

# Description of *Pintomyia limafalcaoae* and *Pintomyia antioquiensis*, Two New Species of Phlebotomine Sand Fly (Diptera, Psychodidae) from the Colombian Andes

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Two new species of phlebotomine sand fly from Colombian Andes are described, belonging to the subgenus *Pifanomyia* of the genus *Pintomyia*. *P. (P.) limafalcaoae* sp. nov. for which both sexes are described, is assigned to the series *pia* while *P. (P.) antioquiensis* sp. nov., known only from the male, is included in the series *verrucarum*. The subgenus *Pifanomyia* is characterized and identification keys presented for the two new species.

Key words: *Pintomyia (Pifanomyia) antioquiensis* sp. nov. - *Pintomyia (Pifanomyia) limafalcaoae* sp. nov. - Phlebotominae - Psychodidae - taxonomy - Colombian Andes

Two new species of phlebotomine, described below, were captured between December 1997-March 1998, in the province of Montebello, Department of Antioquia, in the Colombian Andes.

## MATERIALS AND METHODS

After clearing by the method described by Forattini (1973) and mounting on microscope slides in Canada balsam medium, the specimens were measured with a Zeiss® eye-piece calibrated according to a standard Zeiss® scale and drawn with the help of an Olympus® clear chamber. All measurements are given in micrometers. The measurements of paratypes are given in parentheses. The species nomenclature is in accordance with Galati (1995).

## DESCRIPTION

*Pintomyia (Pifanomyia) limafalcaoae* sp. nov.  
(Figs 1-16)

Holotype (male): total body length 3085. Whole insect dusky.

Head (Fig. 1): length 375; width 350. Eyes: length 205; width 120 (frontal view). Interocular distance 135. Interocular suture not united with the antennal suture. Clypeus length 125. Antennomere lengths: AIII 380, AIV 160, AV 155, AXV 68 and AXVI 60. Antennal formula AIII-AXV 2; AXVI 0; ascoids simple and short, those on AIV not reaching the middle of the segment (Fig. 3); papilla present on AV (Fig. 4) but absent on AXIII (Fig. 5). Length of the palpomeres: I 38, II 128, III 135, IV 78 V 270; Newstead's spines (*ca.* 7), on median third of palpomere III (Fig. 6) and absent from palpomere II. Labroepipharynx 223 long. Labium with the labial sutures united. Cervix: ventrocervical sensillae present.

Thorax: mesonotum length 590. Pleura with 2 proepimeral setae and 12, 13 upper anepisternal setae; absence of setae on the anterior katepisternum margin and the suture between katepimeron and metepisternum. Wing (Fig. 12): length 2170, width 620. Length of vein sections: *alpha* 530, *beta* 230, *gamma* 240, *delta* 160, *pi* 120, *R*<sub>5</sub> 1340. Length of femora, tibiae, basitarsi and tarsi II+III+IV+V: foreleg 800, 1020, 640, 800; midleg, missing; hindleg 820, 1450, 800, 860.

Abdomen 2678 long. Tergites II-VII with tergal papillae. Terminalia (Fig. 14): gonostyles 127 long, with 4 and 5 major spines (Fig. 15) and one subterminal seta; the spines having the following disposition: one apical, the upper external on the 4th apical of the structure, the lower external and the internal in the middle of the structure (the gonostyle with 5 spines, the extra spine being implanted between the two external ones). Gonocoxite (250 long x 63 wide), with median tuft of *ca.* 12 isolated setae. Paramere simple and concave in the middle of the dorsal margin; dorsal margin length 188 and the ventral margin length 225, with the setae implanted in the 5th apical. Conical aedeagus, dorsal margin length 77 and ventral margin length 100. Lateral lobe length 254; width 28. Genital pump: 150 long; piston length 117 and chamber length 50. Genital filaments length 430 or 2.87 times length of genital pump. Tip of genital filaments simple (Fig. 13). Cercus 195 long.

Allotype (female): total body length *ca.* 2870. General coloration as in the male.

Head (Fig. 2): length 380; width 390. Eyes: length 208; width 126 (frontal view). Interocular suture not united with the antennal suture. Interocular distance 135. Clypeus 120 long. Flagellomeres missing. Palpomere lengths: I 38, II 130, III 158, IV 103, V, missing. Newstead's spines (*ca.* 12), on median 3rd of palpomere III (Fig. 9) and absent from palpomere II. Labroepipharynx 255 long. Cibarium (Fig. 10) with *ca.* 20 reduced anterior teeth, five posterior teeth and lateral teeth very reduced too, pigment patch and posterior bulge not well developed, arch complete. Pharynx (Fig. 10) unarmed. Labium with sutures united. Maxilla: lacinia (Fig. 7) with 3-4 external teeth disposed in a

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Received 25 May 2001

Accepted 12 December 2001

longitudinal row and *ca.* 13 internal teeth. Hypopharynx (Fig. 8) with *ca.* 15 deep apicolateral teeth.

Cervix: ventrocervical sensillae present.

Thorax: mesonotum 670 long. Pleurae with 2, 4 proepimeral setae and 16 upper anepisternal setae. Absence of the setae on the anterior katepisternum margin and the suture between katepimeron and metepisternum. Wing (Fig. 11): length 2370 and width 730. Length of vein sections: *alpha* 600, *beta* 260, *gamma* 270, *delta* 125, *pi* 110, R5 1490. Length of femora, tibiae, basitarsi and tarsi II+III+IV+V: foreleg, missing; midleg 800, 1290, basitarsi and tarsi II+III+IV+V, missing; hindleg 900, 1510, 830, 880.

Abdomen length 1820. Tergite VIII without setae.

