The genus *Aphrastomyia* Coher & Lane, 1949 in Costa Rica (Insecta: Diptera: Mycetophilidae)

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Abstract. The genus *Aphrastomyia* Coher & Lane, 1949 is shown to be present in Costa Rica with seven species, which are described as new to science: *A. biocellata* sp. n., *A. brevicornis* sp. n., *A. communis* sp. n., *A. flavicornis* sp. n., *A. longirostris* sp. n., *A. quadrilineata* sp. n., and *A. solitaria* sp. n. Based on new information on the adult morphology in these species, the description of the genus is supplemented. Even though two infrageneric lineages are recognisable, *Aphrastomyia* is shown to be a systematic entity quite distinct from other mycetophilid genera. Its peculiar morphology is discussed in a phylogenetic context. A key to the Costa Rican species of *Aphrastomyia* is given.

Kurzfassung. Die Gattung *Aphrastomyia* Coher & Lane, 1949 in Costa Rica (Insecta: Diptera: Mycetophilidae). Die Gattung *Aphrastomyia* Coher & Lane, 1949 wird mit sieben Arten aus Costa Rica gemeldet, die als neu für die Wissenschaft beschrieben werden: *A. biocellata* sp. n., *A. brevicornis* sp. n., *A. communis* sp. n., *A. flavicornis* sp. n., *A. longirostris* sp. n., *A. quadrilineata* sp. n. und *A. solitaria* sp. n. Auf Grundlage neuer Informationen über die Morphologie adulter Tiere wird die Gattungsbeschreibung ergänzt. Obwohl zwei Artengruppen erkennbar sind, wird gezeigt, dass *Aphrastomyia* eine systematische Einheit darstellt, die sich deutlich von anderen Mycetophiliden-Gattungen unterscheidet. Ihre besondere Morphologie wird in einem phylogenetischen Kontext diskutiert. Es wird ein Bestimmungsschlüssel der *Aphrastomyia*-Arten von Costa Rica vorgelegt.

Key words. Insecta, Diptera, Mycetophilidae, genus *Aphrastomyia*, new species, Neotropical region, Costa Rica.

Introduction

To present knowledge, the genus *Aphrastomyia* Coher & Lane, 1949 is among the less speciose genera of mycetophilids, the distribution of which is confined to the New World. Four species were described to date: *A. cramptoni* Coher & Lane, 1949 (from Brazil); *A. shannoni* Lane, 1956 (Peru, Brazil); *A. cerqueirei* Lane, 1961 (Brazil); and †*A. planistylus* Baxter in Baxter & Poinar, 1994 (Dominican amber). Additionally, two unnamed species are known to occur in eastern North America (VOCKEROTH 1981) and on the Antilles (MATILE 1978). In Central America the presence of *Aphrastomyia* was not known so far, but could be anticipated from the fragmentary distribution pattern described above. In the course of studies of various Sciaroidea groups in Costa Rica, the senior author identified seven *Aphrastomyia* species, which turned out to be new to science and are described in the following. These findings, in a territory as small as Costa Rica, leave no doubt that *Aphrastomyia* is not at all the species-poor genus that it previously seemed to be. Instead, *Aphrastomyia* is another case illustrating the wealth of the Costa Rican, and Neotropical, fungus gnat fauna and how little is known about it.

Since its description, the genus *Aphrastomyia* was classified with the Leiini in Mycetophilidae-Sciophilinae, a position not doubted subsequently (PAPAVERO 1978, BECHEV 2000). MATILE (1978) saw his Afrotropical genus *Mohelia* Matile, 1978 very close to *Aphrastomyia*, mainly because these two genera share an identical wing venation. However, as repeatedly indicated in mycetophilid literature, the monophyly of Leiini sensu EDWARDS (1925), and phylogenetic interrelationships of the genera included therein, should be carefully re-analysed. With such a final goal in mind, the present article aims to provide broader and more detailed information on one of the least known leiine genera in the Neotropics. The peculiar combination of morphological characters found in the species of *Aphrastomyia* will certainly enrich the phylogenetic discussion on leiine interrelationships.

Material and Methods

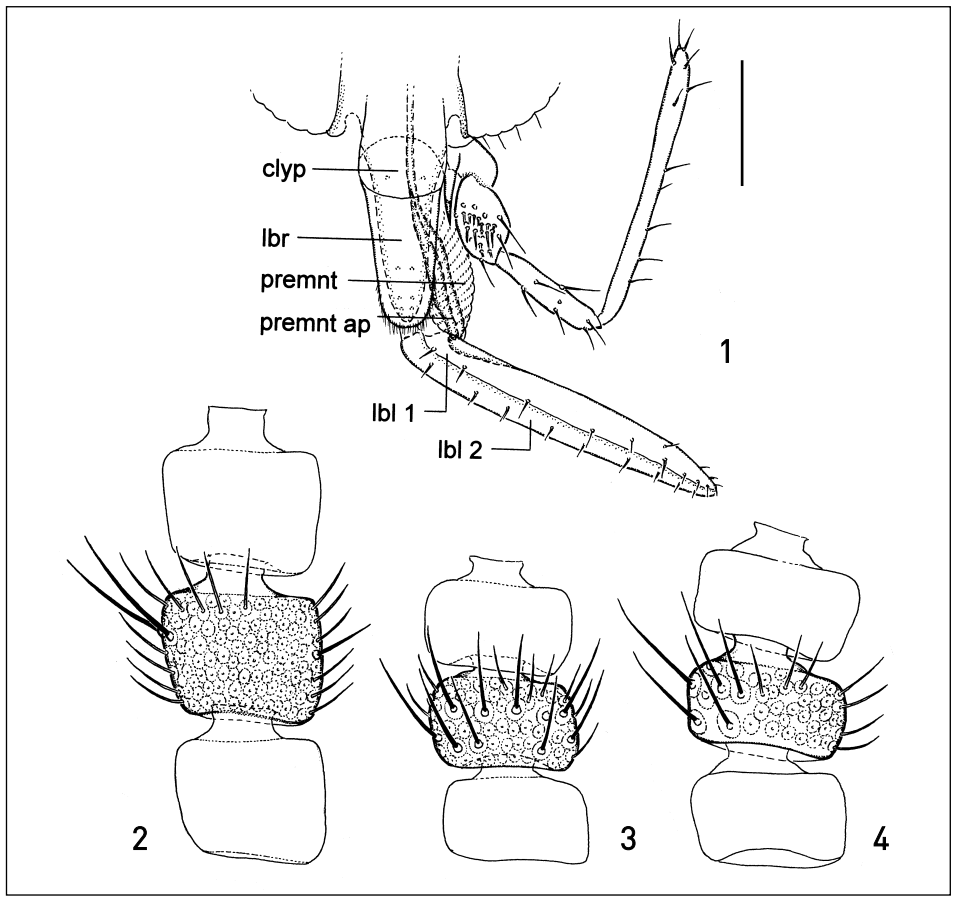
Specimens of the new species were picked from unsorted Malaise trap samples in the care of the Instituto Nacional de Biodiversidad (INBio), Santo Domingo, Costa Rica. Type specimens were macerated in cold 10 % KOH, dehydrated in ethanol, treated with beechwood creosote and mounted on microscopic slides in Canada balsam. Other specimens were stored in 70 % ethanol. All types are deposited in the INBio collection, additional material is kept in the Staatliches Museum für Tierkunde, Dresden, Germany. Usage of morphological terminology follows that of SÖLI (1997). Drawings were made using an Olympus BX50 microscope in combination with the U-DA drawing unit.

Genus *Aphrastomyia* Coher & Lane, 1949

Supplement to description (see COHER & LANE 1949)

Stout mycetophilids about 2.5 mm in length, with vividly yellow and brown colouration and extended mouthparts.

