

## A new species of *Anastrepha* from Amazonia, with redescriptions of *A. caudata* Stone and *A. hendeliana* Lima (Diptera: Tephritidae)

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**Abstract.** Three species of *Anastrepha* from upper Amazonia are described or redescribed and illustrated. They are considered closely related and are placed in the *A. caudata* species group. *Anastrepha caudata* Stone 1942 is redescribed based on the holotype, the only known specimen. Its type locality is probably São Paulo de Olivença in Amazonas, Brazil, not the state or city of São Paulo as previously assumed. *Anastrepha hendeliana* Lima 1934, new status, is removed from synonymy with *A. longicauda* Lima 1934 based on specimens from Brazil (Amazonas and Rondonia) and Colombia (Caquetá). The female is described for the first time. *Anastrepha brunnealata*, n. sp., is described from specimens from Venezuela (Amazonas) and probably Peru (Loreto). *Anastrepha longicauda* Lima is placed in the *dentata* species group.

**Resumen.** Se describen o describen e ilustran tres especies de *Anastrepha* del Amazonia. Ellas están consideradas cercanamente relacionadas y las ubican en el grupo de especies *caudata*. Se redescrive *Anastrepha caudata* Stone 1942 basado en el holotipo, el único espécimen conocido. La localidad tipo probablemente es São Paulo de Olivença en el Amazonas, Brasil, no el estado o la ciudad de São Paulo como se asumió anteriormente. Se remueve *Anastrepha hendeliana* Lima 1934, stat. n., de la sinonimia de *A. longicauda* Lima 1934 basado en especímenes de Brasil (Amazonas y Rondonia) y Colombia (Caquetá). La hembra es descrita por primera vez. Se describe *Anastrepha brunnealata*, sp. n., de especímenes de Venezuela (Amazonas) y probablemente Peru (Loreto). Se ubica *Anastrepha longicauda* Lima en el grupo de especies *dentata*.

### Introduction

*Anastrepha* is the most agriculturally important and also the most diverse genus of fruit flies (Diptera: Tephritidae) in the New World, with more than 200 valid species (Norrbom et al. 1999a, b). *Anastrepha caudata* Stone, *A. hendeliana* Lima, and *A. brunnealata*, n. sp., are three poorly known and closely related species occurring in upper Amazonia (Map 1). *Anastrepha caudata*, known only from its holotype, was previously believed to occur in southern Brazil, but its type locality is probably São Paulo de Olivença in western Amazonas, not the state or city of São Paulo. *Anastrepha hendeliana* has recently been considered a synonym of *A. longicauda* Lima, but it appears to be a distinct species occurring in Amazonas and Ron-

donia, Brazil and Caquetá, Colombia. *Anastrepha brunnealata* is described here based on specimens from southern Amazonas state, Venezuela and others probably from Loreto Department in eastern Peru.

The terminology used in this paper follows the glossary of White et al. (1999), and the acronyms for institutions where specimens are deposited follow Thompson (1999).

Norrbom et al. (1999b) recently discussed the phylogenetic relationships within *Anastrepha* and recognized various species groups, but *A. caudata* and *A. hendeliana* (as synonym of *A. longicauda*) were treated as unplaced species. They and *A. brunnealata* are here placed in the *caudata* species group, which can be diagnosed as follows: wing pattern with complete S- and V-bands (plesiomorphic); pattern mostly

brown (apomorphic); hyaline area in cell br narrow, not extended to vein  $R_{4+5}$  (apomorphic); distal hyaline area in cell dm often narrowed or interrupted by small extensions or connection between S- and V-bands (apomorphic); body size moderately large; distal half or more of oviscape brown (apomorphic), but otherwise head, thorax, and abdomen without brown markings (plesiomorphic), except sometimes a small spot on scuto-scutellar suture; mesonotum entirely microtrichose (plesiomorphic); terminalia moderately long (plesiomorphic?); the aculeus tip more than two-thirds serrate, the basal part slightly constricted and the serrate part triangular (polarity uncertain); and at least in *A. brunnealata* and *A. hendeliana*, the lateral surstylus of the male moderately long and broadly triangular (polarity uncertain); and the proctiger with a distinct lateral fold dividing the sclerotized areas (apomorphic).

The structure of the proctiger indicates that the *caudata* group belongs to the large clade including the *pseudoparallela* + *spatulata* + *ramosa* + *doryphoros* + *grandis* + *serpentina* + *fraterculus* species groups (Norrbom et al. 1999b). Within this large clade, the apomorphic wing pattern characters are rare, except in some species of the *grandis* and *serpentina* species groups. These similarities may be independently derived or perhaps are indicative of closer relationship among these species groups. In aculeus tip shape, the species of the *caudata* group are more similar to many species of the *pseudoparallela* group. This character and several other diagnostic characters (e.g., body size, terminalia length, lateral surstylus shape) are variable and intergrade considerably among other *Anastrepha* species, and thus are difficult to evaluate in cladistic terms. But some of them could be synapomorphies and their presence in the same combination further suggests, in addition to the apomorphic wing pattern characters, that the species of the *caudata* group are closely related.

All three species of the *caudata* group run to page 23 in the key of Steyskal (1977). The following couplets may be substituted for the first couplet on that page to distinguish them from the other species on pages 23-24.

