

The subgenus *Migonemyia* Galati 1995 (Diptera, Psychodidae, Phlebotominae), with description of a new species *Migonemyia vaniae*

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The capture of a new species of the subgenus Migonemyia Galati, 1995 (Diptera, Psychodidae, Phlebotominae), Migonemyia vaniae sp. nov. in the Ribeira Valley, state of São Paulo, Brazil, together with the other two species: Mg. migonei (França, 1920) and Mg. rabelloi (Galati & Gomes, 1992) lead us to review this subgenus. The new species was described and illustrated. The genitalia of the two other species were also illustrated and some genital characteristics (number of setae on the gonocoxite tuft, ejaculatory ducts and pump and ducts/pump ratio; and number of setae on the tergite VIII of the females) considered important to differentiate the three species, including five populations of Mg. migonei (from Northeastern, Southeastern, and Southern Brazilian regions and of Peru) were submitted to variance analyses. The Mg. migonei population of Northeastern Brazilian region showed distinct smaller values ($P < 0.05$) than the other Brazilian populations studied as regarding these characteristics. The capture of both sexes of these three species in sympatry confirms the association between the sexes of Mg. rabelloi, recognised as doubtful when this species was originally described. Identification keys for male and female of the three species are presented.

Key words: review - taxonomy - *Migonemyia (Migonemyia) vaniae* sp. nov. - Phlebotominae - Psychodidae

A new phlebotomine species of *Migonemyia* Galati 1995 denominated *Migonemyia (Migonemyia) vaniae* was captured in a rural area (22J0735878 UTM 7282790), 260 m above sea level, close to the Atlantic forest reserve on the Serra de Paranapiacaba in the Ribeira Valley, in southern state of São Paulo, Brazil, together with *Mg. migonei* and *Mg. rabelloi*, between January 2001 and December 2003.

This reserve is located in a transitional area between dense umbriferous submontane forest and mixed umbriferous submontane forest (Veloso et al. 1991), formed of calcareous rock and containing large caves.

The genus *Migonemyia* was proposed by Galati (1995) within the subtribe Lutzomyiina Abonnenc & Leger, 1976 and was subdivided by her into two subgenera *Migonemyia* and *Blancasmyia* Galati, 1995.

Both sexes of the genus *Migonemyia* may be characterized as follows: AIII short, smaller or equivalent to half the length of the head; 5th palpomere longer than 3rd; Newstead's spines dispersed on the 3rd palpomere. Males: gonostyle with four spines, presence of the pre-apical seta, and the inner spine located very close to the apex or beyond the middle, more apically or at same level than the lower external spine; gonocoxite with a basal tuft of setae and basal inner face of gonocoxite without sclerotized longitudinal band. Females: cibarium with

four horizontal posterior teeth and the anterior ones in vertical position arranged in a transversal row, presence of sclerotized area and the posterior bulge; spermathecae tubular or bulbous, and the common sperm duct short or absent.

The subgenus *Migonemyia* may be distinguished from *Blancasmyia* in both sexes by the absence of the retrocervical sensillae. Males: gonostyle with the inner spine located on its apical third. Females: presence of small sclerotized protuberance on tergite IX. Hence, both sexes of *Blancasmyia* present the ventrocervical sensillae. Males: gonostyle with the inner spine located almost apically. Females: absence of the small sclerotized protuberance on tergite IX.

Two species were then included in the subgenus *Migonemyia*: *Mg. migonei* (França, 1920) with wide geographical distribution in South America and *Mg. rabelloi* with distribution restricted to the Ribeira Valley, southern state of São Paulo, Brazil (Galati & Gomes 1992). When this latter species was described the association between the sexes was recognized as uncertain, because although they were both captured in the region of the Ribeira Valley the captures were not made in the same locality. However, a new appraisal of this association became possible with the capture of both genders of these two species together with the new taxon.

Thus, beyond to describe both sexes of the new species and confirming the correct association between the sexes of *Mg. rabelloi*, it is also purpose of this paper to present a review of the subgenus.

MATERIALS AND METHODS

The captures were undertaken with modified automatic light traps (Natal et al. 1991), to which the collection chamber is external and linked to the body of the

Financial support: Fapesp process no. 00/06811-0

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Received 8 February 2007

Accepted 2 April 2007

trap by a cotton sleeve, with a plastic casing, ca. 20 cm long, or with an electric aspirator at a probable resting site with bait for the phlebotomines.

The specimens were measured with a Zeiss® eyepiece calibrated according to a standard Zeiss® scale and drawn with an Olympus® clear chamber. All measurements are given in micrometers. The measurements of paratypes are given in parentheses. The species nomenclature follows Galati (1995, 2003a) and the characters are described in accordance with the same author (2003b). The type material will be deposited in the entomological collections of the Faculdade de Saúde Pública of the Universidade de São Paulo (FSP-USP) and the Centro de Pesquisa Rene Rachou, Fundação Oswaldo Cruz, Belo Horizonte (CPqRR-Fiocruz).

Beyond the type-material of *Mg. vaniae* sp. nov., specimens of *Mg. rabelloi* and *Mg. migonei* deposited in the Epidemiology department (FSP-USP) collections were examined for the following comparison: in the females, the number of setae on the tergite VIII and in males, the number of setae in the gonocoxite tuft; the length of the ejaculatory ducts and the ejaculatory pump and the ratio between these two characters for the three species of the subgenus *Migonemyia*, covering five populations of *Mg. migonei* which occur in different Brazilian regions: one in the South (state of Paraná), two in the Southeast (state of São Paulo: Iporanga municipality and Greater São Paulo metropolitan area), one in the Northeast (state of Ceará), and one in Peru.

For the comparisons of these characteristics, variance analyses were undertaken, the confidence intervals for which were obtained in accordance with Gabriel's method (Sokal & Rohlf 1981, Rohlf & Sokal 1981).

Excepting the specimens from Viçosa municipality, state of Ceará, mounted on microscope slides in Canada balsam, all the others, including the others of this same state, after clearing by the method described by Forattini (1973), were mounted in NC medium (Cerqueira 1943). As it is possible that the resins may have had some effect on the length of the ejaculatory ducts and the ejaculatory pump, the specimens of the Brazilian Northeast region were divided into two groups for the variance analyses.

Further, the papilla on the antennomere V (AV) was examined in both sexes.

The geographical distribution presented for *Mg. migonei* was based on the data base of the Cipa Group (1997) and complemented for some areas: Brazil: Rondônia (Gil et al. 2003), Mato Grosso do Sul (Martins et al. 1978), Rio Grande do Norte (Ximenes et al. 2000), Alagoas (Saraiva et al. 2006); Colombia: La Guajira (Barreto et al. 2006); Peru: Pasco (Cáceres et al. 2000); Paraguay: Amambay Guaira, Itapúa, Misiones (Salomón et al. 2003).