Spermathecae (Fig. 16) resemble wrinkled vesicles (25 long x 23 wide) with a much smaller apical ring (5 long x 12 wide); smooth individual ducts, 70 long x 10 wide; smooth common duct, 145 long x 20 wide. Cercus 150 long.

Collection dates and deposition of material type. Holotype male: Montebello, Antioquia Department, Colom-

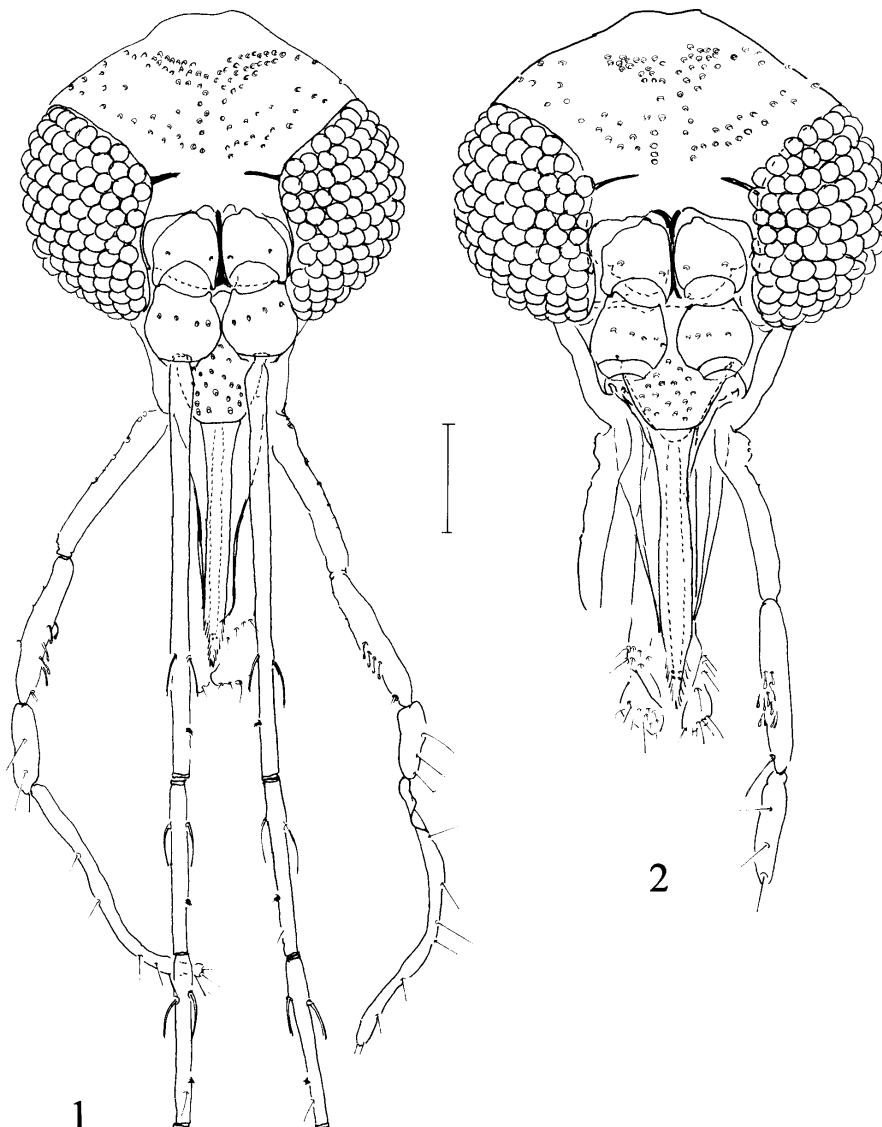
bia, 23.12.1997; allotype female same locality as holotype, 31.3.1998. Holotype and allotype deposited in entomological collection of the Department of Biology, University of Antioquia, Colombia, both captured by M Wolff & P Gutierrez with Shannon trap 18:00-20:00 h.

Locality type: Vereda Savanitas, 37 km SE of Medellin, 2060 m above sea level, 05° 54' 8.4" N and 75° 31' 1.3" W, in area of humid montaine forest on a rock formation containing small caves.

*Pintomyia (Pifanomyia) antioquiensis* sp. nov.  
(Figs 17-26)

Holotype (male): total body length 2650. Insect predominantly pale brown, with mesonotum darker brown.

Head (Fig. 17): length 353 (332, 340; n = 2); width 310 (300; n = 2). Eyes: length 178; width 100 (frontal view) (160, 170 x 93, 90; n = 2). Interocular distance 115 (117, 123; n = 2). Interocular suture not united with the antennal suture. Clypeus length 115 (115; n = 2). Antennomere lengths:

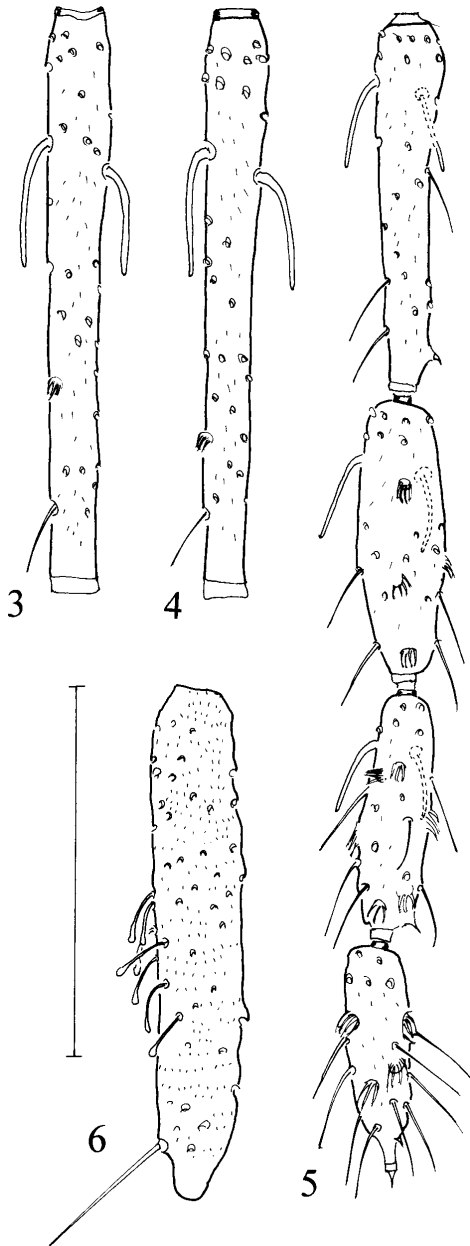


*Pintomyia (Pifanomyia) aldafalcaoae* sp. nov. holotype male and allotype female - Fig. 1: head male. Fig. 2: head female. Bar = 100  $\mu$ m

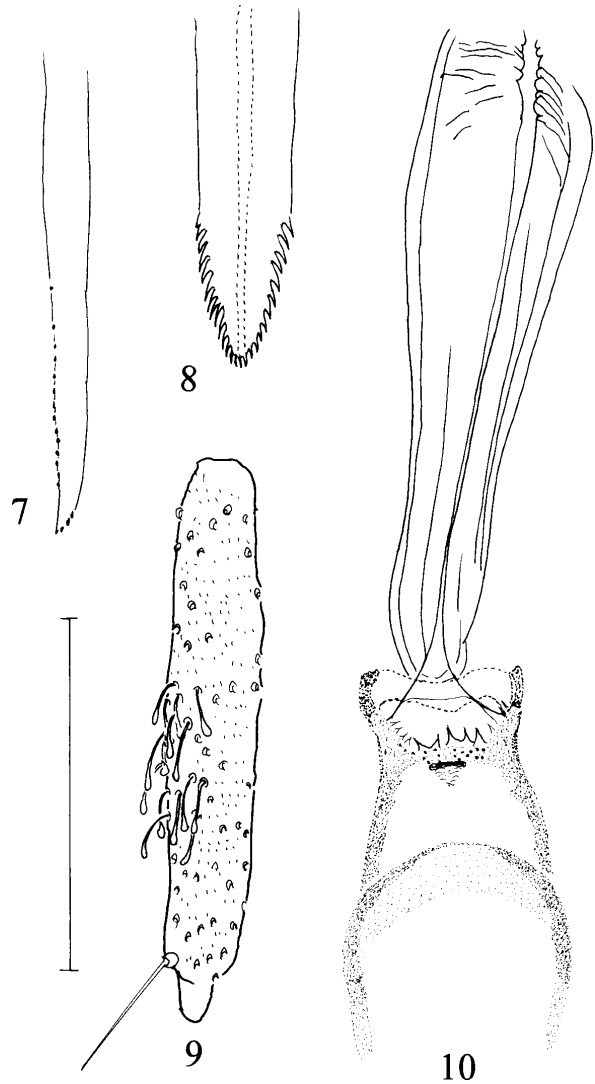
AIII 320 (305, 325; n = 2), AIV 128 (120, 127; n = 2), AV 126 (120, 127; n = 2), AXV 72 (65, 75; n = 2) and AXVI 60 (58, 60; n = 2). Antennal formula AIII-AXIV 2; AXV 1, AXVI 0; ascoids simple and short, those on AIV reaching the middle of the segment (Fig. 19); papilla present in AV (Fig. 19). AXI-AXIII with medial papilla (Figs 20, 21). Length of the palpomeres: I 38 (35, 37; n = 2), II 165 (148, 165; n = 2), III 150 (138, 150; n = 2), IV 122 (98, 120; n = 2), V 357 (305, 370; n = 2); Newstead's spines on median third of the palpomere III (Fig. 18) and absent in the palpomere II. Labroepipharynx 227 long. Cervix: ventrocervical sensillae present.

Thorax: mesonotum length 500 (510, 550; n = 2). Pleura with 1, 2 (1, 2; n = 2) proepimeral setae and 9, 11 (5-9; n = 2) upper anepisternal setae; absence of setae on the anterior katepisternum margin and of the suture between katepimeron and metepisternum. Wing (Fig. 22): length 1860 (1760, 1900; n = 2) and width 510 (480, 500; n = 2). Length of vein sections: *alpha* 460 (400, 430; n = 2), *beta* 160 (160, 190; n = 2), *gamma* 320 (300, 320; n = 2), *delta* 110 (60, 110; n = 2), *pi* 70 (110; n = 2),  $R_5$  1240 (1200, 1250; n = 2). Length of femora, tibiae, basitarsi and tarsi II+III+IV+V: foreleg, missing; midleg 720, 970, 565, 680; hindleg 750, 1150, 640, 760.