1. Wing pattern predominantly yellow to orange brown; hyaline area in cell br broad, extended to vein  $R_{4+5}$ ; distal hyaline area in cell dm not narrowed or interrupted by small extensions or connection between S- and V-bands. Oviscape orange. Scutal microtrichial pattern variable, but sometimes largely nonmicrotrichose ..... first couplet, p. 23

- Wing pattern mostly brown (Fig. 1); hyaline area in cell br narrow, not extended to vein  $R_{4+5}$ ; distal hyaline area in cell dm often narrowed or interrupted by small extensions or connection between S- and V-bands. Distal half or more of oviscape brown. Scutum entirely microtrichose ..... 2
- 2. C-band with a large yellow area in cell  $r_1$  posterior to pterostigma extending almost to distal end of band (Fig. 1A-B); V-band separated from or narrowly connected to S-band along vein  $R_{4+5}$ . Oviscape 4.86-5.60 mm. long, 1.18-1.32 times as long as mesonotum. Aculeus 4.86-5.15 mm. long; tip (Fig. 4A-B) with apical 0.79-0.82 serrate, 0.12-0.14 mm. wide, at base of serrate part 0.10-0.11 mm. wide. .... *brunnealata*, n. sp.
- C-band with at most small yellow area in cell  $r_1$  posterior to base of pterostigma (Fig. 1C-F); V-band broadly connected to S-band in cell  $r_{2+3}$ . Oviscape 4.40-5.90 mm. long, 1.02-1.33 times as long as mesonotum. Aculeus 3.55-5.90 mm. long; tip (Fig. 4C-E) variable. .... 3
- 3. S-band with yellow basal area in cell dm usually not extending into cell br nor reaching R-M (Fig. 1D-F). Oviscape 4.90-5.90 mm. long, 1.21-1.33 times as long as mesonotum. Aculeus 5.10-5.90 mm. long; tip (Fig. 4F) with apical 0.69-0.76 serrate, 0.10-0.11 mm. wide, at base of serrate part distinctly narrower, 0.07-0.08 mm ..... *hendeliana* Lima
- S-band with yellow basal area in cell dm extending into cell br and reaching R-M (Fig. 1C). Oviscape ca. 4.4 mm. long, 1.02 times as long as mesonotum. Aculeus 3.55 mm. long; tip (Fig. 4C-D) with apical 0.90 serrate, 0.15 mm. wide, at base of serrate part only slightly narrower, 0.14 mm ... *caudata* Stone

### *Anastrepha brunnealata* Norrbom and Caraballo, new species

(Figs. 1A-B, 2A-B, 3A, 4A-B, Map 1)

**Recognition.** *Anastrepha brunnealata* differs from other species of *Anastrepha* with mostly brown wing patterns by the following combination of characters: S- and V-bands complete; S-band without posterior extension in middle of cell  $cu_1$ ; C-band with large yellow extension into cell  $r_1$  posterior to pterostigma; and aculeus tip more than three-fourths serrate. Of the most similar species, *A. caudata* Stone also has shorter terminalia (oviscape 4.4 mm. long, 1.02 times as long as mesonotum) and a slightly stouter and more serrate aculeus tip, whereas *A. hendeliana* has

