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Revision of the *Anastrepha benjamini* species group and the *A. pallidipennis* complex (Diptera: Tephritidae)

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Abstract: The shape of the facial carina in *Anastrepha* is discussed. Although taxonomically useful, the protrudent form probably occurs by convergence in different species groups. Two species groups in which the carina is usually produced are revised. The *benjamini* species group includes: *benjamini* Lima (from southeastern Brazil), *gigantea* Stone (from Panama), *magna*, n. sp. (from Colombia and Venezuela), and *superflua* Stone (from Panama). Host data for this group are limited to only one record of *benjamini* from a species of *Pouteria* (Sapotaceae). The *pallidipennis* complex, which is included in the *pseudoparallela* species group, is recognized to include: *amnis* Stone (from southern Brazil and possibly Trinidad), *curitis* Stone (from Colombia, Peru, and northern Brazil), *pallida*, n. sp. (from Panama), *pallidipennis* Greene (from Colombia and Venezuela), and *velezi*, n. sp. (from Colombia). These species breed in fruit of *Passiflora* (Passifloraceae) (*P. ambigua* Hemsl., *ligularis* Juss., *nitida* H.B.K., *quadrangularis* L., and *seemannii* Griseb.). The relationships of these *Anastrepha* species are discussed, and diagnoses and illustrations are provided to permit their identification. A neotype is designated for *A. consobrina* (Loew), and the identity of this species is clarified.

Resumen: Se discute la forma de la carina de la cara en *Anastrepha*. Aunque esta característica es útil taxonómicamente, probablemente la forma producida ocurre por convergencia en varios grupos de especies. Se revisan dos grupos de especies que normalmente tiene una carina producida. El grupo *benjamini* incluye: *benjamini* Lima (del sureste de Brasil), *gigantea* Stone (de Panamá), *magna*, sp. n. (de Colombia y Venezuela), y *superflua* Stone (de Panamá). Datos de huéspedes del grupo *benjamini* incluyen solo un registro de *benjamini* en una especie de *Pouteria* (Sapotaceae). El complejo *pallidipennis*, que es una parte del grupo *pseudoparallela* incluye: *amnis* Stone (del sur de Brasil y tal vez de Trinidad), *curitis* Stone (de Colombia, Perú, y el norte de Brasil), *pallida*, sp. n. (de Panamá), *pallidipennis* Greene (de Colombia y Venezuela), y *velezi*, sp. n. (de Colombia). Estas cinco especies se alimentan de frutos de *Passiflora* (Passifloraceae) (*P. ambigua* Hemsl., *ligularis* Juss., *nitida* H.B.K., *quadrangularis* L., y *seemannii* Griseb.). Se discuten las relaciones de estas *Anastrepha* especies y se proveen diagnoses e ilustraciones para su identificación. Se designa un neotipo de *A. consobrina* (Loew), y se establece la identidad de esta especie.

Introduction

Anastrepha is the largest and economically most important genus of Tephritidae in the Neotropical Region, including almost 200 described and numerous undescribed species, some of which are major pests of mango, citrus, and other crops. Relationships within *Anastrepha* are poorly understood, but a number of species groups have been recognized (Norrbom and Kim 1988b).

The *benjamini* species group was proposed by Steyskal (1977) to include species in which the facial carina is produced medially and is convex in profile (Fig. 1-2). Although the medially produced carina clearly is an apomorphic character state, the monophyly of the *benjamini* group as currently composed is doubtful, based on the variation in this character and because of other character state distributions (see "Relationships"). Although probably a homoplastic character, the shape of the carina is useful taxonomically, and the species in which it is known to be produced medially are revised in this paper.

As explained below in the "Relationships" section, I am here including only the following four species in the *benjamini* group: *benjamini* Lima, *gigantea* Stone, *magna*, new species, and *superflua* Stone. The only known host data for these species is one record of a *Pouteria* sp. (Sapotaceae) for *benjamini*. Five other species, *A. amnis* Stone, *curitis* Stone, *pallida*, new species, *pallidipennis* Greene, and *velezi*, new species, are here recognized as the *pallidipennis* complex, and are included in the *pseudoparallela* species group. All five species of the complex breed in fruit of *Passiflora* spp. (Passifloraceae), as do most other species of the *pseudoparallela* group.

Materials and methods

I use the morphological terminology of McAlpine (1981), except as noted by Norrbom and Kim (1988a). Wing band terminology follows Stone (1942a) and Steyskal (1977). Acronyms for the institutions where specimens are deposited are as follows: AMNH - American Museum of Natural History, New York; BMNH - Natural History Museum,

London; CMP - Carnegie Museum of Natural History, Pittsburgh; CTNLM - Colección Nacional "Luis Ma. Murillo", ICA, Sanidad Vegetal, Bogotá; DEI - Deutsches Entomologisches Institut, Eberswalde; INBio - Instituto Nacional de Biodiversidad, Costa Rica; INPA - Instituto Nacional de Pesquisas da Amazônia, Manaus; IZAM - Universidad Central de Venezuela, Maracay; UFPC - Universidade Federal do Paraná, Curitiba; UNCM - Universidad Nacional de Colombia, Medellín; USNM - National Museum of Natural History, Smithsonian Institution; ESALQ - Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, Piracicaba;

ZMHU - Zoologisches Museum der Humboldt Universität, Berlin.

Relationships

The facial carina (= clypeal ridge of Stone 1942a, Steyskal 1977) is produced in various species of *Anastrepha*. Although the produced carina clearly is an apomorphic character state (in most *Anastrepha* and the related genus *Toxotrypana* it is concave in profile), it appears to be a homoplastic character because of the variation in its shape, as well as conflicts with other character state distributions. The monophyly of the *benjamini* group as

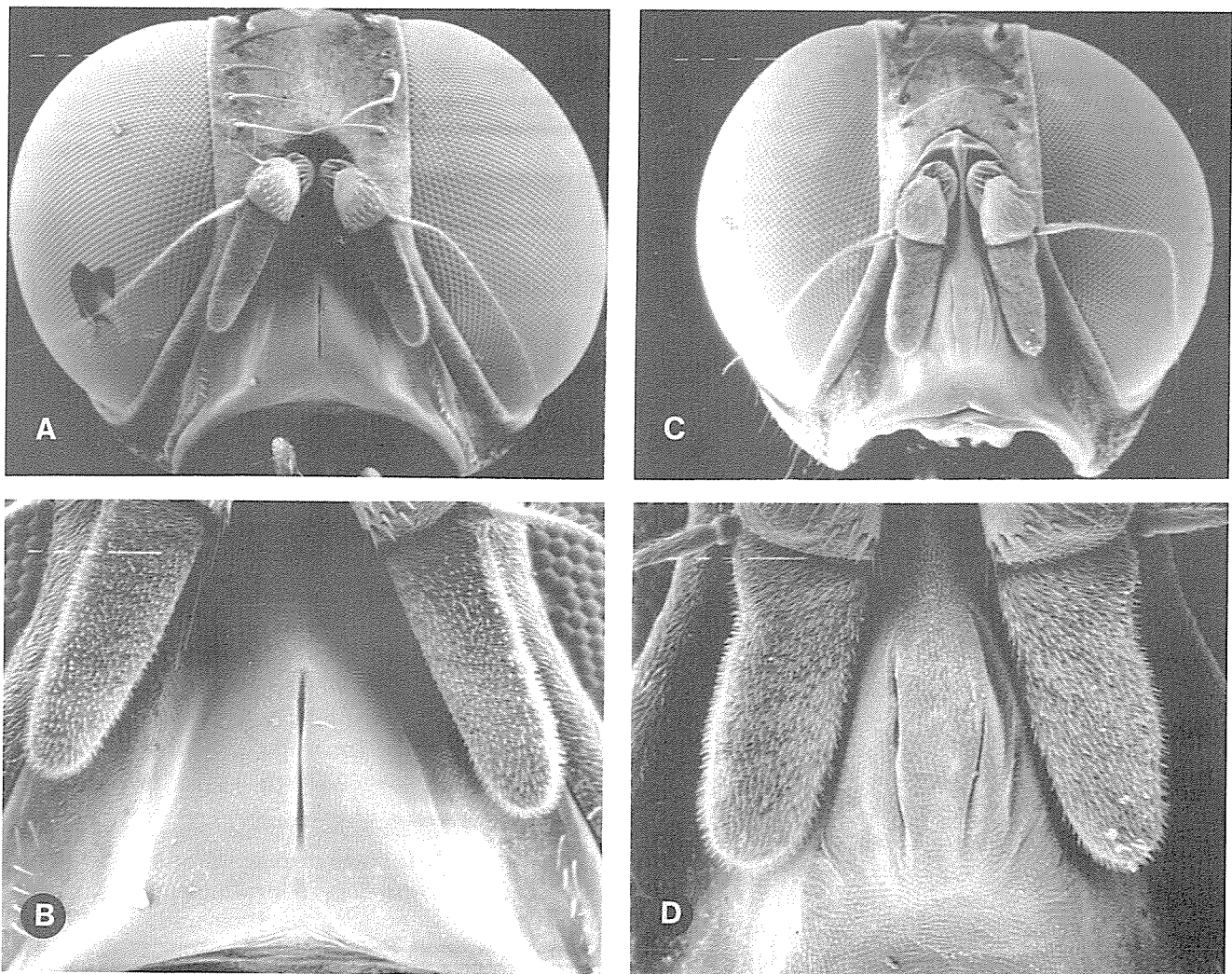


Fig. 1. Head, anterior view: A-B, *superflua* (♂), Barro Colorado I.; C-D, *pallida*, Panama, Barro Colorado I.

currently composed (Norrbom & Kim 1988b), based solely on the presence of a produced carina, is thus doubtful.