Head. Head capsule, seen laterally, with pointed vertex; foramen situated far dorsally resulting in clearly 'hanging' type of head. Median convexity of postgenae largely developed. Antenna with scape and pedicel subequal in size; both setose, scape with 1 large dorsal seta, pedicel with 1 very large dorsal seta. Flagellum in males shorter to longer than mesonotum; in females shorter than, or as long as, mesonotum. Male flagellomeres (Figs 2, 4) dorsally with one to several seta(e), flagellomeres 1-2(-4) ventrally usually with 1(-2) short seta(e). Female flagellomeres (Fig. 3) with numerous setae all over. In both sexes, flagellomeres with short stems, and nodes wider than long; node densely covered with short trichia, bases of trichia giving polygon-like pattern. Eyes large, its median margin with shallow incision above antennal socket; with numerous interommatidial setulae. Ocelli two or three, lateral ocelli far away from eye margins; when numbering three, ocelli arranged in narrow triangle with medial ocellus clearly smaller. Sometimes with row of strong bristles behind hind eye margin. Vertex setose, with 1-3 pairs of bristles pointing anteriorly. Frontal furrow deep. Frontal tubercle present, one-pointed. Face subtriangular to subtrapezoid, setose, somewhat larger than, or as large as, clypeus. Clypeus setose or non-setose. Proboscis (Fig. 1) lengthened due to extension of labrum, hypopharynx and labium; labellum articulating with premental apodeme and folded inwardly in many specimens seen. Labrum rounded apically; usually non-setose. Prementum present as two long, non-setose, membranous lobes bearing even rows of microtrichia, with premental apodeme in between, latter channel-like with long, possibly tube-like process. Stipes non-setose. Lacinia present as bare style. Maxillary palpus 4-segmented with one non-setose palpomere present proximal of palpomere 3; palpomere 3 stout, with setae and hair-like sensilla scattered over inner surface, or concentrated in pit; palpomeres 4 and 5 setose, elongate cylindrical, 4 much shorter than 5; palpomere 5 with short, spine-like setae usually concentrated apically and on slight swelling subbasally.



Figs 1-4: Mouthparts and antennal flagellomeres in *Aphrastomyia* spp.; 1: proboscis and right maxillary palpus in *A. longirostris* sp. n. (0.1 mm); 2: flagellomeres 3-5 in *A. communis* sp. n., male, lateral view (0.05 mm); 3: ditto, *A. communis* sp. n., female; 4: ditto, *A. quadrilineata* sp. n., male. 1: paratype from Fila Ceniza; 2: paratype from Cerro Rincón; 3: paratype from Hitoy Cerere; 4: paratype. Abbreviations: clyp = clypeus; lbl = labellum; lbr = labrum; premnt = prementum; premnt ap = premental apodeme. In parentheses: length of scale bar.

Thorax (Fig. 5). Antepronotum and proepisternum with suture in between, both setose; antepronotum with 3 bristles pointing anteriorly. Proepisternum anteriorly fused with basisternum 1, latter non-setose. Proepimeron large, extending along entire hind margin of proepisternum; bare. Ventral portion of proepimeron fitting into excavation in mesepisternum. Anepisternum little smaller than preepisternum 2, both non-setose; anapleural suture incomplete. Preepisternum 2 covering most basal portion of mid coxa. Anepimeron large, narrowed ventrally and occupying space between preepisternum 2 and laterotergite. Laterotergite ovate, protruding, setose along posterior margin. Mediotergite, metepimeron and metepisternum non-setose. Scutum evenly setose; with several bristles laterally, dorsolaterally and postero-dorsally. Scutellum with 1-2 pairs of large bristles. Wing. Membrane with brown tinge, sometimes clouded apically. R1 maximally as long as ta, usually shorter. Veins with dorsal setae on R, R1 except distally, R5, ta, branches of M and CuA, occasionally

Fig. 5: Thorax in *A. brevirostris* sp. n., lateral view. Paratype. Length of scale bar = 0.5 mm.

also on tb most distally and CuA-stem distally; without ventral setae. Halter club-shaped; stem short, pale, setose distally; knob dark, setose. Legs. Stout. Front coxa entirely setose anteriorly; mid coxa setose in distal half; hind coxa with a few setae most distally. Hind femur large and strongly flattened. Tibiae with most trichia and setae arranged in rows, largest setae maximally as long as tibial diameter. Fore tibia little shorter than femur; with large setae few in number and confined to subapical portion; anteroapical depression with distal comb of 7-9 short setae. Mid tibia with up to three sparse, longitudinal rows of large setae; antero-subapically with dense, straight comb of stiff setae. Hind tibia with two long rows of large setae; antero-subapically with dense, oblique comb of stiff setae. Tarsal trichia and setae in rows. Tarsal claws with 1 tiny and 1 large tooth inside and thus seemingly split into two branches. Empodia as long as claws, narrow. Pulvilli absent.

Abdomen. Sternite 1 non-setose, all other sclerites evenly setose. In segments 1-5, tergites and sternites subequal in length. In male, segments 6-8 telescoped, with at least sternites 7-8 clearly longer than corresponding tergites. In female, segments posterior of 5 telescoped.

Terminalia. Male (based on Costa Rican species; Figs 7-23). Sternite 9 traceable as partially independent sclerite, but anteriorly fused with gonocoxites, large, roughly U-shaped, with large setae. Gonocoxites with comparatively narrow portions ventrally and short portions dorsally, with large setae on outer surfaces; with 2 expansive lobes interiorly; lobes interconnected among one other, with gonostyli and, through sclerotized, V-shaped bridge, with

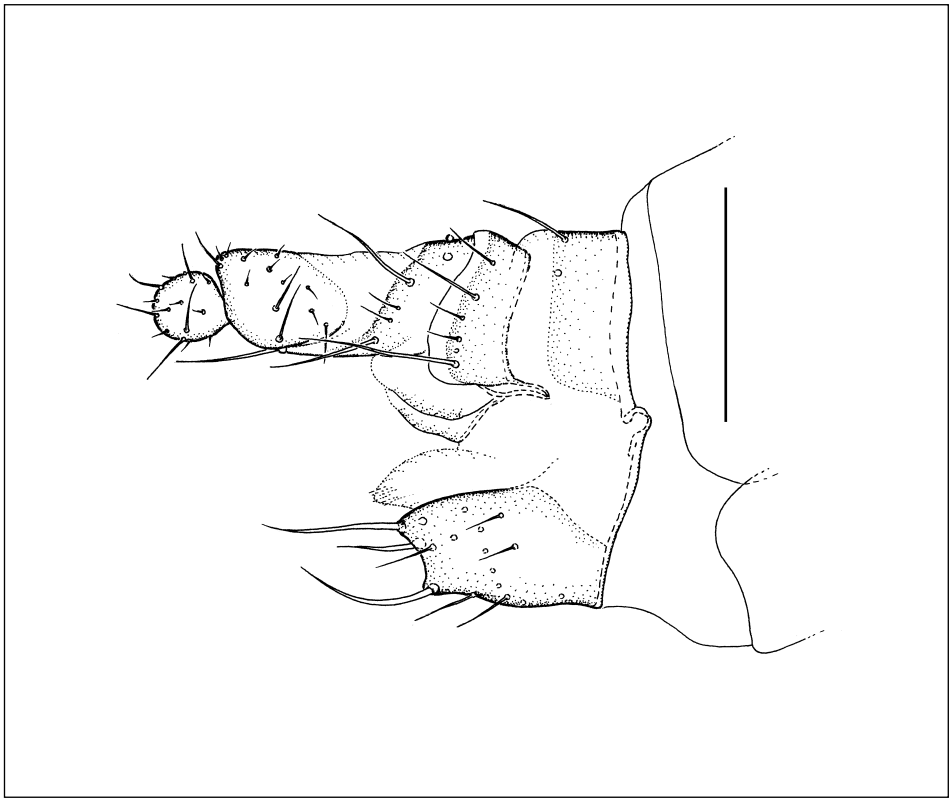


Fig. 6: Female terminalia in *A. communis* sp. n., lateral view. Paratype from Sendero Arboles Caídos. Length of scale bar = 0.2 mm.

