Medical and Veterinary Entomology

Medical and Veterinary Entomology (2017), doi: 10.1111/mve.12233

Description of *Pintomyia salomoni* sp. n., a new phlebotomine species from northwest Argentina

A. D. FUENZALIDA [1,2,3] and M. G. QUINTANA [1,2,3,4]

[1]Instituto Nacional de Medicina Tropical, Puerto Iguazú, Misiones, Argentina, [2]Facultad de Ciencias Naturales e Instituto Miguel Lillo, Instituto Superior de Entomología, Universidad Nacional de Tucumán, San Miguel de Tucumán, Tucumán, Argentina, [3]Red de Investigación de las Leishmaniasis en la Argentina (REDILA), San Miguel de Tucumán, Tucumán, Argentina and [4]Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), San Miguel de Tucumán, Tucumán, Argentina

Abstract. A new species of phlebotomine sandfly is described and illustrated using male and female specimens collected in the provinces of Jujuy and Tucumán, Argentina. Both male and female morphological characters allow the inclusion of the new species within the *Pintomyia* genus, *Pifanomyia* subgenus, *serrana* series (Diptera: Psychodidae). The species was denominated as *Pintomyia salomoni* n. sp., and is closely related to *Pintomyia* (*Pifanomyia*) *torresi* and *Pintomyia* (*Piffanomyia*) *boliviana*.

Key words. *Pintomyia salomoni* sp. n, Diptera, Phlebotominae, northwest Argentina.

Introduction

Phlebotomine sandflies are responsible for the transmission of protozoa of the genus *Leishmania*, as well as some bacteria and viruses. The importance of studying these blood-sucking insects is associated with their public health implications and their impact on both humans and domestic animals.

In Argentina, 35 species of sandfly are currently recorded (Quintana *et al.*, 2012; Szelag *et al.*, 2016), and seven species have been recorded within the genus *Pintomyia* (Costa Lima, 1932) in four provinces in the east of the country. In accordance with Galati (2003), the genus *Pintomyia* is constituted of two subgenera: *Pintomyia s.s.* and *Pifanomyia* Ortiz & Scorza, 1963. The latter subgenus is divided into seven series: *monticola*, *pacae*, *pia*, *verrucarum*, *serrana*, *evansi* and *townsendi*. Of the seven species of the *Pintomyia* genus found in Argentina, four [*Pintomyia bianchigalatiae* (Andrade-Filho, Aguiar, Dias & Falcão, 1999), *Pintomyia damascenoi* (Mangabeira, 1941), *Pintomyia fischeri* (Pinto, 1926) and *Pintomyia pessoai* (Coutinho & Barretto, 1940)] are included in the *Pintomyia* subgenus, and three [*Pintomyia misionensis* (Castro, 1959), *Pintomyia monticola* (Costa Lima, 1932) and *Pintomyia torresi*] in the *Pifanomyia* subgenus (Le Pont & Desjeux, 1991). In the subgenus *Pifanomyia*, the first two species constitute the *monticola* series, and the last belongs to the *serrana* series. Males and females of the new species described in the present paper share common characters with *Pintomyia boliviana* (Velasco & Trapido, 1974) and *P. torresi* (Le Pont & Desjeux, 1991), which have been identified in Bolivia and captured at altitudes of above 1500 m a.s.l.

The last living species to be described and included in the *Pintomyia* genus and *Pifanomyia* subgenus was identified by Wolff & Galati (2002) and was assigned to the series *pia*. However, between 2002 and 2008, 10 fossil species of the *Pintomyia* genus were described (Andrade Filho *et al.*, 2009). The specimens of the new sandfly species were collected in two provinces of northwest Argentina. In this paper, the description of *Pintomyia salomoni* sp. n. is based on two male and 23 female specimens.

Materials and methods

Collections were obtained in areas with epidemiological antecedents of cutaneous leishmaniasis and without previous records of sandflies, in the months of March and May 2013. Sampling sites numbered six in Jujuy Province and were situated in the locality of Aguas Calientes (24°35′32.74″ S, 64°54′32.87″ W), in the department of El Carmen, in the transitional area between Yungas forest and dry Chaco ecoregions. In Tucumán Province, sampling sites numbered eight and were situated within the locality of the Escaba Dam (26°48′28.69″ S,

Correspondence: María Gabriela Quintana, Instituto Nacional de Medicina Tropical -Sede Tucumán- San Miguel de Tucumán, Tucumán (4000), Argentina. Tel.: + 54 381 423 2965; Fax: + 54 381 423 2695; E-mail: gabrieladelaquintana@gmail.com

65°13′09.09″ W), in the department of Alberdi in the Yungas forest ecoregion. Captures were made with REDILA (Red de Investigación de las Leishmaniasis en la Argentina) ultraviolet light traps (Fernández *et al.*, 2015). The specimens were clarified according to Forattini (1973) and mounted in Canada balsam.

