

Drosophila angustibuca Duda *sensu* Frota-Pessoa is an undescribed species (Diptera, Drosophilidae)

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RESUMO. *Drosophila angustibuca* Duda *sensu* Frota-Pessoa é uma espécie ainda não descrita (Diptera, Drosophilidae). Uma nova espécie sul-americana de *Drosophila*, incluída no subgrupo I do grupo *tripunctata* e identificada incorretamente nos últimos 50 anos como sendo a espécie costarriquenha *Drosophila angustibuca* (*sensu* Frota-Pessoa, 1954; *non* Duda, 1925), é descrita no presente artigo sob o binômio *Drosophila nappae* **sp. nov.** Os espécimens-tipo foram retirados de uma linhagem obtida a partir de várias fêmeas coletadas entre julho de 1994 e abril de 1995 no Morro Santana, Porto Alegre (RS), Brasil. A descrição é acompanhada de ilustrações detalhadas das terminálias masculina e feminina.

PALAVRAS-CHAVE. Brasil; espécie nova; grupo *tripunctata*; Paraguai; região Neotropical.

ABSTRACT. *Drosophila nappae* **sp. nov.**, belonging to the subgroup I of the *Drosophila tripunctata* species group of the subgenus *Drosophila*, is described from flies of one strain established from several females collected from July 1994 through April 1995 at Morro Santana, Porto Alegre, state of Rio Grande do Sul, Brazil. This species has been misidentified during the past fifty years as *Drosophila angustibuca* (*sensu* Frota-Pessoa, 1954; *non* Duda, 1925, described from Costa Rica). Illustrations of male and female terminalia are also provided.

KEYWORDS. Brazil; Neotropical region; new species; Paraguay; *tripunctata* group.

DUDA (1925) based his description of *Drosophila angustibuca* on 15 specimens (1 male, 14 females) collected in 1921, at Suiza de Turrialba, Costa Rica and deposited at the Magyar Természettudományi Múzeum [Hungarian National History Museum](HNHM) in Budapest, Hungary. As no holotype was designated in the original description they automatically acquired the status of syntypes. Thirty-eight years later, WHEELER (1963) analyzed two out of the 14 female syntypes, designated one of them as lectotype and, following a personal communication from the former curator (Dr. F. Mihályi) of the above-mentioned Museum, assumed the remaining 13 specimens (1 male, 12 females) of the original type series had been lost. Later on, however, BÄCHLI (1984:28) did realize that 12 (1 male, 11 females) of the remaining paralectotypes of *Drosophila angustibuca* had been overlooked by the former curator as they were not lost but preserved together with the lectotype and one paralectotype (both females) in the collection of the HNHM in Budapest and only one out of the 14 original females was in fact lost [just one labelled empty pin remains].

WHEELER (1963), while selecting the female lectotype of *Drosophila angustibuca*, was the first to raise a suspicion that the Brazilian specimens used by FROTA-PESSOA (1954) to redescribe *Drosophila angustibuca* Duda, 1925 belong to an undescribed species. This suspicion was later confirmed by VILELA & BÄCHLI (1990), who redescribed the male

paralectotype (the only male among the 15 syntypes of the original type series) of *Drosophila angustibuca* and realized that the males belonging to this species have a terminalia undoubtedly different from those of the Brazilian specimens mistakenly identified and illustrated by FROTA-PESSOA (1954), and cited by most of the subsequent Brazilian authors, as *Drosophila angustibuca*.

On the other hand, BÄCHLI *et al.* (2000) had the opportunity to dissect the sole female paralectotype of *Drosophila paraguayensis* Duda, 1927 and, mostly through the analysis of the spermathecae and oviscapt valves, to realize that it does not belong to the same species as the male lectotype but it rather belongs to one undescribed species most probably known in the literature as *Drosophila angustibuca sensu* Frota-Pessoa 1954 (*non* Duda, 1925).

The purpose of the present paper is to formally describe this relatively well-known but still undescribed species of Neotropical *Drosophila* belonging to the *tripunctata* group.