sternite 9; dorsal gonocoxal apodemes interconnected by narrow, sclerotized bridge. Gonostylus large, posteriorly orientated, with large setae on outer surface; among other structural modifications, with lobe, or process, dorso-subbasally. Aedeagus, presumably including parameres, making up extremely complex, strongly sclerotized structure; in ventral view elongate, with variously folded and lobed structurity apically and short ejaculatory apodeme far basally; in lateral view with apical portions largely expanding dorsally. Tergite 9 broader than gonocoxites, shaped roughly like inverted trapezoid; distal margin with emargination associated with striking, more heavily sclerotized portions, or even lobes or processes; setose. Cerci ovate, broadly rounded apically, with setae apically and dorsally. Hypoproct weaker than cerci, bi-lobed, at apex of either subtriangular lobe with 1 small and 1 large seta. Female (Fig. 6). Tergite 8 short, with row of setae along posterior margin. Gonocoxite 8 extending posteriorly up to proximal cercus segment, setose, with several bristles apically. Gonapophysis 8 large, very thin and pale. Tergite 9 almost as long as tergite 8, with numerous setae along posterior margin. Gonocoxite 9 largely reduced. Gonapophysis 9 present as bare, poorly sclerotized interior structure. Tergite 10 short but distinct, setose; with narrow, setose process posteriorly, presumedly representing sternite 10. Cerci 2-segmented; in lateral view, proximal segment subrectangular and distal segment slightly ovate, proximal segment little longer than distal, both setose with some dorsal setae short and spine-like.

Discussion

As shown in the species paragraphs below, morphology in *Aphrastomyia* species is comparatively uniform; by other words, *Aphrastomyia* as such is easily recognisable. A brief diagnosis of the genus includes the following characters: (1) the presence of dorsal setae on the antennal flagellum; (2) an extended proboscis; (3) the wing venation with Sc short and running into R; R1 short; R4 absent; and both anterior and posterior forked veins complete; and (4) the trichia on tibiae and tarsi arranged in longitudinal rows. The question of the number of ocelli occurs in all discussions of *Aphrastomyia* (MATILE 1978; BAXTER & POINAR 1997), but as shown here, both the two- and three numbered condition is met. Beyond these diagnostic characters, there are other peculiarities of – as we presume – phylogenetic significance: (A) the presence of a synsclerite made up of proepisternum and basisternum 1; (B) the considerably enlarged proepimeron; and (C) the lack of ventral setae on all wing veins including the radial branches. All these and other characters should be analysed in a broad context, i.e. with the 'leiine problem' in mind, but for now we can only support MATILE´s (1978) view on the close relationship of *Aphrastomyia* and *Mohelia*, and *Aphrastomyia*+*Mohelia* and *Megophthalmidia* Dziedzicki, with *Mohelia* known to us only from the literature.

Phenology

Species of *Aphrastomyia* were found in Costa Rican forests in altitudes between about 200 to 2500 metres. Therefore, we assume that representatives of this genus can be found wherever forests are present. Nothing can be said about the quality of the respective kind of forest, or whether more open habitats are strictly avoided. Considered the scarce collection data, one should also avoid to make rash generalisations on spatial or temporal patterns in the occurrence of individual species. Individuals of *Aphrastomyia* species have never been collected in large quantities, and numerous insect samples from mature, natural forests did not contain a single specimen. The seven species dealt with here are represented by a total of 53 individuals, which were found among ten thousands of other fungus gnats. We expect that continued study in Costa Rica will reveal the presence of even more species of *Aphrastomyia*, not to mention the South American continent at large and the diversification of the genus in this region.

Infrageneric relationships

Based on characters of the male terminalia, two species groups are recognisable. One group includes *Aphrastomyia biocellata*, *brevicornis* and *quadrilineata* and is characterized by bi-lobed gonostyli, with the outer lobe bearing an almost bare process inside; by the ventral gonocoxal lobes stout and pointing inwardly; and by the dorsal gonocoxal lobes broad and with a process orientated dorsally. Within this group, *A. biocellata* and *quadrilineata* are most similar to one other and may be considered sister-species. The other group is made up of *A. communis*, *flavicornis* and *longirostris*. These species share a similar outline of gonostyli; slender, posteriorly orientated ventral gonocoxal lobes; and mainly posteriorly orientated dorsal lobes. Again, a pair of sister-species is recognisable, *A. flavicornis* and *longirostris*. The infrageneric position of the seventh species, *A. solitaria*, is not absolutely certain due to the somewhat intermediate structure of gonostyli; however, the outline of the gonocoxal lobes speaks for a closer affinity to the species group around *A. communis*.

It is uncertain whether or not previously named, non-Costa Rican species of *Aphrastomyia* fit into one of the species groups identified here, as male terminalia are too insufficiently described, or males were not yet found.

Key to Costa Rican species (males)

LANE (1961) gives an identification key that employs characters, like the colour of antennae, mesonotum and legs. In the key given here, we refer to structural differences between species, because (1) colour may be subject of infraspecific variation; or (2) subject of sexual dimor-

phism; (3) impression of colour, even patterns of 'light' and 'dark', depend on the condition of the study material (dry, or wet, or slide-mounted); and (4) colour may change with time (ethanol-stored specimens becoming paler etc.). With these facts in mind, and considered the increasing number of known species, we refrain from keying *Aphrastomyia* females. Females are known only for a part of the species, and sufficient structural differences are not recognisable. Description of *Aphrastomyia* species based exclusively on females, as done by LANE (1961), should be a thing of the past. As regards males of the Costa Rican species, characters, like the structure and colour of antennae, the length of proboscis, or the colour of mesonotum and abdomen, point the way to proper species identifications. However, characters of the terminalia must be employed in order to become certain on the species identity; with some experience, such characters are recognisable even under a good stereo microscope. As exemplified by the species-pair *Aphrastomyia biocellata* and *quadrilineata*, structural differences between species may be very small and then recognisable only through the high resolution of a compound microscope.

The descriptions of the living non-Costa Rican species of *Aphrastomyia* reveal that *A. cramptoni* differs from the species keyed below by the gonostylus (or gonocoxal lobe?) bearing inside a large, dorsally oriented megaseta. We are unable to interpret the only figure of *Aphrastomyia shannoni* entitled "apical portion of basistyle and dististyle"; however, the verbal description of this species does not match any of the species described here. *Aphrastomyia cerquerai* from the Amazonas basin is known only from the female. Its colouration matches that of our *A. flavicornis*; however, we hesitate to combine female individuals under a common name that originate from two geographical regions that are so far apart.