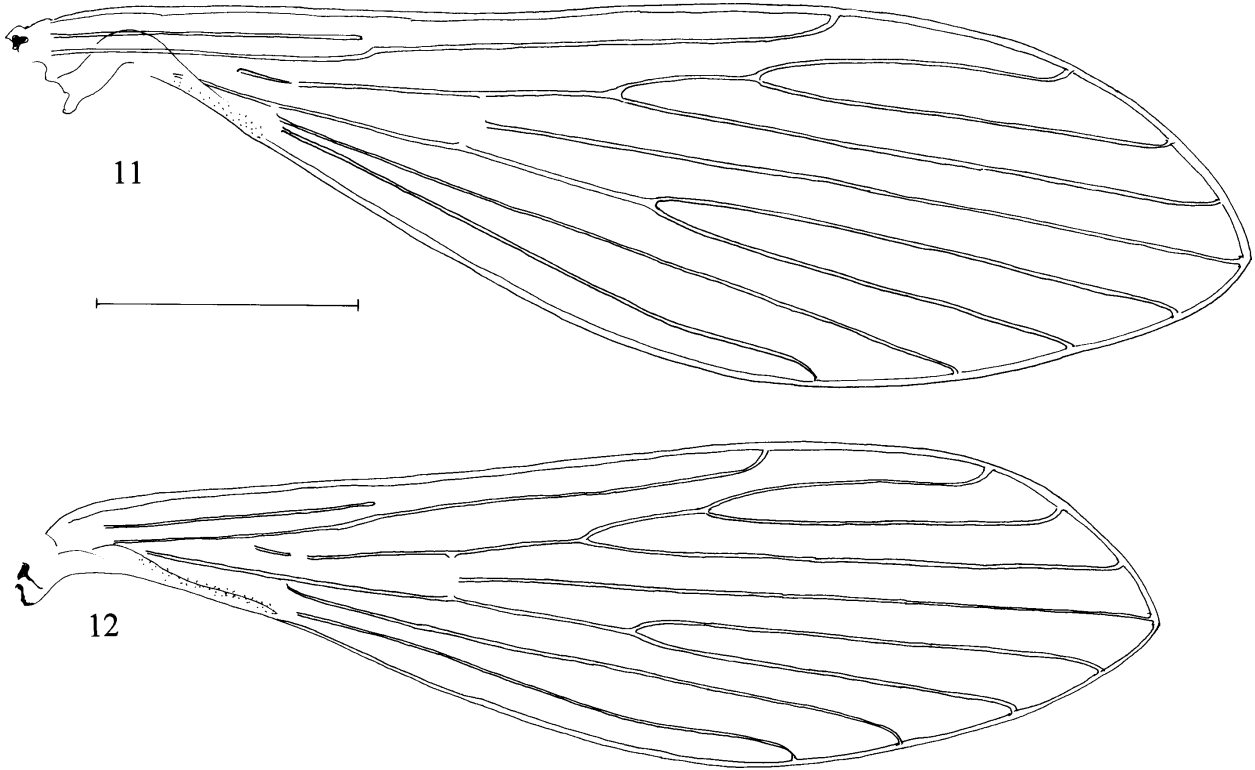
Abdomen 1300 (1230, 1370; n = 2) long. Tergites IV-VII with tergal papillae. Terminalia (Fig. 24): gonostyle (Fig. 25) 160 long (150, 160; n = 2), with 4 major spines and one subterminal seta; the spines with the following disposition: one apical, the upper external on the 4th apical of the structure, the lower external and the internal before the



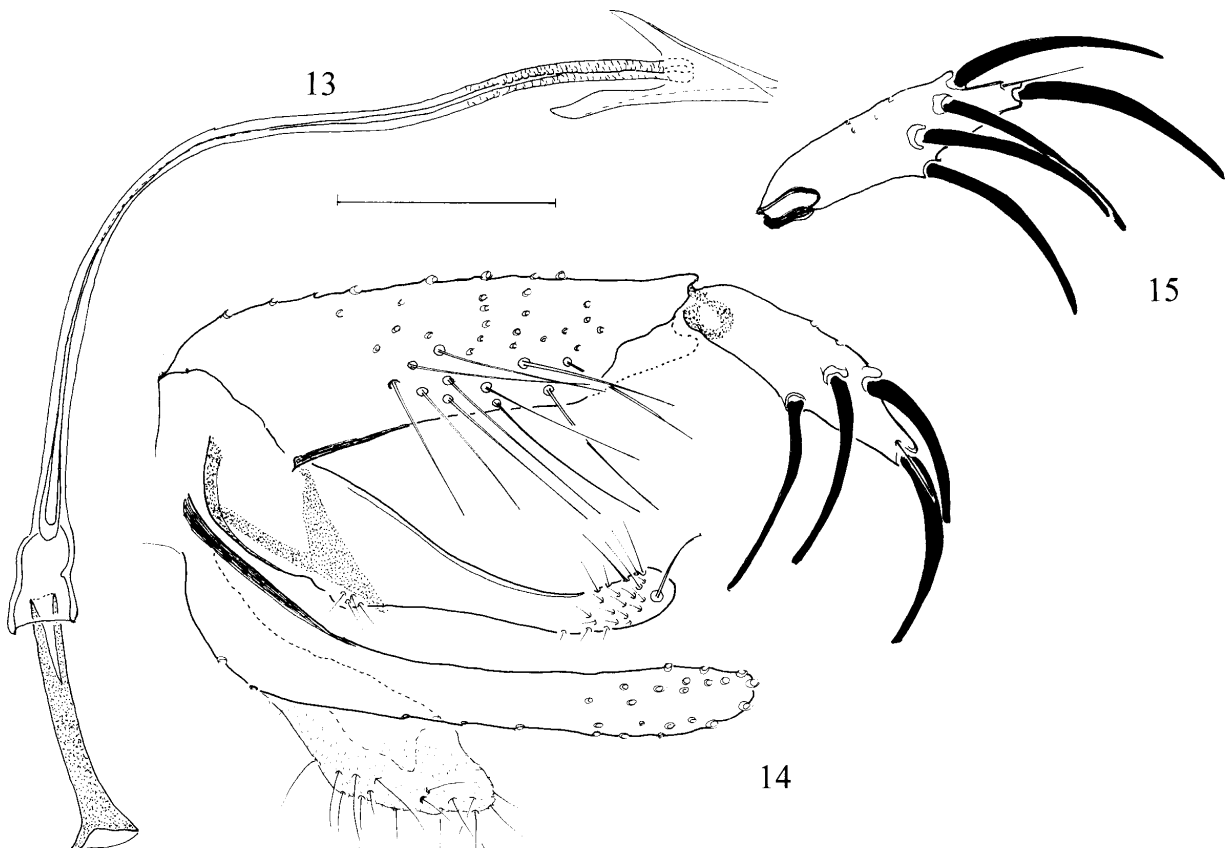
*Pintomyia (Pifanomyia) aldafalcaoae* sp. nov. Holotype male - Fig. 3: antennomere IV. Fig. 4: antennomere V. Fig. 5: antennomere XIII-XVI. Fig. 6: palpomere III. Bar = 100  $\mu$ m