Refer to KANESHIRO (1969) and VILELA & BÄCHLI (1990, 2000) for details respectively on the methods and terminology used.

Drosophila nappae **sp. nov.** (Figs. 1-10)

Drosophila paraguayensis Duda, 1927 (*partim*, paralectotype female [deposited in the Staatliches Museum für Tierkunde, Dresden,

Germany):186 (fig.59, female terminalia); Frota-Pessoa, 1954:265 but not 266 (key); indirectly designated by Vilela & Bächli, 1990:102, formally labelled as such by Bächli *et al.*, 2000:76, and cited by them as “undescribed *Drosophila* species”, 90 (figs. 14A, left wing; B, left oviscapt valve; C, right oviscapt valve; D, inner spermathecal capsules).

Drosophila angustibucca (*sensu* Frota-Pessoa, 1954; *non* Duda, 1925); Frota-Pessoa, 1954 (misidentification):266 (key), 278 (as a redescription), plate XIV (figs. 4, male terminalia, ventral view; 5, aedeagus, aedeagal apodeme, left gonopod + paraphysis, dorsal view), plate XVII (fig. 38, right oviscapt valve), plate XVIII (fig. 48, inner spermathecal capsule; fig. 57, egg), plate XIX (fig. 67, male terminalia, right lateral view), plate XXI (fig. 85, posterior leg), plate XXII (fig. 94, right wing); Araújo & Valente, 1981:1488 (table I, seasonal fluctuation, abundance), 1489 (table III, feeding site); Franck *et al.*, 1984:244 (fig. 1, metaphase plates), 245 (fig. 2, photomap of polytene chromosomes), 248 (fig. 3, chromosome inversions); Franck & Valente, 1985:135-138 (tables II-IV, figs. 1-4, seasonal fluctuation); Valente & Araújo, 1991:241, 242 (tables I, II, seasonal fluctuation, abundance) 244-247 (tables III, IV, feeding sites); Franck & Napp, 1992:125, 126 (figs. 1c, 2c, electrophoretic patterns), 127, 128 (tables 1, 2, genetic similarity) 129 (fig. 3, dendrograms); De Toni & Hofmann, 1995:349 (table I, seasonal fluctuation, abundance); Saavedra *et al.*, 1995:63 (table 1, distribution, abundance), 65 (fig. 3, seasonal fluctuation), 67, 68 (table 3, feeding and breeding sites), 69, 70 (tables 4, 5, niche-breadth, niche overlapping), 71 (fig. 4, dendrogram); Loreto *et al.*, 1998: 154-155 (table 1, transposable elements); Yotoko *et al.*, 2003:615 (footnote of table 1, *CoxII* gene).

Drosophila species R3 of the *tripunctata* group; Tidon-Sklorz *et al.*, 1994:631 (table II, geographical distribution, abundance), 634 (subgroup affiliation).

Drosophila species 1 of the *tripunctata* group; Yotoko *et al.*, 2003:615 (table 1, *CoxII* gene), 617 (fig. 1, phylogenetic tree).

Holotype male (postabdomen dissected), labelled “Brasil - RS [Rio Grande do Sul], Porto Alegre, VII.1994 - IV.1995, L. Basso-da-Silva col. / *Drosophila nappae* Vilela, Valente & Basso-da-Silva / HOLOTIPO [red label]”. Paratypes: 4 males (2 dissected) and 8 females (3 dissected): same data as holotype. The disarticulated terminalia are kept in a microvial filled with glycerin and attached by the stopper to the pinned specimen. The type specimens were obtained in late May 1995 from a strain established by a mixture of several males and females collected by net sweeping over banana-baited traps between July 1994 and April 1995 at Morro Santana, Porto Alegre. They are all deposited in the Museu de Zoologia, Universidade de São Paulo, São Paulo, SP, Brazil (MZSP). Type locality: Morro Santana, Porto Alegre, state of Rio Grande do Sul, Brazil.