1 Tergite 9 with pair of strongly sclerotized, pointed processes on posterior margin (Figs 8, 10) **2**
- Tergite 9 without such processes (Figs 12, 14, 17, 20, 23) **3**

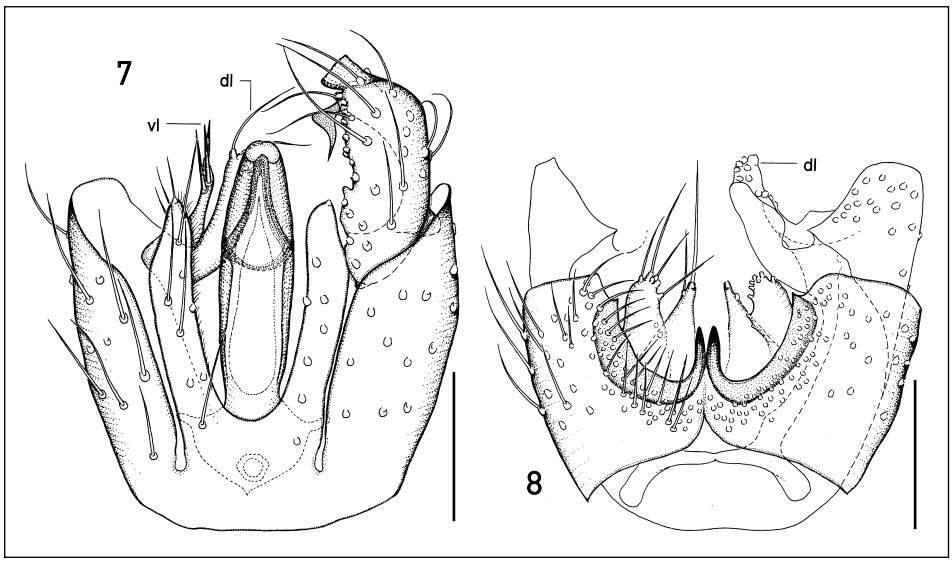
2 Tergite 9 with posterior processes long, situated in deep excavation and neighboured by numerous long setae (Fig. 8); gonostylus with blade-like megaseta inside distally (Fig. 7); antenna yellow at base and brownish distally ..... ***A. longirostris* sp. n.**
- Tergite 9 with posterior processes short, situated in shallow excavation and neighboured by few short setae (Fig. 10); gonostylus distally with 5 claw-like setae sitting on inwardly directed hood (Fig. 9); antenna entirely yellow ..... ***A. communis* sp. n.**

3 Lobes of sternite 9 shorter than gonocoxites (Figs 11, 13); gonocoxal lobes, including setae, pointing posteriorly (Figs 11, 13, 14) **4**
- Lobes of sternite 9 as long as gonocoxites (Figs 15, 18, 21); gonocoxal lobes, including setae, pointing inwardly (Figs 15, 18, 21), or dorsally, respectively (Figs 17, 20, 23) **5**

4 Tergite 9 with 2 strongly sclerotized, slightly projecting, subrectangular lobes on posterior margin (Fig. 12); gonostylus with blade-like megaseta inside distally (Fig. 11); dorsal gonocoxal lobes setose apically (Figs 11, 12) ..... ***A. flavicornis* sp. n.**
- Tergite 9 with 2 weakly sclerotized, projecting, rounded lobes on posterior margin (Fig. 14); gonostylus (Fig. 13) without blade-like megaseta inside distally; dorsal gonocoxal lobes non-setose apically (Fig. 14) ..... ***A. solitaria* sp. n.**

5 Tergite 9 with emargination evenly U-shaped (Fig. 17); gonostylus, in ventral view, elongate and slender, with small sclerotized process dorso-basally (Figs 15, 16); aedeagus poorly sclerotized apically (Fig. 15) ..... ***A. brevicornis* sp. n.**
- Tergite 9 with emargination subrectangular and bearing hairy lobe (Figs 20); gonostylus, in ventral view, short, with large, finger-like process dorso-basally (Figs 18, 19, 21, 22); aedeagus strongly sclerotized apically (Figs 18, 21) **6**

6 Gonostylus inside with pointed process (Fig. 19); gonocoxites extensively setose ventrally (Fig. 18); emargination of tergite 9 with tiny hairy lobe (Fig. 20) ..... ***A. quadrilineata* sp. n.**
- Gonostylus inside with blunt-ending process (Fig. 22); gonocoxites with setae largely confined to ventro-lateral portions (Fig. 21); emargination of tergite 9 with large hairy lobe (Fig. 23) ..... ***A. biocellata* sp. n.**



Figs 7-8: *Aphrastomyia longirostris* sp. n., male. 7: terminalia, left gonostylus and dorsal parts omitted, ventral view; 8: tergite 9, cerci and hypoproct, adjacent parts indicated, dorsal view. Length of scale bar = 0.1 mm. 7: holotype; 8: paratype from Cerro Azul. Abbreviations: dl = dorsal lobe of gonocoxites; vl = ventral lobe of gonocoxites.

Description of species

Aphrastomyia longirostris sp. n. (Figs 1, 7-8)

Description

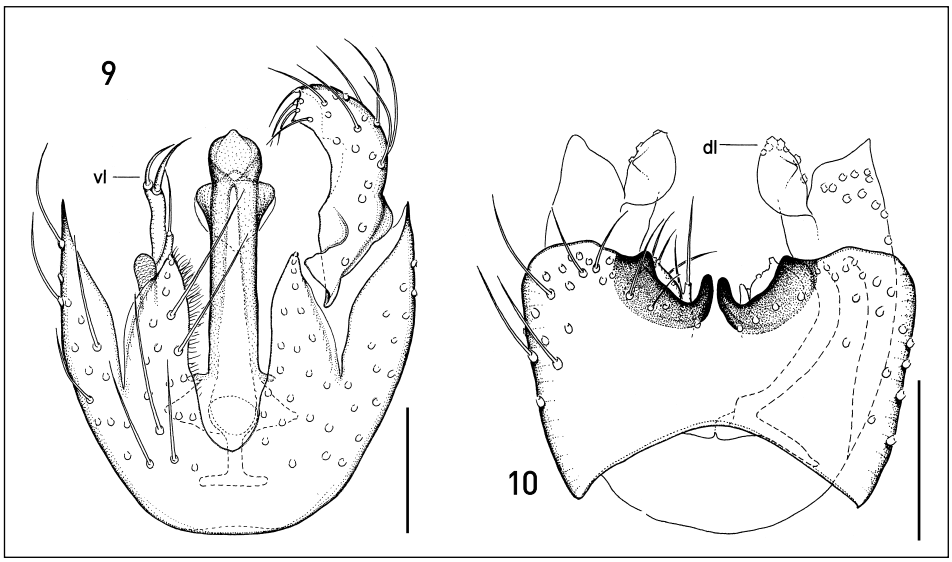
Colouration. Antenna with scapus, pedicellus and flagellomeres 1-4 yellowish, rest of flagellum brownish. Scutum yellowish with 2 broad, brown stripes latero-dorsally and 2 narrow, brown stripes medio-posteriorly. Scutellum brown with yellow medial portion. Mediotergite yellow with 2 broad, brown stripes medially. Pleura yellowish, laterotergite with brownish ventral apex, sclerite at base of halter brownish. Coxae yellow. Femora 1 and 2 yellowish, 3 yellowish with brown tip. Abdominal tergite 1 yellow with brown spot at posterior margin, 2-4 yellow with brown central and posterior portions; sternites 1-4 yellow; segments 5-7 and terminalia brown.

Male. Body length about 2.1 mm. Wing length 1.6 mm.

Head. Antennal flagellum longer than mesonotum; flagellomeres with 1 seta dorsally; flagellomeres 1-2 with 1 ventral seta. Fourth flagellomere with node 1.3 times as wide as long. Ocelli 3. Indistinct row of 5-6 bristles behind hind eye margin. Face as large as clypeus, latter non-setose. Proboscis (Fig. 1) as long as head. Palpomere 3 with scattered hair-like sensilla. Fifth palpomere 2.5 times as long as preceding palpomere.

Wing. Membrane with weakly clouded apical portion.