*Pintomyia (Pifanomyia) aldafalcaoae* sp. nov. Allotype female - Fig. 7: maxilla's lacinia. Fig. 8: hypopharynx. Fig. 9: palpomere III. Fig. 10: cibarium. Bar = 100  $\mu$ m



Wings of *Pintomyia (Pifanomyia) aldafalcaoae* sp. nov. - Fig. 11: allotype female. Fig. 12: holotype male. Bar = 500  $\mu$ m



*Pintomyia (Pifanomyia) aldafalcaoae* sp. nov. holotype male - Fig. 13: aedeagus, genital pump and filaments. Fig. 14: terminalia. Fig. 15: the other gonostyle. Bar = 100  $\mu$ m

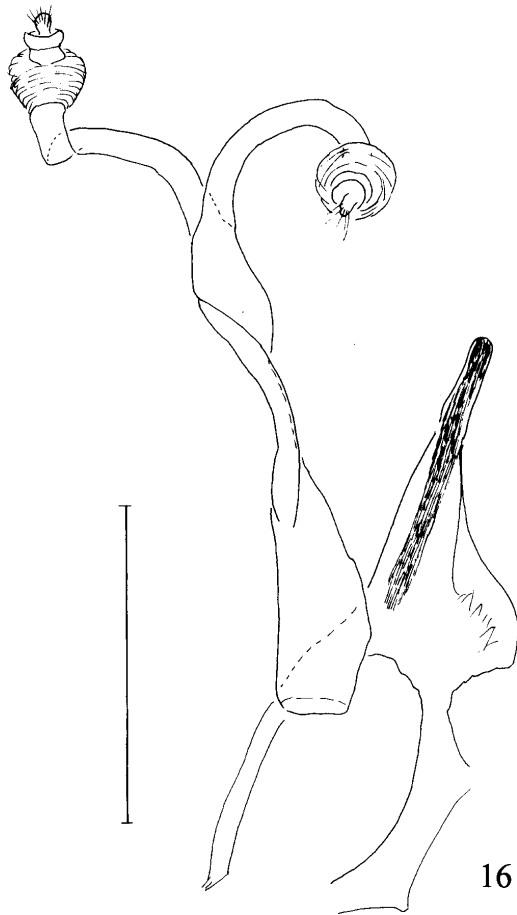
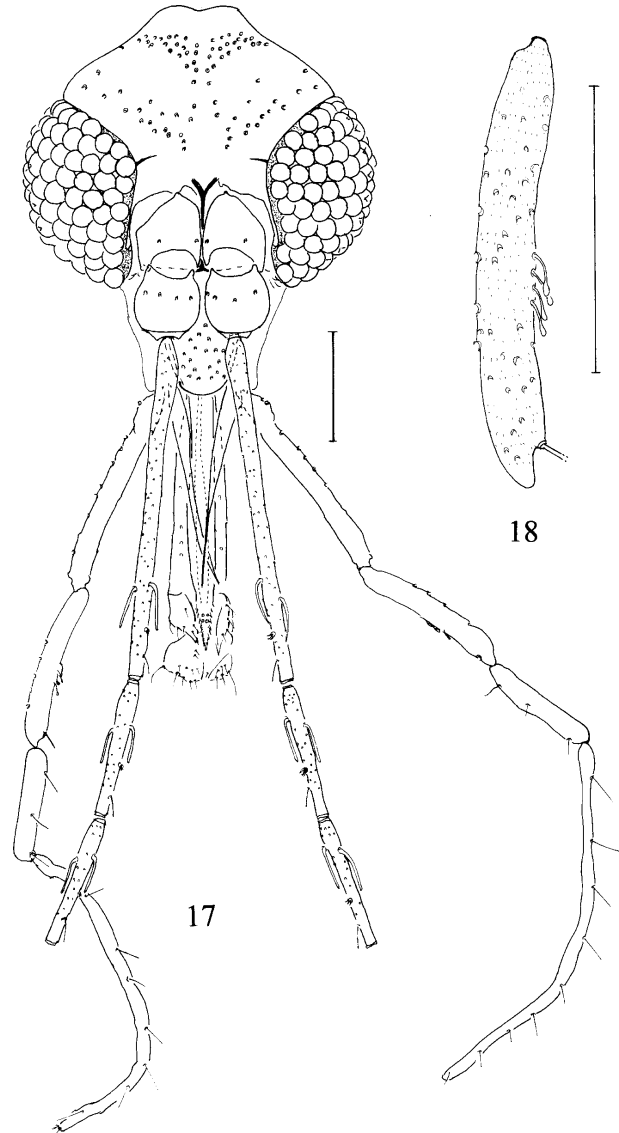