The insects were measured under a binocular microscope (Primo Star; Carl Zeiss Jena GmbH, Jena, Germany), using an ocular micrometre objective with correction factors for the different objective lenses. Measurements are given in micrometres and are presented for the male holotype and female allotype. Mean ± standard deviation (SD) values in paratypes and numbers of paratype specimens observed are shown in parentheses. Measurements of some characters were not made because some structures were lost during the preparation and mounting process. The nomenclature and classification are based on the proposals made by Galati (2003). Abbreviations are based on Marcondes (2007).

Pintomyia salomoni **Quintana & Fuenzalida, sp. n.**

Type material and deposition of types

The holotype male (no. ESC004i) and allotype female (no. ESC002i) were collected with REDILA light traps in a forest area near the Escaba Dam, Alberdi department, province of Tucumán, Argentina on 7 March 2013 (collected by ADF and MGQ). One male and 21 female paratypes were collected under the same conditions as the holotype. One female paratype was collected in the locality of Aguas Calientes, El Carmen department, province of Jujuy, Argentina on 21 March 2013 (collected by MGQ, ADF, José Direni Mancini and Elvira Casagranda). The type material is deposited in the Phlebotomine Sandfly Collection of the Instituto-Fundación Miguel Lillo (I-FML).

Type locality

The holotype male was collected in Argentina, Tucumán, Alberdi Department, Escaba (27°39′29″ S, 65°45′39″ W; 566 m a.s.l.), within the Yungas subtropical forest ecoregion.

Bionomics

Males and females were collected in an area with native forest patches. The presence of bats was observed in both areas close to water bodies, located in elevations of 500–700 m a.s.l. Tobacco and sugar cane crops were observed nearby.

Etymology

In recognition of his passionate dedication and contribution to knowledge of phlebotomines, and of his study of the eco-epidemiology of leishmaniasis in Argentina, the authors are very pleased to name this species in honour of their mentor Dr Oscar Daniel Salomón.

Description

Male and female adults are described.

Pintomyia salomoni is predominantly light brown in colour. The pleura and pronotum are lighter than the mesonotum and metanotum.

Holotype male

Head. Length 311 µm (mean ± SD: 308.5 ± 3.5 µm; $n = 2$); width 224 µm (206.0 ± 25.4 µm; $n = 2$) (Fig. 1A). Head length : width ratio: 1.4 (1.5 ± 0.2; $n = 2$). Eye length 97 µm (96.5 ± 0.7 µm; $n = 2$); eye width 56 µm (53.0 ± 4.2 µm; $n = 2$). Eye length : head width ratio: 0.4 (0.5 ± 0.1; $n = 2$). Clypeus length 121 µm (121.5 ± 0.7 µm; $n = 2$). Clypeus length : head length ratio: 0.39 (0.4 ± 0.01; $n = 2$). Interocular distance 111 µm (106.0 ± 7.1 µm; $n = 2$). Labrum–epipharynx distance 159 µm (154.5 ± 6.4 µm; $n = 2$). Labrum–epipharynx distance : head length ratio: 0.5 (0.5 ± 0.01; $n = 2$). First flagellomere with simple ascoid, internal more basal than external (Fig. 1B). Flagellomere lengths: FI 157 µm (187.5 ± 43.1 µm; $n = 2$); FII 76 µm (89.5 ± 19.1 µm; $n = 2$); FIII 104 µm (102.5 ± 2.1 µm; $n = 2$) with papilla; FXIII 71 µm (57.5 ± 19.1 µm; $n = 2$); FXIV 55 µm (58.0 ± 4.2 µm; $n = 2$). FIII : labrum–epipharynx distance ratio: 1.0 (1.2 ± 0.3; $n = 2$), FI : FIV ratio: 2.1 (2.1 ± 0.04; $n = 2$), FI : FIII ratio: 1.5 (1.8 ± 0.5; $n = 2$). Palpal formula: 1.4.2.3.5 ($n = 2$). Palpal segment lengths: PI 29 µm (32.0 ± 4.2 µm; $n = 2$); PII 105 µm (100.0 ± 7.1 µm; $n = 2$); PIII 128 µm (120.5 ± 11.0 µm; $n = 2$); PIV 92 µm (88.5 ± 5.0 µm; $n = 2$); PV 254 µm (245.0 ± 13.0 µm; $n = 2$). PIII : PV ratio: 0.5 (0.5 ± 0.02; $n = 2$). Newstead's sensilla are dispersed in the third palpal segment (Fig. 1C).

Cervix. Ventrocervical sensilla are present.