Variations in shape of the carina includes location and extent of the produced part. In *A. atrox* (Aldrich), the carina is produced between the antennae, and in three other species (*A. integra* (Loew), an undescribed species near *parallela* (Wiedemann), and another undescribed species), it is produced only slightly more ventrally (the most produced part is dorsal to the juncture of the pedicel and first flagellomere on the mesal side when the antenna is directed ventrally).

In the following species, most of which have been included in the *benjamini* group (Steyskal 1977), the carina is produced medially, although slightly more dorsally in *gigantea* than in the other species. In some there is intraspecific variation in carina shape. In *A. superflua*, the variation is sexually dimorphic; in the female (Fig. 2A), the produced area is larger and its dorsal margin is usually perpendicular to the face. In the male, the carina is similar to that in *pallidipennis* (Fig. 1A-B). In the two type specimens of *magna*, the carina is only very slightly produced medially. In *curitis*, the carina varies in profile from slightly convex to

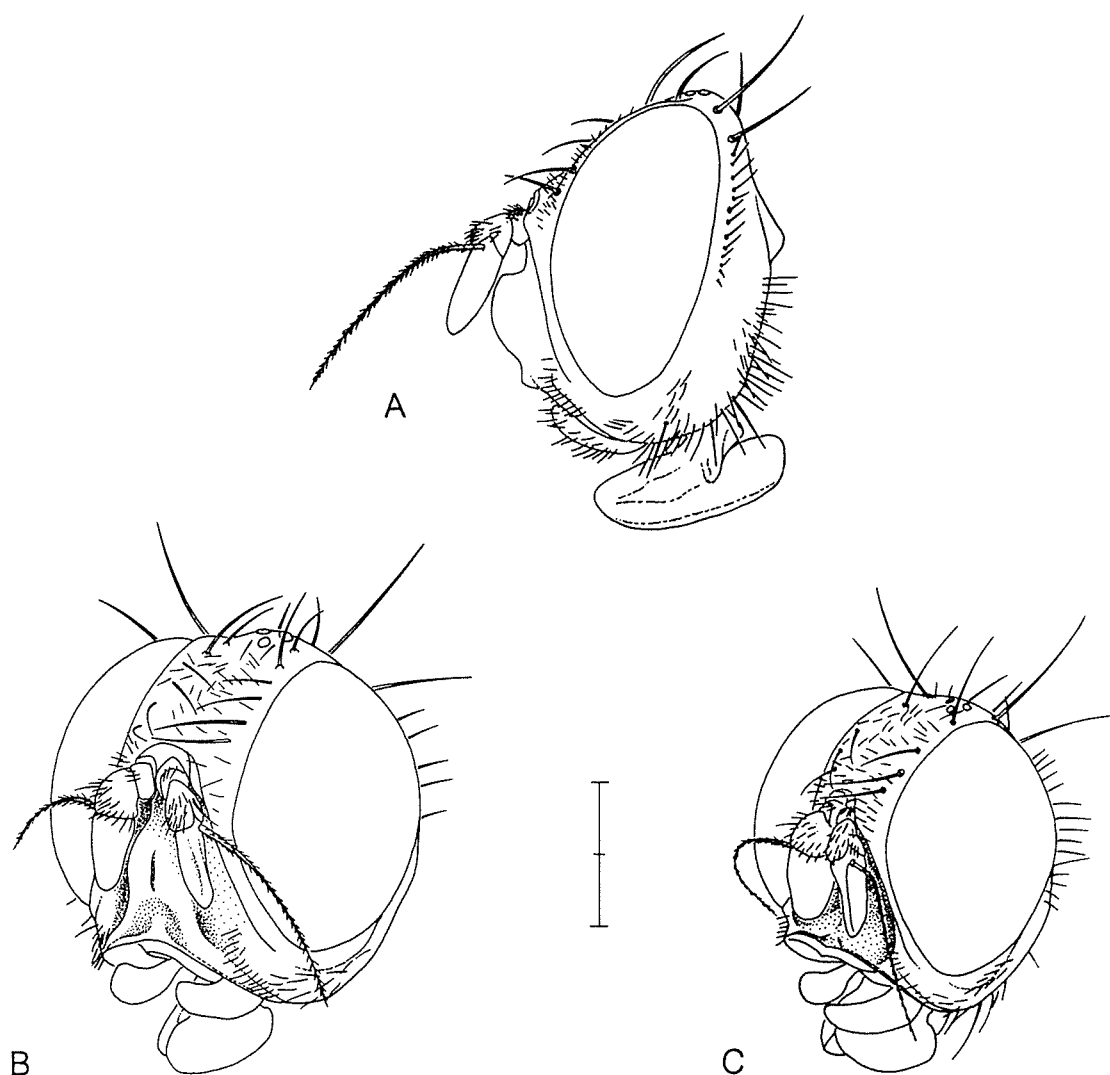


Fig. 2. Head: A, *superflua* (♀), Panama, El Cermeno, lateral view; B, *pallidipennis*, Colombia, La Mesa, anterolateral view; C, *velezi*, Colombia, Santo Domingo, anterolateral view.

straight, so this character also may vary similarly in other species until now known from relatively few specimens. *A. consobrina* (Loew), which has been classified in the *pseudoparallela* group but does not belong in the *pallidipennis* complex, normally has a concave or straight carina, but R.A. Zucchi (pers. comm.) has observed one female in which it is strongly produced. Finally, I have seen a male specimen from Rondonia, Brazil that keys to *A. grandicula* Norrbom of the *grandis* species group (see Norrbom 1990) which has a strongly produced carina. Additional specimens are needed to determine if it is a male of *grandicula*, previously known from only females, or a new species.

The variety of the facial carina shapes in *Anastrepha* suggests that there has been independent evolution of this character in different species or species groups (i.e., at least some of the shapes are independently derived character states rather than a transformation series). Unless there is homoplasy in the evolution of the facial carina in *Anastrepha*, there would also have to be convergence in at least the following two characters: 1) the absence of the hyaline mark at the apex of vein R_1 , which is a synapomorphy for the *grandis* group; and 2) the basal location of the spiracle of female syntergosternite 7, which is a synapomorphy for the *pallidipennis* complex. The carina shape varies in these species. It is strongly produced in *pallidipennis* and *pallida*, straight to slightly convex in profile in *curitis*, straight in *amnis*, and strongly concave in *velezi*.

The monophyly of the *pallidipennis* complex is indicated by the extreme basal location of the spiracle of female syntergosternite 7, a character unique to this group within *Anastrepha*. The *pallidipennis* complex and the species previously placed in the *chiclayae* group (Norrbom and Kim 1988b) are here included in the *pseudoparallela* species group. Morphological support for this group is weak, although all of the species have similarly shaped aculeus tips (relatively elongate and broad, and extensively, finely serrate, except in *velezi*). All species whose biology is known breed predominantly or exclusively in *Passiflora*.

Support for the monophyly of the *benjamini* species group, even as here restricted to only *benjamini*, *gigantea*, *magna*, and *superflua*, is not extensive. It is suggested mainly by the shape of the facial carina, although as explained above this seems to be a highly homoplastic character. All four species have relatively long female terminalia, which may indicate their relationship, but this

character state occurs in various other *Anastrepha* species and is difficult to evaluate without knowing the sister group of the *benjamini* group.

A. superflua has several character states seemingly plesiomorphic for *Anastrepha*, including the apex of vein M meeting the costa at a distinct angle (rare in *Anastrepha* except in the *cryptostrepha*, *schausi*, and *punctata* species groups), a relatively stout katepisternal seta, and the sclerotized areas of the male cercus broadly connected (Fig. 4C) (typical of plesiomorphic species groups such as those above and the *robusta* group), which suggests it may not belong in the *benjamini* group. Vein M sometimes meets the costa at a slight angle in *benjamini*, however, and in both species there is a strong indentation in base of the S-band, perhaps indicating the relationship of these species. A similar indentation is present in various other *Anastrepha* species whose relationships are uncertain (e.g., the *robusta* group, *hamadryas* (Stone), *connexa* Lima), so this character appears subject to homoplasy. The epandrium in *superflua* is very long in lateral view (Fig. 4C), which probably is an autapomorphy.

A. benjamini possesses a large oval area of dense microtrichia surrounding the apex of the lobe of cell bcu (in both sexes), which apparently is an autapomorphy of this species.

A. magna and *gigantea* appear to be sister species. The shape of the aculeus tip and the weak ridge on it (unique within *Anastrepha*), the yellow area in cell r_1 between the C- and S-bands (uncommon in *Anastrepha*, probably apomorphic within the *benjamini* group if it is monophyletic), and the extremely large size of these two species (among the largest species of *Anastrepha*) are synapomorphies indicating their close relationship. Other characters, such as the aculeus tip nonserrate and the pattern of hooklike scales on the eversible membrane, are of uncertain polarity until the sister group of the *benjamini* group is identified, but they also may be synapomorphies.

Taxonomy

Anastrepha amnis Stone

Fig. 3A, 7A

Anastrepha amnis Stone 1942a:88 [description]; Foote 1967:7 [in catalog]; Steyskal 1977:18 [in key]; Zucchi 1978:25 [Brazil], 1981a [diagnosis]; Norrbom and Kim 1988b:3 [in classification].

Anastrepha consobrina: Lima 1934:532; Capoor 1955:31 [misidentification].

Diagnosis. Within the *pallidipennis* complex, *amnis* differs from *pallidipennis*, *pallida*, and *velezi* by its entirely microtrichose scutum. It differs from *curitis* by its shorter and more serrate aculeus tip (Fig. 7A), which is less than 0.30 mm long, with the apical 0.92-1.00 serrate, vs. 0.37-0.51 mm long, with the apical 0.73-0.80 serrate in *curitis* (Fig. 7C-F). In the key of Steyskal (1977), *amnis* may run to *pallidipennis* or *curitis* (p. 9) if the facial carina is produced, to *consobrina* (Loew) (p. 11 or 23), which differs in having the spiracle of syntergosternite 7 at least 1.5 mm from its base and more numerous (>75) long hook-like dorsobasal scales on the ever-sible membrane (Zucchi 1981a), or it may go to page 18 as indicated.