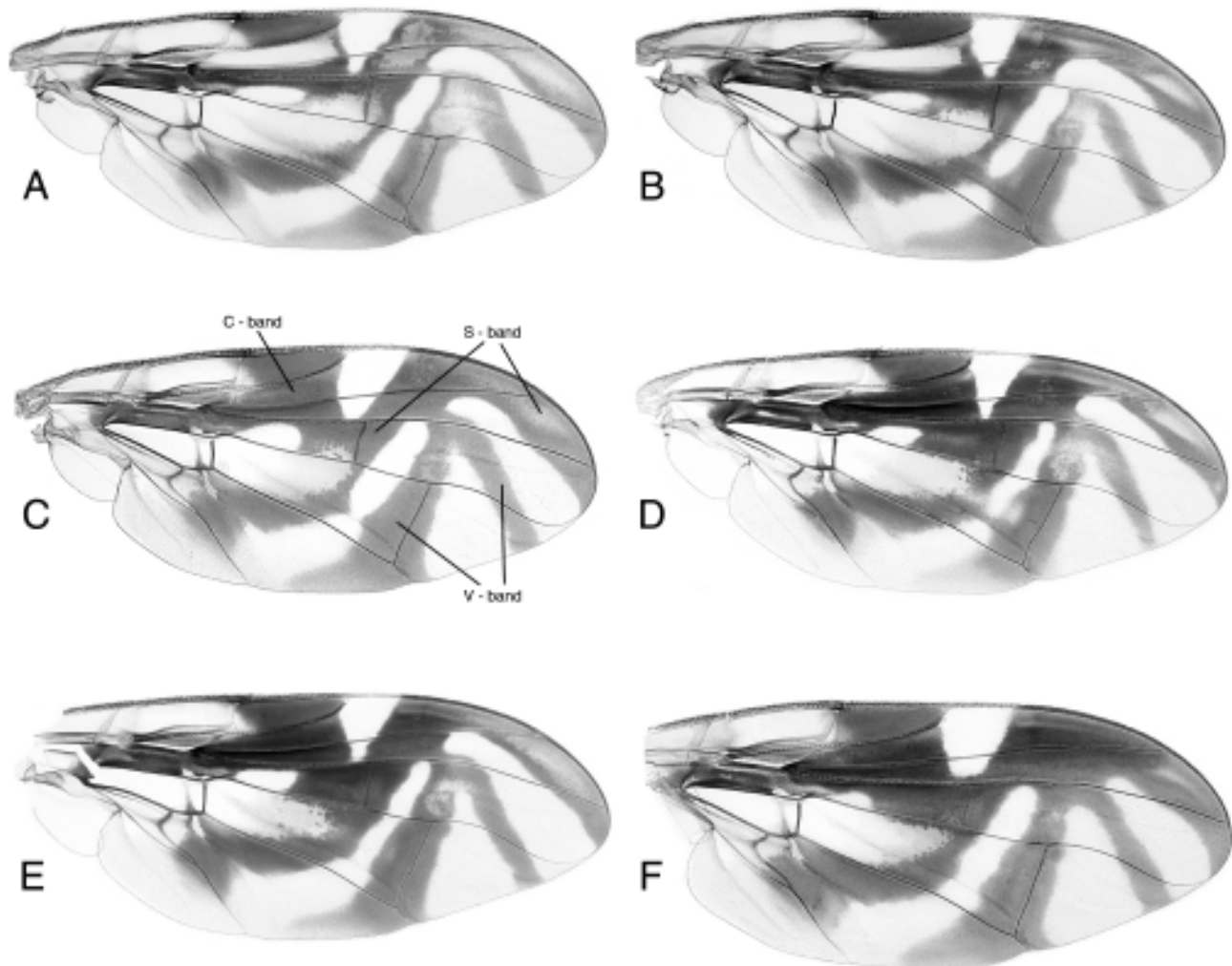


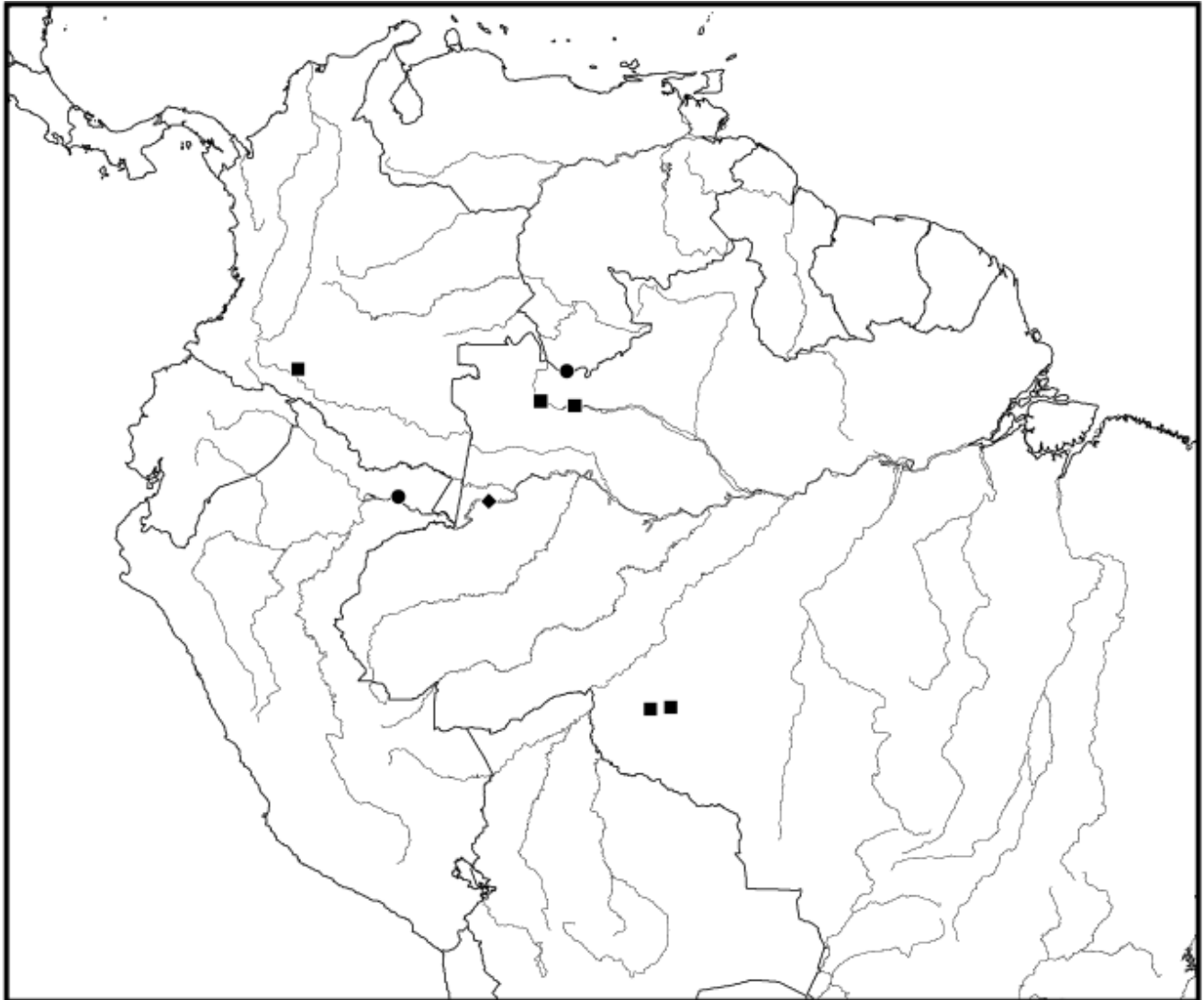
Fig. 1. Wing: A-B, *Anastrepha brunnealata* (holotype and male paratype, Venezuela: Cerro Neblina base camp); C, *A. caudata* (holotype); D-F, *A. hendeliana* (Brazil: 62 km SE Ariquemes, USNM00216556, USNM00216552; Brazil: Boca Cauaburi, USNM00216548).

a slightly narrower aculeus tip and slightly darker wing pattern.

**Description.** Largely yellow to orange with white to pale yellow markings. Setae dark brown to black.

**Head** - Yellow to orange except ocellar tubercle brown. Facial carina, in profile, concave. 4-5 frontal setae; 2 orbital setae, posterior seta well developed. Ocellar seta weak, pale, at most slightly longer than ocellar tubercle. Antenna extended 0.7-0.8 distance to lower facial margin. **Thorax** - Mostly orange with following areas white or yellow (not always well differentiated in dried specimens): postpronotal lobe; single medial and paired sublateral vittae on scutum, the slender medial vitta extended nearly full length of scutum, broadened posteriorly beyond acrostichal seta but not reaching dorsocentral seta; sublateral vitta extended

from transverse suture almost to posterior margin, including intra-alar seta; scutellum; dorsal margin of anepisternum; greater ampulla; katepimeron; and most of anatergite and katatergite. Subscutellum and mediotergite entirely orange. Mesonotum 4.12-4.60 mm long. Scutum entirely microtrichose; setulae uniformly yellow to pale orange brown. Katepisternal seta pale, weak, barely differentiated to slightly longer than postocellar seta. **Wing** (Fig. 1A-B) - Length 9.8-10.8 mm., width 3.8-4.3 mm. Cell c 1.06-1.17 times as long as pterostigma. Vein M strongly curved apically; cell  $r_{4+5}$  0.72-0.89 times as wide at apex as at level of DM-Cu; section of M between BM-Cu and R-M 1.84-2.33 times as long as section between R-M and DM-Cu. Distal lobe of cell bcu moderately long, bcu 1.51-1.76 times as long as its anterior margin. Pattern mostly moderately dark brown. C-band and S-



Map 1. Distributions of species of the *Anastrepha caudata* group. Symbols represent the known collection localities as follows: circle - *A. brunnealata*; diamond - *A. caudata*; square - *A. hendeliana*.