Additional specimen examined (not used in the description, therefore not considered paratype). BRASIL. *Minas Gerais*: 1 male (previously dissected) labelled: “Serra do Cipó. MG. BR. 1130m. 24-III-77, Sene e Carsons” [terminalia in an attached microvial, collection code A40 = gallery forest located at 27 km from the bridge over Cipó river, at an elevation of 1,130 m above sea level, municipality of Santana do Riacho, highway MG-010 in the direction of Conceição do Mato Dentro], deposited in the MZSP.

Diagnosis. Scutum brown, anterior half with two lighter stripes just within the dorsocentral rows; facial carina large and broad, not sulcate; wing brownish, crossveins clouded, C index = 3.7-4.4; three strong black setae at base of posterior tarsomere I; abdomen shining yellow, tergites 2-4 with posterior dark brown bands medially broadened; aedeagus anterodorsally bearing a distinctive pair of slightly membranous, finger-shaped processes, which are backwards directed and covered with tiny spines.

Description. Head mainly yellowish brown. Frontal length = 0.32-0.40 mm; top to bottom width ratio = 1.4-1.7. Frontal triangle indistinct; ocellar triangle dark brown, about 31-38 % of frontal length. Fronto-orbital plates indistinct. Mid orbital as tiny as fronto-orbital setulae, distance of posterior orbital to anterior one ca. 1/2 of that to inner vertical. Length ratio of anterior to posterior orbital = 0.6-0.7, of mid to anterior orbital = 0.2-0.4; poc = 62-80%, oc = 79-93% of frontal length; vt index = 1.2; vibrissal index = 0.3-0.5. Facial carina yellow, broad, not sulcate. Cheek index = 5.4-7.0. Eye index = 1.2-1.3. First flagellomere short-haired; length to width ratio = 1.8-2.0. Arista with 6-8 upper and 3-4 lower branches plus terminal fork, 7-9 relatively long inner branches. Proboscis and palpi light brown. Face light yellow.