The following specimens of *Mg. migonei* and *Mg. rabelloi* were examined:

Mg. migonei. BRAZIL, state of São Paulo: Iporanga municipality, Bairro Serra, A Gurgel's small farm 13♂ 11♀ 2002, 2003; JD Andrade's small farm 2♂ 8♀ 2001, 2002, 2003; Parque Estadual Turístico do Alto Ribeira (PETAR) 13♀ 2001, 2002, EAB Galati, AM Marassá,

RM Gonçalves-Andrade and A Galati col.; Great São Paulo metropolitan area (GSP): Cotia municipality, Bairro Capuava 10♂ 10♀ 2005, MB Fonseca, DA Silva and VL Berndt col.; São Paulo municipality, Bairro Jaraguá 10♂ 3♀ 2001, BJ Dicezare col.; state of Paraná: Lon-drina municipality, Godoy farm 1♂ 1975, AC Gomes col.; Jussara municipality, CMMP farm 1♂ 1988, U Teodoro col.; Ponta Grossa municipality, Vila Velha park 1♀ 2006, MF Rosa-Cruz col.; Santa Mariana municipality, São Francisco park 4♂ 5♀ 2006, MF Rosa-Cruz col.; Ribeirão Claro municipality, São Sebastião small farm (cave) 5♂ 2006; *idem* (pigpen) 1♂ 2006, Massafra R col.; state of Ceará: 12♂ 47♀ 1999, Funasa-Corse team col.; Viçosa municipality 13♂, 1954, Deane col.; state of Amapá: Teresinha municipality 1♀ 1959, Dauer et al. col.; PERU, Pasco Department: Oxapampa province, Villa Rica District 1♂ 1997, AG Cáceres col.; Junín Department: Chanchamayo province, San Luis district 1♂ 2♀ 2001, AG Cáceres col.; Cusco Department: La Convención province, Quelouno district 1♂ 2♀ 1999, AG Cáceres col.; Puno Department: Sandia Province, San Juan de Oro district 11♂ 4♀ 2002, AG Cáceres col.; VENEZUELA, Estado Cojedes: 1♂ 1981, Elio col.

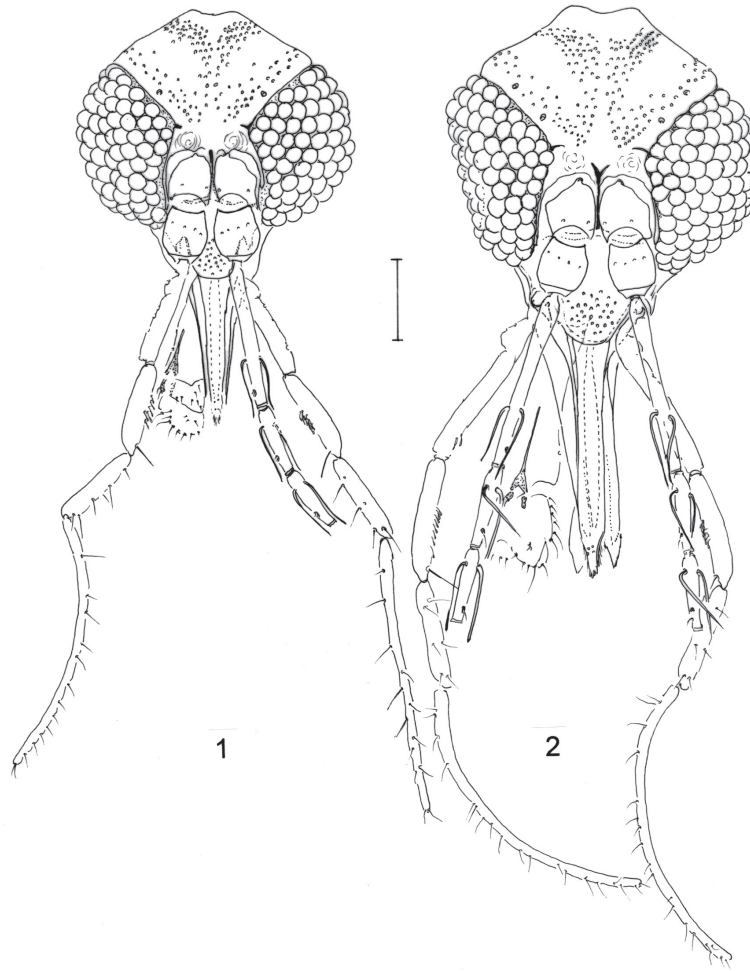
Mg. rabelloi. BRAZIL, state of São Paulo: Iguape municipality, Palmeira small farm (forest) 2♀ (holotype and paratype) 1982; Pedro de Toledo municipality, Bairro Araçatuba 1♂ (paratype) 1974; Cananéia municipality, district of Itapitangui 1♂ (paratype) 1980; Iporanga municipality, Bairro Serra, A Gurgel's small farm (chicken house) 2♂ 1♀ 2003; *idem* (pigpen) 3♂ 1♀ 2003; *idem* (banana tree in middle of pasture) 1♂ 2003; *idem* (forest) 2♀ 2003, EAB Galati, MB Fonseca and JR Andrade col.

RESULTS

Description of *Migonemyia vaniae* sp. nov. (Figs 1-28, 31, 33, 34)

Holotype (male) - Total body length 2460 (2531 ± 118; n = 12). Insect predominantly pale brown, with the head, pronotum, and mesonotum darker brown.

Head (Fig. 1) - Length 330 (335 ± 15; n = 12); width 330 (351 ± 22; n = 12). Eye: length 218 (214 ± 13; n = 12); width 130 (123 ± 6; n = 12) (frontal view). Interocular distance 93 (99 ± 3; n = 12). Interocular suture separated from antennal suture. Clypeus length 95 (98 ± 6; n = 12). Antennomere lengths: AIII 180 (172 ± 8; n = 12), AIV 83 (82 ± 5; n = 12), AV 78 (79 ± 4; n = 12), AXV 50 (53 ± 1; n = 10), and AXVI 45 (48 ± 2; n = 10). AIII/head length ratio: 0.55:1.0 (0.51 ± 0.02:1.0; n = 12). Antennal formula AIII - AXV 2, XVI 0 (Figs 3-10); ascoids simple and long, their apices on AIV go beyond the apex of the segment (Fig. 3); papilla present on AV (Fig. 4); presence of papillae on AXIII. Length of the palpomeres: I 30 (31 ± 3; n = 12), II 100 (103 ± 8; n = 12), III 115 (123 ± 10; n = 12), IV 113 (111 ± 11; n = 12), V 335 (322 ± 21; n = 12). Palpal formula: 1.2.4.3.5 (1.2.4.3.5; n = 8; 1.4.2.3.5; n = 2; 1. 2. (3.4).5; n = 1; 1. (2.4). 3. 5; n = 1); Newstead's spines grouped in the middle of palpomere III, being in number 0 or 2 (0, 1, 2; n = 12) on palpomere II (Fig. 21). Labroepipharynx 183 (185 ± 13; n = 12) long. Labial sutures united.