band broadly connected along vein  $R_{4+5}$ . C-band with cell bc and most of cell c yellowish to subhyaline; posterior to pterostigma with large yellow area in base of cell sc and in cell  $r_1$ , often barely extending into cell  $r_{2+3}$ , extending distally almost to distal margin of band; hyaline area in cell br not extended to vein  $R_{4+5}$ . S-band basally with large yellow area in cell dm extending distally into cell br and reaching R-M; rest of middle and distal sections of band brown; distal section of band broad, at apex of vein  $R_{2+3}$  0.68-0.80 times width of cell  $r_{2+3}$ , often slightly broader along vein  $R_{4+5}$ ; separated from or narrowly touching apex of vein M. Hyaline spot in cell  $r_1$  nearly triangular, extended to or almost to vein  $R_{4+5}$ , its apex aligned basal to R-M. V-band complete, separated from or

(holotype only) narrowly connected to S-band along vein  $R_{4+5}$ , but sometimes (3 of 4 males) with narrow connection in posterior half of cell dm; extended basally along posterior wing margin to or almost to vein  $A_1+Cu_2$  but not connected to base of S-band. **Abdomen** - Entirely orange. **Male terminalia** (Fig. 2A-B) - Lateral surstylus moderately long, without unusual modifications; in lateral view basal half tapering, distal to level of prensisetae flat and very slightly posteriorly curved; in posterior view broadly triangular, medial margin nearly straight, lateral margin convex, gradually curved. Proctiger with lateral fold separating sclerotized areas. Phallus (n=1) 8.2 mm long; 1.84 times as long as mesonotum. Glans 0.80 mm long; acrophallus moderately stout. **Female**

**terminalia** - Oviscape 4.86-5.60 mm. long, 1.18-1.32 times as long as mesonotum; distal half brown; spiracle at basal 0.24. Eversible membrane (Fig. 3A) with 20-25 large, hook-like dorsobasal scales in triangular pattern. Aculeus 4.86-5.15 mm long; base 0.28 mm. wide; shaft 0.16 mm. wide at midlength; tip (Fig. 4A-B) 0.28 mm. long, 0.12-0.14 mm. wide, basal part slightly narrowing, lateral margin very slightly convex, apical 0.79-0.82 serrate, elongate triangular, 0.10-0.11 mm. wide. Spermathecae pear-shaped to elongate ovoid.

**Distribution.** Venezuela (Amazonas) and probably Peru (Loreto). The Venezuelan type specimens were collected near Cerro de la Neblina, a large tabletop mountain, or tepui, on the Brazilian border. The other two specimens, which lack locality data except for the name "Pebas", presumably were collected at the site of that name, sometimes spelled "Pévas", at 03°20'S 071°49'W in Loreto, Peru.

**Biology.** The host plants and other aspects of the biology of this species other than dates when adults occur (November - April) are unknown.

**Type data.** Holotype female (National Museum of Natural History, Washington, USNM00052661), VENEZUELA: Amazonas: Cerro de la Neblina basecamp, 0°50'N 66°9'44"W, 1-10 Mar 1984, D. Davis and T. McCabe 155. Paratypes - [PERU: Loreto: ?] Pebas, "Amaz.", coll. Oldenberg, 1m (DEI USNM00052658); Pebas, Nov-Dec 1906, M. de Mathan, 1m (PAN USNM00052657). VENEZUELA: Amazonas: Cerro de la Neblina basecamp, 0°50'N 66°9'44"W, 4-12 Feb 1984, D. Davis and T. McCabe 140, 1m (USNM USNM00052660); Cerro de la Neblina basecamp, near Rio Baria, 0°50'N 66°10'W, 27 Jan 1985, P. J. and P. M. Spangler, R. Faitoute and W. Steiner 140, 1m (USNM USNM00052659); same locality (as "Rio Negro, Rio Baria, 0°50'N 66°10'W"), 25 Mar - 16 Apr 1984, C. Padilla 140, 1f (IZAM USNM00052662).

**Etymology.** The name of this species is an adjective referring to its mostly brown wing pattern.

***Anastrepha caudata* Stone**  
(Figs. 1C, 3B, 4C-D, Map 1)

*Anastrepha caudata* Stone 1942: 85 [description, figure of aculeus tip]; Foote 1967: 8 [in catalog]; Steyskal 1977: 23 [in key]; Zucchi 1978: 38 [Brazil]; Norrbom et al. 1999a: 77 [in catalog]; Norrbom et al. 1999b: 338

[in species list]; Zucchi 2000: 23 [in key]; Souza Filho et al. 2000: 277 [Brazil: São Paulo].

**Recognition.** *Anastrepha caudata* differs from other species of *Anastrepha* with mostly brown wing patterns by the following combination of characters: S- and V-bands complete; S-band without posterior extension in middle of cell  $c_{u_1}$ ; C-band without large yellow extension into cell  $r_1$  posterior to pterostigma; oviscape ca. 4.4 mm. long, 1.02 times as long as mesonotum; aculeus ca. 3.55 mm. long, tip with distal 9/10 serrate, base of serrate part 0.14 mm. wide. Of the most similar species, *A. brunnealata* has a long yellow extension in cell  $r_1$  within the C-band, and it and *A. hendeliana* have slightly longer terminalia and narrower and less serrate aculeus tips.