Terminalia. Sternite 9 (Fig. 7) laterally separate from gonocoxites for long distance, with narrow lobes as long as gonocoxites. Gonocoxites (Figs 7, 8) about as long as wide; 2 lobes interiorly; ventral lobe setose, with 3 spine-like setae apically; dorsal lobe longer, posteriorly directed, with several long setae apically; dorsal gonocoxal apodemes long. Gonostylus (Fig. 7) large, broad in lateral view, excavated inside; with blade-like, pointed megaseta



Figs 9-10: *Aphrastomyia communis* sp. n., male. 9: terminalia, left gonostylus and dorsal parts omitted, ventral view; 10: tergite 9, cerci and hypoproct, adjacent parts indicated, dorsal view. Length of scale bar: 0.1 mm. 9: holotype; 10: paratype from Hitoy Cerere. Abbreviations: dl = dorsal lobe of gonocoxites; vl = ventral lobe of gonocoxites.

distally at inner margin; dorsally with double lobe bearing 2 setae on one sub-lobe and subtriangular, sclerotized process on another. Aedeagus (Fig. 7) projecting posteriorly beyond gonocoxites. Tergite 9 (Fig. 8) with deep emargination; more strongly sclerotized portions running into long, pointed processes medially; with setae of various lengths laterally and along anterior margin of sclerotized portion.

Female. Unknown.

Etymology. The Latin name is composed of 'longus', long, and 'rostrum', beak, referring to the very long proboscis in this species.

Types. Holotype. Male, Costa Rica, Puntarenas province, Corcovado National Park, Fila Ceniza, 260 m, 14 March – 6 April 2003, by Malaise trap, K. Caballero, M. Moraga & A. Azofeifa (INBio sample no. 73513). **Paratypes.** 3 males, same data as holotype; 1 male, Puntarenas province, Cerro Puma, 100–300 m, 19 June – 8 July 2003, by Malaise trap, M. Moraga, A. Azofeifa & K. Caballero (no. 74508); 1 male, Guanacaste province, Nandayure, Bellavista, Cerro Azul, 1050 m, 1 May – 19 July 2003, by Malaise trap, W. Porras & D. Briceño (no. 74645).

Other material (in ethanol). 7 males, same data as the holotype.

Aphrastomyia communis sp. n. (Figs 2, 3, 6, 9-10)

Description

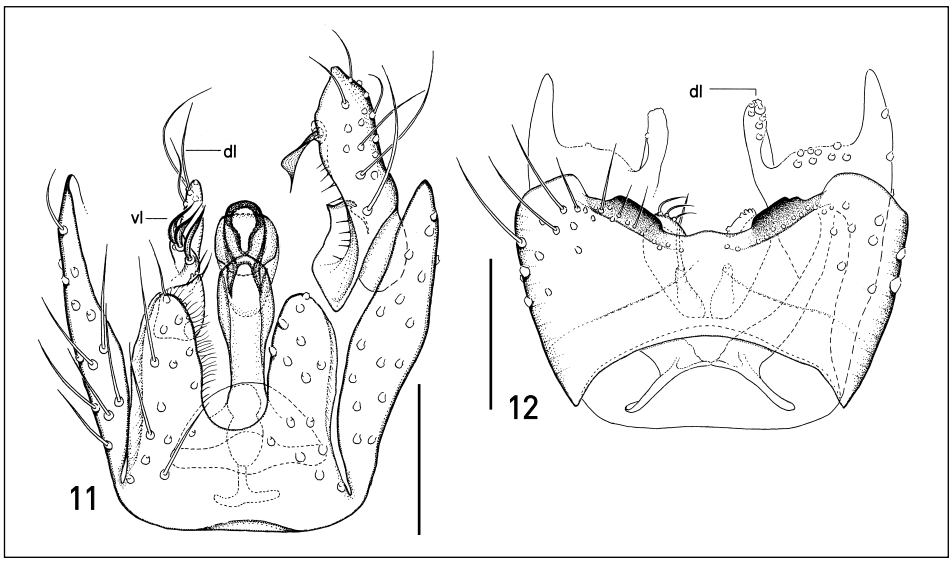
Colouration. Antenna yellow. Scutum yellow with lateral portions brown (lighter posterior of wing base) and 2 narrow, brown stripes medio-posteriorly. Scutellum brown with yellow medial portion. Mediotergite yellow with 2 broad, brown stripes medially. Pleura yellowish, ventral apices of preepisternum 2 and laterotergite brownish, sclerite at base of halter brownish. Coxae yellowish with brownish distal portions (smallest on coxa 1). Femora 1 and 2

yellowish, 3 brown with broad, yellowish medial ring. Male abdominal tergite 1 brown, 2-5 yellow with brownish hind and lateral margins; sternites 1-4 mainly yellow, 5-7 brown. Male terminalia yellow with lobes of sternite 9, dorsal lobes of gonocoxites and gonostyli brown. Female abdomen largely as in male, but tergites 2-5 with brown portions larger and segments 6-7 entirely brown. Female terminalia yellow with gonocoxites 8 brown.
Male. Body length about 2.3 mm. Wing length 1.8 mm.
Head. Antennal flagellum longer than mesonotum; flagellomeres with (1-)2 setae dorsally; flagellomeres 1-2(-4) with 1 seta ventrally (Fig. 2). Fourth flagellomere with node 1.4 times as wide as long. Ocelli 3. Face little larger than clypeus, latter non-setose. Proboscis 0.6 times length of head. Palpomere 3 with scattered hair-like sensilla. Fifth palpomere 1.6 times as long as preceding palpomere.
Terminalia. Sternite 9 (Fig. 9) laterally separate from gonocoxites for short distance; with broad, pointed lobes shorter than gonocoxites; a finger-like process with scaly surface projecting from dorsal wall of either lobe. Gonocoxites (Figs 9, 10) about as long as wide; 2 lobes interiorly; ventral lobe subdivided into two slender portions, one sub-lobe with 1 long seta, other sub-lobe with 2 strong setae; dorsal lobe heavy, posteriorly directed, running into blunt, strongly sclerotized, setose process; dorsal gonocoxal apodemes long. Gonostylus (Fig. 9) large, broad in lateral view, excavated inside; ventral border thin and bare, running apically into inwardly curved hood with 5 claw-like setae; dorsally with double lobe bearing 1 seta on one sub-lobe and sclerotized process on another. Aedeagus (Fig. 9) projecting posteriorly beyond gonocoxites. Tergite 9 (Fig. 10) with shallow emargination; more strongly sclerotized portions running into short processes medially; with setae of various lengths laterally and along anterior margin of sclerotized portion.
Female. Body length about 2.3 mm. Wing length 1.8 mm.
Head. Fourth flagellomere (Fig. 3) with node 1.8 times as wide as long.
Terminalia. See Fig. 6.
Etymology. The Latin species epithet refers to the fact that this species is the most commonly found, and apparently most widespread, among the *Aphrastomyia* species in Costa Rica.
Types. Holotype. Male, Costa Rica, Cartago province, National Park Tapantí-Macizo de la Muerte, Sendero Arboles Caídos, 1500–1600 m, 9 April 2002, by Malaise trap, D. Rubí & C. Hansson (INBio sample no. 67891). **Paratypes.** 1 male, 1 female, same data as holotype; 2 males, Puntarenas province, Corcovado National Park, 800 m S Cerro Rincón, 745 m, 20 Dec.–7 Feb. 2002, by Malaise trap, J. Azofeifa (no. 67159); 1 male, 2 females, Limón province, Biological Reserve Hitoy Cerere, Sendero Espavel, 560 m, 11 March-1 April 2003, by Malaise trap, E. Rojas, B. Gamboa & W. Arana (no. 73628); 1 male, Guanacaste province, Miravalles, Estación Cabro Muco, 1100 m, 23 June–6 July 2003, by Malaise trap, J. Azofeifa, J. Gutiérrez & B. Hernández (no. 74095).
Other material (in ethanol). 2 females, same data as the holotype.

