocellar setae = 71–78 % of frontal length; vibrissal index = 0.27–0.38. Cheek index about 7–9. Eye index = 1.08–1.12. Thorax length 0.95–1.07 mm. h index = 0.90. Transverse distance of dorsocentral setae 211–233 % of longitudinal distance; dc index = 0.45–0.58, scut index = 0.80, sterno index = 0.33–0.36, mid katapisternal seta about 63–71 % of the anterior one. Wing length

1.14–1.21 mm, length to width ratio = 2.22–2.31. Indices: C = 1.42–1.56, ac = 3.57–4.00, hb = 0.54–0.56, 4C = 1.39–1.50, 4v = 1.94–2.00, 5x = 1.71–2.17, M = 0.67–0.80, prox. x = 0.50.

♀ *Terminalia*. Oviscapt valve broad-triangular, distally rounded, with about 1 discal and 12–14 marginal mostly peglike ovisensilla, which gradually increase in size from the most proximal to the most distal; discal one clearly separate by a small gap from the marginal ones [not shown in fig. 250 of Burla (1956: 305), probably because the illustrated valve was a little inclined]. Inner spermathecal capsule sclerotized, mushroom-shaped, apically with a shallow indentation; introvert deeply invaginated, subdistally remarkably globose.

*Distribution*. Brazil (state of Rio de Janeiro).

*Biology*. Unknown.

*Comments*. One non-type female cited in the original description of *H. pleurostrigata* is partially preserved as pinned specimen and partially as permanent mount, respectively labelled: “Rio de Janeiro – DF: Brasil V.53 H. Burla coll / 212 / pleuralis [sic] / slide 220” and “Hirtodros. pleuralis [sic] / 220”. Although very similar to the type specimens, we were unable to confirm its specific status, mostly because of some subtle differences we have observed regarding the shape of the oviscapt valve and the size of its peglike ovisensilla. However, it should be pointed out that the photomicrograph of one right wing used by Burla to illustrate his original description of *H. pleurostrigata* (Burla, 1956: 321, fig. 357) undoubtedly was taken from the permanent mount 220 cited above. We were able to reach this conclusion by comparing the breakage line of the wing included in the slide mount with that of the photomicrograph cited above.

When analyzing the microscope slide mountings of the holotype of *H. pleurostrigata* we realized that its wings, regarding shape and cloudings (Fig. 15A), were remarkably similar to those of the holotype of *Hirtodrosophila jordanensis* as depicted in a photomicrograph included in the original description of the latter (Frota-Pessoa, 1945:474; fig. 2). However, the wing cloudings of a non-type specimen of *H. pleurostrigata* (slide Nr. 220) as shown in the original description of *H. pleurostrigata*, discussed above, are not so obvious. There also seems to be a great similarity between their oviscapt valves. Almost 60 years after its original description (Frota-Pessoa, 1945), *H. jordanensis* is still known only by its single female holotype. It would be desirable to try to collect male topotypes of *H. jordanensis*, in Campos do Jordão, state of São Paulo, Brazil, to verify whether or not they are sibling species or even conspecific.

#### THE NEW WORLD SPECIES OF *HIRTODROSOPHILA*

To facilitate further studies, we present below an updated alphabetic list of the 36 binomies assumed to be valid for the extant New World species of *Hirtodrosophila*, according to their occurrence in one or both biogeographic regions (countries are cited in parentheses [states or equivalents, whenever directly or indirectly known, are cited in brackets]). The data on the list below are based both on the present paper and on the following literature: Williston, 1896:411,412; Sturtevant, 1921:75,76,82; Duda, 1925:193–198; Malloch, 1926:30; Patterson & Wagner, 1943:219; Patterson & Mainland, 1944:63; Frota-Pessoa, 1945:469–483; Williams, 1948:9; Hsu, 1949:90,91,114,115; Carson & Stalker, 1951:318; Clayton & Ward, 1954:99; Wheeler, 1954:54–56, 1957:80,89, 1963:54, 1965:764,765,767, 1970:23–25, 1981:52–54; Dorsey & Carson, 1956:179; Heed, 1957:68,72; Miller, 1958:8; Strickberger, 1962:115; Throckmorton, 1962:338; Spieth & Heed,

1975:288; Lacy, 1981:59–62, 1982:1268; Carson et al., 1983:241; Bächli, 1984:31,32,35,37; Grimaldi, 1987a:10, b:133,149, 1994:130; Vilela & Bächli, 1990:126–130; Band, 1993:239.