Figs 1-2: *Migonemyia vaniae* sp. nov. head (holotype male and allotype), frontal view. 1: female; 2: male. Bar = 100 μ m.

Cervix - ventrocervical sensillae absent.

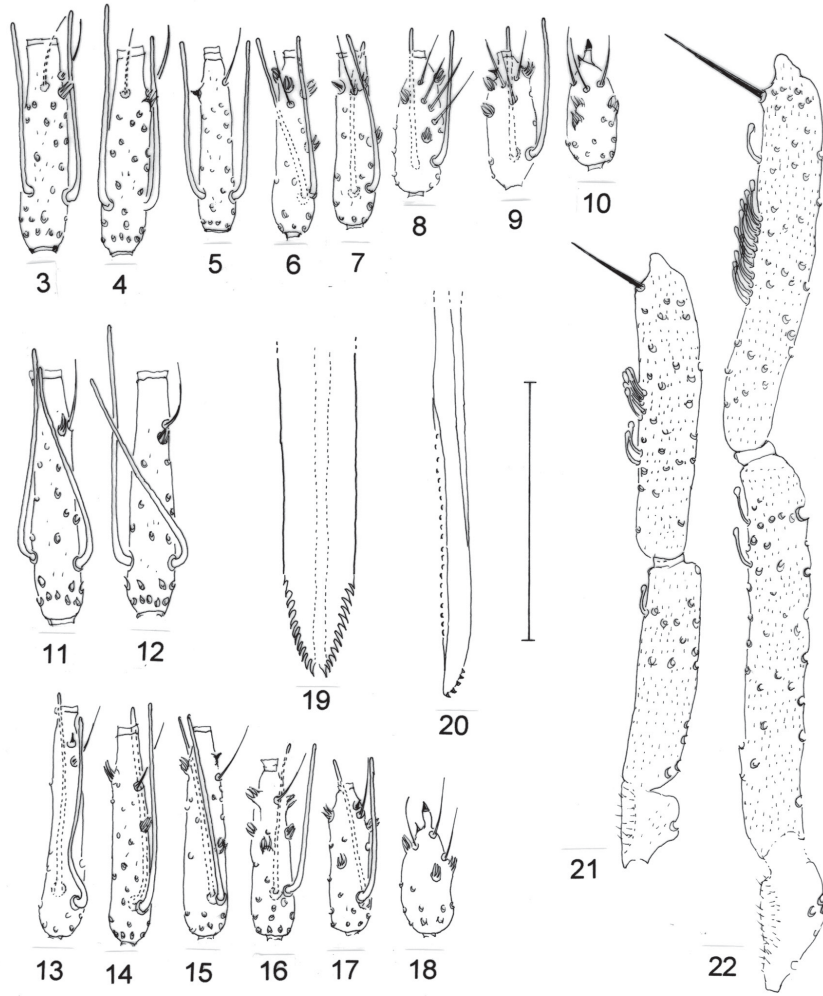
Thorax - Length 550 (550 ± 35 ; $n = 12$); mesonotum length 500 (513 ± 37 ; $n = 12$). Pleura with 2 proepimeral setae (2 - 6; $n = 12$) and 10, 11 upper anepisternal setae (6 - 16; $n = 12$). Setae present on the anterior katepisternum margin. Suture between katepimeron and metepisternum absent. Wing (Fig. 24): length 1630 ($1675 - 87$; $n = 12$), width 500 (523 ± 28 ; $n = 12$). Length of vein sections: *alpha* 470 (485 ± 48 ; $n = 12$), *beta* 180 (177 ± 20 ; $n = 12$), *gamma* 200 (220 ± 28 ; $n = 12$), *delta* 230 (218 ± 35 ; $n = 12$), *pi* 110 (108 ± 21 ; $n = 12$), R_5 1040 (1118 ± 66 ; $n = 12$). Length of femora, tibiae, basitarsi, and tarsi II+III+IV+V: foreleg 550 (565 ± 54 ; $n = 6$), 550 (562 ± 40 ; $n = 5$), 310 (320 ± 17 ; $n = 5$), 480 (484 ± 17 ; $n = 5$); midleg 580 (605 ± 27 ; $n = 6$), 685 (720 ± 37 ; $n = 6$), 390 (416 ± 19 ; $n = 6$), 540 (570 ± 20 ; $n = 6$); hindleg 640 (651 ± 39 ; $n = 8$), 850 (890 ± 68 ; $n = 7$), 475 (501 ± 27 ; $n = 7$), 605 (634 ± 29 ; $n = 7$).

Abdomen - 1250 (1316 ± 91 ; $n = 12$) long. Tergites III-VII with conspicuous tergal papillae. Terminalia (Fig. 34): gonostyle 115 (114 ± 6 ; $n = 21$) long, with 4 major