Aphrastomyia flavicornis sp. n. (Figs 11-12)

Description

Colouration. Antenna yellow. Scutum with brown lateral portions and yellowish dorsal portion. Scutellum brown with yellow medial portion. Mediotergite laterally yellowish, medially brown with lighter central portion. Pleura yellowish, sclerite at base of halter brown. Coxae yellowish with brownish distal apices. Femora 1 and 2 yellowish, 3 brownish with broad, yellowish ring medially. Male abdominal tergites 1 mainly brown, 2-5 yellow with brownish lateral and posterior portions; sternite 1-4 yellow, 5-7 brownish. Male terminalia brownish with gonostyli darker. Female abdomen largely as in male, but brown portions larger. Female terminalia yellow with gonocoxite 8 brown.
Male. Body length about 2.4 mm. Wing length 1.8 mm.
Head. Antennal flagellum longer than mesonotum; flagellomeres with 1 seta dorsally; flagellomeres 1-2(-4) with 1(-2) ventral seta(e). Fourth flagellomere with node 1.4 times as



Figs 11-12: *Aphrastomyia flavicornis* sp. n., male. 11: terminalia, left gonostylus and dorsal parts omitted, ventral view; 12: tergite 9, cerci and hypoproct, adjacent parts indicated, dorsal view. Length of scale bar: 0.1 mm. 11: holotype; 12: paratype. Abbreviations: dl = dorsal lobe of gonocoxites; vl = ventral lobe of gonocoxites.

wide as long. Ocelli 3. A row of about 5 bristles behind hind eye margin. Face as large as clypeus, latter non-setose. Proboscis 0.6 times length of head. Palpomere 3 with scattered hair-like sensilla. Fifth palpomere 2.1 times as long as preceding palpomere.

Wing. CuA-stem setose distally.

Terminalia. Sternite 9 (Fig. 11) laterally separate from gonocoxites for long distance, with broad lobes clearly shorter than gonocoxites. Gonocoxites (Figs 11, 12) about as long as wide; 2 lobes interiorly; ventral lobe setose, with 3 short megasetae apically; dorsal lobe more long and slender, posteriorly directed, with several long setae apically, dorsally with broad, setose connection to gonocoxites; dorsal gonocoxal apodemes long. Gonostylus (Fig. 11) large; with blade-like, pointed megaseta distally at inner margin; basally with large lobe running into slender, sclerotized process orientated dorsally. Aedeagus (Fig. 11) almost as long as gonocoxites. Tergite 9 (Fig. 12) with emargination broad and shallow; more strongly sclerotized portions subrectangular, somewhat projecting; with setae of various lengths laterally and along anterior margin of sclerotized portions.

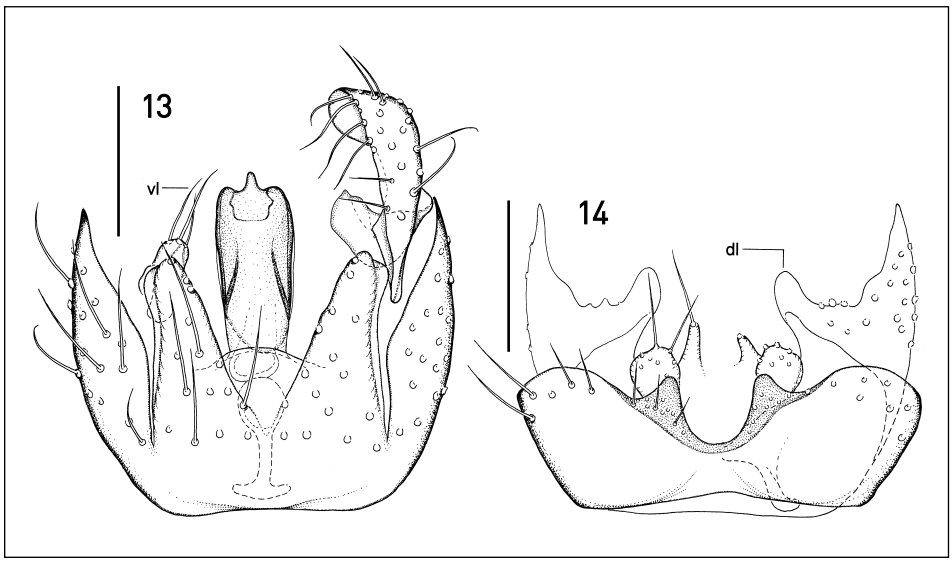
Female. Body length about 2.5 mm. Wing length 1.8 mm.

Head. Fourth flagellomere with node 1.4 times as wide as long.

Etymology. The Latin name is composed of ‘flavus’, yellow, and ‘cornu‘, horn, referring to the entirely yellow antennae in this species.

Types. Holotype. Male, Costa Rica, Puntarenas province, Corcovado National Park, Cerro Rincón, 745 m, 23 April – 24 June 2002, by Malaise trap, J. Azofeifa (INBio sample no. 70843). **Paratypes.** 4 males, 1 female, same data as holotype.

Other material (in ethanol). 2 males, same data as the types (no. 70842); 1 male, same locality as the types, but 1 Aug. – 25 Sept. 2002 (no. 71459); 2 males, Puntarenas province, Cerro Puma, 100–300 m, 19 June – 8 July 2003, by Malaise trap, M. Moraga, A. Azofeifa & K. Caballero (nos 74507–74508); 1 male, Guanacaste province, Nandayure, Bellavista, Cerro Azul, 1050 m, 1 May – 19 July 2003, by Malaise trap, W. Porras & D. Briceño (no. 74645); 1 male, Limón province, Biological Reserve Hitoy Cerere, Sendero Espavel, 300 m, in tall secondary rain forest, 29 Sep. – 10 Oct. 2003, by Malaise trap, M. & C. Jaschhof.



Figs 13-14: *Aphrastomyia solitaria* sp. n., holotype male. 13: terminalia, left gonostylus and dorsal parts omitted, ventral view; 14: tergite 9, cerci and hypoproct, adjacent parts indicated, dorsal view. Length of scale bar: 0.1 mm. Abbreviations: dl = dorsal lobe of gonocoxites; vl = ventral lobe of gonocoxites.

***Aphrastomyia solitaria* sp. n. (Figs 13-14)**

Description

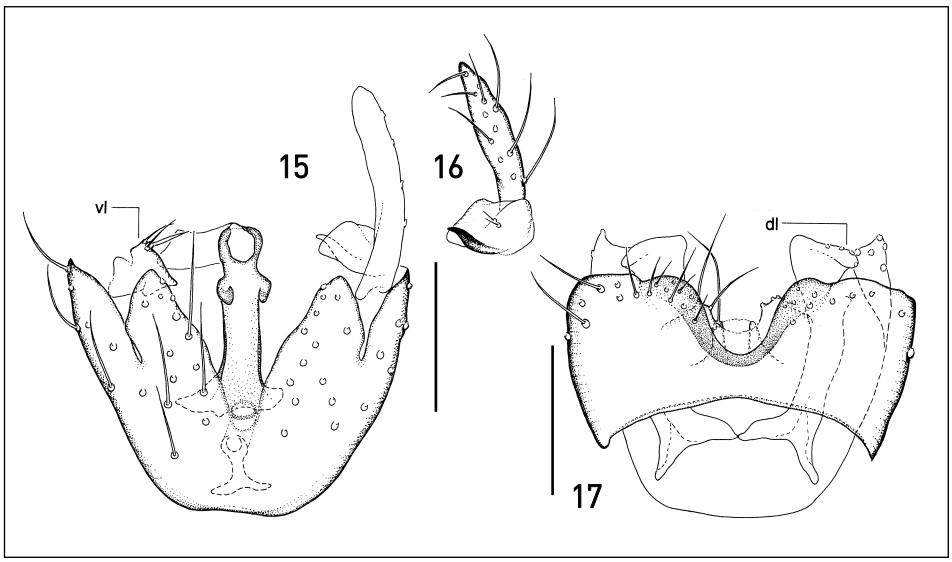
Colouration. Antenna yellow. Scutum brown with 3 yellow stripes dorsally. Scutellum brown with yellow medial portion. Mediotergite brownish with lighter medial portion. Pleura yellowish, ventral portions of preepisternum 2 and laterotergite brownish. Coxae yellowish with brownish distal portions (smallest on coxa 1). Femora 1 and 2 dark yellowish, 3 brown with broad, yellowish medial ring. Abdominal tergite 1 brown, 2-5 brown with yellow anterior edges; sternites 1-4 mainly light brown, 5-7 brown. Male terminalia brown.