Thorax. Mesonotum 360 µm (352.0 ± 11.3 µm; $n = 2$). Proepimeral setae 6 µm (5.0 ± 1.4 µm; $n = 2$); upper anepisternal setae 8 µm (8.5 ± 0.7 µm; $n = 2$). Setae on the anterior katepisternum margin are absent ($n = 2$). Wing length 1524 µm (1394.5 ± 183.1 µm; $n = 2$); maximum wing width 357 µm (347.0 ± 14.1 µm; $n = 2$). Wing length : width ratio: 4.3 (4.0 ± 0.4; $n = 2$). Length of vein sections: α 329 µm (303.0 ± 36.8 µm; $n = 2$); β 175 µm (176.0 ± 1.4 µm; $n = 2$); γ 408 µm (362.0 ± 65.1 µm; $n = 2$); δ 50 µm (35.0 ± 21.2 µm; $n = 2$); ε 468 µm (441.0 ± 38.2 µm; $n = 2$); π 97 µm (59.5 ± 53.0 µm; $n = 2$); $\alpha : \beta$ ratio 1.9 (1.7 ± 0.2; $n = 2$); R4 740 µm (708.5 ± 44.5 µm; $n = 2$); R5 1048 µm (968.0 ± 113.1 µm; $n = 2$) (Fig. 1D). Foreleg: length of coxa 270.3 µm (267.9 ± 3.5 µm; $n = 2$); length of femur, tibia and tarsomeres I, II, III, IV and V (holotype only): 661.1 µm, 695.0 µm, 422.8 µm, 206.5 µm, 130.1 µm, 111.3 µm and 73.3 µm, respectively. Mid-leg: length of coxa 269.6 µm (262.1 ± 10.6 µm; $n = 2$). Hindleg: length of coxa 270.6 µm (260.6 ± 14.1 µm; $n = 2$).