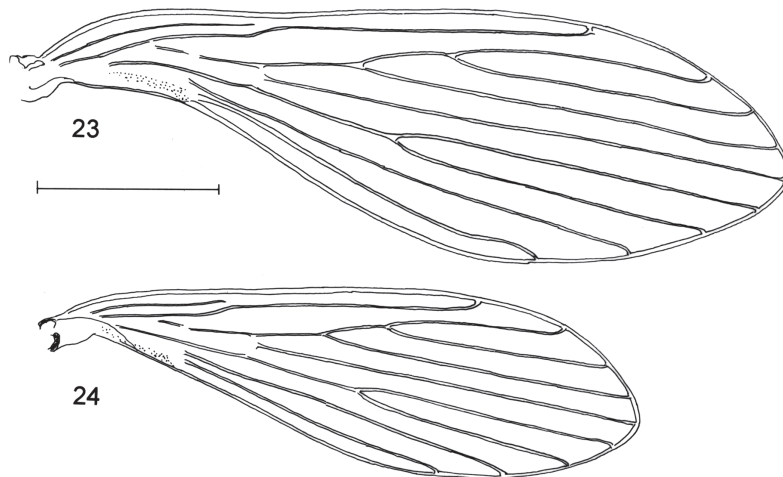
spines; the spines having the following disposition: one apical, the upper external on the 3rd apical part of the structure, the lower external and the internal one beyond the middle of the structure, at the same level. Gonocoxite 215 long \times 63 wide ($220 \pm 10 \times 70 \pm 7$; $n = 21$) with a basal tuft of 8 thin and short (varying from 5 to 10; 8 ± 1.0 ; $n = 21$) setae. Paramere simple, digitiform and slightly convex; dorsal margin length 128 (130 ± 6 ; $n = 21$) and ventral margin length 165 (164 ± 12 ; $n = 21$) with setae on the apical half. Conical aedeagus, dorsal margin length 115 (103 ± 12 ; $n = 21$) and ventral margin length 78 (74 ± 6 ; $n = 21$). Lateral lobe length 215 (222 ± 9 ; $n = 21$); width 18 (20 ± 1 ; $n = 21$). Genital pump: 143 (150 ± 10 ; $n = 21$) long; piston length 118 (126 ± 10 ; $n = 21$); pavilion width 43 (39 ± 3 ; $n = 21$); chamber width 23 (25 ± 3 ; $n = 21$); genital filaments length 642 (655 ± 43 ; $n = 21$) or 4.49 (4.38 ± 0.3 ; $n = 21$) times the length of genital pump. Tip of genital filaments simple (Fig. 33). Cercus 150 (150 ± 10 ; $n = 21$) long.

Allotype (female) - Total body length ca. 2697 (2550 ± 143 $n = 5$). General coloration as that of the male.

Head (Fig. 2) - Length 415 (387 ± 25 ; $n = 5$); width



Figs 3-22: *Migonemyia vaniae* sp. nov. 3-10, 21 (holotype male); 3-10: antennomeres IV, V, XI-XVI, respectively; 21: palpomeres I, II and III; 11-20, 22 (allotype); 11-18: antennomeres IV, V, XI-XVI, respectively; 19: hypopharynx; 20: lacinia; 22: palpomeres I, II and III. Bar = 100 μ m.



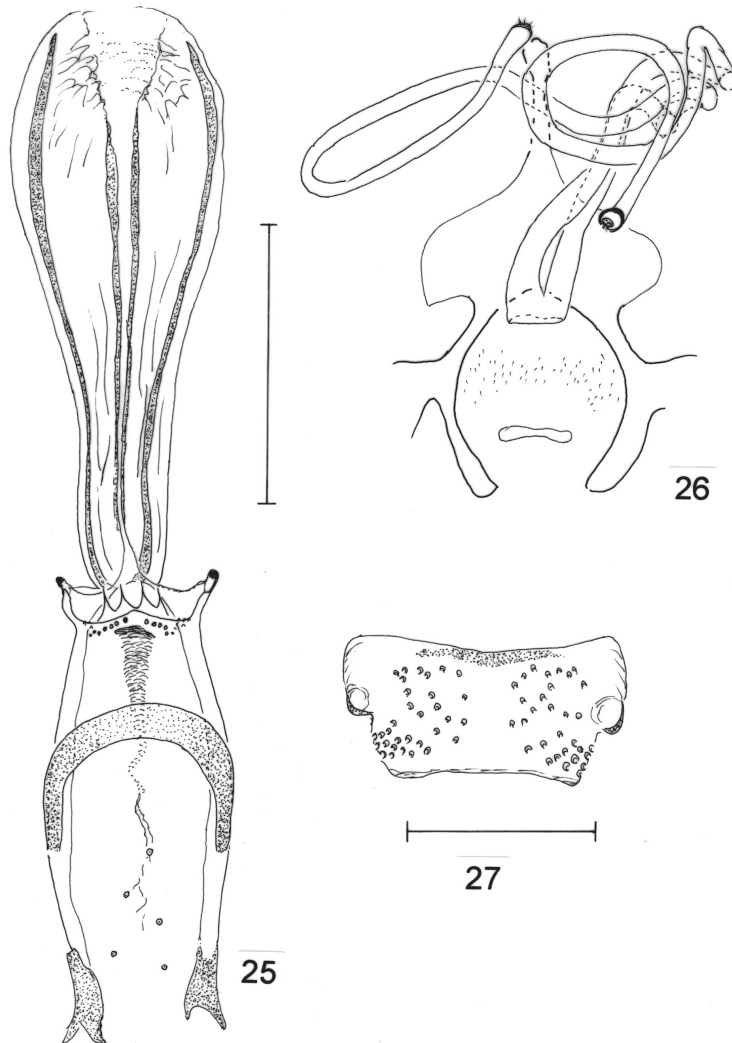
Figs 23-24: wings (allotype and holotype male). *Migonemyia vaniae* sp. nov. 23: female; 24: male. Bar = 500 μ m.

380 (366 ± 18 ; $n = 5$). Eye: length 238 (221 ± 12 ; $n = 5$); width 138 (130 ± 17 ; $n = 5$) (frontal view). Interocular suture separated from antennal suture. Interocular distance 110 (106 ± 11 ; $n = 5$). Clypeus 133 (127 ± 10 ; $n = 5$) long. Antennomeres: AIII 220 (193 ± 10 ; $n = 4$), AIV 100 (89 ± 1 ; $n = 4$), AV 95 (88 ± 0 ; $n = 4$), AXV 58 (54 ± 1 ; $n = 3$), and AXVI 50 (49 ± 5 ; $n = 3$). AIII/head length ratio: 0.53:1.0 (0.51 ± 0.02 :1.0; $n = 4$). Antennal formula AIII – AXV 2, XVI 0 (Figs 11-18); ascoids simple, their apices on AIV go beyond the segment apex (Fig. 11); papilla present on AV (Fig. 12). Palpomere lengths: I 40 (41 ± 5 ; $n = 5$), II 158 (138 ± 9 ; $n = 5$), III 150 (144 ± 8 ; $n = 5$), IV 125 (129 ± 9 ; $n = 5$), V 400 (391 ± 35 ; $n = 5$). Palpal formula: 1.4.3.2.5 or 1.4.(2.3).5; $n = 1$ or 1.4.2.3.5; $n = 4$. Newstead's spines distributed in the middle of palpomere III and 1-2 (0-2; $n = 5$) near the top of palpomere II (Fig. 22).

Labroepipharynx 283 (261 ± 16 ; $n = 5$) long. Cibarium (Fig. 25) with anterior teeth situated in one developed transversal row; 4 posterior (horizontal) teeth, many lateral greatly reduced teeth, pigment patch and posterior bulge well developed; arch complete. Pharynx (Fig. 25) not armed. Hypopharynx (Fig. 19) with well 12-13 delineated apicolateral teeth. Maxilla: lacinia with 4-5 external teeth disposed in a longitudinal row with about 22 internal teeth (Fig. 20). Labial sutures united.