**Description.** Largely yellow to orange with white to pale yellow markings. Setae dark brown to black. **Head** - Yellow except ocellar tubercle brown. Facial carina, in profile, concave. 3-4 frontal setae; 2 orbital setae, posterior seta well developed. Ocellar seta weak, pale, barely longer than ocellar tubercle. Antenna extended 0.7 distance to lower facial margin. **Thorax** - Mostly orange with at least following areas white or yellow (not well differentiated in holotype): postpronotal lobe; single medial and paired sublateral vittae on scutum, sublateral vitta extended from transverse suture almost to posterior margin, including intra-alar seta; scutellum; dorsal margin of anepisternum; and most of anatergite and katatergite. Scuto-scutellar suture with narrow transverse medial brown spot. Subscutellum and mediotergite entirely orange. Mesonotum 4.30 mm long. Scutum entirely microtrichose; setulae uniformly yellow to pale orange brown. Katepisternal seta undifferentiated. **Wing** (Fig. 1C) - Length 10.1 mm., width 4.36 mm. Cell  $c$  1.07 times as long as pterostigma. Vein M strongly curved apically; cell  $r_{4+5}$  0.82 times as wide at apex as at level of DM-Cu; section of M between BM-Cu and R-M 1.82 times as long as section between R-M and DM-Cu. Distal lobe of cell  $bcu$  moderately long,  $bcu$  1.43 times as long as its anterior margin. Pattern mostly moderately dark brown. C-band and S-band broadly connected along vein  $R_{4+5}$ . C-band with cell  $bc$  and most of cell  $c$  yellowish to subhyaline; yellow area covering base of cell  $sc$  and posterobasal corner of pterostigma, but extending only slightly into cell  $r_1$  posterior to base of pterostigma; hyaline area in cell  $br$  not extended to vein  $R_{4+5}$ . S-band basally with large yellow area in cell  $dm$  extending distally into cell  $br$  and reaching R-M; rest of middle and distal sections of band brown; distal section of band broad, at apex of

vein  $R_{2+3}$  0.73 times width of cell  $r_{2+3}$ , slightly broader along vein  $R_{4+5}$ ; narrowly touching apex of vein M. Hyaline spot in cell  $r_1$  nearly triangular, extended to vein  $R_{4+5}$ , its apex aligned basal to R-M. V-band complete, broadly connected to S-band in cell  $r_{2+3}$ , and both bands with small extensions in posterior half of cell dm narrowing intermediate hyaline area; extended basally along posterior wing margin almost to vein  $A_1+Cu_2$  but not connected to base of S-band. **Abdomen** - Entirely orange. **Male terminalia** - Unknown. **Female terminalia** - Oviscape ca. 4.4 mm. long (base partially damaged in holotype; 4.3 mm. according to Stone 1942), 1.02 times as long as mesonotum; brown on at least distal half ventrally, dorsomedially extending to base; spiracle at basal 0.32. Eversible membrane (Fig. 3B) with 20-25 large, hook-like dorsobasal scales in triangular pattern. Aculeus 3.55 mm. long; base 0.30 mm. wide; shaft 0.16 mm. wide at midlength; tip (Fig. 4C-D) 0.31 mm. long, 0.15 mm. wide, basal part with lateral margin slightly convex, apical 0.90 serrate, elongate triangular, at base of serrate part 0.14 mm. wide. Spermathecae ovoid.

**Distribution.** *Anastrepha caudata* is known only from the holotype, probably collected in the state of Amazonas, Brazil (see Type data).

**Biology.** The host plants and other aspects of the biology of this species are unknown.

**Type data.** Holotype female (The Natural History Museum, London (BMNH)), with the following labels: "Type" [circular, red-margined]; "Brazil. S. Paulo. H. W. Bates. BM. 1859-74." [hand-written]; "Anastrepha caudata Stone Type" [Stone's writing]. The terminalia are mounted on Stone's "Slide 38.V.18b". The holotype has been presumed to be from São Paulo state, but the collector, H. W. Bates, did not collect there (Papavero 1973). The type locality is probably Amazonas: São Paulo de Olivença, where Bates collected from 10 Sep 1857 to 2 Feb 1858.

### *Anastrepha hendeliana* Lima, new status

(Figs. 1D-F, 2C-D, 3C, 4E, Map 1)

Lima 1934: 528 [description, figures of male terminalia, wing]; Stone 1942: 85 [taxonomy]; Foote 1967: 12 [in catalog, type data]; Steyskal 1977: 33 [in list]; Zucchi 1978: 58 [Brazil]; Zucchi 1981: 291 [synonymy with *A. longicauda*]; Zucchi in Zucchi et al. 1996: 261 [lectotype designation]; Norrbom et al. 1999a: 80 [in cata-

log, as synonym]; Norrbom et al. 1999b: 338 [in species list, as synonym].

**Recognition.** *Anastrepha hendeliana* differs from other species of *Anastrepha* with mostly brown wing patterns by the following combination of characters: S- and V-bands complete; S-band without posterior extension in middle of cell  $cu_1$ ; C-band without large yellow extension into cell  $r_1$  posterior to pterostigma; oviscape 4.90-5.90 mm. long, 1.21-1.33 times as long as mesonotum; aculeus 5.10-5.90 mm. long, tip with distal 0.69-0.76 serrate, base of serrate part 0.07-0.08 mm. wide. Of the most similar species, *A. brunneolata* has a long yellow extension in cell  $r_1$  within the C-band and a slightly paler wing pattern, and *A. caudata* has slightly shorter terminalia and a broader and more serrate aculeus tip.

**Description.** Largely orange with white to pale yellow markings. Setae dark brown to black. **Head** - Yellow except ocellar tubercle brown. Facial carina, in profile, concave. 4-5 frontal setae; 2 orbital setae (1 female with 1 on 1 side, 2 on other), posterior seta well developed. Ocellar seta weak, at most 1.5 times as long as ocellar tubercle. Antenna extended 0.62-0.75 distance to lower facial margin. **Thorax** - Mostly orange with following areas white or yellow (not always well differentiated in dried specimens): postpronotal lobe; single medial and paired sublateral vittae on scutum, the slender medial vitta extended nearly full length of scutum, broadened posteriorly beyond acrostichal seta but not reaching dorsocentral seta; sublateral vitta extended from transverse suture almost to posterior margin, including intra-alar seta; scutellum; dorsal margin of anepisternum; at least dorsal half of greater ampulla; katapimeron; and most of anatergite and katatergite. Scuto-scutellar suture often with irregular narrow transverse medial brown spot. Subscutellum and mediotergite entirely orange. Mesonotum 3.95-4.60 mm long. Scutum entirely microtrichose; setulae mostly yellow to orange, pale brown laterally. Katapisternal seta usually weak, pale, occasionally (3 of 13 specimens scored) darker, at most as long as postocellar seta. **Wing** (Fig. 1D-F) - Length 9.1-10.6 mm., width 3.7-4.3 mm. Cell c 1.10-1.19 times as long as pterostigma. Vein M strongly curved apically; cell  $r_{4+5}$  0.83-0.96 times as wide at apex as at level of DM-Cu; section of M between BM-Cu and R-M 1.92-2.38 times as long as section between R-M and DM-Cu. Distal lobe of cell bcu moderately long, bcu 1.48-1.54 times as long as its anterior margin. Pattern mostly dark brown; V-band and distal third of S-band sometimes paler (especially in