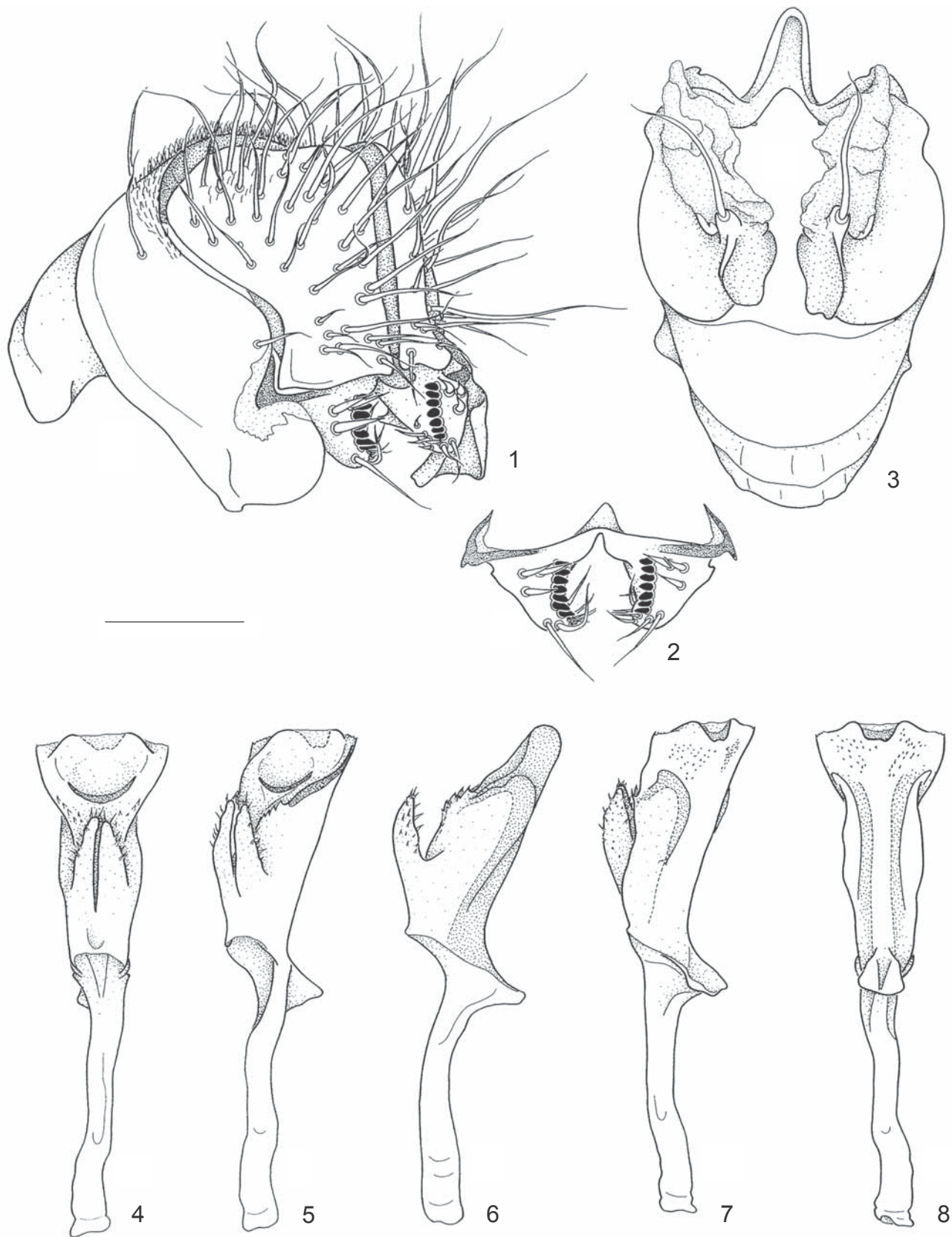
Thorax dull, brown; anterior half with two lighter stripes just within the dorsocentral rows; length = 1.4-1.6 mm; h index = 0.6-0.9; 8 irregular rows of acrostichals. Transverse distance of dorsocentrals 1.9-2.5x longitudinal distance; dc index = 0.6-0.8. Scutellum brown; scut position index = 0.7-0.9; basal scut divergent; scut index = 1.0-1.1; prescutellars absent; sterno index = 0.5-0.6; mid katapisternal = 58-100% of the anterior one. Halteres light brown, dorsally darker. Legs uniformly light brown. Three strong black setae at base of posterior tarsomere I, which is slightly wider than posterior tarsomere II, but not twice as wide, as it remarkably occurs in *Drosophila platitarsus* Frota-Pessoa, 1954. Apical setae on first and second tibiae, the latter spur-shaped, preapicalls on all three.

Wing brownish, slightly pointed at tip of R_{4+5} , crossveins clouded; length = 2.8-3.2 mm; length to width ratio = 2.1-2.3. Indices: C = 3.7-4.4, ac = 1.6-2.0, hb = 0.4-0.5, 4c = 0.6-0.7, 4v = 1.4-1.6, 5x = 0.7-1.0, M = 0.3-0.4, prox. x = 0.4-0.5.