Cervix - Ventrocervical sensillae absent.

Thorax - Length 720 (637 ± 69 ; $n = 5$); mesonotum 700 (597 ± 60 ; $n = 5$) long. Pleurae with 4, 5 (1 - 5 $n = 5$) proepimeral setae, 13, 14 (9 - 17; $n = 5$) upper anepisternal setae. Setae present on the anterior katepisternum margin. Suture between katepimeron and metepisternum absent. Wing (Fig. 23): length 2060



Figs 25-27: *Migonemyia vaniae* sp. nov. (allotype female). 25: cibarium and pharynx; 26: genital fork and spermathecae; 27: tergite IX with sclerotized protuberance, dorsal view. Bar = 100 μ m.

(2008 ± 176; n = 5) and width 670 (620 ± 73; n = 5). Length of vein sections: *alpha* 710 (648 ± 69; n = 5), *beta* 240 (200 ± 12; n = 5), *gamma* 260 (255 ± 43; n = 5), *delta* 360 (336 ± 42; n = 5), *pi* 130 (130 ± 20; n = 5), R5 1440 (1382 ± 172; n = 5). Length of femora, tibiae, basitarsi, and tarsi II+III+IV+V: foreleg 720 (630 ± 30; n = 3); 700 (637 ± 47; n = 3); 410 (347 ± 35; n = 3); 590 (542 ± 23; n = 3); midleg 750 (650 ± 30; n = 3); 930 (793 ± 67; n = 3), 520 (453 ± 15; n = 3); 640 (587 ± 50; n = 3); hindleg 830 (710 ± 36; n = 3); 1110 (980 ± 66; n = 3), 600 (550 ± 27; n = 3); 710 (670 ± 37; n = 3).

Abdomen - Length 1430 (1396 ± 57; n = 5). Tergite VIII with 1, 2 (0 - 3; n = 5) setae. Tergite IX with sclerotized protuberance (Figs 27, 28). Spermathecae (Figs 26, 31) tubular, with no clear transition to the common sperm ducts, measuring 7.4 (7.9 ± 2.1; n = 5) at maximum width; terminal knob highly sclerotized and sessile; individual sperm ducts smooth, 397 (385.4 ± 26.5; n = 5) long; narrowing gradually from their base to the spermathecae, the basal and apical width being 10 (9.2 ± 1.0; n = 5) and 5.0 (4.9 ± .02; n = 5), respectively; common sperm duct smooth and vestigial. Cercus 132 (132 ± 8; n = 5) long.

Type-material - Holotype ♂: BRAZIL, state of São Paulo, Iporanga municipality, Bairro Serra, A Gurgel's small farm (chicken-house) 21-22 Mar 2003. Allotype *idem* 08-09 Dec 2003 (FSP-USP); 21 ♂ 5 ♀ Paratypes: *idem* 12 ♂ 3 ♀ 18-19, 22-23 Oct 2003, 06-07, 08-09, 09-10, 10-11, 11-12 Dec 2003 (2 ♂ 1 ♀ CPqRR-Fiocruz; 10 ♂ 2 ♀ (FSP-USP); *idem* (pig-pen) 2 ♂ 16-17 Nov 2003, 7-8 Dec 2003; *idem* (domicile-veranda) 1 ♀ 23-24 May 2003; *idem* (forest) 3 ♂ 1 ♀ 12-13, 13-14 Nov, 6-7 Dec 2003, 8-9 Dec 2003 (FSP-USP); *idem* (pasture) 1 ♂ 10-11 Nov 2003; *idem* (bank of stream, in a hole between roots used as shelter by a bitch for her litter) 1 ♂ 19 Nov 2003; *idem*: Dona. Donária's small farm (peridomicile) 1 ♂ 12-13 Dec 2003 (FSP-USP) and *idem* JR Andrade's small farm (pig-pen) 1 ♂ 10-11 Dec 2003 (FSP-USP). The captures were made by EAB Galati, MB Fonseca, and JR Andrade with modified automatic light traps, except for that in the shelter of the dogs which was undertaken with an aspirator.

Etymology - The name of the new species *Migonomyia vaniaiae* derives from that of our colleague Vânia Lúcia Brandão Nunes whom we thus wish to honor in recognition of her dedication to the study of the phlebotomines, leishmaniases, and trypanosomatids of the state of Mato Grosso do Sul.

Migonemyia (Migonemyia) migonei (França, 1920)

Phlebotomus Migonei França, 1920. Holotype ♂: Asunción, Paraguay.

Phlebotomus migonei: Theodor 1932 (♀ description and ♂ redescription from Argentinean specimens); Barretto 1947 (complete geographical distribution with respective references).

Lutzomyia migonei: Theodor 1948, 1965 (classifications); Barretto 1962 (classification); Martins, Williams, Falcão 1978 (classification and geographical dis-

tribution); Young 1979 and Young and Duncan 1994 (♂ ♀ redescription, identification keys, and geographical distribution); Aguiar and Medeiros 2003 (Brazilian geographical distribution and habitats); Cipa Group 1997 (geographical distribution, first reference to the species by country, and synonyms).

Sergentomyia migonei: Barretto, 1955 (classification).

Lutzomyia (Coromyia) migonei: Forattini 1971 (classification); Forattini 1973 (♂ ♀ redescription; identification keys).

Migonemyia (Migonemyia) migonei: Galati 1995 (classification); Galati 2003a (classification) Galati 2003b (identification keys and distribution).

Syn. *Phlebotomus araozi* Paterson & Shannon, 1926 (Dyar 1929).

Phlebotomus rangeli Nuñez-Tovar, 1924 (Dyar & Nuñez-Tovar 1926).

Geographical distribution - PARAGUAY (Asunción: type-locality): Alto Paraná, Amambay, Caaguazú, Caazapá, Central, Chaco, Guairá, Itapúa, Misiones, San Pedro. ARGENTINA: Catamarca, Formosa, Jujuy, Misiones, Salta, Santiago del Estero. BOLIVIA: La Paz; BRAZIL: *Central-Western Region* - Mato Grosso do Sul, Mato Grosso; *Northern Region* - Acre, Amazonas, Amapá, Pará, Rondônia; *Northeastern Region* - Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Rio Grande do Norte; *Southeastern Region* - Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo; *Southern Region* - Paraná, Rio Grande do Sul, Santa Catarina; PERU: Madre de Dios, Puno, Pasco, Junín, Cusco; COLÔMBIA: La Guajira, Magdalena; TRINIDAD: Trinidad and Tobago VENEZUELA: Apure, Aragua, Barinas, Carabobo, Cojedes, Distrito Federal, Falcón, Lara, Mérida, Miranda, Portuguesa, Sucre, Tachira, Trujillo, Yaracuy, Zulia.