Description. Mostly yellow to pale orangebrown. Setae dark brown or black. *Head*: 3 frontal setae. 2 orbital setae. Facial carina strong, without vertical grooves; in profile straight. Antenna extended about 0.60 distance to ventral facial margin. *Thorax*: Mesonotum 3.50-3.62 mm long. Scutum entirely microtrichose; mostly yellow, without dark markings; medial white stripe present, posteriorly extended laterally to between acrostichal and dorso-central setae. Scutal setulae yellow. Subscutellum and mediotergite entirely yellow. Katepisternal seta weak, yellow. *Wing* (Lima 1934, Plate LXIX, Fig. 30): 8.39-9.50 mm long. C- and S-bands narrowly connected along vein R_{4+5} . V-band complete, separated from S-band. Vein M moderately curved apically, and well separated from apex of S-band. *Female terminalia* (Lima 1934, Plate LXXIV, Fig.

54): Syntergosternite 7 6.50-6.80 mm long, 1.80-1.94 times as long as mesonotum; spiracle 0.62-0.705 mm from base, this distance 0.17-0.20 times as long as mesonotum. Eversible membrane with dorsobasal hook-like scales in rounded triangular pattern. Aculeus 5.66-5.85 mm long; tip (Lima 1934, Fig. 29) 0.27-0.28 mm long, 0.11-0.12 mm wide, apical 0.92-1.00 serrate, serrate part slightly sagittate to triangular. Spermathecae spherical to ovoid.

Remarks. I have not examined the holotype of *amnis*, a female in the Instituto Oswaldo Cruz, from Brazil: Rio de Janeiro: Itatiaia, 700 m, 31.I.1929, J.F. Zikan. The above description is based on the examined female from Santa Catarina, plus measurements of the holotype provided by Lima (1934), Capoor (1955), and Zucchi (1978). With the exception of mesonotum length and aculeus tip length, the holotype has the larger measurements and ratios of those listed in the description. Maracujá, presumably the plant from which the female from Santa Catarina was reared, is a common name in Brazil for various species of *Passiflora*.

A single female from Trinidad (coast of St. Andrew or St. David Parish, trap 181, in sapodilla, 18.VII.1990, Trinidad and Tobago survey No. K-11) might be *amnis*. It has the following measurements: mesonotum 3.29 mm long; wing 7.65 mm long; syntergosternite 7 5.49 mm long, 1.67 times as long as mesonotum; spiracle 0.42 mm from base, this distance 0.12 times as long as mesonotum;

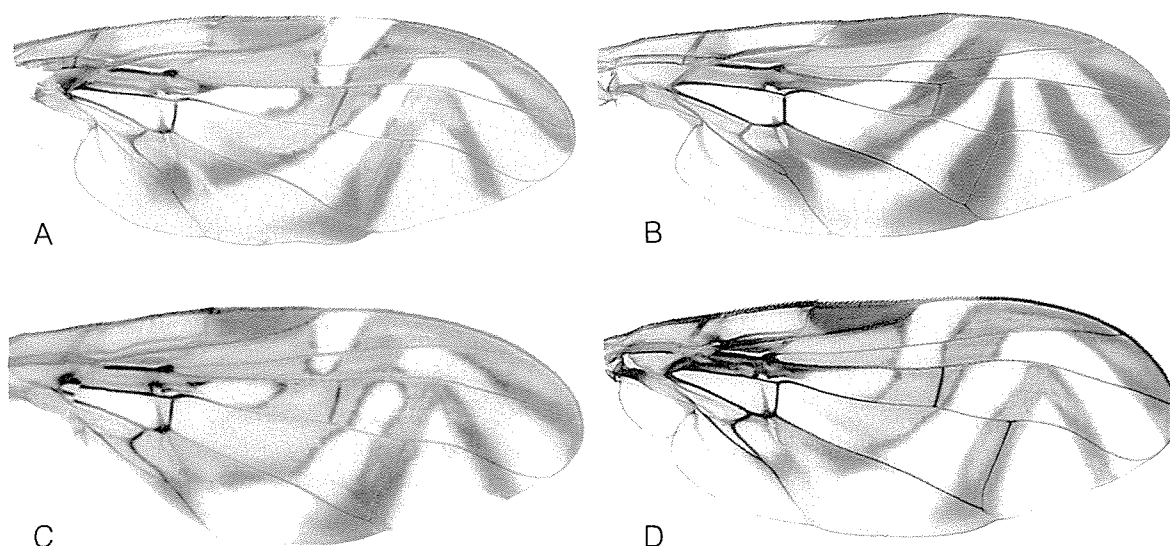


Fig. 3. Wing: A, *amnis*, Brazil, Itajai; B, *magna*, holotype; C, *pallida*, Panama, Barro Colorado I.; D, *velezi*, Colombia, Santo Domingo.

aculeus 4.58 mm long; tip (Fig. 7B) 0.24 mm long, 0.11 mm wide, apical 0.84 serrate. This female differs from the female of *annis* from Santa Catarina in having only 1 orbital seta and its V-band narrowly connected to the S-band.

Specimens examined. BRAZIL: Santa Catarina: Itajaí, "larvas em maracujó [sic]", 31.XII.1981, H. Kalve Laje, 1♀ (UFPC).

Anastrepha benjamini Lima

Fig. 4A, 5A

Anastrepha benjamini Lima 1938b:16 [description, host]; Stone 1942a:34 [revision]; Foote 1967:7 [in catalog]; Steyskal 1977:9 [in key]; Zucchi 1978:32, 1981b:292 [Brazil]; Norrbom and Kim 1988b:3, 14 [in classification and host list].

Anastrepha connexa: Lima 1938a:61 [misidentification], 1938b:16 [female only].

Anastrepha discessa Stone 1942a:34 [description]; Foote 1967:7 [in catalog]; Steyskal 1977:9 [in key]; Zucchi 1978:32, 1981b:292 [synonymy].

Anastrepha dicessa: Norrbom & Kim 1988b:3 [misspelling].

Diagnosis. *A. benjamini* differs from other species of the *benjamini* group in having a large oval area surrounding the apex of the lobe of cell *bcu* with much denser microtrichia than on other parts of the wing, and by the shape of its aculeus tip (Stone 1942a, Fig. 4B-C), which tapers subbasally, then is more or less parallel-sided until the apical tapered serrate part. I have not observed the former char-

acter state in any other species of *Anastrepha*. *A. benjamini* differs from *A. connexa* Lima (not seen), a species of uncertain relationship that has a very similar wing pattern (Lima 1938b, fig. 4), in the shape of the outer surstylus, which is broader and blunter in *connexa* (Lima 1938b, fig. 1), by its longer aedeagus (greater than 10 mm long vs. only 4.4 mm long in *connexa* according to Stone (1942a)), and perhaps by the shape of the facial carina, which was not described by Lima (1934, 1938b) nor Zucchi (1978) for *connexa*.

Description. Mostly yellow to pale orangebrown. Setae dark brown or black. **Head:** 4-6 frontal setae. 2 orbital setae. Facial carina strong, produced medially, usually with unpaired medial vertical groove and 0-3 additional grooves; in profile, carina strongly convex medially. Antenna extended 0.55-0.70 distance to ventral facial margin. **Thorax:** Mesonotum 3.54-4.05 mm long. Scutum entirely microtrichose; mostly yellow, without dark markings; medial scutal white stripe absent on 2♀♀ from Muritiba (all white areas indistinct on other specimens examined). Scutal setulae yellow. Subscutellum and mediotergite entirely yellow. Katepisternal seta weak, yellow. **Wing** (Lima 1938a, Fig. 5-7; Stone 1942a pl. 4C): 8.70-10.30 mm long. C- and S-bands separated or connected along vein R_{4+5} . V-band complete, connected to S-band along vein R_{4+5} . Vein M moderately curved apically, sometimes meeting costa at slight angle, well separated from apex of S-band. Cells *bcu*, cu_1 , and a_1 with large oval area of



Fig. 4. Male epandrium, surstyli, and cercus, lateral view: A, *benjamini*, Brazil, Agua Preta; B, *curitis*, Brazil, Manaus; C, *superflua*, Panama, La Campana.

very dense microtrichia. *Male terminalia*: Outer surstylus (Fig. 4A, 5A) relatively long, with small medial lobe apically. Cercus (proctiger) with lateral crease, sclerotized areas narrowly connected (Fig. 4A). Aedeagus 10.70-13.60 mm long, 3.00-3.67 times as long as mesonotum. *Female terminalia*: Syntergosternite 7 8.80-10.95 mm long, 2.23-2.70 times as long as mesonotum; spiracle 1.79-2.08 mm from base, this distance 0.45-0.52 times as long as mesonotum. Eversible membrane with numerous large hook-like dorsobasal scales in rounded triangular pattern (similar to *superflua*, Fig. 6H). Aculeus 8.72-10.53 mm long; tip (Lima 1938b, Fig. 8; Stone 1942a, Fig. 4B-C; Zucchi 1981b, Fig. 6-7) tapered subbasally, parallel-sided, then tapered to apex, 0.29-0.31 mm long, 0.13 mm wide, apical 0.38-0.39 serrate. Spermathecae spherical.

Remarks. This species is known only from the states of Bahia and Rio de Janeiro, Brazil (Zucchi 1978). The only reported host plant is "guapeba branca" (*Pouteria* sp., Sapotaceae) (Lima 1938b). I have not seen the female holotype in the Instituto Oswaldo Cruz, but the USNM paratypes are from the same collection series.