Male. Body length about 2.6 mm. Wing length 2.1 mm.

Head. Antennal flagellum longer than mesonotum; flagellomeres 1-4 with 2 setae dorsally, flagellomeres 5-14 with 1 seta dorsally, flagellomeres 1-2 with 1 seta ventrally. Fourth flagellomere with node 1.6 times as wide as long. Ocelli 3. A row of about 5 bristles behind hind eye margin. Clypeus non-setose. Palpomere 3 with scattered hair-like sensilla.

Wing. CuA-stem setose.

Terminalia. Sternite 9 (Fig. 13) laterally separate from gonocoxites for long distance, with broad lobes shorter than gonocoxites, emargination in between lobes deep V-shaped. Gonocoxites (Figs 13, 14) shorter than wide; 2 lobes interiorly; ventral lobe stout, with several setae pointing posteriorly; dorsal lobe running into bare, sclerotized, posteriorly directed process; dorsal gonocoxal apodemes long. Gonostylus (Fig. 13) bi-lobed; outer lobe elongate, setose, apically hood-like turned inwardly; inner lobe situated subbasally, membranous rather than sclerotized, variously folded, with 1 seta. Aedeagus (Fig. 13) projecting beyond gonocoxites posteriorly. Tergite 9 (Fig. 14) with U-shaped emargination; emargination with more strongly sclerotized portions somewhat projecting laterally; with setae of various lengths mainly along distal margin.



Figs 15-17: *Aphrastomyia brevicornis* sp. n., male. 15: terminalia, left gonostylus and dorsal parts omitted, ventral view; 16: gonostylus, dorsal view; 17: tergite 9, cerci and hypoproct, adjacent parts indicated, dorsal view. Length of scale bar: 0.1 mm. 15: holotype; 16-17: paratype. Abbreviations: dl = dorsal lobe of gonocoxites; vl = ventral lobe of gonocoxites.

Female. Unknown.
Etymology. The Latin species epithet means 'lonely', which is an allusion to the fact that only a single individual of this species is known.
Holotype. Male, Costa Rica, Puntarenas province, Buenos Aires, Potrero Grande, La Amistad International Park, Altamira, Cerro Frantzius, 2134 m, 21 Sept.–21 Oct. 2002, by Malaise trap, D. Rubí & M. M. Chavarria (INBio sample no. 72953).

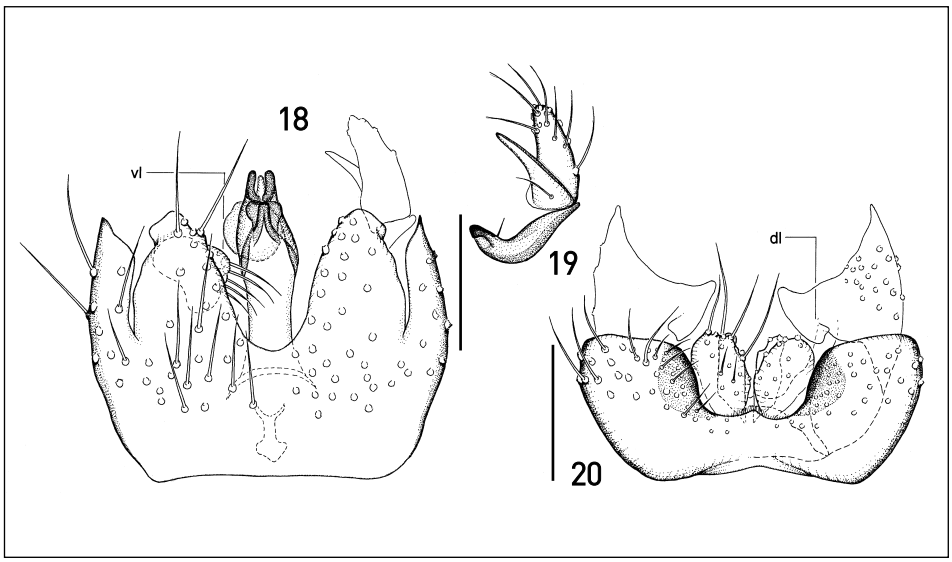
Aphrastomyia brevicornis sp. n. (Figs 5, 15-17)

Description
Colouration. Antenna with scapus, pedicellus and flagellomere 1 yellow, rest of flagellum brownish. Thorax and coxae yellowish. Abdominal tergites 1-5 brown with yellowish anterior edges, 6-7 mainly brownish; sternite 1-4 yellow, 5-7 brownish. Terminalia yellow with brown gonostyli.
Male. Body length about 2.3 mm. Wing length 1.9 mm.
Head. Antennal flagellum shorter than mesonotum; flagellomeres with 2 setae dorsally; proximal flagellomeres without ventral seta(e). Fourth flagellomere with node 1.8 times as wide as long. Ocelli 3. Face as large as clypeus, latter setose. Proboscis 0.7 times length of head. Palpomere 3 with scattered hair-like sensilla. Fifth palpomere 2.7 times as long as preceding palpomere.
Thorax. See Fig. 5. Wing. Membrane with weakly clouded apical portion. CuA-stem setose distally.
Terminalia. Sternite 9 (Fig. 15) laterally separate from gonocoxites for short distance, with broad lobes as long as gonocoxites, emargination in between lobes deep and anteriorly with very weak border. Gonocoxites (Figs 15, 17) about as long as wide; 2 lobes interiorly;

ventral lobe stout, with 2 small and 1 short, strong setae pointing inwardly; dorsal lobe running into sclerotized, dorsally directed, blunt-ending process bearing setae apically; dorsal gonocoxal apodemes long and wide. Gonostylus (Fig. 16) bi-lobed; outer lobe elongate, setose, inside subbasally with short, thin, roundish extension bearing 2 setulae at base; inner lobe finger-like, strongly sclerotized. Aedeagus (Fig. 15) slightly projecting beyond gonocoxites posteriorly. Tergite 9 (Fig. 17) with deep, U-shaped emargination with comparatively poorly sclerotized margins; setae confined to distal and lateral areas of tergal surface.
Female. Unknown.
Etymology. The Latin name is composed of 'brevis', short, and 'cornu', horn, referring to the short antennae in this species.
Types. Holotype. Male, Costa Rica, Cartago province, National Park Tapantí-Macizo de la Muerte, Sendero Arboles Caídos, 1500–1600 m, 9 April 2002, by Malaise trap, D. Rubí & C. Hansson (INBio sample no. 67891). **Paratype.** 1 male, Costa Rica, Cartago province, National Park Tapantí-Macizo de la Muerte, Estación La Esperanza, 2200–2600 m, in cloud forest (oak, *Quercus* spp.), 3–22 Nov. 2003, by Malaise trap, M. & C. Jaschhof.