Fig. 16: *Pintomyia (Pifanomyia) aldafalcaoae* sp. nov. allotype female. Genital fork and spermathecae. Bar = 100  $\mu$ m

middle of the structure; the internal one implanted on a prominent tubercle. Gonocoxite 275 long x 108 wide (255, 275 x 100, 107; n = 2) with three tufts of long setae. The basal tuft with ca. 40 sinuous setae; the median with 6-7 semi-foliaceous setae and the apical tuft with ca. 30 straight setae. Paramere (Figs 24, 26): dorsal margin length 227 (210, 230; n = 2) and the ventral margin length 280 (280; n = 2); the median part of the dorsal margin with evident concavity and in its apex presents a little tubercle with five setae; margin ventral with a pre-apical protuberance and a little tubercle covered with short setae. Aedeagus (Fig. 26) conical, dorsal margin length 112 (108, 112; n = 2) and the ventral margin length 75 (95; n = 2). Lateral lobe (425 long x 20 wide in the middle/ 45 at the apex) (415, 430 x 20/45, 20/48; n = 2). Genital pump: 167 (158; n = 2) long; piston length 135 (125, 130; n = 2) and chamber length 60 (60, 55; n = 2). Genital filament length 627 (573, 620; n = 2) or 3.75 (3.62, 3.92; n = 2) times length of genital pump. Tip of genital filament simple, but slightly widened (Fig. 23). Cercus 245 (230, 238; n = 2) long.

Collection dates and deposition of type material. Holotype male and one paratype male: Montebello, Antioquia Department, Colombia, 31.3.1997. One paratype male same locality as holotype, 31.3.1998. All three captured by M Wolff with sticky traps (paper strips impregnated with



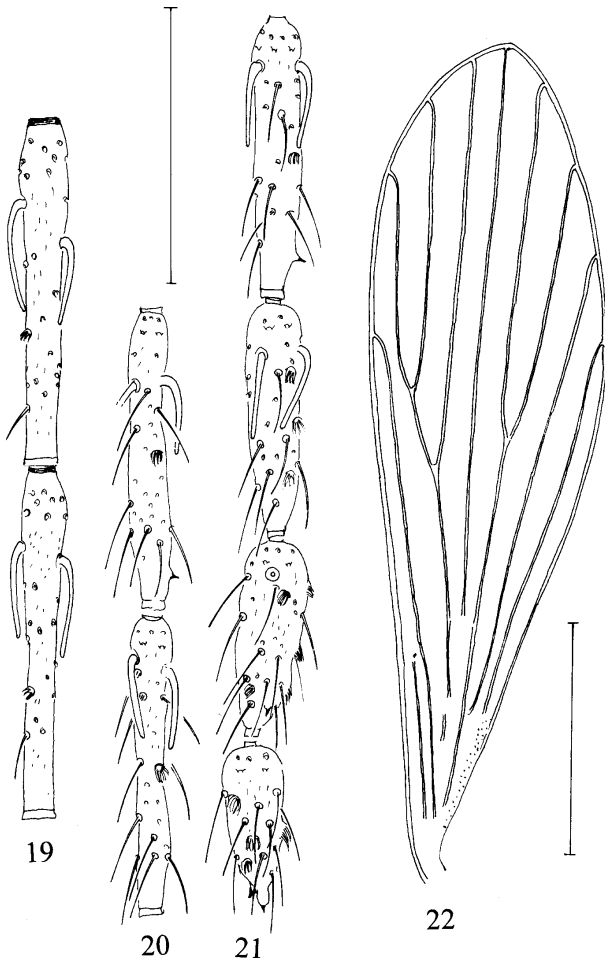
*Pintomyia (Pifanomyia) antioquiensis* sp. nov. Holotype male - Fig. 17: head. Fig. 18: palpomere III. Bars = 100  $\mu$ m

castor oil) and deposited in the entomological collection of the Department of Biology, University of Antioquia, Colombia.

Locality type similar to *P. (P.) limafalcaoae* sp. nov.

#### TAXONOMIC DISCUSSION

The taxon *Pifanomyia* Ortiz & Scorza, 1963 was proposed as a subgenus of the genus *Phlebotomus* Rondani, 1840 consisting of the species of group *serrana* Barretto, 1962. This group of species and four other groups: *vespertilionis*, *vesicifera*, *christophei* and *verrucarum* were included in the subgenus *Coromyia* Barretto, 1962 of the genus *Lutzomyia* França, 1924 by Barretto (1962). Theodor (1965) and Lewis et al. (1977) included the species group *verrucarum*, consisting of the series *verrucarum* Fairchild, 1955 and *serrana*, within the genus *Lutzomyia*. Vianna Martins et al. (1978) considered the *verrucarum* species group to consist only members of



*Pintomyia (Pifanomyia) antioquiensis* sp. nov. Holotype male - Fig. 19: antennomere IV-V. Fig. 20: antennomere XI-XII. Fig. 21: antennomere XIII-XVI. Bar = 100  $\mu$ m. Fig. 22: wing. Bar = 500  $\mu$ m

the series *verrucarum* and the subgenus *Pifanomyia* as originally proposed, but within the genus *Lutzomyia*. Young and Duncan (1994) admitted group *verrucarum* and eliminated the series of species. Galati et al. (1995) amplified the subgenus *Pifanomyia* to include the series *evansi*, *monticola*, *verrucarum* and *townsendi* in the genus *Lutzomyia* and following Galati (1995) included two other series: *pacae* and *pia* and considered that all belonged within the genus *Pintomyia* Costa Lima, 1932, together with the subgenus *Pintomyia*, s. str.