Specimens examined. BRAZIL: "Mang." [possibly Rio de Janeiro: Manguinhos], 19.I.1915, R. Fischer, 1♀ (DEI). Bahia: Agua Preta, reared ex. fruit of guapeba branca, 8.XII.1937, G. Bondar, 1♂ 1♀ paratypes 1♂ 1♀ (USNM) [with only following labels: "2495", paratypes also with "3535" and red "PARATYPO", female paratype with "Anastrepha benjamini Costa Lima" and other female with "A. connexa C.L. variegata"]; Muritiba, Fazenda Claudia, 21.VI.1978, A.S. Nascimento, 2♀ (ESALQ).

Anastrepha consobrina (Loew)

Fig. 6C

Trypeta consobrina Loew 1873:230 [description].

Anastrepha consobrina: Bezzi 1909:283 [in list & key]; Hendel 1914:15 [in list & key]; Lima 1930:160 [host]; Stone 1942a:87 [description]; Foote 1967:8 [in catalog]; Steyskal 1977:11,23 [in key]; Zucchi 1978:91, 1981a:5; Norrbom and Kim 1988b:3 [in classification], 15 [host list].

Anastrepha zikani Lima 1934:533 [description]; Capoor 1955:31 [host]; Zucchi 1978:90 [redescription], 1981a:5 [lectotype designation].

[not] *Anastrepha consobrina*: Lima 1934:532; Capoor 1955:31 [see *amnis*].

[not] *Anastrepha consobrina*: Curran 1934:433 [misidentification of *dissimilis*].

Diagnosis. *A. consobrina* differs from *A. amnis* in having the spiracle of syntergosternite 7 much farther from its base and by having many more tooth-like dorsobasal scales of the eversible membrane (Fig. 6C), as noted by Capoor (1955) and Zucchi (1978, 1981a). I see little difference in the shape of vein $R_{2+3'}$, which Stone (1942) believed would also separate these species. The facial carina normally is concave or straight, but R.A. Zucchi (pers. comm.) has observed one female (from Sero-pedica, Rio de Janeiro) in which it is strongly produced. *A. consobrina* has been adequately described by previous authors, and I will not re-describe it further here.

Remarks. The identity of the name *consobrina* has been in doubt, and Zucchi (1978, 1981a) considered it unrecognizable. Stone (1942) interpreted it as the senior synonym of *zikani*, whereas Lima (1934) and Capoor (1955) used it for the species here recognized as *amnis*.

A. consobrina is among the species now classified in *Anastrepha* for which Loew did not specify the location of his type material. The types of some of these species are in the Museum of Comparative Zoology (e.g., the species from the Antilles), but those of the others are not and have been considered lost (Zucchi 1981a). There are no putative type specimens of *consobrina* in the MCZ, nor in the Naturhistorisches Museum Wien, whose collection Loew also studied. I have studied the American Tephritidae in both institutions. Loew (1873:211) also stated that he examined specimens from the ZMHU, and although there are no *Anastrepha* specimens marked as Loew type specimens there, most of the specimens present that are old enough to have been seen by him closely match descriptions of one of his species for which he gave no indication of the type depository. Thus, it is possible that these specimens are types, or from the same collection series as the specimens on which Loew based his species. However, because there remains considerable doubt, I am designating a neotype in the case of *consobrina* to clearly resolve the status of this name.

The old material in the ZMHU collection has hand written, geographically color coded labels, added until the early 1900's (some of Becker's specimens are among those so labelled). These are cut down drawer header labels (F.C. Thompson, pers. comm.). The Neotropical specimens have bright green or bluegreen labels. Loew described *consobrina* from an unstated number of specimens

of both sexes from Brazil. The only female fitting the original description of *consobrina*, and which is here designated as neotype, has a bluish green label with "Brasilien Para Sieber S.", and a white label with "Anastrepha zikani C.L. det. Hering 1941". Sieber collected in Brazil from 1801 to 1813 (Papavero 1971:48), thus Loew could have examined this specimen, and the neotype may have been a syntype.

A. consobrina is known from Brazil (Rio de Janeiro and Pará) and Argentina (Capoor 1955, Blanchard 1961, Zucchi 1978). The female from Tumatumari, Guyana reported by Curran (1934) is a paratype of *dissimilis* Stone (1942a). The only reported field reared host plant of *consobrina* is *Passiflora quadrangularis* L. (Lima 1934, Capoor 1955).

Anastrepha curitis Stone

Fig. 4B, 5B-C, 6I, 7C-F

Anastrepha curitis Stone 1942a:32 [description]; Foote 1967:9 [in catalog]; Steyskal 1977:9 [in key]; Zucchi 1978:40 [Brazil]; Norrbom and Kim 1988b:3 [in classification].

Anastrepha pallidipennis: Couturier et al. 1993:223 [Brazil, Peru, hosts] [misidentification].

Diagnosis. Within the *pallidipennis* complex, *curitis* differs from *pallidipennis*, *pallida*, and *velezi* by its entirely or mostly microtrichose scutum. It differs from *amnis* in the size and shape of the aculeus tip (see diagnosis for *amnis*). It differs from *velezi* in having the aculeus tip serrate, and from the other species in the distance of the spiracle of syntergosternite 7 from its base (0.80-1.25 mm in *curitis* vs. at most 0.62 mm in the other species) and in the ratio of this distance to mesonotum length (0.20-0.28 in *curitis* vs. 0.10-0.17 in the other species).

Description. Mostly yellow to pale orangebrown. Setae dark brown or black. *Head*: 3-4 frontal setae. 1-2 orbital setae (posterior seta absent except in specimens from Colombia, and on one side on 1♂ from Manaus, Brazil (ESALQ)). Facial carina strong, usually produced medially and with unpaired medial vertical groove, but sometimes with additional grooves or lacking grooves entirely; in profile, carina usually slightly convex medially, occasionally (2 Colombia ♀, 2 Peru ♂) straight. Antenna extended 0.60-0.80 distance to ventral facial margin. *Thorax*: Mesonotum 3.20-4.53 mm long. Scutum entirely microtrichose or rarely (Colombia ♂, Belem, Brazil ♂, and Benevides, Brazil ♀) with narrow

paired submedial nonmicrotrichose stripe from anterior margin to slightly beyond the level of supra-alar seta; mostly yellow, without dark markings; medial white stripe present (although it and other white areas sometimes indistinct). Scutal setulae yellow. Subscutellum and mediotergite entirely yellow. Katepisternal seta weak, yellow. *Wing* (Stone 1942a pl. 4A): 7.74-10.60 mm long. C- and S-bands connected along vein R_{4+5} . V-band complete, separated from S-band or narrowly connected to it along vein R_{4+5} . Vein M strongly curved apically, but well separated from apex of S-band. *Male terminalia*: Outer surstylus (Fig. 4B, 5B-C) relatively short, truncate or with very weak medial lobe apically. Cercus (proctiger) with lateral crease, sclerotized areas narrowly connected or divided (Fig. 4B). Aedeagus 9.05-10.70 mm long, 2.44-3.09 times as long as mesonotum. *Female terminalia*: Syntergosternite 7 6.48-9.07 mm long, 1.74-2.08 times as long as mesonotum; spiracle 0.80-1.25 mm from base, this distance 0.20-0.28 times as long as mesonotum. Eversible membrane with dorsobasal hook-like scales in oval or rounded triangular pattern. Aculeus 5.24-8.41 mm long; tip (Fig. 7C-F) 0.37-0.51 mm long, 0.11-0.16 mm wide, apical 0.73-0.80 serrate, serrate part elongate sagittate. Spermathecae (Fig. 6I) spherical to ovoid.

Remarks. The specimens here reported as *curitis* vary somewhat in the shape of the aculeus tip, the shape of the base and location of the spiracle of syntergosternite 7, and terminalia length. They might represent more than one species, but without larger series of specimens or more biological data, this hypothesis is difficult to test. Couturier reported *Passiflora nitida* H.B.K. and an undetermined *Passiflora* sp. as host plants (as *A. pallidipennis*). A female has been collected on *P. quadrangularis* in Peru.

Specimens examined. Holotype - ♀ (BMNH), BRAZIL: Pará. Other specimens - BRAZIL: Amazonas: Manaus, INPA, 9.VI.1977, Paraluppi, 1♂ (INPA); Manaus, 1.VII.1977, 1♂ (INPA); Manaus, INPA, 30.V.1977, I.S. Gorayeb, 1♀ (INPA); Manaus, Km. 14 INPA, III.1986, ex. larva, frutas *Passiflora grandiflora* [reported as *P. nitida* by Couturier et al. 1993], G. Couturier, 4♂ 2♀ (ESALQ); Manaus, Est. Aleixo, Km. 4, 16.VI.1977, 1♀ (INPA); Manaus, AM 01, Km. 31, 19.III.1976, Nike, 1♀ (USNM); Rod. AM - 01, Km. 80, 19.III.1976, I.S. Gorayeb, 1♂ 1♀ (INPA) 1♂ (USNM); same, Km. 85, 16.V.1976, 1♀ (USNM). Pará: 1.X.1892, Schulze, 1♀ (ZMHU);

Belem, V. 1924, F.X. Williams, 1♂ (AMNH); Benevides, X. 1918, S.M. Klages, 1♀ without abdomen (CMP). COLOMBIA: Doncello Cg., I. 1974, L. Nuñez, 1♂ 2♀ (USNM). PERU: Loreto: Iquitos, on *Passiflora quadrangularis*, 1974, J. Salazar, 1♀ (USNM); Rio Maniti, Santa Cécilia, larvas en fruto de *Passiflora* sp. [reported as *P. nitida* by Couturier et al. 1993], 15.XI.1992, G. Couturier, 2♂ (ESALQ).