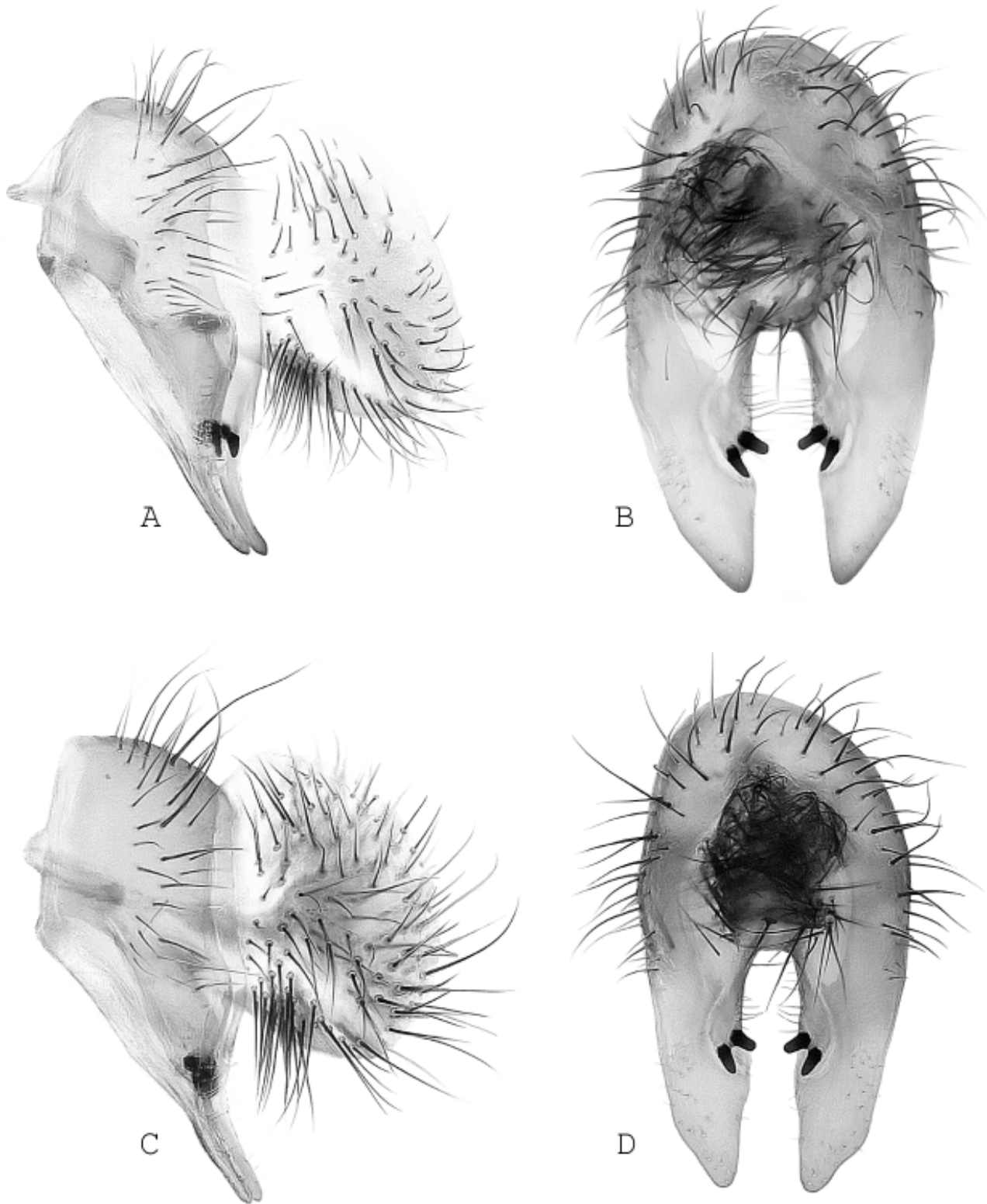


Fig. 2. Epandrium and surstyli, lateral and posterior views: A-B, *Anastrepha brunnealata* (Venezuela: Cerro Neblina base camp, USNM00052660); C-D, *A. hendeliana* (Brazil: 62 km SE Ariquemes, USNM00216556).

Colombian male). C-band and S-band broadly connected along vein  $R_{4+5}$ . C-band with cell bc and most of cell c yellowish to subhyaline; yellow area covering base of cell sc and posterobasal corner of pterostigma, but at most extending only slightly into cell  $r_1$  posterior to base of pterostigma; hyaline area in cell br not extended to vein  $R_{4+5}$ . S-band basally with large yellow area in cell dm, distally usually not extending into cell br nor reaching R-M (only in Colombian male); rest of middle and distal sections of band brown; distal section of band broad, at apex of vein  $R_{2+3}$  0.67-0.83 times width of cell  $r_{2+3}$ , sometimes slightly broader along or near vein  $R_{4+5}$ ; separated from or (1 Rondonian male, Boca Cauaburi male) narrowly touching apex of vein M. Hyaline spot in cell  $r_1$  nearly triangular, extended to or almost to vein  $R_{4+5}$ , its apex aligned basal to R-M, or (Boca Cauaburi and Colombian males) more rounded, with broader apex partially aligned with R-M. V-band complete, broadly connected to S-band in cell  $r_{2+3}$ , sometimes (type specimens, left wing of Boca Cauaburi male) more broadly connected in cell  $r_{2+3}$  to beyond level of distal margin of proximal arm of V-band; both bands often, especially in male, with small extensions in posterior half of cell dm narrowing intermediate hyaline area; proximal arm extended basally along posterior wing margin almost to vein  $A_1+Cu_2$  but not connected to base of S-band. **Abdomen** - Entirely orange. **Male terminalia** (Fig. 2C-D) - Lateral surstylus moderately long, without unusual modifications; in lateral view basal half tapering, distal to level of prenisetae flat and very slightly posteriorly curved; in posterior view broadly triangular, medial margin nearly straight, lateral margin convex, gradually curved or with short, slight subapical concave area. Proctiger with lateral fold separating sclerotized areas. Phallus ( $n=4$ ) 6.0-7.5 mm long; 1.52-1.81 times as long as mesonotum. Glans 0.70 mm long; acrophallus moderately stout. **Female terminalia** - Oviscape 4.90-5.90 mm. long, 1.21-1.33 times as long as mesonotum; mostly brown, base yellow at most to slightly beyond level of spiracles ventrally and usually dorsolaterally; spiracle at basal 0.23-0.27. Eversible membrane (Fig. 3C) with 30-45 large, hook-like dorsobasal scales, smaller laterally, in triangular pattern. Aculeus 5.10-5.90 mm. long; base 0.29-0.31 mm. wide; shaft 0.11-0.13 mm. wide at midlength; tip (Fig. 4E) 0.26-0.30 mm. long, 0.10-0.11 mm. wide, basal part slightly narrowing, lateral margin very slightly convex, apical 0.69-0.76 serrate, elongate triangular, 0.07-0.08 mm. wide. Spermathecae pear-shaped to elongate ovoid.