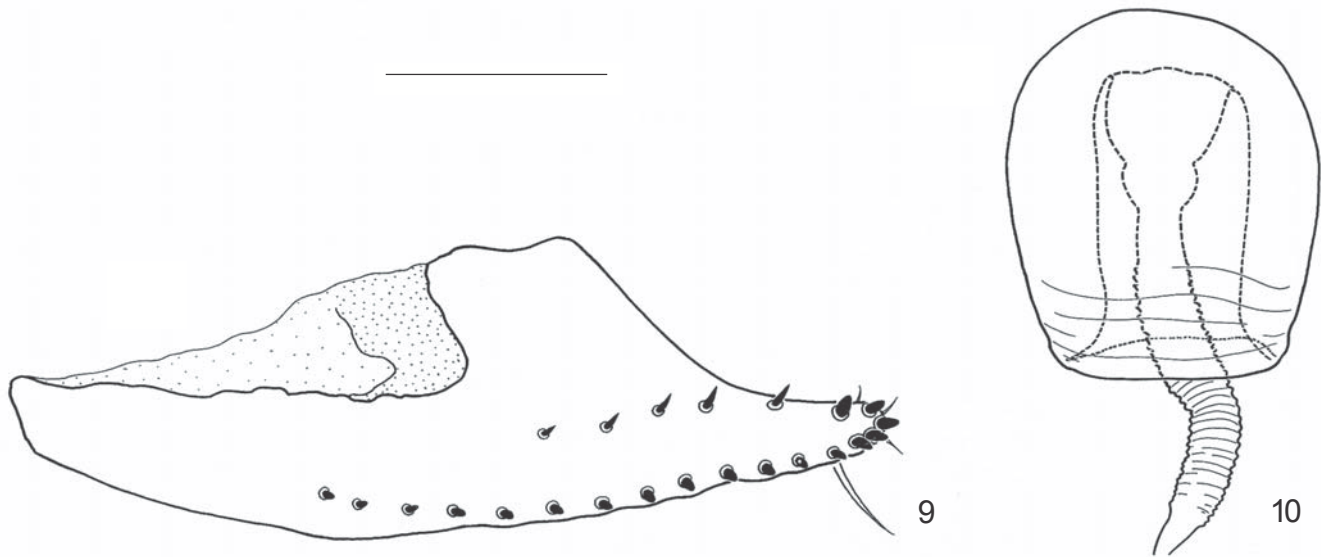
Abdomen shining brownish yellow, tergite 2 with a posterior, usually medially interrupted dark brown band, tergites 3-5 with a posterior dark brown band, usually not interrupted but enlarged and somewhat triangle-shaped in the mid line, mostly not reaching anterior margin, tergite 6 slightly darker in the mid line.

Male terminalia (Figs. 1-8). Epandrium slightly microtrichose on posterior dorsal area with 3-6 upper and no lower setae; ventral lobe slightly covering surstylus. Cerci slightly microtrichose on dorsal area, linked to epandrium by membranous tissue. Surstylus not microtrichose, with 7-8 cone-shaped prenisetae, 3-4 long, strong outer setae and 7-9 long, thin inner setae. Decasternum as in Fig. 2. Hypandrium longer than epandrium; dorsal arch present, strongly sclerotized; gonopod fused to paraphysis, bearing one long seta on anterior inner margin. Aedeagus lateroventrally strongly sclerotized, anterodorsally bearing a distinctive pair of slightly membranous, finger-shaped, and backwards directed processes, covered with tiny spines; dorsally bearing a small, slightly sclerotized, crescent-shaped plate at subdistal area; distal end medially membranous in dorsal and ventral views, laterally expanded and ventrally covered with tiny spines. Aedeagal apodeme rod-shaped, slightly longer than aedeagus. Ventral rod as in Figs. 5-8.

Female terminalia (Figs. 9, 10). Valves of oviscapt (Fig. 9)



Figs. 1-8. Male terminalia of the holotype of *Drosophila nappae* sp. nov.: 1, epandrium, cerci, surstyli and decasternum, oblique posterior view; 2, surstyli and decasternum, posterior view; 3, hypandrium and gonopods+paraphyses [fused], posterior view; 4-8, aedeagus and aedeagal apodeme, several views from dorsal through ventral. All figures were drawn to the same scale. Scale bar = 0.1 mm.



Figs. 9,10. Female terminalia of one paratype of *Drosophila nappae* sp. nov.: **9**, left oviscapt valve, lateral view; **10**, inner spermathecal capsule, lateral view. Both figures were drawn to the same scale. Scale bar = 0.1 mm.

with 16-19 marginal and 5-7 discal peg-like ovisensilla. Spermathecal capsule (Fig. 10) somewhat elliptical, with some furrows at base; spermathecal duct with a spherical dilatation, becoming gradually wider apically, sclerotized. FROTA-PESSOA (1954:279) states the dilatation is positioned at the base of the capsule, as it is shown in his figure 48 (plate XVIII). This feature is also seen in the photomicrograph of the spermathecal capsules taken by BÄCHLI *et al.* 2000:90 (fig. 14D). However, the dilatation is more apically positioned in our Fig. 10 probably because the spermathecal duct has moved to an inner position during the chemical treatments.