***Anastrepha gigantea* Stone**

Fig. 8A-B

Anastrepha gigantea Stone 1942b:299 [description]; Foote 1967:11 [in catalog]; Steyskal 1977:9 [in key]; Norrbom and Kim 1988b:3 [in classification].

Diagnosis. See diagnosis of *magna*.

Description. Mostly yellow to pale brown. Setae black. *Head*: 3 frontal and 2 orbital setae. Facial carina strong, without grooves; in profile, strongly convex dorsomedially. Antenna extended 0.80 distance to ventral facial margin. *Thorax*: Mesonotum 5.18 mm long. Scutum without microtrichia except narrowly along transverse suture and on extreme lateral margin; mostly yellow, without dark markings; with narrow white medial stripe (faint in holotype as are other white areas). Scutal setulae pale brown. Subscutellum and mediotergite entirely yellow. Katepisternal seta weak, yellow. *Wing* (Stone 1942b, Fig. 8): 12.88 mm long. C- and S-bands broadly connected along vein R_{4+5} and poorly separated in cells r_1 and r_{2+3} by irregular yellow area. Arms of V-band connected and broadly connected to S-band in cell r_{2+3} . Vein M strongly curved apically, its apex slightly covered by apex of S-band. Cell cu_1 , except small basal area, and apical 2/3 of cell dm microtrichose. *Female terminalia*: Syntergosternite 7 9.37 mm long, 1.81 times as long as mesonotum; gradually tapered; spiracle 1.87 mm from base, this distance 0.36 times as long as mesonotum. Eversible membrane with 10 large hook-like scales in semicircular row and about 8 shorter scales, together forming somewhat triangular pattern. Aculeus 8.72 mm long; tip (Fig. 8A-B) 0.43 mm long, 0.12 mm wide, nonserrate, acute apically, with weak subbasal ridge on ventral side. Spermathecae lost in holotype.

Remarks. The most produced part of the facial carina is slightly more dorsal in *gigantea* than in the other species of the *benjamini* group. The aculeus of the holotype was mounted in balsam and was tilted strongly to one side, so that the figure of

its tip in Stone (1942b, Fig. 4) is lateroventral. The extreme apex is broken. The holotype is the only known specimen and no host plants have been reported for *gigantea*.

Specimens examined. Holotype - ♀ (USNM), PANAMA: El Cermeño, 6.II.1940, J. Zetek 4630.

***Anastrepha magna* Norrbom, new species**

Fig. 3B, 6E, 8C-D

Diagnosis. *A. magna* differs from *gigantea*, to which it runs in the key of Steyskal (1977), as follows: 1) C- and S-bands broadly separated along vein R_{4+5} and in all of cell r_{2+3} by hyaline area (in *gigantea* these bands broadly fused along R_{4+5} and in much of cell r_{2+3} ; in both species the area between these bands in cell r_1 is yellow, but it is fainter in *magna*); 2) scutum entirely microtrichose (it is without microtrichia, except laterally, in *gigantea*); 3) arms of V-band separated and not fused with S-band; 4) apex of M slightly more curved and more of it covered by apex of S-band; 5) large nonmicrotrichose areas present medially in cell cu_1 and between S- and V-bands in cell dm; and 6) extreme apex of aculeus tip (Fig. 8C) blunt (it is more acute in *gigantea* (Fig. 8a)). The incomplete V-band and the nonmicrotrichose areas in cells cu_1 and dm distinguish *magna* from all other species of the *benjamini* group and the *pallidipennis* complex, and the following characters distinguish both it and *gigantea* from the other species: aculeus tip nonserrate (serrate in other species except *velezi*) and with weak ridge; cell r_1 yellow between C- and S-bands; and apex of vein M touching apex of S-band.

Description. Mostly yellow to pale brown. Setae dark brown or black. *Head*: 4-6 frontal and 2 orbital setae. Facial carina strong, with small transverse grooves, but without dorsoventral grooves; in profile, slightly convex medially. Antenna extended 0.70 distance to ventral facial margin. *Thorax*: Mesonotum 5.51-6.68 mm long. Scutum entirely microtrichose; mostly yellow, without dark markings; white areas indistinct on type specimens. Scutal setulae yellow. Subscutellum and mediotergite entirely yellow. Katepisternal seta weak, yellow. *Wing* (Fig. 3B): 12.92-13.58 mm long. C- and S-bands well separated along veins R_{2+3} and R_{4+5} , but cell r_1 faintly yellow between them. Arms of V-band not connected, and separated from S-band. Vein M strongly curved apically, its apex broadly

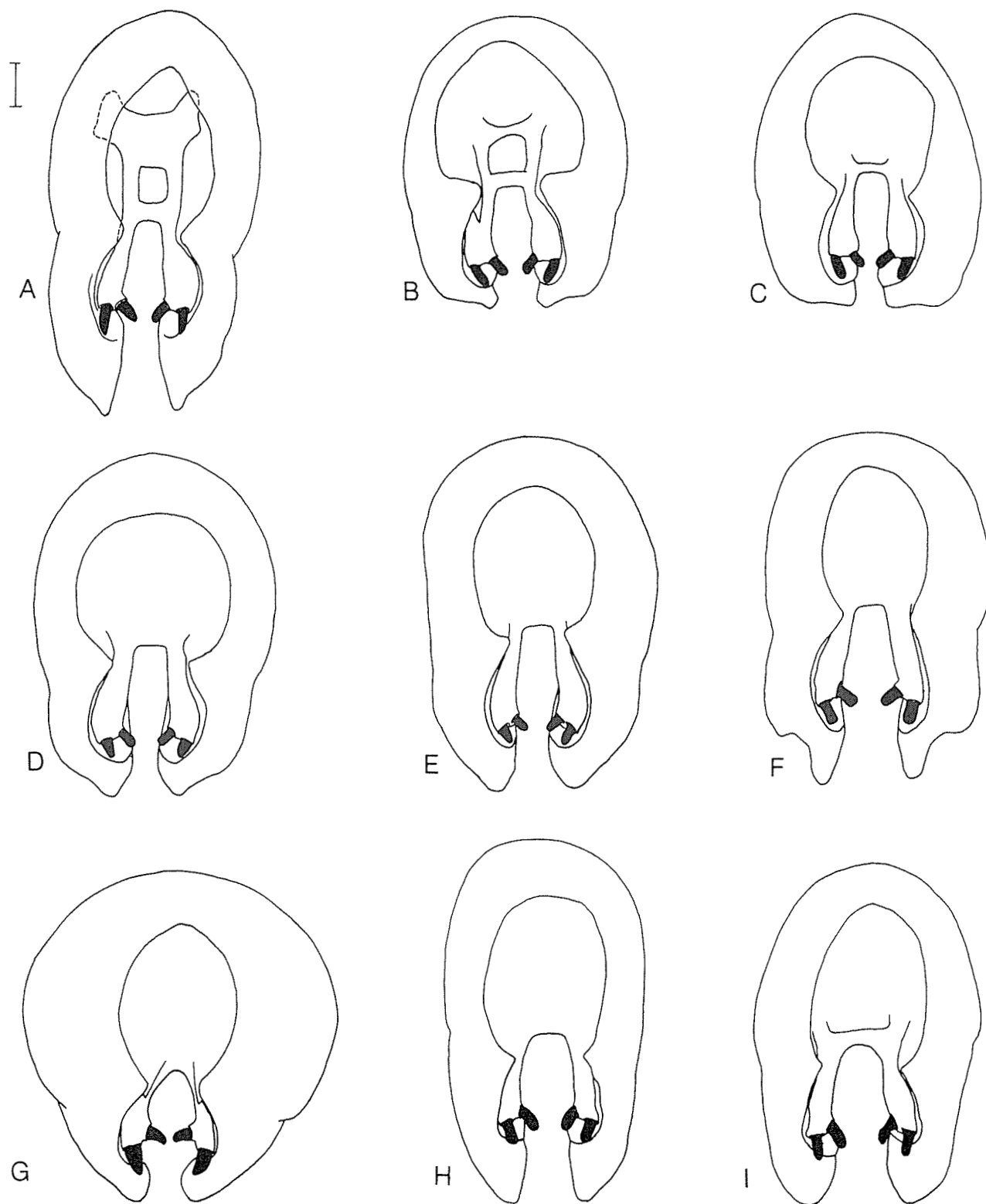


Fig. 5. Male epandrium and surstyli, posterior view: A, *benjamini*, Brazil, Agua Preta; B, *curitis*, Colombia, Doncello; C, *curitis*, Brazil, Manaus; D, *pallida*, Panama, Barro Colorado I., ex. *P. ambigua*; E, *pallida*, Panama, Barro Colorado I., ex. *P. seemanni*; F, *pallidipennis*, Colombia, Palmira; G, *superflua*, Panama, La Campana; H-I, *velezi*, Colombia, Santo Domingo.

covered by apex of S-band. Cell cu_1 with large medial area and cell dm with large area(s) between S- and V-bands without microtrichia. *Female terminalia*: Syntergosternite 7 8.56-8.64 mm long, 1.52-1.55 times as long as mesonotum; gradually tapered; spiracle 2.06 mm from base, this distance 0.36-0.37 times as long as mesonotum. Eversible membrane (Fig. 6E) with 13-17 large hook-like scales in semicircular row and about 10 shorter scales, together forming somewhat triangular pattern. Aculeus 8.72-8.97 mm long; tip (Fig. 8C-D) 0.47-0.50 mm long, 0.12-0.13 mm wide, nonserrate, blunt apically, with weak subbasal ridge on ventral side. Spermathecae (Fig. 6J) elongate.

Remarks. The name of this species refers to its large size. The host plants are unknown. The Colombian female was probably collected in a large savannah area in the eastern part of that country that has subsequently been divided among several departments. "Guayabal" refers to an area where guava occurs (R. Velez-Angel, pers. comm.).