**Distribution.** This species is known from the states of Amazonas and Rondonia, Brazil and Caquetá Department, Colombia.

**Biology.** The host plants and other aspects of the biology of this species other than dates when adults occur (October - January, March) are unknown.

**Comments.** Zucchi (1981) considered *A. hendeliana* a synonym of *A. longicauda* Lima, but the wing photograph from the original description (Lima 1934, Fig. 27) looks more like this species than *A. longicauda* (Lima 1934, Fig. 25). It is especially similar to the left wing of the male from Boca Cauaburi which has the S- and V-bands broadly fused in cell  $r_{2+3}$  (the right wing of the latter is more similar to other specimens). The apical curve of vein M is stronger than in *A. longicauda*, the hyaline area in cell br is smaller, the S-band and proximal arm of the V-band are closer and less divergent, and the base of the S-band has a broad yellowish area in cell dm. Lima (1934) and Zucchi (1981) stated that the holotype of *A. longicauda* is teneral and its wing pattern color is not fully developed, thus the latter character may not be developed or readily apparent if present, but it is unlikely that the former three characters would vary intraspecifically to such an extent.

*Anastrepha longicauda* Lima appears to belong to the *dentata* species group. It was excluded from this group by Norrbom (1985) and Norrbom et al. (1999b) based on the assumption that it possessed the male characters of *A. hendeliana*. Although the true male remains unknown, Lima's description and photos of the eversible membrane (all dorsobasal scales minute), the extremely slender oviscape and aculeus, and the wing pattern, especially the incomplete V-band with the proximal arm connected to the S-band, indicate its probable relationship to other species of the *dentata* group.

**Type data.** Lectotype male (Instituto Oswaldo Cruz, Rio de Janeiro (IOC)), BRAZIL: Amazonas: Rio Negro, S. Gabriel [= São Gabriel da Cachoeira; see Silva and Ronchi-Teles 2000: 204], 6 Oct 1927 or 26 Nov 1927, J. F. Zikan, no. 1824, designated by Zucchi in Zucchi et al. 1996: 261. Paralectotype male (IOC), same data as lectotype, no. 1823. [not examined]. The lectotype designation did not specify whether the 6 October or 26 November syntype was designated.

**Other specimen data.** BRAZIL: Amazonas: Boca [Rio] Cauaburi, 31 Mar 1961, J. and B. Bechyne, 1m (IZAM USNM00216548). Rondonia: Ariquemes, 62