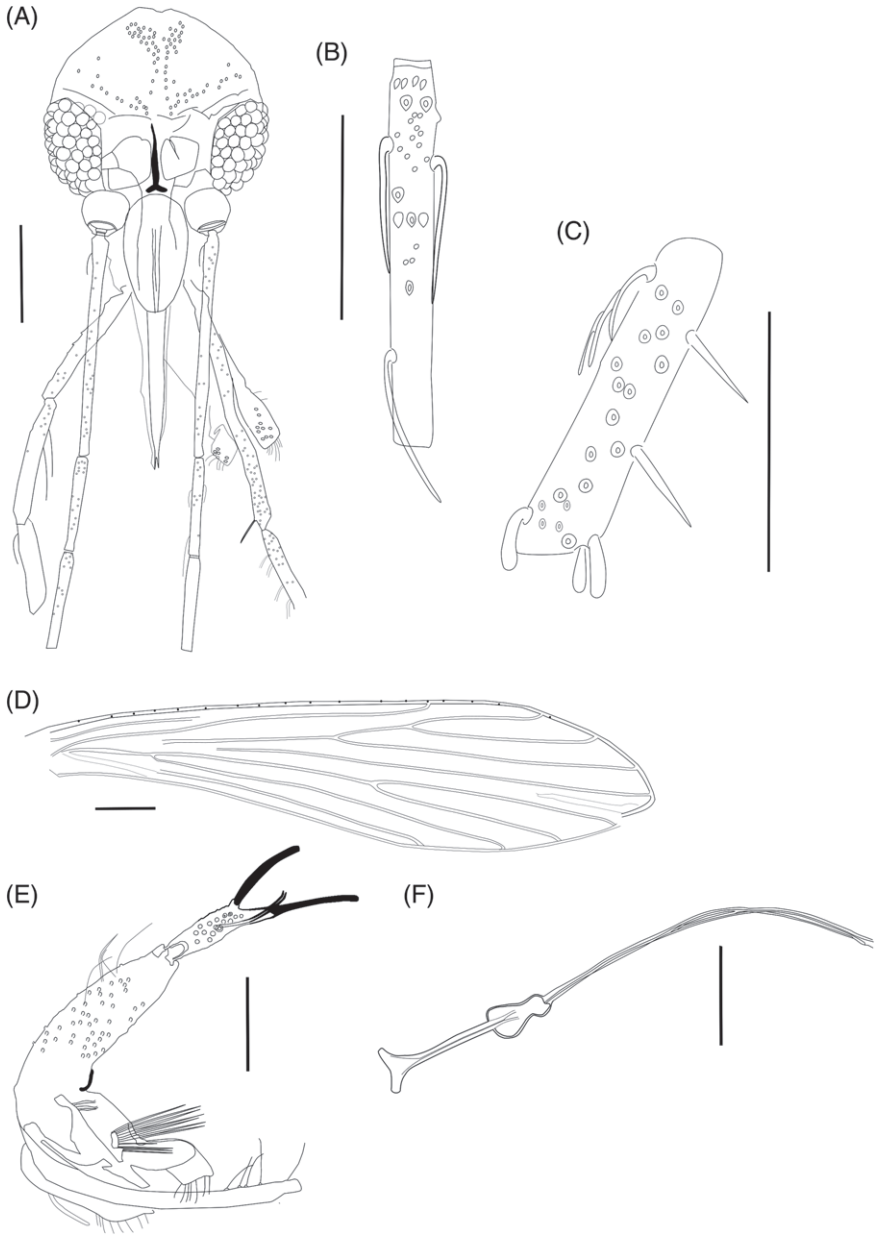

Fig. 1. *Pintomyia salomoni* sp. n. (male holotype): (A) head; (B) flagellomere I; (C) palpal segment III; (D) wing; (E) genitalia; (F) aedeagal filaments. Scale bars: 100 μm.

Abdomen. Length 1170 μm (1209.0 ± 55.2 μm; $n = 2$). Gonocoxite length 195 μm (186.5 ± 12.0 μm; $n = 2$); maximum width 71 μm (60.5 ± 14.9 μm; $n = 2$) (Fig. 1E). The gonocoxite has a sclerotized longitudinal band in the ventral margin. Setae are present from the medial region to the apical extreme. Gonostyle length 110 μm (105.0 ± 7.1 μm; $n = 2$); maximum width 25.1 μm (25.1 ± 0.0 μm; $n = 2$). The gonostyle has three spines, of which two are well developed (one apical and one upper external implanted in the apex of a tubercle) and the third is an inferior external spine and is thinner than the others. The subterminal spine is absent. The paramere is branched; dorsal margin length 189.6 μm (187.9 ± 2.3 μm; $n = 2$); ventral margin length 130.9 μm (131.0 ± 0.1 μm; $n = 2$). The median region of the dorsal lobe of the paramere shows a convex curvature. The interlobular region shows a 10-bristle tuft. The ventral margin of the paramere is thinner and sharper than the dorsal margin (Fig. 1E). The parameral sheath is conic and sclerotized with one rounded ventral protuberance. Epandrial lobe length 277.6 μm (266.6 ± 15.6 μm; $n = 2$); extends beyond extreme of paramere, with a rounded apex and a simple setae group in the tip. Length of sperm pump 181 μm (176.0 ± 7.1 μm; $n = 2$). Length of aedeagal filaments 359 μm (297.0 ± 87.7 μm; $n = 2$) (Fig. 1F). Aedeagal filaments are thin and twice as long as the sperm pump. The tips are simple without modifications. Pavilion length 64 μm