*Nearctic exclusively (8 species).*

- Hirtodrosophila alabamensis* (Sturtevant, 1918) (Canada [Quebec or Ontario], USA [Michigan, West Virginia, Virginia, Illinois, Nebraska, Missouri, Texas, Alabama]).  
*Hirtodrosophila chagrinensis* (Stalker & Spencer, 1939) (USA [New York, Michigan, Wisconsin, Ohio, Iowa]).  
*Hirtodrosophila cinerea* (Patterson & Wheeler, 1942) (USA [Nebraska, Texas]).  
*Hirtodrosophila duncani* (Sturtevant, 1918) (USA [Minnesota, Wisconsin, Michigan, New York, Massachusetts, Connecticut, Rhode Island, Pennsylvania, New Jersey, Delaware, Maryland, West Virginia, Ohio, Indiana, Illinois, Virginia, North Carolina, South Carolina, Missouri, Texas, Oklahoma, Arkansas, Tennessee, Louisiana, Mississippi, Alabama, Georgia, Florida]).  
*Hirtodrosophila grisea* (Patterson & Wheeler, 1942) (USA [Arizona]).  
*Hirtodrosophila longala* (Patterson & Wheeler, 1942) (USA [New Mexico], Mexico [Chihuahua]).  
*Hirtodrosophila orbospiracula* (Patterson & Wheeler, 1942) (USA [Arizona, Texas], Mexico [Hidalgo]).  
*Hirtodrosophila ordinaria* (Coquillett, 1904) (USA [Alaska, Washington, California, Montana, Minnesota, New York, New Hampshire, Massachusetts, Tennessee, North Carolina], Canada [Quebec]).

*Neotropical exclusively (25 species).*

- Hirtodrosophila batracida* Grimaldi, 1994 (Mexico [Oaxaca], Nicaragua [Matagalpa], Costa Rica [San José]).  
*Hirtodrosophila clypeata* (Wheeler, 1968) (Panama [Canal Zone]).  
*Hirtodrosophila clypeora* (Wheeler, 1968) (Costa Rica).  
*Hirtodrosophila clyptata* Grimaldi, 1987 (Brazil [Rio de Janeiro]).  
*Hirtodrosophila flavohalterata* (Duda, 1925) (Costa Rica [Cartago]).  
*Hirtodrosophila fuscohalterata* (Duda, 1925) (Costa Rica [Cartago]).  
*Hirtodrosophila gilva* (Burla, 1956) (Brazil [Rio de Janeiro]).  
*Hirtodrosophila glabrifrons* (Duda, 1925) (El Salvador, Costa Rica [Cartago]).  
*Hirtodrosophila jordanensis* (Frota-Pessoa, 1945) (Brazil [São Paulo]).  
*Hirtodrosophila kuscheli* (Brncic, 1957) (Chile [Juan Fernandez Is.]).  
*Hirtodrosophila levigata* (Burla, 1956) (Brazil [São Paulo, Rio de Janeiro]).  
*Hirtodrosophila magnarcus* (Frota-Pessoa, 1951) (Brazil [Rio de Janeiro, São Paulo, Rio Grande do Sul]).  
*Hirtodrosophila mendeli* (Mourão, Gallo & Bicudo, 1965b) (Brazil [São Paulo], Argentina [Misiones]).  
*Hirtodrosophila mexica* (Wheeler, 1954) (Mexico [Michoacan, Veracruz], El Salvador).  
*Hirtodrosophila morgani* (Mourão, Gallo & Bicudo, 1967) (Brazil [São Paulo]).  
*Hirtodrosophila narinosa* (Frota-Pessoa, 1945) (Costa Rica [Cartago]).  
*Hirtodrosophila pichis* (Vilela & Bächli, 1990) (Peru [Pasco], Bolivia [La Paz]).  
*Hirtodrosophila pleuralis* (Williston, 1896) (Saint Vincent Is.).  
*Hirtodrosophila pleurostrigata* (Burla, 1956) (Brazil [Rio de Janeiro]).  
*Hirtodrosophila prognatha* (Sturtevant, 1916) (Puerto Rico, Haiti).  
*Hirtodrosophila ramulosa* (Burla, 1956) (Brazil [Rio de Janeiro]).  
*Hirtodrosophila spinicauda* (Malloch, 1926) (Costa Rica [Alahuela], Panama).  
*Hirtodrosophila strigocula* (Burla, 1956) (Brazil [Bahia]).  
*Hirtodrosophila subflavohalterata* (Burla, 1956) (Brazil [Rio de Janeiro]).  
*Hirtodrosophila subgilva* (Burla, 1956) (Brazil [Rio de Janeiro]).