Holotype. ♀ (IZAM), VENEZUELA: Amazonas: San Pedro de Cataniapo, 100 m, "en la luz", 28.VIII.1981, J.L. Garcia. Paratype. 1♀ (UNCM), COLOMBIA: Orientales, Los Llanos, en Guayabal, XII.1947, F.L. Gallego.

Anastrepha pallida Norrbom, new species

Fig. 1C-D, 3C, 5D-E, 7G

Anastrepha pallidipennis: Stone 1942a:32; Foote 1967:14; Norrbom and Kim 1988b:51; White and Elson-Harris 1992:163. [In part, Panamanian records and hosts] [misidentification].

Diagnosis. Of the species of the *pallidipennis* complex, *pallida* differs from *curitis* and *amnis* in lacking microtrichia on most of the scutum, and from *velezi* by its aculeus tip (Fig. 7G), which has the apical 3/5 - 4/5 sagittate and serrate. *A. pallida* differs from *pallidipennis*, to which it will run in the key of Steyskal (1977), by the shape of the outer surstylus (Fig. 5D-E), in which the medial apical lobe is very small or absent (compare with Fig. 5F of *pallidipennis*). Females of these two species are difficult to distinguish. The facial carina in *pallidipennis* (Fig. 2B) usually has an unpaired medial groove (and sometimes additional ones), whereas in most specimens of *pallida* (Fig. 1C-D), the grooves are paired or irregularly arranged. The V-band and S-bands are sometimes connected in *pallida* (Fig.

3C), whereas they are not connected in *pallidipennis*.

Description. Mostly yellow to pale orangebrown. Setae dark brown or black. *Head*: 3-4 (rarely 5) frontal setae. 1-2 orbital setae (ratio of posterior seta absent: present on one side: present on both sides = 3:7:23 in specimens from *P. ambigua*, 2:5:14 in specimens from *P. seemannii*). Facial carina (Fig. 1C-D) strong, produced medially, usually with 2-4 vertical grooves; in profile strongly convex medially. Antenna extended 0.60-0.75 distance to ventral facial margin. *Thorax*: Mesonotum 3.29-4.65 mm long. Scutum without microtrichia except narrowly along transverse suture and postsutural part lateral to intra-alar seta; mostly yellow, without dark markings; medial white stripe present, posteriorly extended laterally to between acrostichal and dorsocentral setae. Scutal setulae yellow. Subscutellum and mediotergite entirely yellow. Katepisternal seta weak, yellow. *Wing* (Fig. 3C): 7.57-9.88 mm long. C- and S-bands broadly connected along vein R_{4+5} . V-band complete, separated from S-band [most specimens from *P. seemannii*] or connected to it along vein R_{4+5} [most specimens from *P. ambigua*]. Vein M strongly curved apically, but well separated from apex of S-band. *Male terminalia*: Outer surstylus (Fig. 5D-E) broad, usually with small medial apical lobe. Cercus (proctiger) with lateral crease, sclerotized areas narrowly connected or divided. Aedeagus 10.45-12.35 mm long, 2.99-3.25 times as long as mesonotum. *Female terminalia*: Syntergosternite 7 7.73-10.37 mm long (up to 11.3 mm, Stone 1942a), 2.00-2.52 times as long as mesonotum; spiracle 0.37-0.62 mm from base, this distance 0.10-0.16 times as long as mesonotum. Eversible membrane with hook-like dorsobasal scales in rounded triangular or oval pattern. Aculeus 5.84-8.15 mm long; tip (Fig. 7G) 0.41-0.56 mm long, 0.12-0.14 mm wide, apical 0.63-0.76 serrate, serrate part elongate sagittate. Spermathecae spherical.

Remarks. The name of this species refers to its generally pale color. The type series was reared from fruit of *Passiflora ambigua* Hemsl. and *P. seemannii* Griseb. in Panama.

Holotype. ♀ (USNM), PANAMA: Barro Colorado I., reared *Passiflora seemannii*, J. Zetek 3697. PARATYPES. PANAMA: Barro Colorado I., reared *Passiflora ambigua*, 19.VI.1935, J. Zetek 3480, 6♂ 5♀ (USNM); Barro Colorado I., reared *Passiflora*

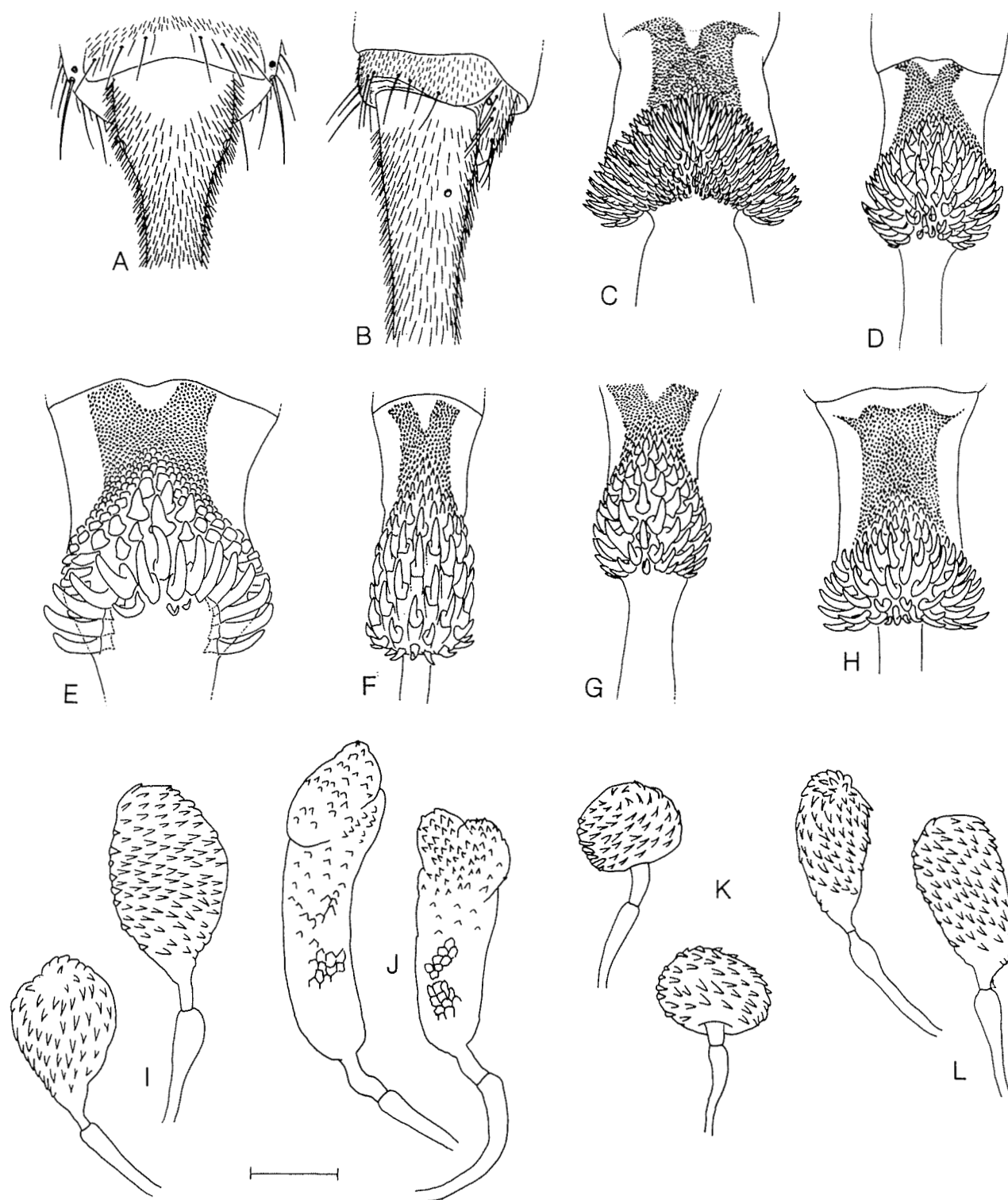


Fig. 6. Female terminalia: A, base of syntergosternite 7, ventral view; B, same, lateral view; C-H, dorsobasal scales of eversible membrane; I-L, spermathecae (2 of 3 shown); A,F-G,K, *pallidipennis*, Colombia, La Mesa; B,D,L, *velezi*, Colombia, Santo Domingo; C, *consobrina*, Estado de Rio de Janeiro; E, *magna*, Colombia, Los Llanos; H, *superflua*, Panama, El Cermeño; I, *curitis*, Brazil, Amazonas; J, *magna*, holotype.

seemannii, J. Zetek 3697, 6♂ 10♀ (USNM); Barro Colorado I., reared ex. *Passiflora ambigua*, 18-19.VI.1938, J. Zetek 4158, 5♂ 1♀ (USNM); Barro Colorado I., reared ex. *Passiflora ambigua*, 6-9.IV.1939, J. Zetek 4348, 8♂ 4♀ (USNM); Barro Colorado I., reared ex. *Passiflora seemannii*, 17-19.VII.1940, J. Zetek 4668, 2♂ 3♀ (USNM).

Anastrepha pallidipennis Greene

Fig. 2B, 5F, 6A,F-G,K, 7H-J

Anastrepha pallidipennis Greene 1934:166 [description, host]; Stone 1942a:32 [in part, revision]; Gonzalez 1952:449 [Colombia]; Foote 1967:14 [in catalog]; Steyskal 1977:9 [in key]; Caraballo 1981:75 [Venezuela]; Norrbom and Kim 1988b:51 [in part; in host list]; White and Elson-Harris 1992:163 [in review of economic spp.].

Anastrepha sp. poss. *pallidipennis*: Yepes and Velez 1989:83.

[not] *Anastrepha pallidipennis*: Couturier et al. 1993:223 [see *curitis*].