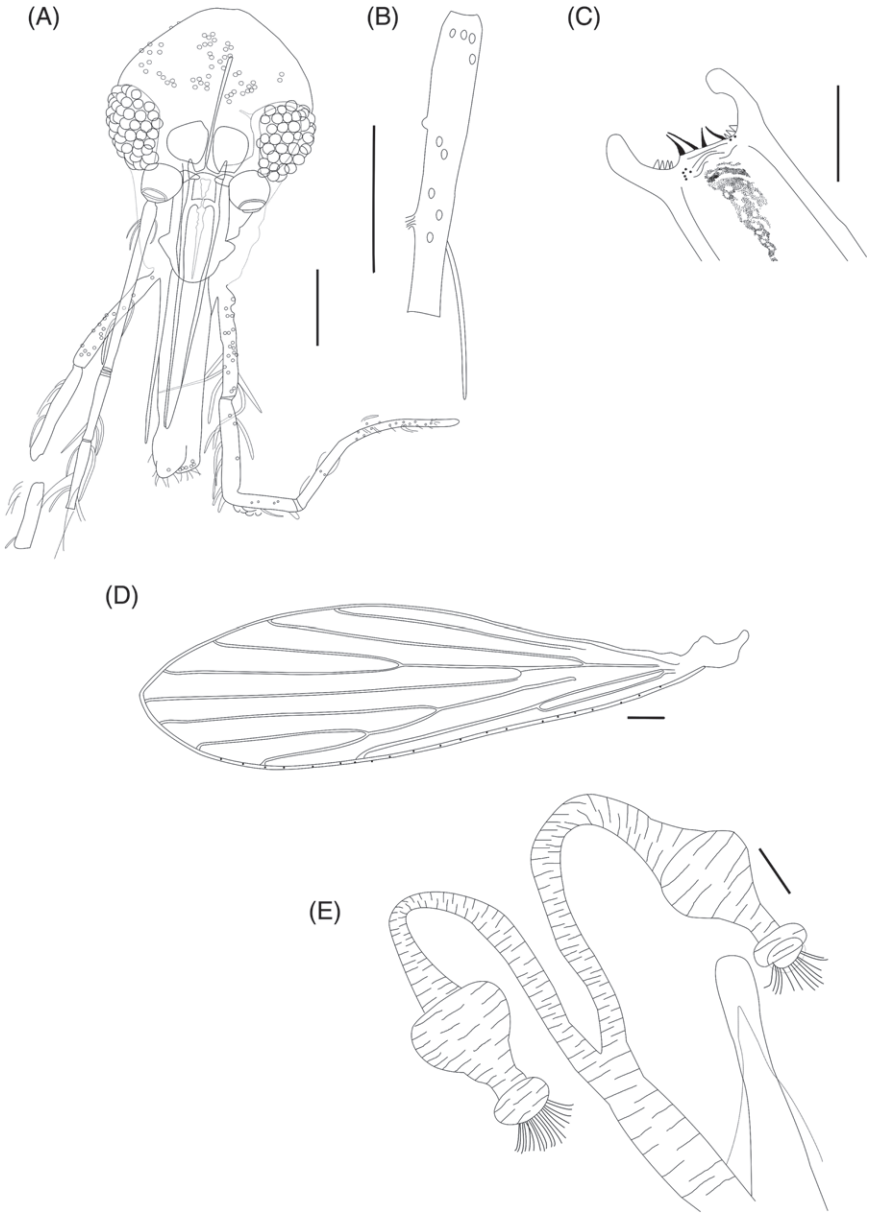

Fig. 2. *Pintomyia salomoni* sp. n. (female allotype): (A) head; (B) flagellomere III; (C) cibarium; (D) wing; (E) genitalia. Scale bars: (A–D) 100 μm; (E) 10 μm.

(62.0 ± 2.8 μm; $n = 2$); piston length 139 μm (132.0 ± 9.9 μm; $n = 2$) (approximately twice as long as the pavilion) (Fig. 1F).

Allotype female

Head. Length 359 μm (352.6 ± 14.7 μm; $n = 22$); width 224 μm (237.1 ± 29.2 μm; $n = 22$). Head length : width ratio: 1.6 (1.5 ± 0.2; $n = 22$) (Fig. 2A). Clypeus length 141 μm (138.0 ± 9.2 μm; $n = 22$). Clypeus length : head length ratio: 0.4 (0.4 ± 0.02; $n = 22$). Eye length 104 μm (110.0 ± 9.6 μm; $n = 22$); eye width 54 μm (62.2 ± 16.3 μm; $n = 21$). Eye length : head length ratio: 0.3 (0.3 ± 0.03; $n = 22$). Interocular distance 118 μm (121.1 ± 15.5 μm; $n = 21$). Labrum–epipharynx distance 207 μm (221.0 ± 14.4 μm; $n = 22$). Labrum–epipharynx distance : head length ratio: 0.6 (0.6 ± 0.04; $n = 22$). The antenna has a simple ascoid; the internal is more apical than the external, as in the male. Flagellomere lengths: FI 202 μm (201.3 ± 54.2 μm; $n = 8$); FII 94 μm (99.1 ± 20.5 μm; $n = 7$); FIII 93 μm (91.2 ± 6.6 μm; $n = 6$); FXIII 57 μm ($n = 1$, paratype female no. ESC0002d); FXIV 52 μm ($n = 1$, paratype female no. ESC002d); FIII with papilla (Fig. 2B). FI : labrum–epipharynx distance ratio: 1.0 (0.9 ± 0.2; $n = 8$); FI : FII ratio: 2.1 (2.1 ± 0.7; $n = 7$); FI : FIII ratio: 2.2 (2.2 ± 0.7; $n = 6$). Palpal formula 1.4.2.3.5

($n = 10$). Palpal segment lengths: PI 45 μm (39.0 ± 7.1 μm; $n = 21$); PII 112 μm (114.3 ± 9.3 μm; $n = 21$); PIII 127 μm (131.0 ± 9.3 μm; $n = 19$); PIV 97 μm (88.5 ± 8.0 μm; $n = 15$); PV 239 μm (219.3 ± 31.2 μm; $n = 11$). PIII : PV ratio: 0.5 (0.6 ± 0.1; $n = 11$). Newstead's sensilla are dispersed on the third palpal segment.

The cibarium has four well developed posterior (horizontal) teeth, with the external teeth next to the internal teeth (Fig. 2C). The anterior (vertical) teeth are few and small in size, occupying the lateral region of the cibarium. The sclerotized area is conic and the sclerotized arch is complete. The pharynx has well marked creases and is without conspicuous spines in its apical region (Fig. 2C).

Cervix. Ventrocervical sensilla are present.