*Nearctic plus Neotropical (3 species).*

- Hirtodrosophila nigrohalterata* (Duda, 1925) (USA [Texas], Mexico [Veracruz], El Salvador, Costa Rica [Cartago]).  
*Hirtodrosophila pictiventris* (Duda, 1925) (USA [Florida], Mexico [Veracruz, Oaxaca], El Salvador, Costa Rica [Alajuela], Cuba [Cienfuegos], Ecuador [Galapagos], Brazil [Pará]).  
*Hirtodrosophila thoracis* (Williston, 1896) (USA [Louisiana, Florida], Mexico [Veracruz, San Luis Potosi], El Salvador [San Vicente], Costa Rica [Alajuela], Saint Vincent Is., ? Brazil [Rio de Janeiro]).



## ZUSAMMENFASSUNG

Folgende südamerikanische *Hirtodrosophila*-Arten werden beschrieben und deren männliche Terminalia durch Strichzeichnungen und Mikrophotographien illustriert: *H. gilva* (Burla, 1956); *H. levigata* (Burla, 1956); *H. magnarcus* (Frota-Pessoa, 1951) [= *H. caxiensis* (Cordeiro, 1952), neues Synonym; = *H. paralevigata* (Burla, 1956), neues Synonym]; *H. mendeli* (Mourão, Gallo & Bicudo, 1965); *H. morgani* (Mourão, Gallo & Bicudo, 1967); *H. pleurostrigata* (Burla, 1956); *H. subgilva* (Burla, 1956). Sieben der neun analysierten Arten weisen einmalige Strukturen in der äusseren Morphologie und in den männlichen Terminalia auf, die den Artstatus klar bestätigen, obwohl bei einem Artenpaar, (*H. gilva* und *H. mendeli*) die Unterschiede sehr klein sind. Eine aktualisierte Liste der Neuwelt-Arten von *Hirtodrosophila* wird beigegeben.