Diagnosis. *A. pallidipennis* differs from the other species of the *pallidipennis* complex by the shape of the male outer surstylus (Fig. 5F), which has a large apicomedial lobe. It further differs from *curitis* and *amnis* in lacking microtrichia on most of the scutum, and from *velezi* by its aculeus tip (Fig. 7H-J), which has the apical 2/3 - 4/5 sagittate and serrate. Also see diagnosis of *pallida*.

Description. Mostly yellow to pale orangebrown. Setae dark brown or black. *Head*: 3-4 frontal setae. 2 orbital setae (posterior seta absent only on one side on 4 of 28 specimens examined). Facial carina (Fig. 2B) strong, produced medially, with 1-3 vertical grooves, one of which is usually medial and unpaired; in profile, carina slightly to strongly convex medially. Antenna extended 0.60-0.80 distance to ventral facial margin. *Thorax*: Mesonotum 3.09-4.28 mm long. Scutum without microtrichia except narrowly along transverse suture and post-sutural part lateral to intra-alar seta; mostly yellow, without dark markings; medial white stripe present (although it and other white areas sometimes indistinct), posteriorly rounded and extended laterally to between acrostichal and dorsocentral setae. Scutal setulae yellow. Subscutellum and mediotergite entirely yellow. Katepisternal seta weak, yellow. *Wing* (Stone 1942a pl. 3D): 7.98-10.55 mm long. C- and S-bands narrowly to broadly connected along vein R_{4+5} . V-band complete, not connected to S-band. Vein M strongly curved apically, but well separated from apex of S-band. *Male terminalia*: Outer surstylus (Fig. 5F) with large medial apical lobe. Cercus (proctiger) with lateral crease, sclerotized areas narrowly connected or divided. Aedeagus 9.88-10.70 mm long, 2.78-3.06 times as long as mesonotum. *Female terminalia*: Syntergosternite 7 6.50-8.81 mm long, 1.79-2.34 times as long as mesonotum; spiracle 0.46-0.62 mm from base, this distance 0.13-0.18 times as long as mesonotum. Eversible membrane with dorsobasal hook-like scales (Fig. 6F-G) in oval or rounded triangular pattern. Aculeus 5.48-7.44 mm long; tip (Fig. 7H-J) 0.37-0.51 mm long, 0.12-0.14 mm wide, apical 0.67-0.78 serrate, serrate part elongate sagittate. Spermathecae (Fig. 6K) spherical.

Remarks. *Passiflora quadrangularis* L., commonly known as badea, is a host in Colombia. The specimens that Couturier et al. (1993) reported from *Passiflora nitida* H.B.K. and a *Passiflora* sp. in Brazil and Peru are *curitis*, and the host records of *P. ambigua* and *P. seemannii* from Panama in Stone (1942a) refer to *pallida*.

Specimens examined. Holotype - ♀ (USNM), COLOMBIA: Antioquia: Medellín, [reared from] *Passiflora quadrangularis*, 25.VIII.1930, C.H. Ballou. Other specimens - COLOMBIA: Antioquia: Barbosa, reared ex. badea (*Passiflora quadrangularis*), III.1989, F. Yepes, 2♂ 1♀ (USNM); same except 12.XII.1989, 1♀ (USNM); Sta. Rosa de Osos, en badea, V.1988, F.C. Yepes, 1♀ (USNM). Cundinamarca: La Mesa, trampa McPhail mango, 2.IV.1989, G. Sanchez, 4♂ 4♀ (USNM). Valle: Caicedonia, reared ex. *Passiflora* sp., 19.VI.1989, A. Trochez, 2♂ 2♀ (USNM); Palmira, IV,X,XI.1943, B. Losada, 3♂ 4♀ (USNM). VENEZUELA: Aragua: Rancho Grande, 1100 m, 25.VIII.1955, F. Fernandez & C.J. Rosales, 1 (IZAM).

Anastrepha superflua Stone

Fig. 1A-B, 2A, 4C, 5G, 6H

Anastrepha superflua Stone 1942a:33 [description]; Foote 1967:16 [in catalog]; Steyskal 1977:9 [in key]; Norrbom and Kim 1988b:3 [in classification].

Diagnosis. *A. superflua* differs from all other species of the *benjamini* group and the *pallidipennis* complex as follows: katepisternal seta relatively stout; female with aculeus tip parallel-sided until tapered serrate part (other species are nonserrate, or are tapered or slightly broadened before the

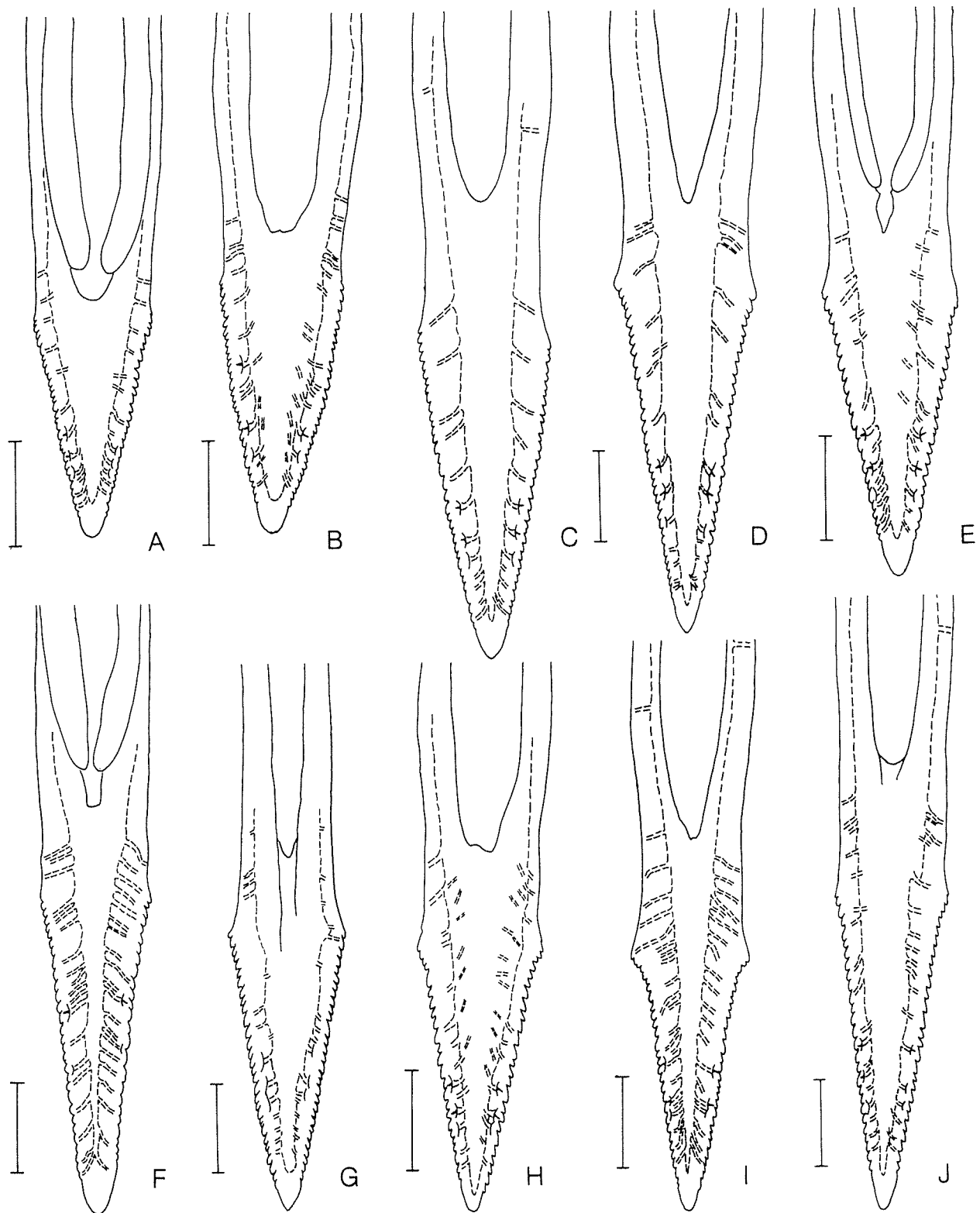


Fig. 7. Aculeus tip, ventral view: A, *amnisi*, Brazil, Itajaí; B, *amnisi*?, Trinidad; C, *curitis*, holotype; D, *curitis*, Peru, Iquitos; E, *curitis*, Brazil, Amazonas; F, *curitis*, Brazil, Pará; G, *pallida*, Panama, Barro Colorado I., ex. *P. seemanni*; H, *pallidipennis*, holotype; I, *pallidipennis*, Colombia, La Mesa; J, *pallidipennis*, Colombia, Palmira.

serrate part); male with epandrium very long in lateral view (Fig. 4C), and with sclerotized areas of cercus broadly connected. The apex of vein M usually meets the costa at a distinct angle, and in the female, the facial carina is especially strongly produced, with the dorsal margin of the produced area usually perpendicular to the plane of the face. The latter two characters distinguish *superflua* from most other species of the *benjamini* group, but they occur to a lesser extent in some specimens of *benjamini*.