Etymology. The epithet is a genitive patronym to honor our good friend the late Marly Napp from the Departamento de Genética, Universidade Federal do Rio Grande do Sul.

Geographical distribution. Based on its type locality (Porto Alegre) and assuming that all the material examined (unknown depository) and misidentified by FROTA-PESSOA (1954: 279) as *Drosophila angustibucca* (not Duda, 1925) belongs in fact to *Drosophila nappae* sp. nov., its known distribution includes southeastern and southern Brazil, where it has been collected in the states of Rio de Janeiro (Rio de Janeiro [then Distrito Federal]), São Paulo (Campos do Jordão, Mogi das Cruzes, Mongaguá [cited as Vila Atlântica], Pirassununga) and Rio Grande do Sul (Feliz and Porto Alegre). Making the same above-cited assumption for the specimens identified (apparently using the key by FROTA-PESSOA 1954) and cited in most subsequent papers (i.e. ARAÚJO & VALENTE 1981; FRANCK *et al.* 1984; FRANCK & VALENTE 1985; VAL & KANESHIRO 1988; VALENTE & ARAÚJO 1991; DE TONI & HOFMANN 1995; SAAVEDRA *et al.* 1995), the following additional localities of the state of São Paulo: Salesópolis [Estação Biológica de Boracéia], state of Rio Grande do Sul: Bento Gonçalves, Esmeralda [Estação Ecológica de

Aracuri], Guaíba [Estação experimental agrônômica], Viamão [Parque de Itapuã], Tenente Portela [Parque Florestal Estadual do Turvo] and state of Santa Catarina: Santa Catarina Island [Morro da Lagoa da Conceição] must be included. Moreover, assuming that the female paralectotype (but not the male lectotype) of *Drosophila paraguayensis* Duda, 1927 also belongs, according to BÄCHLI *et al.* (2000:79,80,90), to *Drosophila nappae* sp. nov. (cited as undescribed *Drosophila* species), the distribution of the latter species must include Paraguay (Hohenau [Department of Itapúa]) as well. However, it should be pointed out that, for the time being, we have no way to know whether or not the male specimen collected by C.A.W. Schnuse and O. Garlepp in Peru [Department of Ucayali], Mishagua [river, misspelled as Meshagua on the label] (by the Urubamba river), on 03.X.1903, and identified by DUDA (1927:184) as *Drosophila angustibucca* belongs to *Drosophila nappae* sp. nov. If extant, it should be checked regarding to its identification. Additionally, we have no way to verify whether or not the specimens cited as occurring in Minca (HOENIGSBERG & LIN 1977:58) and Santa Marta's highlands (HOENIGSBERG 1995a:87, b:177), Colombia, belongs to *Drosophila angustibucca* Duda, 1927 or *Drosophila nappae* sp. nov. as there are no statements regarding their depositories or about the key used to identify them. So, the known (confirmed) northernmost record of *Drosophila nappae* sp. nov. is represented by just one analyzed male specimen (cited above) collected in the Serra do Cipó (municipality of Santana do Riacho), state of Minas Gerais, Brazil.

Larval breeding sites (n = emerged imagines). Assuming that all the identifications of *Drosophila angustibucca* cited in the literature (except those by Duda) were based on FROTA-PESSOA (1954:266) only 11 specimens of *Drosophila nappae*

sp. nov. have been so far recorded as being emerged from fruits, which belong to two plant families. Thus, it seems that they do not represent the main substrate where the flies develop. They are as follows: fruits of *Syagrus romanzoffiana* (Cham.) Glassman (Arecaceae) collected in the Parque Florestal Estadual do Turvo (Spring 1982, n = 9) and at Guaíba (Winter 1982, n = 1) (SAAVEDRA *et al.* 1995:67, 68; cited as *Arecastrum romanzoffianum*), fruit of *Randia armata* (Sw.) DC (Rubiaceae) collected in the Parque Florestal Estadual do Turvo (Spring 1982, n = 1, according to SAAVEDRA *et al.* 1995:68).