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## REFERENCES

- Bächli, G. 1974. Revision der von Duda beschriebenen südostasiatischen Arten des *Drosophila*-Subgenus *Hirtodrosophila* (Diptera: Drosophilidae). Mitt. zool. Mus. Berl. 49: 267–315.
- Bächli, G. 1984. Catalog of the types of Drosophilidae in the Hungarian Natural History Museum, Budapest (Diptera). Folia ent. hung. 45(2): 27–41.
- Band, H.T. 1993. Drosophilidae (Diptera) collected in Spring in Michigan. Great Lakes Ent. 26(3): 237–240.
- Burla, H. 1956. Die Drosophilidengattung *Zygothrica* und ihre Beziehung zur *Drosophila*-Untergattung *Hirtodrosophila* mit Beschreibung von 45 neuen Arten (Diptera acalyptrata). Mitt. zool. Mus. Berl. 32(2): 189–321.
- Carson, H.L. & Stalker, H.D. 1951. Natural breeding sites for some wild species of *Drosophila* in the Eastern United States. Ecology 32(2): 317–330.
- Carson, H.L., do Val, F.C. & Wheeler, M.R. 1983. Drosophilidae of the Galápagos islands, with descriptions of two new species. Int. J. Ent. 25(4): 239–248.
- Clayton, F.E. & Ward, C.L. 1954. Chromosomal studies on several species of Drosophilidae. Univ. Texas Publs 5422: 98–105.
- Cordeiro, A.R. 1952. *Drosophila (Hirtodrosophila) caxiensis*, a new species of fungus-feeding fly from Brazil. Dusenía 3: 303–308.
- Dorsey, C.K. & Carson, H.L. 1956. Selective responses of wild Drosophilidae to natural and artificial baits. Ann. ent. Soc. Am. 49: 177–181.
- Duda, O. 1923. Die orientalischen und australischen Drosophiliden-Arten (Dipteren) des Ungarischen National-Museums zu Budapest. Annls hist.-nat. Mus. natn. hung. 20: 24–59.
- Duda, O. 1924. Beitrag zur Systematik der Drosophiliden unter besonderer Berücksichtigung der paläarktischen u. orientalischen Arten (Dipteren). Annls hist.-nat. Mus. natn. hung. 22: 149–229.
- Duda, O. 1925. Die costarikanischen Drosophiliden des Ungarischen National-Museums zu Budapest. Arch. Naturg. 90 (A): 172–234.
- Frota-Pessoa, O. 1945. Sobre o subgênero "*Hirtodrosophila*" com descrição de uma nova espécie (Diptera, Drosophilidae, *Drosophila*). Revta bras. Biol. 5(4): 469–483.
- Frota-Pessoa, O. 1951. "*Drosophila (Hirtodrosophila) magnarcus*" n. sp. (Diptera, Drosophilidae). Revta bras. Biol. 11(4): 407–411.
- Grimaldi, D.A. 1987a. Amber fossil Drosophilidae (Diptera), with particular reference to the Hispaniolan taxa. Am. Mus. Novit. 2880: 1–23.
- Grimaldi, D.A. 1987b. Phylogenetics and taxonomy of *Zygothrica* (Diptera: Drosophilidae). Bull. Am. Mus. nat. Hist. 186: 103–268.
- Grimaldi, D.A. 1990. A Phylogenetic, Revised Classification of the Genera in the Drosophilidae (Diptera). Bull. Am. Mus. nat. Hist. 197: 1–139.
- Grimaldi, D.A. 1994. Description and immature stages of *Hirtodrosophila batracida* sp. n. (Diptera: Drosophilidae). Ent. scand. 25: 129–136.
- Heed, W.B. 1957. Ecological and distributional notes on the Drosophilidae (Diptera) of El Salvador. Univ. Texas Publs 5721: 62–78.
- Hsu, T.C. 1949. The external genital apparatus of male Drosophilidae in relation to systematics. Univ. Texas Publs 4920: 80–142.