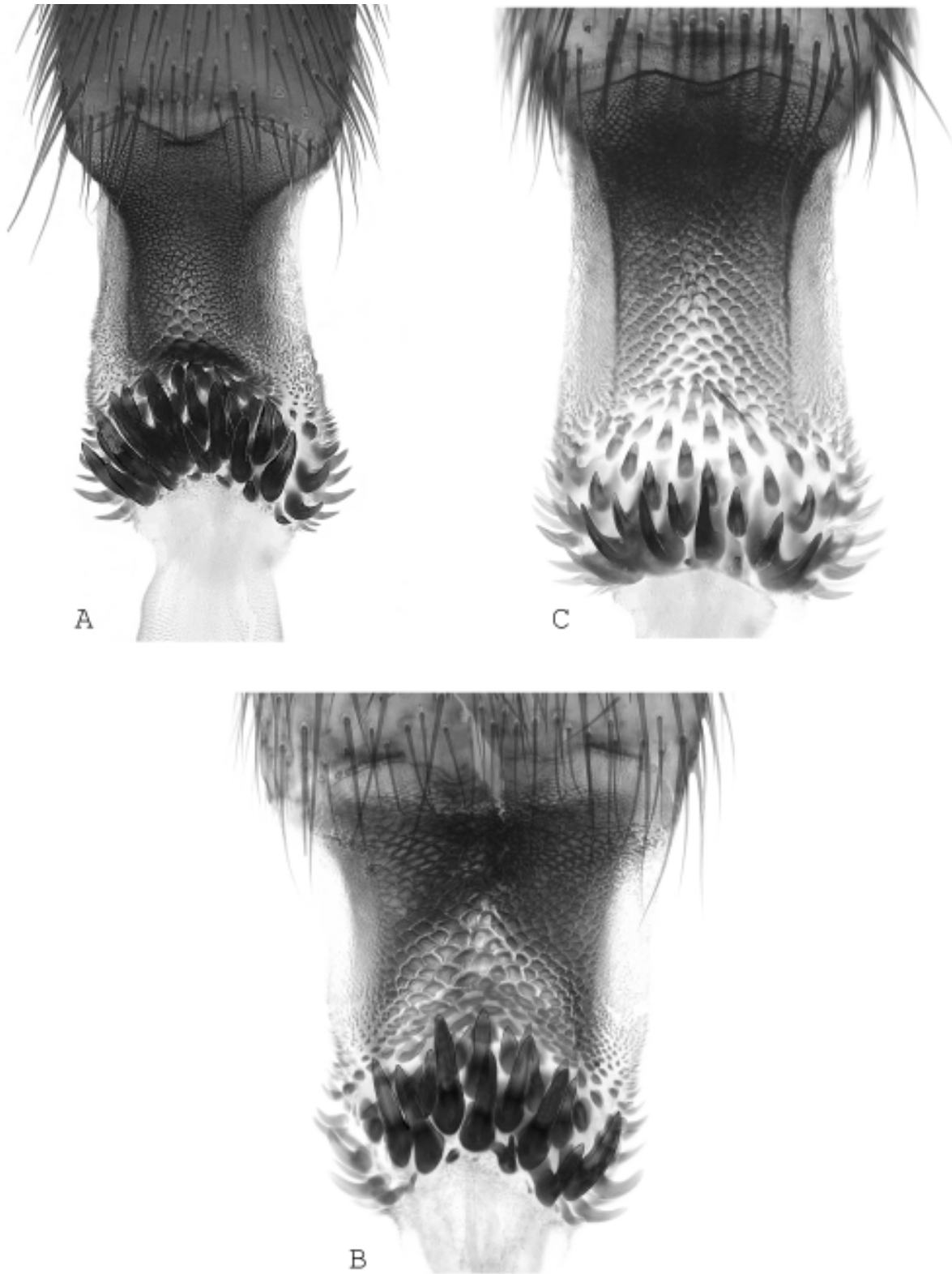


Fig. 3. Eversible membrane, dorsobasal scales: A, *Anastrepha brunnealata* (Venezuela: Rio Baria, USNM00052662); B, *Anastrepha caudata* (holotype); C, *A. hendeliana* (Brazil: 62 km SE Ariquemes, USNM00216552).

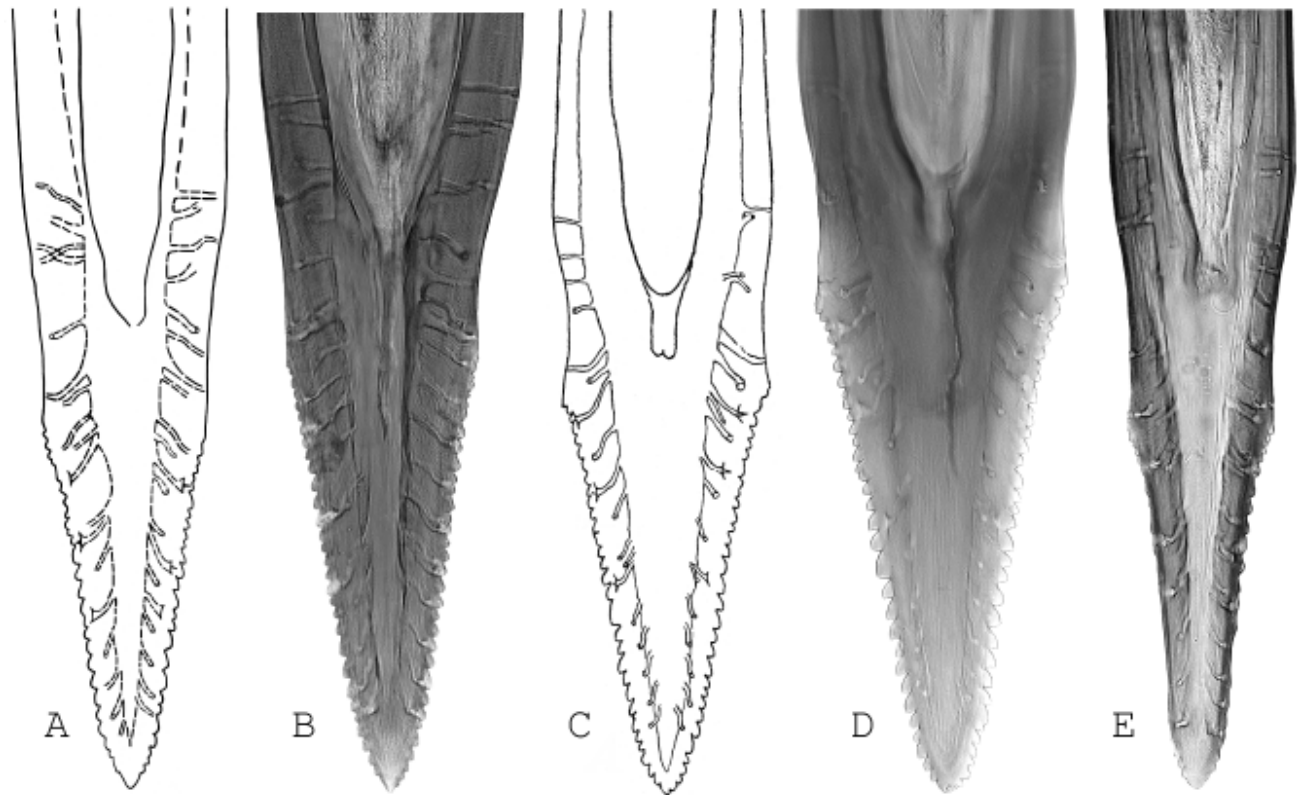


Fig. 4. Aculeus tip: A-B, *Anastrepha brunnealata* (Venezuela: Cerro Neblina base camp, USNM00052661; Rio Baria, USNM00052662); C-D, *A. caudata* (holotype; C copied from Stone 1942); E, *A. hendeliana* (Brazil: 62 km. SE Ariqueemes, USNM00216559).

km. SE of, 22-31 Oct 1997, W. J. Hanson, 4m2f (USU USNM USNM00216555-60); same, 8-20 Nov 1994, 1m (USU USNM00216554); same, 7-18 Nov 1995, 2f (USNM USNM00216552-3); Ariqueemes, 62 km. SW of, near Fazenda Rancho Grande, collected at light, 6-15 Dec 1990, D. A. Rider and J. E. Eger, 2f (FSCA USNM USNM00216550-1). COLOMBIA: Caquetá: Río Ortegua near Río Peneya, 14-18 Jan 1969, Duckworth and Dietz, 1m (USNM USNM00216549).

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