Migonemyia (Migonemyia) rabelloi (Galati & Gomes, 1992)

Lutzomyia rabelloi Galati & Gomes, 1992 (Holotype ♀: Iguape municipality, state of São Paulo, Brazil) and probable males; Young & Duncan, 1994 (reproduction of figures from Galati & Gomes 1992 and geographical distribution); Cipa Group 1997 (geographical distribution).

Migonemyia (Migonemyia) rabelloi: Galati 2003a (classification) Galati 2003b (identification keys and geographical distribution).

Geographical distribution - BRAZIL: state of São Paulo. The knowledge of this species up to now is limited to the Ribeira Valley region in the following municipalities: Cananéia, Iguape, Iporanga, and Pedro de Toledo.

The results of the variance analyses undertaken to compare the male characteristics: lengths of the ejaculatory pump and duct and the ratio between these two structures are presented in Table I and the number of the setae in the gonocoxite tuft in Table II. The only character for the females, number of setae on the tergite VIII (Table III).

The papilla on the 5th antennomere (AV) is present in both sexes of *Mg. vaniaiae*, sp. nov. and in the *Mg.*

TABLE I

Average with their respective confidence intervals of ejaculatory duct length, ejaculatory pump, and the ratio between the lengths of ejaculatory ducts/ejaculatory pump for *Migonemyia vaniae* sp. nov., *Mg. rabelloi*, and six populations of *Mg. migonei*

Characteristics/species (populations)	N	Ejaculatory duct saverage (CI)	Ejaculatory pump average (CI)	Ducts/pump ratio average (CI)
<i>Mg. vaniae</i> sp. n.	22	654.4 (637.7 - 671.1)	149.4 (145.9 - 153.0)	4.39 (4.26 - 4.51)
<i>Mg. rabelloi</i>	8	382.9 (355.2 - 410.5)	141.9 (136.0 - 147.8)	2.71 (2.50 - 2.92)
<i>Mg. migonei</i> ^a	12	546.7 (524.1 - 569.3)	122.3 (117.4 - 127.1)	4.47 (4.30 - 4.64)
<i>Mg. migonei</i> ^b	12	557.4 (534.8 - 580.0)	121.7 (116.9 - 126.5)	4.58 (4.41 - 4.75)
<i>Mg. migonei</i> ^c	12	549.1 (526.5 - 572.4)	122.9 (118.1 - 127.7)	4.47 (4.30 - 4.64)
<i>Mg. migonei</i> ^d	12	443.2 (420.7 - 465.8)	116.4 (111.6 - 121.2)	3.82 (3.65 - 3.99)
<i>Mg. migonei</i> ^e	12	434.2 (411.6 - 456.8)	113.8 (109.0 - 118.6)	3.81 (3.66 - 3.98)
<i>Mg. migonei</i> ^f	12	491.2 (468.6 - 513.8)	118.8 (113.9 - 123.6)	4.14 (3.97 - 4.31)

Mg. migonei populations. *a*: Iporanga municipality (Brazilian Southeast region); *b*: Greater São Paulo metropolitan area (Brazilian Southeast region); *c*: state of Paraná (Brazilian South region); *d*: state of Ceará (Brazilian Northeast region); *e*: Viçosa municipality, state of Ceará (Brazilian Northeast region); *f*: Peru; CI: confidence interval ($\alpha = 0.05$).

TABLE II

Number of setae on the gonocoxite tuft of *Migonemyia vaniae* sp. nov., *Mg. rabelloi*, and five populations of *Mg. migonei*

Species (populations)	N	Interval observed	Average	CI
<i>Mg. vaniae</i> sp. nov.	22	5 - 10	7.8	7.4 - 8.3
<i>Mg. rabelloi</i>	8	11 - 15	12.4	11.6 - 13.2
<i>Mg. migonei</i> ^a	15	6 - 8	6.2	5.6 - 6.8
<i>Mg. migonei</i> ^b	20	5 - 8	6.0	5.5 - 6.5
<i>Mg. migonei</i> ^c	12	5 - 8	6.5	5.9 - 7.1
<i>Mg. migonei</i> ^d	25	2 - 7	4.6	4.1 - 5.0
<i>Mg. migonei</i> ^e	12	0 - 5	2.6	1.9 - 3.2

Mg. migonei populations. *a*: Iporanga municipality (Brazilian Southeast region); *b*: Greater São Paulo metropolitan area (Brazilian Southeast region); *c*: state of Paraná (Brazilian South region); *d*: state of Ceará (Brazilian Northeast region); *e*: Peru; CI: confidence interval ($\alpha = 0.05$).

TABLE III

Number of setae on the female tergite VIII of *Migonemyia vaniae* sp. nov., *Mg. rabelloi*, and five populations of *Mg. migonei*

Species (populations)	N	Interval observed	Average	CI
<i>Mg. vaniae</i> sp. nov.	6	0 - 2	1.0	-1.4 - 3.4
<i>Mg. rabelloi</i>	6	0 - 4	3.2	0.8 - 5.6
<i>Mg. migonei</i> ^a	32	9 - 22	14.1	13.0 - 15.1
<i>Mg. migonei</i> ^b	13	9 - 19	12.8	11.2 - 14.5
<i>Mg. migonei</i> ^c	5	11 - 16	13.4	10.8 - 16.0
<i>Mg. migonei</i> ^d	47	5 - 13	8.7	7.8 - 9.6
<i>Mg. migonei</i> ^e	8	9 - 16	12.4	10.3 - 14.5

Mg. migonei populations. *a*: Iporanga municipality (Brazilian Southeast region); *b*: Greater São Paulo metropolitan area (Brazilian Southeast region); *c*: state of Paraná (Brazilian South region); *d*: state of Ceará (Brazilian Northeast region); *e*: Peru; CI: confidence interval ($\alpha = 0.05$).

migonei populations of the Brazilian South and Southeast regions, but it is absent from *Mg. rabelloi* and in the Brazilian Northeastern and Peruvian *Mg. migonei* populations as well as from the male from Venezuela and the female from Amapá.

TAXONOMIC DISCUSSION

The characteristics described above allow us to include this new species in the subgenus *Migonemyia*, in accordance with Galati (1995). With the description of this new taxon this subgenus is seen to consist of three closely related species.