Both sexes of this genus may be characterized as follows: 5th palpomere longer than 3rd; on this palpomere, Newstead's spines occur between the median and pre-apical regions; ventrocervical sensillae present and the setae on the anterior margin of katepisternum may occur. Male: flagellomere with short ascoids, those on AIV, commonly not passing the middle of the segment; gonostyle with three, four or five spines and presence (with some exceptions) of the pre-apical seta; gonocoxite with or without tufts of setae; lateral lobes with round apices and thinner than gonocoxite; simple paramere; presence of

tergal papillae (except in series *townsendi*) at least on some tergites. Female: ratio between lengths 2nd palpomere/ palpus > 0.16:1.0; ascoids on the AIV reaching the subapical region of the segment; hypopharynx with well delimited and deep teeth; lacinia with external teeth disposed in a single and longitudinal row, cibarium with four (sometimes five or six) posterior horizontal teeth and the anterior (vertical) teeth in one or two transversal rows, complete sclerotised arch; Tergite VIII with or without setae; spermathecae with long common duct, the individual ducts may or may not be sclerotised, the body predominantly vesicular with or without wrinkled aspect, apical ring and distinct terminal knob. The subgenus *Pifanomyia* is distinguished from *Pintomyia*, s. str. in both sexes by the absence of spines on the hind femur and in the females by the spermathecae which present an apical ring, distinct knob and unsclerotised individual ducts.

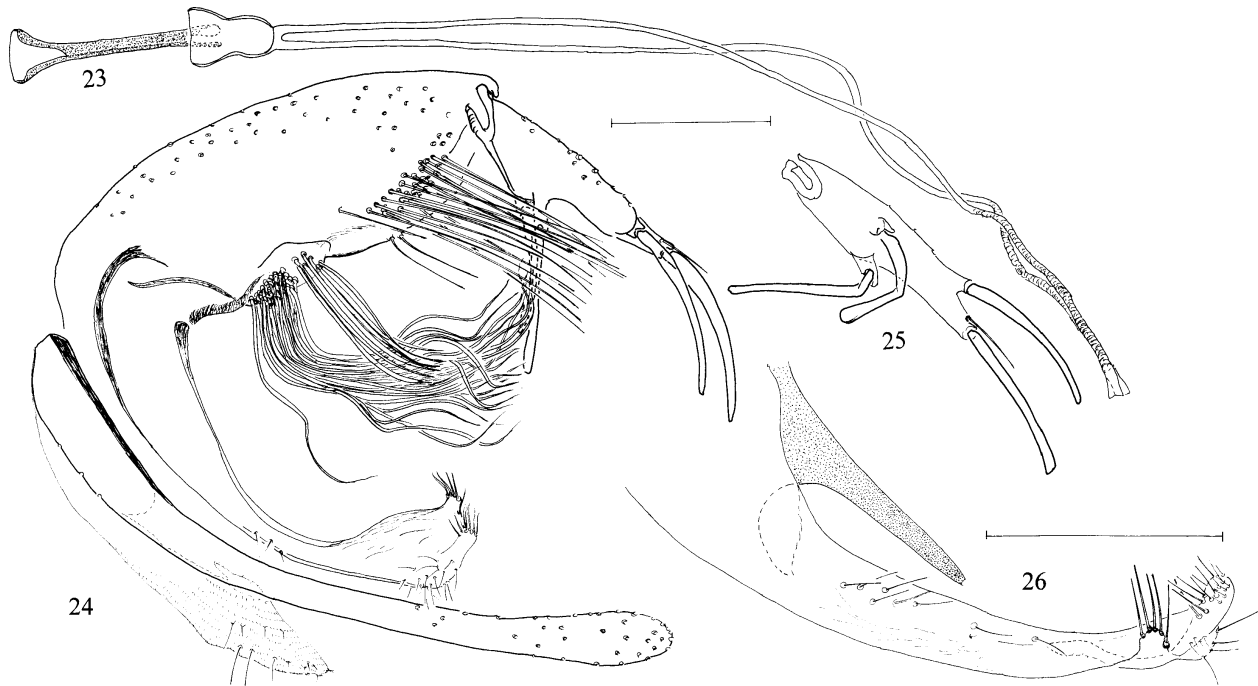
In the male, the presence on the gonostyle of one major apical spine, the subapical seta and extra external spine and in the female the wrinkled vesicular aspect of the spermatheca with a much narrower apical ring, long common duct and shorter individual ducts, lead us to consider *P. limafalcaoae* sp. nov. as belonging to the series *pia*. This series had hitherto been constituted of seven species: *P. pia* (Fairchild & Hertig, 1961), *P. reclusa* (Fernandez & Rogers, 1991), *P. suapiensis* (Le Pont, Torrez-Espejo & Dujardin, 1997), *P. tihuliensis* (Le Pont, Torrez-Espejo & Dujardin, 1997), *P. tocaniensis* (Le Pont, Torrez-Espejo & Dujardin, 1997), *P. torrealbai* (Vianna Martins, Fernandez & Falcão, 1979) and *P. valderramai* (Cazorla, 1988). With the exception of *P. pia*, all these species are known by specimens of only one of the sexes; *P. suapiensis*, *P. tihuliensis* and *P. tocaniensis* by the female and *P. reclusa*, *P. torrealbai* and *P. valderramai* by the male.