Aphrastomyia quadrilineata sp. n. (Figs 4, 18-20)

Description
Colouration. Antenna yellowish, somewhat darker towards tip. Scutum yellow with 4 brown stripes and brown shoulders. Scutellum brown with yellow medial portion. Mediotergite brown with lighter medial and lateral portions. Pleura yellowish, laterotergite mainly brownish. Coxa 1 yellow with small brownish distal portion, coxae 2 and 3 yellow with brownish distal halves. Femur 1 yellowish, 2 mainly yellowish, 3 entirely brown. Abdominal tergites 1-5 brown with extensively yellow anterior edges, 6 and 7 mainly brown; sternites 1-4 yellow, 5-7 brown. Terminalia brown.
Male. Body length about 2.6 mm. Wing length 1.8 mm.
Head. Antennal flagellum shorter than mesonotum; flagellomeres with several setae dorsally, fewer in number on distal flagellomeres; first flagellomere with setae all round; flagellomeres 1(-2) with 1(-2) seta(e) ventrally (Fig. 4). Fourth flagellomere with node twice as wide as long. Ocelli 2, with third ocellus still indicated under surface of integument. A row of about 7 bristles behind hind eye margin. Face as large as clypeus, latter setose. Proboscis 0.7 times length of head. Labrum with one to several seta(e). Palpomere 3 with sensory pit. Fifth palpomere 2 times as long as preceding palpomere.
Wing. CuA-stem setose distally.
Terminalia. Sternite 9 (Fig. 18) laterally separate from gonocoxites for short distance, with broad lobes as long as gonocoxites. Gonocoxites (Figs 18, 20) shorter than wide; ventrally with numerous setae on lateral and central portions; 2 lobes interiorly; ventral lobe stout, with numerous setae pointing inwardly; dorsal lobe bare, running into sclerotized, dorsally directed, blunt-ending process; dorsal gonocoxal apodemes short. Gonostylus (Fig. 19) bi-lobed; outer lobe setose, inside with triangular, pointed process bearing 1 seta at base; inner lobe finger-like, curved, with sclerotized apex and 1 erect, preapical setula. Aedeagus (Fig. 18) projecting beyond gonocoxites posteriorly. Tergite 9 (Fig. 20) with emargination broad and deep, medially with weak, hairy projection; more strongly sclerotized portions along either side of emargination; setae covering posterior two thirds of tergal surface.
Female. Unknown.
Etymology. The Latin name is composed of 'quadri-', four, and 'lineatus', lineated, referring to the four brown stripes on the scutum in this species.
Types. Holotype. Male, Costa Rica, Guanacaste province, Nandayure, Bellavista, Cerro Azul, 1050 m, 1 May – 19 July 2003, by Malaise trap, W. Porras & D. Briceño (INBio sample no. 74645). **Paratypes.** 3 males, same data as holotype.
Other material (in ethanol). 3 males, same data as the types.



Figs 18-20: *Aphrastomyia quadrilineata* sp. n., male. 18: terminalia, left gonostylus and dorsal parts omitted, ventral view; 19: gonostylus, dorsal view; 20: tergite 9, cerci and hypoproct, adjacent parts indicated, dorsal view. Length of scale bar: 0.1 mm. 18: holotype; 19–20: paratypes. Abbreviations: dl = dorsal lobe of gonocoxites; vl = ventral lobe of gonocoxites.

Aphrastomyia biocellata sp. n. (Figs 21-23)

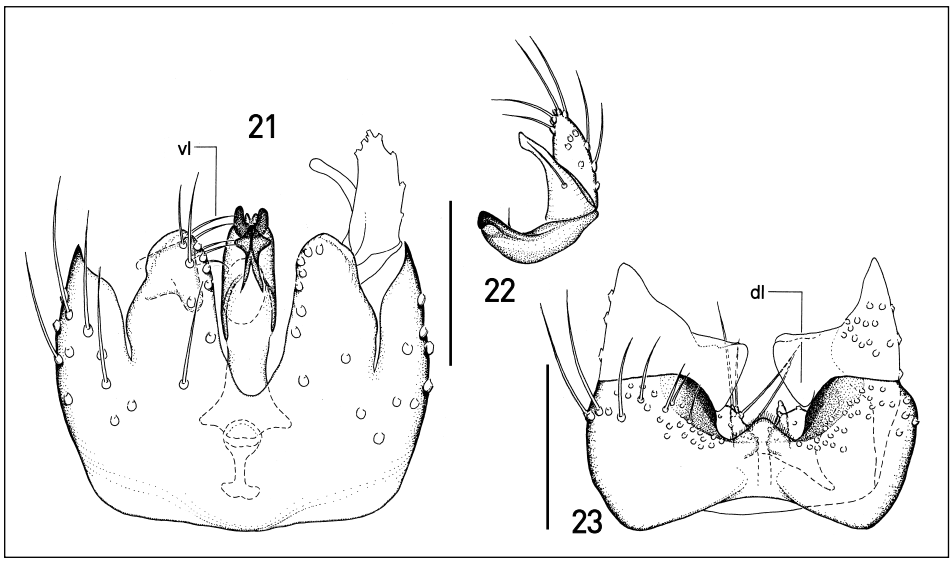
Description

Colouration. Antenna yellowish becoming darker towards tip. Scutum mainly brownish (lighter posterior of wing base) with 3 yellowish stripes medio-posteriorly. Scutellum brown with yellow medial portion. Mediotergite brown. Pleura yellowish, laterotergites brown. Coxa 1 yellowish with small brownish distal portion, coxae 2 and 3 yellowish with brownish distal halves. Femur 1 yellowish, 2 yellowish with brownish distal portion and 3 entirely brown. Male abdominal tergites 1-4 brown with yellowish anterior edges; sternite 1 yellow, 2-4 yellowish anteriorly and brownish posteriorly; segments 5-7 and terminalia brown. Female abdomen largely as in male, but brown portions larger.

Male. Body length about 2.3 mm. Wing length 1.6 mm.

Head. Antennal flagellum shorter than mesonotum; flagellomeres with several setae dorsally, fewer in number on distal flagellomeres; first flagellomere with setae all round, and second flagellomere almost so. Fourth flagellomere with node 1.9 times as wide as long. Ocelli 2. A row of about 7 bristles behind hind eye margin. Face as large as clypeus, latter setose. Proboscis 0.6 times length of head. Palpomere 3 with sensory pit. Fifth palpomere 2 times as long as preceding palpomere.

Terminalia. Sternite 9 (Fig. 21) laterally separate from gonocoxites for short distance, with broad lobes as long as gonocoxites. Gonocoxites (Figs 21, 23) shorter than wide; with setae largely confined to lateral portions ventrally; 2 lobes interiorly; ventral lobe stout, with numerous setae pointing inwardly; dorsal lobe bare, running into sclerotized, dorsally directed, blunt-ending process; dorsal gonocoxal apodemes short. Gonostylus (Fig. 22) bi-lobed; outer lobe setose, inside with blunt-ending process bearing 1 seta dorso-laterally or centrally; inner lobe finger-like, curved, with sclerotized apex and 1 erect, preapical setula. Aedeagus



Figs 21-23: *Aphrastomyia biocellata* sp. n., male. 21: terminalia, left gonostylus and dorsal parts omitted, ventral view; 22: gonostylus, dorsal view; 23: tergite 9, cerci and hypoproct, adjacent parts indicated, dorsal view. Length of scale bar: 0.1 mm. 21: holotype; 22-23: paratype. Abbreviations: dl = dorsal lobe of gonocoxites; vl = ventral lobe of gonocoxites.

(Fig. 21) projecting beyond gonocoxites posteriorly. Tergite 9 (Fig. 23) with emargination broad and deep, medially with distinctive, hairy projection; more strongly sclerotized portions slightly exposed along either side of emargination; setae covering posterio-lateral areas of tergal surface.

Female. Body length about 2.4 mm. Wing length 1.8 mm.

Head. Fourth flagellomere with node 2.1 times as wide as long.

Etymology. The Latin species epithet means 'with two ocelli'.

Types. Holotype. Male, Costa Rica, Limón province, Biological Reserve Hitoy Cerere, Sendero Espavel, 560 m, 11 March – 1 April 2003, by Malaise trap, E. Rojas, B. Gamboa & W. Arana (INBio sample no. 73628). **Paratypes.** 1 male, same data as holotype; 2 males, 2 females, same locality, but 18 Sept. – 7 Oct. 2003, E. Rojas, B. Gamboa, W. Arana, M. & C. Jaschhof.

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