Adult feeding sites (n = collected imagines). Assuming that all the identifications of *Drosophila angustibucca* in the literature (except those by Duda) were based on FROTA-PESSOA (1954), a total of 232 specimens (listed below) have been recorded as being collected as adults over fruits belonging to eight plant families, of which just one (Arecaceae) has also been recorded as a breeding site for *Drosophila nappae* **sp. nov.** Fruits of *Ficus organensis* (Miq.) Miq. (Moraceae) in the Parque de Itapuã (III.1980, n = 1 and VII.1981, n = 14 in VALENTE & ARAÚJO 1991:244). Fruits of *Diospyros inconstans* Jacquin (Ebenaceae) in the Parque de Itapuã (VII.1981, n = 8 in VALENTE & ARAÚJO 1991:244; cited as *Maba inconstans*). Fruits of *Passiflora elegans* Mart. (Passifloraceae) in the Parque de Itapuã (I.1981, n = 120 in VALENTE & ARAÚJO 1991:244). Fruits of *Maclura tinctoria* (L.) D. Don ex Steud. (Moraceae) in the Parque Florestal Estadual do Turvo (I.1982, n = 6 in VALENTE & ARAÚJO 1991:246 and SAAVEDRA *et al.* 1995:67; cited as *Chlorophora tinctoria*). Fruits of *Syagrus romanzoffiana* (Cham.) Glassman (Arecaceae) in the Parque Florestal Estadual do Turvo (X.1980, n = 2 in VALENTE & ARAÚJO 1991:245), (Spring 1982, n = 28) and at Guaíba (Winter 1982, n = 4) (SAAVEDRA *et al.* 1995:67, 68; cited as *Arecastrum romanzoffianum*). Fruits of *Campomanesia guazumifolia* (Cambessedes) (Myrtaceae) in the Parque Florestal Estadual do Turvo (II.1981, n = 5 in VALENTE & ARAÚJO 1991:247; cited as *Brittoa sellowiana*). Fruits of *Bromelia antiacantha* Bertol. (Bromeliaceae) in the Parque Florestal Estadual do Turvo (X.1980, n = 3 in VALENTE & ARAÚJO 1991:246). Fruits of *Cabralea glaberrima* in the Parque Florestal Estadual do Turvo (X.1980, n = 20 in VALENTE & ARAÚJO 1991:246). Fruits of *Didymopanax morototoni* (Aubl.) Dcne et Planch. (Araliaceae) in the Parque Florestal Estadual do Turvo (VII.1980, n = 20 in VALENTE & ARAÚJO 1991:246). Fruit of *Chrysophyllum gonocarpum* (Martius & Eichler) Engler (Sapotaceae) in the Parque Florestal Estadual do Turvo (Spring 1982, n = 1 in SAAVEDRA *et al.* 1995:68).

Relationships. It belongs to the subgroup I (*cf.* VILELA 1992:198) of the *Drosophila tripunctata* species group of the subgenus *Drosophila*. It shares with *D. angustibucca* Duda, 1925, *D. neoguarumunu* Frydenberg, 1956, *D. platitarsus* Frota-Pessoa, 1954, *D. rostrata* Duda, 1925, and *D. setula* Heed & Wheeler, 1957, the following remarkable features: aedeagus dorsally with a small, sclerotized, crescent-shaped plate at subdistal area, and anterodorsally bearing a pair of finger-shaped and backwards directed processes. The processes are

smaller and mostly membranous in those five species but only slightly membranous and proportionally longer in *Drosophila nappae* **sp. nov.** Additionally, all of them but the latter, have in common a remarkable, sclerotized, T-shaped area partially surrounded by the pair of processes in the anterodorsal, mostly membranous surface of aedeagus.

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