*P. pia* was included in the species group *oswaldoi* of the genus *Lutzomyia* by Theodor (1965) and by Cazorla (1988), to which *P. valderramai* was also considered to belong. Young and Duncan (1994) included this latter species in this group, but *P. pia* was considered to be an ungrouped species, as was *P. torrealbai*. Vianna Martins et al. (1978) included *P. pia* in isolated or aberrant species and Vianna Martins et al. (1979) consider *P. torrealbai* as an aberrant species. *P. reclusa* was included in the subgenus *Helcocyrtomyia* Barretto, 1962 by Fernandez and Rogers (1991) and Young and Duncan (1994). Le Pont et al. (1997) consider *P. suapiensis*, *P. tihuliensis* and *P. tocaniensis* as *incertae sedis* and suggest that this three species may, together with *P. pia*, constitute another series of the subgenus *Pifanomyia*.

The male and the female of this new species may be distinguished from the others of the series *pia* by the characteristics in the identification key presented below:

Males

- 1 Tuft of the gonocoxite sparse and situated on the median 3rd .....2
- Tuft of the gonocoxite compact and situated on the basal-median part .....3
- 2(1) Dorsal margin of the paramere almost straight and the setae on the apical 3 rd ..... *P. pia*



*Pintomyia (Pifanomyia) antioquiensis* sp. nov. holotype male - Fig. 23: genital pump and filaments. Fig. 24: terminalia. Fig. 25: the other gonostyle. Fig. 26: aedeagus and the other paramere. Bars = 100  $\mu$ m

- Dorsal margin of the paramere curve and the apical setae on the apical 5th ..... *P. limafalcaoae* sp. nov.  
 3(1) Labroeipharynx ca. 280  $\mu$ m; AIII ca. 350  $\mu$ m ..... *P. reclusa*  
 Labroeipharynx ca. 220  $\mu$ m; AIII ca. 300  $\mu$ m ..... 4  
 4(3) Tuft of the gonocoxite with ca. 10 setae ..... *P. torrealbai*  
 Tuft of the gonocoxite with ca. 17-19 setae ..... *P. valderramai*

Females

- 1 Labroeipharynx more than 350  $\mu$ m ..... 2  
 Labroeipharynx smaller than or equal to 310  $\mu$ m ..... 3  
 2(1) Pleurae all brown ..... *P. pia*  
 Pleurae brown only in the basal region ..... *P. tihuiliensis*  
 3(1) Pleurae all brown ..... *P. limafalcaoae* sp. nov.  
 Pleurae partially brown or completely pale ..... 4  
 4(3) Pleurae completely pale ..... *P. tocaniensis*  
 Pleurae brown in its basal part ..... *P. suapiensis*

The *Pintomyia (Pifanomyia) antioquiensis* sp. nov. presents papilla in AV; gonocoxite with a sclerotized band on the basal ventral margin and presence of tufts of setae; gonostyle with four spines, with the internal one implanted before or in the middle of the structure; presence of tergal papillae in some tergites may be included, according to Galati (1995), into the series *verrucarum*. Based on these characteristics eight species are included in this series: *P. andina* (Osorno, Osorno-Mesa & Morales, 1972), *P. aulari* (Felicangeli, Ordoñez & Manzanilla, 1984), *P. cajamarcensis* (Galati, Cáceres & Le Pont, 1995), *P. columbiana* (Ristorcelli & Van Ty, 1941), *P. deorsa* (Pérez,

Ogusuku, Monje & Young, 1991), *P. disiuncta* (Morales, Osorno & Osorno-Mesa, 1974), *P. moralesi* (Young, 1979) and *P. verrucarum* (Townsend, 1913).

The male of *P. antioquiensis* may be distinguished from the other species of the series *verrucarum* by the characteristics present in the following identification key:

- 1 Gonocoxite with single basal tuft of setae ..... 2  
 Gonocoxite with two or more tufts of setae ..... 3  
 2(1) Aedeagus arched, which apex is turned downwards, just as a goose's head ..... *P. deorsa*  
 Aedeagus simple and conical ..... *P. columbiana*  
 3(1) Gonostyle with the internal spine implanted in accentuated tubercle ..... 4  
 Gonostyle with the internal spine implanted in discrete tubercle ..... 7  
 4(3) Gonocoxite with three tufts of setae ..... 5  
 Gonocoxite with two tufts of setae ..... 6  
 5(4) Gonostyle without subapical seta; the apical part of paramere with incipient lobe; setae of the basal tuft's gonocoxite not exceeding the paramere's apex ..... *P. moralesi*  
 Gonostyle with subapical seta; the apical part of paramere with two evident lobes; setae's apex of the basal tuft's gonocoxite exceeding the paramere's apex ..... *P. antioquiensis* sp. nov.  
 6(4) Apex of the inferior external spine of gonostyle truncated and with slight expansion ..... *P. andina*  
 Apex of the inferior external spine of gonostyle pointed ..... *P. aulari*  
 7(3) Gonostyle with columnar aspect, the distance between the external spines greater than twice the distance of

- the superior external from the apical spines.....8  
 Gonostyle with the distance between the external  
 spines similar to the distance between superior external  
 and the apical spines ..... *P. verrucarum*  
 8(7) Dorsal margin's paramere strongly concave and with  
 apical fringe of long setae ..... *P. cajamarcensis*  
 Dorsal margin's paramere with slight concavity and  
 without apical fringe of setae ..... *P. disiuncta*

Etymology. By conferring the name *P. (P.) limafalcaoae* we pay tribute to researcher Alda Lima Falcão of the Centro de Pesquisa René Rachou, Fundação Oswaldo Cruz, Belo Horizonte, Brazil, for her great contribution to our knowledge of American sand flies. The other new species takes its name from the Department of Antioquia, Colombia, where the species was captured.

The association of the sexes of *P. (P.) limafalcaoae* was based on the capture of males and females in the same place, on the compatibility of genital characteristics and similarities of the extra genital characteristics.

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