- Lacy, R.C. 1981. Taxonomic and distributional notes on some fungus-feeding North American *Drosophila* (Diptera, Drosophilidae). Ent. News 92(2): 59–63.
- Lacy, R.C. 1982. Niche breadth and abundance as determinants of genetic variation in populations of mycophagous drosophilid flies (Diptera: Drosophilidae). Evolution 36(6): 1265–1275.
- Malloch, J.R. 1926. New genera and species of acalyptate flies in the United States National Museum. Proc. U. S. natn. Mus. 68 (21): 1–33 + 2 plates.
- Malloch, J.R. 1934. Drosophilidae. In Insects of Samoa 6(8): 267–312.
- Miller, D.D. 1958. *Drosophila* collections in Eastern Canada in 1956. Proc. Neb. Acad. Sci. 67: 8.
- Mourão, C.A., Gallo, A.J. & Bicudo, H.E.M.C. 1965a. Duas novas espécies de *Drosophila* do Brasil (Drosophilidae, Diptera). Cienc. e Cult. 17(2): 160.
- Mourão, C.A., Gallo, A.J. & Bicudo, H.E.M.C. 1965b. Sobre a sistemática de *Drosophila* no Brasil, com descrição de “*D. mendeli*” sp. nov. e “relação das espécies brasileiras do gênero *Drosophila*”. Cienc. e Cult. 17(4): 577–586.
- Mourão, C.A., Gallo, A.J. & Bicudo, H.E.M.C. 1967. *Drosophila morgani*, nova espécie brasileira (Drosophilidae, Diptera). Pap. Avul. Zool. 20(15): 159–164.
- Patterson, J.T. & Wagner, R.P. 1943. Geographical distribution of species of the genus *Drosophila* in the United States and Mexico. Univ. Texas Pubs 4313: 217–281.
- Patterson, J.T. & Mainland, R.P. 1944. The Drosophilidae of Mexico. Univ. Texas Pubs 4445: 9–101.
- Spieth, H.T. & W.B. Heed. 1975. The *Drosophila pinicola* species group (Diptera: Drosophilidae). Pan-Pacif. Ent. 51: 287–295.
- Strickberger, M.W. 1962. Experiments in genetics with *Drosophila*. New York, John Wiley, 144 pp.
- Sturtevant, A.H. 1921. The North American species of *Drosophila*. Pubs Carnegie Instn 301: 1–150.
- Sturtevant, A.H. 1942. The classification of the genus *Drosophila*, with descriptions of nine new species. Univ. Texas Pubs 4213: 5–51.
- Takada, H. 1976. (Drosophilids with specific names dedicated to people). (in Japanese). Makunagi 8: 10–11.
- Throckmorton, L.H. 1962. The problem of phylogeny in the genus *Drosophila*. Univ. Texas Pubs 6205: 207–343.
- do Val, F.C. 1982. The male genitalia of some Neotropical *Drosophila*: Notes and illustrations. Pap. Avul. Zool. 34(27): 309–347.
- do Val, F.C., Vilela, C.R. & Marques, M.D. 1981. Drosophilidae of the Neotropical Region. In: Ashburner, M., Carson, H.L. and Thompson, J.N. (eds.), The Genetics and Biology of *Drosophila*, vol. 3a, pp. 123–168. London, Academic Press.
- Vilela, C.R. & Bächli, G. 1990. Taxonomic studies on Neotropical species of seven genera of Drosophilidae (Diptera). Mitt. schweiz. ent. Ges. 63(Suppl.): 1–332.
- Vilela, C.R. & Bächli, G. 2000. Morphological and ecological notes on the two species of *Drosophila* belonging to the subgenus *Siphodora* Patterson & Mainland, 1944 (Diptera, Drosophilidae). Mitt. schweiz. ent. Ges. 73(1–2): 23–47.
- Wheeler, M.R. 1954. Taxonomic studies on American Drosophilidae. Univ. Texas Pubs 5422: 47–64.
- Wheeler, M.R. 1957. Taxonomic and distributional studies of Nearctic and Neotropical Drosophilidae. Univ. Texas Pubs 5721: 79–114.
- Wheeler, M.R. 1959. A Nomenclatural Study of the Genus *Drosophila*. Univ. Texas Pubs 5914: 181–205.
- Wheeler, M.R. 1962. *Drosophila melina*, nom. nov. (Diptera: Drosophilidae). Proc. ent. Soc. Wash. 64: 246.
- Wheeler, M.R. 1963. Notes on the extant types of Dr. O. Duda's Costa Rican Drosophilidae (Diptera). Bull. Brooklyn ent. Soc. 58(2/3): 51–61.
- Wheeler, M.R. 1965. Family Drosophilidae. In: A Catalog of Diptera of North America, pp. 760–772. U.S. Dept. Agric., Washington.
- 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, São Paulo.
- Wheeler, M.R. 1981. The Drosophilidae: A Taxonomic Overview. In: Ashburner, M., Carson, H.L. and Thompson, J.N. (eds.), The Genetics and Biology of *Drosophila*, vol. 3a, pp. 1–97. London, Academic Press.
- Wheeler, M.R. & Hamilton, N. 1972. Catalog of *Drosophila* species names, 1959–1971. Univ. Texas Pubs 7213: 257–268.
- Williams, D.D. 1948. The geographical distribution in the United States of *Drosophila* species collected in eastern Nebraska. Proc. Neb. Acad. Sci. 58: 9.
- Williston, S.W. 1896. On the Diptera of St. Vincent (West Indies) (Drosophilidae). Trans. ent. Soc. Lond. 1896: 404–417 + 2 plates.