It may be seen in Table I that the average length of the ejaculatory pump of *Mg. vaniae* sp. nov. is much greater than those of the other two species, with its confidence interval presenting a small overlap with that of *Mg. rabelloi*; however, the duct/pump ratio of this latter species is considerably smaller than that of *Mg. vaniae*, sp. nov. and those of the six populations of *Mg. migonei* studied. The length of the ejaculatory pump and the value of the duct/pump ratio of the population of the Northeast region were consistently smaller than those of the other populations observed. Although the average of the Peruvian population was also smaller than those of the populations of the Brazilian Southeast and South there was a small overlap of the confidence intervals of the Peruvian, Iporanga, and state of Paraná populations regarding the duct/pump ratio.

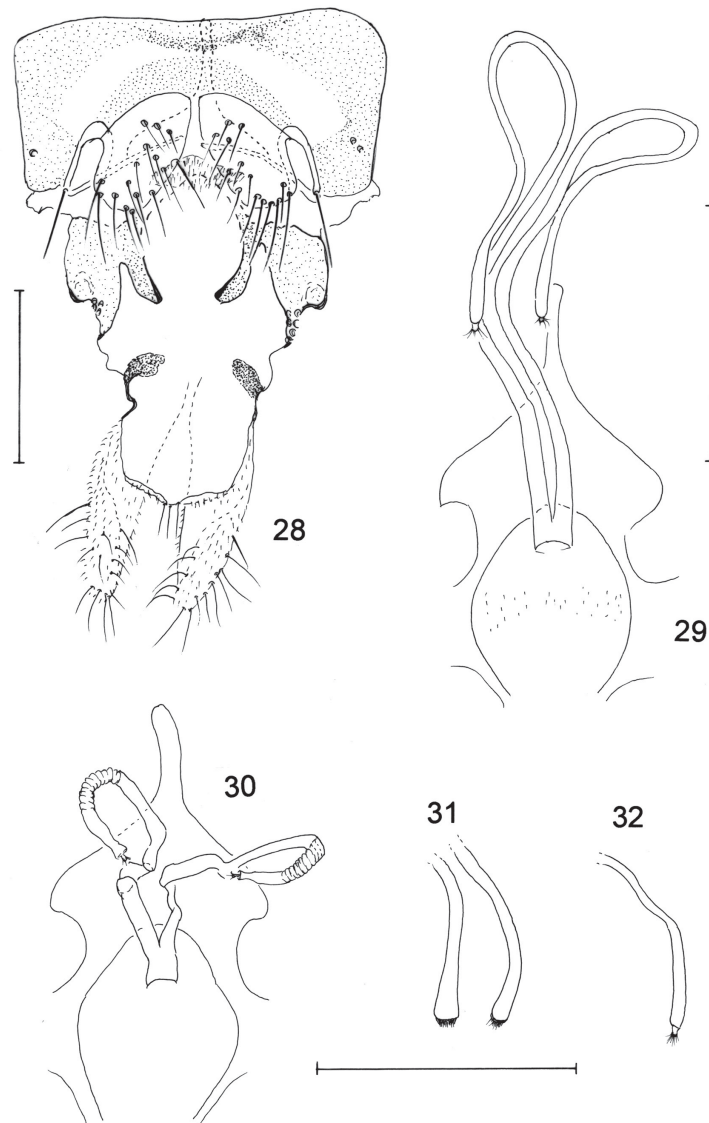
The specimens of the state of Ceará (Brazilian Northeast region) mounted in Canada balsam and NC resins showed some small differences; though these were not significant as their confidence intervals presented considerable overlapping (Table I).

Mg. rabelloi also presents a larger significant number of setae in the gonocoxite tuft than in that of *Mg. vaniae* sp. nov. or those of the *Mg. migonei* populations (Table II). The populations of *Mg. migonei* of the Southeastern and Southern regions show an average number close to 6.0, while in the Northeastern region it is

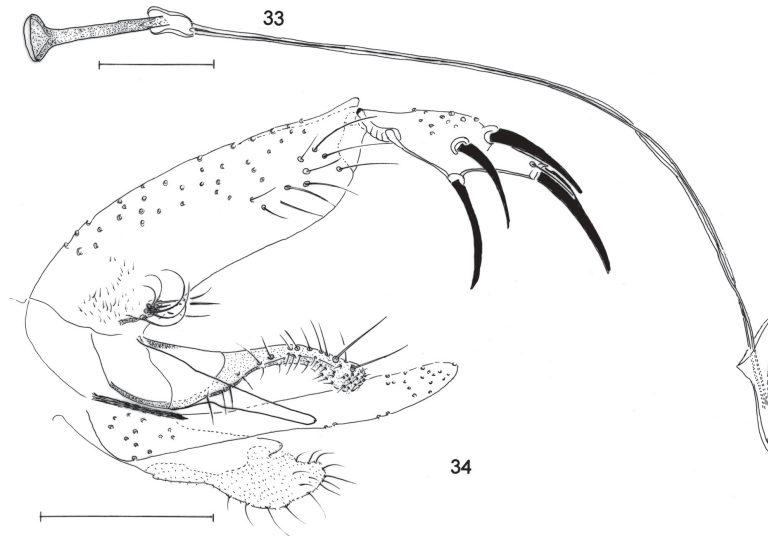
4.6 and thus smaller than those in other Brazilian populations, but the smallest average was observed in the Peruvian population (2.6), in some cases there being no setae at all. In a single Venezuelan specimen observed there were 3; this number had also been represented in a drawing of a Trinidad specimen (Young 1979). Thus it is possible that in the evolutionary process of the subgenus the number of setae may have increased as in *Mg. vaniae* sp. nov. and especially in *Mg. rabelloi*, and reduced to the point of total loss in the Peruvian population. This point of view is supported by phylogenetic analysis that shows *Migonemyia* as being closely related to *Lutzomyia*, this latter frequently having two of its subgenera: *Castromyia* and *Lutzomyia* s. str., with 4-6 setae in the gonocoxite tuft (Galati 2003b).

Apart from these differences, another polymorphic characteristic that was observed in the *Mg. migonei* populations relates to the presence or absence of the papilla on the 5th antennomere (AV). All the specimens observed from the Brazilian South and Southeast regions present the papilla on AV, differently from the populations of the Brazilian Northeast region, Peru, and the only Venezuelan specimen examined, from which it is absent. This papilla is also absent on AV of *Mg. rabelloi*.