Thorax. Mesonotum length: 360 μm (352.0 ± 11.3 μm; $n = 2$). Proepimeral setae 4.0 μm (3.7 ± 0.9 μm; $n = 20$). Upper anepisternal setae 11 μm (9.6 ± 2.9 μm; $n = 19$). Setae on the anterior katepisternum margin are absent ($n = 20$). Wing length 1648 μm (1627.0 ± 156.4 μm; $n = 15$); maximum wing width 391 μm (417.5 ± 35.2 μm; $n = 14$). Wing length : width ratio: 4.2 (3.7 ± 0.6; $n = 15$). Length of vein sections: α 354 μm (359.0 ± 33.0 μm; $n = 14$); β 201 μm (201.3 ± 18.5 μm; $n = 14$); γ 409 μm (395.3 ± 83.0 μm; $n = 14$); δ 59 μm (63.6 ± 14.6 μm; $n = 14$); ε 494 μm (501.6 ± 52.1 μm; $n = 1$); π 97 μm (95.9 ± 20.5 μm; $n = 14$); $\alpha : \beta$ ratio: 1.8 (1.8 ± 0.2; $n = 14$); R4 791 μm (771.6 ± 77.6 μm; $n = 14$); R5 1044 μm (1070.1 ± 88.1 μm; $n = 14$) (Fig. 2D). Foreleg: coxa length 342 μm (310.5 ± 31.2 μm; $n = 23$); femur length 593 μm (463.6 ± 187.9 μm; $n = 7$); tibia length 668 μm (726.5 ± 82.7 μm; $n = 2$); tarsomeres I, II, III, IV and V: 400 μm, 190 μm, 123 μm, 119 μm and 71 μm, respectively (allotype female only). Mid-leg: coxa length 307 μm (313.3 ± 28.8 μm; $n = 23$); femur length 635 μm (635.5 ± 0.7 μm; $n = 2$); tibia length 872 μm; tarsomere I 475 μm ($n = 1$, paratype no. ESC0002i). Hindleg: coxa length 295 μm (302.9 ± 21.2 μm; $n = 22$); femur length 721 ± 44.8 μm ($n = 5$, paratypes nos ESC0001d, ESC0009, ESC0015, ESC0016 y ESC0019); tibia length 1004.0 ± 96.7 μm ($n = 4$, ESC0001d, ESC0009, ESC0016 and ESC0019); tarsomere I 525.0 ± 103.2 μm ($n = 2$, paratype nos ESC0001d and ESC0009); tarsomere II 252 μm ($n = 1$, paratype no. ESC0001d).

Abdomen. Body of spermathecae length 24 μm (28.4 ± 2.3 μm; $n = 23$); maximum width 22 μm (21.4 ± 2.5 μm; $n = 23$), with superficial striation. Head of spermathecae length 3 μm (3.6 ± 0.9 μm; $n = 21$); maximum width 7 μm (6.4 ± 1.1 μm; $n = 22$). The body of the spermathecae is constricted in the median region and expanded at the apex (Fig. 2E). The individual and common sperm ducts show incomplete striations. Individual sperm duct length 69 μm (72.4 ± 9.1 μm; $n = 14$); common duct length 90 μm (76.7 ± 8.7 μm; $n = 12$). Body of spermathecae length : individual sperm duct length ratio: 0.3 (0.4 ± 0.1; $n = 14$). Individual sperm duct length : common sperm duct length ratio: 1.3 (0.9 ± 0.4; $n = 14$). Body of spermathecae length : number of posterior teeth ratio: 6 (7.1 ± 0.6; $n = 23$).

Discussion

The morphology described for *P. salomoni* permits its inclusion within the *Pintomyia* genus, *Pifanomyia* subgenus and *serrana* series according to the following characters: a femur without spines and papilla in FIII in both sexes; a gonocoxite with a sclerotized band; a gonostyle with three spines, only one of which is external; a common duct in the female that reaches or passes half of the fork; tergite VIII is generally with bristles; individual ducts are not sclerosed in their distal half, and the head of the spermathecae is inserted into an apical ring.

The *serrana* series is constituted by 13 species. Both male and female specimens of the new species described herein are very close to two species collected in Bolivia, *P. boliviana* (Velasco & Trapido, 1974) and *P. torresi* (Le Pont & Desjeux, 1991). In 2008 *P. torresi* was recorded for the first time in Argentina in the Chaco region (Salomón *et al.,* 2008, 2010). In addition to describing the new species, this record represents the first register of the *Pintomyia* genus in northwestern Argentina.