Description. Mostly yellow to pale brown. Setae orange to redbrown. *Head*: 3-5 frontal setae. 2 orbital setae. Facial carina (Fig. 1A-B, 2A) strong, produced medially, especially in female, usually with large medial, unpaired groove and often with additional smaller ones (carina with 2 paired grooves only in 3 of 54 specimens examined); in profile, carina strongly convex medially, in female (Fig. 2A) dorsal margin of produced area usually nearly perpendicular to more dorsal part of carina. Antenna extended 0.60-0.80 distance to ventral facial margin. *Thorax*: Mesonotum 3.35-4.74 mm long. Scutum with large areas bare of microtrichia be-

tween medial white stripe and supra-alar seta on presutural part, and between medial and lateral white stripes anterior to dorsocentral seta on postsutural part; mostly yellow, without dark markings, except scuto-scutellar suture often bordered by dark orange or moderate brown band; medial white stripe present (although it and other white areas indistinct in many specimens examined). Scutal setulae yellow. Subscutellum and mediotergite entirely yellow. Katepisternal seta usually almost as large as outer vertical seta, similar in color to other thoracic setae. *Wing* (Stone 1942a pl. 4B): 7.31-11.00 mm long. C- and S-bands connected along vein R_{4+5} . V-band complete, not connected to S-band. Base of S-band with distinct indentation in cell cu_1 . Vein M slightly curved apically, usually meeting costa at distinct angle, well separated from apex of S-band. *Male terminalia*: Epandrium elongate in lateral view (Fig. 4C). Outer surstylus (Fig. 5G) relatively small and blunt. Cercus (proctiger) without lateral crease, sclerotized area broadly continuous (Fig. 4C). Aedeagus 13.60-14.90 mm long, 3.36-4.30 times as long as mesonotum. *Female terminalia*: Syntergosternite 7.9.25-12.57 mm long, 2.25-2.65 times as long as mesonotum; spiracle

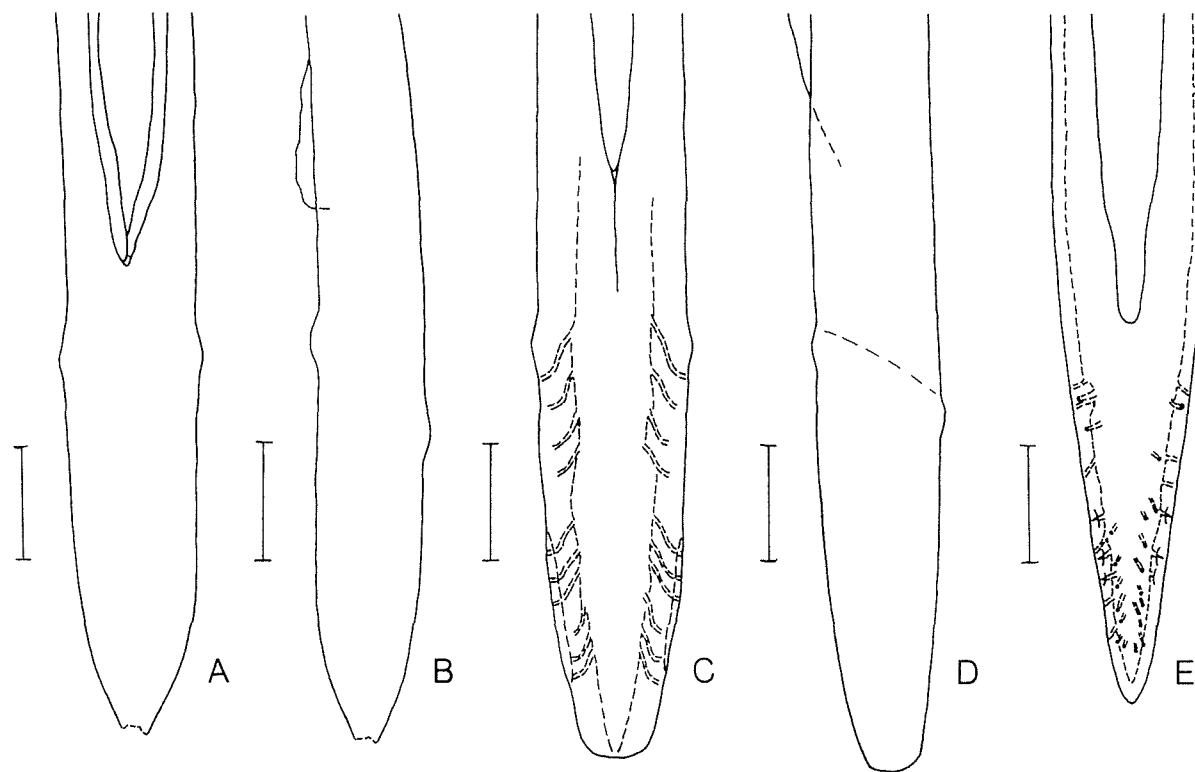


Fig. 8. Aculeus tip: A,C,E, ventral view; B,D, lateral view; A-B, *gigantea*, holotype; C-D, *magna*, Colombia, Los Llanos; E, *velezi*, Colombia, Santo Domingo.

1.67-2.33 mm from base, this distance 0.40-0.48 times as long as mesonotum. Eversible membrane with numerous large hook-like dorsobasal scales (Fig. 6H) in rounded triangular pattern. Aculeus 8.97-12.26 mm long; tip (Stone 1942a, Fig. 4A) 0.28-0.32 mm long, 0.14-0.18 mm wide, parallel-sided basally, apical 0.59-0.66 serrate and triangular. Spermathecae spherical to ovoid.

Remarks. This species is known only from Costa Rica and Panama and its host plants are unknown.

Specimens examined. Holotype - ♀ (USNM), PANAMA: El Cermeño, 20.VI.1939, J. Zetek 4459. Other specimens - COSTA RICA: Guanacaste: Est. Pitillo, 700m, VIII.1994, P. Rios, 2♂ (INBio 2050755, 2050772). PANAMA: Arraijan, V.1949, Zetek 5405, 5♂; same, 25.V.1950, Zetek 5461, 1♀. Balboa, VII.1944, Zetek 5150, 2♀; Balboa, VII.1945, Zetek 5208, 4♂; Balboa, IX.1945, Zetek 5216, 2♂; Balboa, Amador Rd., 20.VII.1939, Zetek 4522, 1♀ paratype; Barro Colorado I., VI-IX.1945, Zetek 5204, 5205, 5206 or 5211, 9♂; El Cermeño, V-VIII.1939, Zetek 4425, 4466, 4468, 4479, 4501 or 4543, 2♂ 7♀ paratypes; same, VI-VII.1940, Zetek 4660, 4663, 4665 or 4666, 5♂ 10♀; La Campana, 23.V.1939, Zetek 4404, 3♂ 1♀ paratypes; Rio Abajo, 4.V.1940, C. Vilagra, 1♀ (all USNM).

Anastrepha velezi Norrbom, new species

Fig. 2C, 3D, 5H-I, 6B,D,L, 8E

Diagnosis. *A. velezi* differs from all other species of the *pallidipennis* complex by its extremely weak facial carina (Fig. 2C) and nonserrate aculeus tip (Fig. 8E). It differs from *curitis* and *amnis* in lacking microtrichia on most of the scutum. The male outer surstylus (Fig. 5H-I) is longer than in *pallida* (Fig. 5D-E), and is broader, but it is without a distinct medial lobe as in *pallidipennis* (Fig. 5F). In the key of Steyskal (1977), *velezi* runs to p. 13, to *scobinae* Stone or *mucronota* Stone, which differ from *velezi* in the location of the spiracle of syntergosternite 7 (distance from base at least 0.30 times length of mesonotum). *A. scobinae* further differs in having the mesonotum almost entirely microtrichose, and *A. mucronota* also differs in outer surstylus shape (tapered to a narrow, apicolateral lobe).

Description. Mostly yellow to pale brown. Setae dark brown or black. *Head*: 3-4 frontal setae. Usually 1 orbital seta (1♀ with posterior seta present

on only right side). Face (Fig. 2C) almost flat, carina weak, without grooves, in profile concave medially. Antenna extended 0.60-0.80 distance to ventral facial margin. *Thorax*: Mesonotum 2.75-3.54 mm long. Scutum without microtrichia except postsutural part lateral to intra-alar seta; mostly yellow, without dark markings; medial white stripe absent (even in specimens with distinct sublateral white stripe). Scutal setulae brown. Subscutellum and mediotergite entirely yellow. Katepisternal seta weak, short or long, pale to moderate brown. *Wing* (Fig. 3D): 7.65-8.48 mm long. C- and S-bands separated or connected along vein R_{4+5} . V-band complete, not connected to S-band. Vein M strongly curved apically, but well separated from apex of S-band. *Male terminalia*: Outer surstylus (Fig. 5H-I) moderately long, bluntly rounded or slightly acute apically, without large medial lobe. Cercus (proctiger) with lateral crease, sclerotized areas divided. Aedeagus 6.90-7.10 mm long, 2.23-2.37 times as long as mesonotum. *Female terminalia*: Syntergosternite 7 5.45-6.48 mm long, 1.68-2.05 times as long as mesonotum; spiracle (Fig. 6B) 0.60-0.70 mm from base, this distance 0.20-0.22 times as long as mesonotum. Eversible membrane with hook-like dorsobasal scales (Fig. 6D) in rounded triangular pattern. Aculeus 4.82-5.48 mm long; tip (Fig. 8E) 0.37-0.45 mm long, 0.12-0.13 mm wide, nonserrate, evenly tapered. Spermathecae ovoid (Fig. 6L).

Remarks. Except for the two paratypes from Urrao, the type specimens are teneral and apparently were reared from *P. ligularis* Juss., although their labels do not specifically state that they were reared. This species is named for Prof. Raul Velez Angel.

Holotype. ♀ (USNM), COLOMBIA: Antioquia: Sto. Domingo, *Passiflora ligularis*, 24.VII.1989, D. Lopez. Paratypes. COLOMBIA: Antioquia: Sto. Domingo, *Passiflora ligularis*, 24.VII.1989, D. Lopez. 3♂ 2♀ (CTLN, USNM); Sto. Domingo, en granadilla, XI.1989, F.C. Yepes, 1♂ 3♀ (USNM, UNCM); Urrao, 1800 m, en flores de granadilla, IV.1986, F. Yepes, 1♂ (UNCM); same, perforando fruto de granadilla - *Passiflora ligularis*, 1♀ (USNM).

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