Beyond these characteristics, the male of *Mg. vaniae* sp. nov. presents more highly pigmented abdominal tergites with the tergal papillae being more easily observed than those of the other two species. The basal part of the ejaculatory ducts is also more heavily pigmented than in *Mg. migonei* or *Mg. rabelloi* and the paramere is digi-



Figs 28, 31: *Migonemyia vaniae* sp. nov. 28: terminalia, frontal view (allotype female); 31: spermathecae (paratype); 29, 32: *Mg. migonei* (female); 29: genital fork and spermathecae; 32: spermathecae; 30: *Mg. rabelloi* (female) genital fork and spermathecae. Bar = 100 μ m.



Figs 33, 34: *Migonemyia vaniae* sp. nov. (holotype male). 33: aedeagus, genital pump, and ducts; 34: genitalia. Bar = 100 μ m.

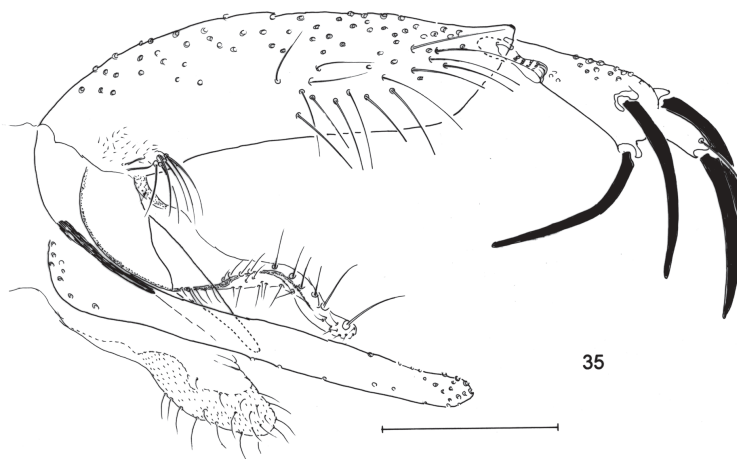


Fig. 35: *Migonemyia migonei* (male), genitalia. Bar = 100 μ m.

tiform and has a slightly convex dorsal margin (Fig. 34), reminiscent of that of *Mg. rabelloi* (Fig. 36) but different from that of *Mg. migonei*, whose margin presents a strong convexity between two concavities (Fig. 35).

The females of *Mg. vaniae* sp. nov. and *Mg. migonei* differ from those of *Mg. rabelloi* in that the two former species present longer, smooth individual sperm ducts (Figs 26, 29), whereas the latter presents segmentation close to the junction with the spermathecae (Fig. 30). *Mg. vaniae* sp. nov. may also be distinguished from *Mg. migonei* by its wider spermathecae and the sessile terminal knob (Figs 31, 32). However, this difference is not always very conspicuous.

As regards the variation in the number of setae on the tergite VIII of the females (Table III), *Mg. vaniae* sp. nov. (of which the range observed varied from 0 to 2) and *Mg. rabelloi* (0 - 4) differ significantly from that of all the populations of *Mg. migonei* (5 - 22) with the respective averages being 1.0, 3.2 and ≥ 8.7 . In a single specimen observed from the Brazilian North region the numbers are 13 and 15. Thus the clearly smaller number of setae on the tergite VIII differentiates *Mg. vaniae* sp. nov. from *Mg. migonei*.

The presence or absence of the papilla on AV in the female *Mg. migonei* population studied shows the same tendency as in the males. Thus, for the populations of

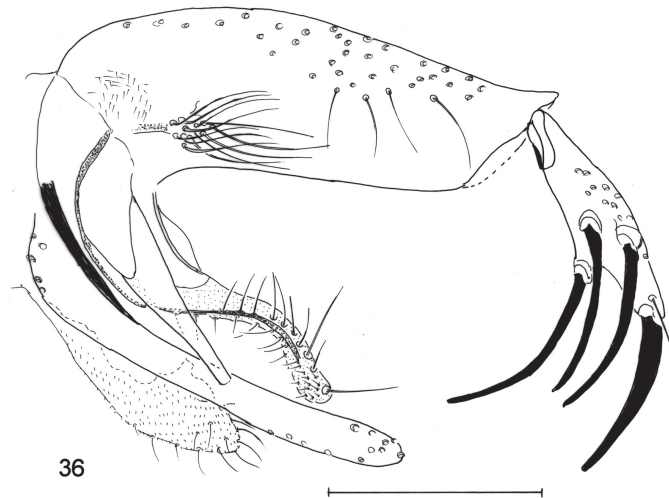


Fig. 36: *Migonemyia rabelloi* (male), genitalia. Bar = 100 μ m.

the Brazilian Southeast and South regions it is impossible to distinguish *Mg. vaniae* from *Mg. migonei*, but it is possible to differentiate them from *Mg. rabelloi*, from which the papilla is absent.

By the above male and female characteristics analyzed, the population of *Mg. migonei* of Brazilian Northeastern region seems to distinguish of those of Southeast and South regions, however more studies are necessary to determine whether these differences constitute an intraspecific or interspecific variations.

An identification key for the males and females of the three species is presented below to make it easier to distinguish them.

MALES

1. Gonocoxite with basal tuft consisting of 11-15 setae (Fig. 36); ejaculatory ducts ≤ 2.9 times longer than the pump *Mg. rabelloi*

Gonocoxite with basal tuft of 0-10 setae; ejaculatory ducts ≥ 3.6 times the length.....2

2(1) Paramere digitiform and slightly convex on the dorsal margin (Fig. 34); ejaculatory ducts and ejaculatory pump measuring respectively ≥ 640 mm and 146 mm *Mg. vaniae* sp. nov.

Paramere strongly convex on the dorsal margin between two concavities (Fig. 35); ejaculatory ducts and ejaculatory pump measuring respectively ≤ 590 mm and 130 mm *Mg. migonei*

FEMALES

1. Set consisting of the common and individual sperm ducts and spermatheca relatively short, equivalent to the height genital fork; individual sperm ducts striated in the transitional region with the spermatheca (Fig. 30) *Mg. rabelloi*

Set consisting of the common and individual sperm ducts and spermatheca very long, measuring two or more times the height of the genital fork; individual sperm ducts smooth in the transitional region with the spermatheca (Figs 26, 29)2

2(1) Tergite VIII with the number of setae varying from 0-2 (Fig. 28); sessile terminal knob (Fig. 31)*Mg. vaniae* sp. nov.

Tergite VIII with the number of setae varying from 5-22; pedunculate terminal knob (Fig. 32)*Mg. migonei*

ACKNOWLEDGEMENTS

To Mr Antônio Gurgel, the owner of the property where the species were collected, and Mr Jânio Ribeiro de Andrade, the local tourist guide, for their cooperation.

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