Male specimens showed more striking differences than females. *Pintomyia salomoni* generally has smaller structures than the other two species, such as in the length of the head (*P. salomoni*, 311 μm; *P. torresi*, 435 μm; *P. boliviana*, 360 μm), FI (*P. salomoni*, 157 μm; *P. torresi*, 268 μm; *P. boliviana*, 290 μm), FII (*P. salomoni*, 76 μm; *P. torresi*, 127 μm; in *P. boliviana* FII + FIII is slightly shorter than FI), FIII (*P. salomoni*, 104 μm; *P. torresi*, 132 μm; in *P. boliviana* FII + FIII is slightly shorter than FI) and PI–PV (*P. salomoni*, 29 μm, 105 μm, 128 μm, 92 μm, 254 μm; *P. torresi*, 30 μm, 153 μm, 168 μm, 114 μm, 300 μm; *P. boliviana*, I + II 160 μm, 170 μm, 100 μm, 350 μm), length and width of wings (*P. salomoni*, 1524 μm, 357 μm; *P. torresi*, 2005 μm, 490 μm; *P. boliviana*, 1700 μm, 500 μm), and the vein sections and parts of the legs (Velasco & Trapido, 1974; Le Pont & Desjeux, 1991). The interocular and labrum–epipharynx distances are shorter than in *P. torresi* (*P. salomoni*, 159 μm, 111 μm; *P. torresi*, 230 μm, 148 μm), and the clypeus is shorter than in *P. boliviana* (*P. salomoni*, 121 μm; *P. boliviana*, 190 μm). The same is true of genital structures such as the gonocoxite, gonostyle and aedeagal filaments, which are smaller in the new species (*P. salomoni*, 195 μm, 110 μm, 359 μm, respectively; *P. torresi*, 270 μm, 155 μm, 479 μm, respectively; *P. boliviana*, 200 μm, 111 μm, 400 μm, respectively). The characters that differentiate *P. salomoni* from the other two species are: (a) the absence of the subterminal spine in the new species, and (b) in the paramere the ventral lobe (131 μm) is slightly shorter than the dorsal lobe (190 μm) in *P. salomoni*, but is the same length in *P. torresi* (255 μm) (Le Pont & Desjeux, 1991) and is almost half the length of the dorsal lobe in *P. boliviana* (Velasco & Trapido, 1974). *Pintomyia salomoni* has a 10-bristle tuft on the interlobular region of the paramere, as does *P. boliviana* (Velasco & Trapido, 1974), whereas *P. torresi* has a tuft of three to five bristles (Le Pont & Desjeux, 1991). The parameral sheath has one ventral protuberance in *P. salomoni*, as in *P. torresi*, whereas that in *P. boliviana* presents two ventral protuberances.

Females are larger than males. The females of *P. salomoni* are smaller in comparison with the females of *P. torresi* and *P. boliviana* in the following structures: length of head (*P. salomoni*, 359 μm; *P. torresi*, 495 μm; *P. boliviana*, 470 μm); width of head (*P. salomoni*, 224 μm, *P. torresi*, 326 μm; *P. boliviana*, 290 μm); labrum–epipharynx distance (*P. salomoni*, 207 μm; *P. torresi*, 300 μm; *P. boliviana*, 340 μm); FI (*P. salomoni*, 202 μm; *P. torresi*, 272 μm; *P. boliviana*, 290 μm); FII (*P. salomoni*, 94 μm; *P. torresi*, 120 μm; in *P. boliviana*, FII + FIII is slightly shorter than FI); FIII (*P. salomoni*, 93 μm; *P. torresi*, 118 μm; in *P. boliviana*, FII + FIII is slightly shorter than FI), and PI–PV lengths (except the measure of PI) (*P. salomoni*, 45 μm, 112 μm, 127 μm, 97 μm, 239 μm, respectively; *P. torresi*, 31 μm, 168 μm, 182 μm, 130 μm, 402 μm, respectively; *P. boliviana*, I + II, 230 μm, 200 μm, 120 μm, 290 μm). In the thorax, wing length and width are shorter (*P. salomoni*, 1648 μm, 391 μm; *P. torresi*, 2007 μm, 580 μm; *P. boliviana*, 2000 μm, 600 μm), as are the vein sections (except the γ-section) and parts of the legs (Velasco & Trapido, 1974; Le Pont & Desjeux, 1991). The abdomen is smaller in *P. salomoni*.

Except for their general size, the spermathecae of *P. salomoni* and *P. torresi* are similar in shape. In both species, the body of the spermathecae and the individual and common ducts have superficial striations, and the proportion of ducts is equal across both species. However, although *P. boliviana* has an apical ring in the spermatheca, as do the other two species, its shape is different, and the individual ducts are twice as long as the common duct. The most conspicuous difference between the female of the new species and those of *P. torresi* and *P. boliviana* is in the disposition of the horizontal teeth of the cibarium: although all three species show four teeth, they are not equidistant in *P. salomoni*.

The characteristics of these structures are enough to distinguish *P. salomoni* as a new species.

At the sites at which the new species was captured, in Jujuy, *P. salomoni* (16%) was captured with *Migonemyia migonei* (França, 1920) (47%), *Nyssomyia neivai* (Pinto, 1926) (25%) and *Evandromyia cortelezzii* (Brèthes, 1923) (12%) (all: Diptera: Psychodidae). In Tucumán, *P. salomoni* (18%) was captured with *M. migonei* (77%) and *E. cortelezzii* (5%).

Remarkably, the new species was captured at altitudes of 500–700 m a.s.l., whereas in Bolivia the species *P. bolivia*na was found at 1500 m a.s.l. (Velasco & Trapido, 1974) and *P. torresi* was found at 2700 m a.s.l. (Le Pont & Desjeux, 1991). In Chaco Province in Argentina, *P. torresi* was found at 151 m a.s.l. (Salomón *et al.*, 2008, 2010). Like *P. boliviana* and *P. torresi*, *P. salomoni* was captured in environments that featured the presence of bats.

Acknowledgements

The authors wish to thank José Direni Mancini, María José Barrionuevo (Instituto Superior de Entomología, Universidad Nacional de Tucumán, San Miguel de Tucumán, Tucumán, Argentina) and Elvira Casagranda [Instituto Gulich, Centro Espacial Teófilo Tabanera (CETT), Comisión Nacional de Actividades Espaciales, Falda del Cañete, Córdoba, Argentina] for their field collaboration, Enrique Szelag (Instituto de Medina Regional, Universidad Nacional del Nordeste, Resistencia, Chaco, Argentina and Instituto Nacional de Medicina Tropical, Puerto Iguazú, Misiones, Argentina) for his valuable comments on this manuscript, and Luciana Martínez Calsina (Instituto de Investigación Animal del Chaco Semiárido, INTA, Leales, Tucumán, Argentina) for her critical review of its use of English. This work was supported by the Bunge and Born Foundation 2012 and Prést (BID PICT12-2482).
The authors declare no conflicts of interest.

References

Andrade Filho, J.D., Galati, E.A.B. & Brazil, R.P. (2009) Review of American fossil Phlebotominae (Diptera: Psychodidae) with a description of two new species. *Journal of Medical Entomology*, **46**, 969–979.

Fernández, M.S., Martínez, M.F., Pérez, A.A., Santini, M.S., Gould, I.T. & Salomón, O.D. (2015) Performance of light-emitting diode traps for collecting sand flies in entomological surveys in Argentina. *Journal of Vector Ecology*, **40**, 373–378.

Forattini, O.P. (1973) *Entomologia Médica. Psychodidae, Phlebotominae, Leishmanioses, Bartonelose*, Vol. **IV**. Edgard Blücher, São Paulo.

Galati, E.A.B. (2003) Classificação de Phlebotominae. *Flebotomíneos do Brasil* (ed. by E.F. Rangel & R. Lainson), pp. 23–51. Fiocruz, Rio de Janeiro.

Le Pont, F. & Desjeux, P. (1991) Descriptions de deus nouvelles espèces de Phlébotomes (Diptera: Psychodidae) de région subandine de Bolivie. *Bulletin de la Société Entomologique de France*, **96**, 301–308.

Marcondes, C.B. (2007) A proposal of generic and subgeneric abbreviations for phlebotomine sandflies (Diptera: Psychodidae, Phlebotominae). *Entomological News*, **118**, 351–356.

Quintana, M.G., Fernández, M.S. & Salomón, O.D. (2012) Distribution and abundance of Phlebotominae, vectors of Leishmaniasis, in Argentina: spatial and temporal analysis at different scales. *Journal of Tropical Medicine*, **2012** Article, 652803.

Salomón, O.D., Quintana, M.G. & Rosa, J.R. (2008) Ecoepidemiología de la leishmaniasis cutánea en Argentina. *Salud y Ciencia*, **16**, 514–520.

Salomón, O.D., Andrade Filho, J.D., Fernández, M.S., Rosa, J.R., Szelag, E.A. & Santini, M.S. (2010) Nuevos registros de Phlebotominae (Diptera: Psychodidae) para la Argentina. *Revista de la Sociedad Entomológica Argentina*, **69**, 261–265.

Szelag, E.A., Andrade Filho, J.D., Parras, M.A. *et al.* (2016) Argentine phlebotomine fauna, new records of Phlebotominae (Diptera: Psychodidae) for the country and the province of Chaco. *Zootaxa*, **4139**, 427–430.

Velasco, J. & Trapido, H. (1974) Two new phlebotomine sandflies from Bolivia, *Lutzomyia boliviana*, n. sp. and *Warileya yungasi*, n. sp. (Diptera: Psychodidae). *Journal of Medical Entomology*, **11**, 433–436.

Wolff, M. & Galati, E.A.B. (2002) Description of *Pintomyia limafalcaoae* and *Pintomyia antioquiensis*, two new species of phlebotomine sand fly (Diptera, Psychodidae) from the Colombian Andes. *Memórias do Instituto Oswaldo Cruz*, **97**, 317–324.

Accepted 13 February 2017