

## Description of *Micropygomyia brandaoi* sp. n. (Diptera: Psychodidae: Phlebotominae), a fossil phlebotomine from the Dominican Republic

José Dilermando Andrade Filho<sup>1</sup>\*, Eunice A Bianchi Galati<sup>1</sup>, Alda Lima Falcão,  
Reginaldo Peçanha Brazil<sup>2</sup>

Laboratório de Leishmanioses, Instituto René Rachou-Fiocruz, Av. Augusto de Lima 1715, 30190-002 Belo Horizonte, MG, Brasil <sup>1</sup>Departamento de Epidemiologia, Faculdade de Saúde Pública, Universidade de São Paulo, São Paulo, SP, Brasil <sup>2</sup>Laboratório de Bioquímica, Fisiologia e Imunologia de Insetos, Instituto Oswaldo Cruz-Fiocruz, Rio de Janeiro, RJ, Brasil

*The description of Micropygomyia brandaoi, a new species of fossil phlebotomine sand fly, is based on one male specimen obtained from Dominican amber of the Miocene period (20 million years). In this new species, the fifth palpal segment is long, the coxite lacks a setal tuft and the style shows four well-developed spines. This set of characters allowed us to place the new species in the genus Micropygomyia Barretto.*

Key words: *Micropygomyia brandaoi* sp. n. - Phlebotominae - sand fly - Diptera - Psychodidae - taxonomy - fossil

Fossil phlebotomines have been discovered in amber from Mexico and the Dominican Republic (Quate 1963, Brazil & Andrade Filho 2002, Andrade Filho & Brazil 2004, Peñalver & Grimaldi 2005, Andrade Filho et al. 2006a, b, 2007). Amber from the Dominican Republic has an estimated age of about 20 million years, and thus dates from the Miocene period (Iturralde-Vicente & MacPhee 1966).

We examined 32 amber inclusions from Dominican Republic containing 55 phlebotomine sandflies specimens; all specimens were assumed to belong to a single undescribed species. A rectangular piece of amber, measuring 1.9 cm x 1 cm was selected as holotype. We are herein describing a new species based only in the holotype. The measures are given in micrometers; measures were made using an Olympus CH2 microscope fitted with an ocular micrometer. Drawings were made using a camera lucida. The classification scheme used is that proposed by Galati (1995).

*Micropygomyia brandaoi* sp. n. (Figs 1-3)

*Male holotype* - Sand fly relatively small, measurement ca 1,456; its entire length could not be measured, and its general color could not be defined with precision. Paired appendages complete.

Head: laid on its side, thus obstructing the width measurement. Mouthparts not distinguishable, thus palpomeres 1st and 2nd could not be clearly separated; length of both palpomeres = 135. Lengths of other palpomeres

as follows: 3rd = 119; 4th = 72; 5th = 262. Palpal formula 1.4.2.3.5, the length of palpomere 5th being longer than the sum of the length of palpomeres 3rd and 4th. Newstead's spines visible on 3rd palpomere, implanted nearly the middle. Antennae complete with ascoids clearly visible, these being simple and short, not reaching the apex of the subsequent flagellomere. Papilla present on AIII, AIV, AXIII-AXVI. Measurements of flagellomeres: AIII = 225; AIV = 88; AV = 88. AXV/AXVI ratio > 1.0. AIII/AIV ratio = 2,56:1 and AIII/palpomere 5 ration = 0,86:1.

Thorax: thoracic bristles not visible, except on the notum. Wings: 568 wide. Principal wing indices:  $\alpha$  (R2) - 316;  $\beta$  (R2 + R3) - 237;  $\gamma$  (R2+R3+R4) - 248;  $\delta$  (part of R1 that extends beyond the junction of R2+R3) - 34.  $\alpha/\beta$  ratio = 1.33:1 and  $\alpha/\delta$  ratio = 9.29:1. Legs without special characters. Lengths of anterior, median and posterior femora 597, 597 and 642 respectively. Lengths of anterior, median and posterior tibiae 783, 879 and 992 respectively. Anterior, median and posterior tarsomeres 507, 541 and 597 respectively. Anterior femur/median femur ratio = 1:1 and anterior femur/anterior tibia ratio = 0.76:1.

Abdomen: genital pump and genital filaments not visible. Aedeagus triangular; gonostyle 99 long, with four spines arranged as follows: one apical, one external superior, one external inferior implanted at same level as an internal spine on the middle of the gonostyle. Pre-apical bristle absent. Coxite 130 long, without bristles. Paramere 132 long, bearing a dorsal group of bristles. Lateral lobe 168 long and 19 wide. Lateral lobe/coxite ratio = 1.29:1; coxite/paramere ratio = 0,98:1; lateral lobe/paramere ratio = 1.27:1.

*Type material* - Holotype male and 54 paratypes males, Dominican Republic, North Santiago, specimen in amber from the mid-Miocene period, deposited in the Phlebotomine Sand Fly collection of the Instituto René Rachou-Fiocruz, Belo Horizonte, MG, Brazil.

*Etymology* - The name *Micropygomyia brandaoi* sp. n. is in honor of Sinval Pinto Brandão Filho, for his contribution to the knowledge on leishmaniasis in Brazil.

Financial support: Capes, Fiocruz

\* Corresponding author: jandrade@cpqrr.fiocruz.br

Received: 12 December 2007

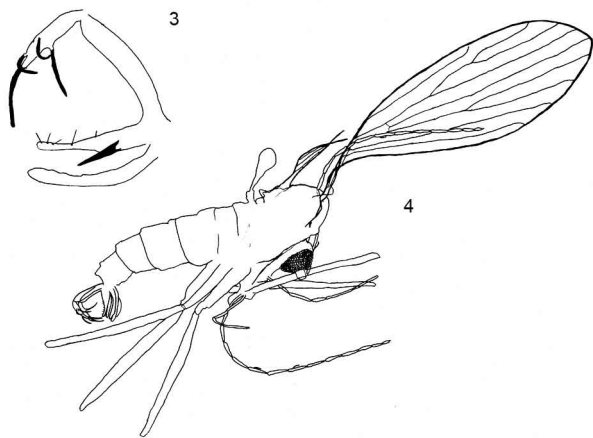
Accepted: 24 June 2008



Fig. 1: *Micropygomyia brandaoi* sp. n. General aspect in amber.



Fig. 2: *Micropygomyia brandaoi* sp. n. Terminalia



Figs 3-4: *Micropygomyia brandaoi* sp. nov. 3: terminalia; 4: general aspect.

### TAXONOMIC DISCUSSION

The presence of short ascoid, palpomere 5th longer than the others, small terminalia, four spines on gonostyle and gonocoxite without bristles allow the inclusion of *Micropygomyia brandaoi* sp. n. in the genus *Micropygomyia* Barretto. In this genus, usually the 2th palpomere is smaller or equal to the 4th. However in the new species the opposite was observed; the same has been described to occur with some specimens belonging to the *Micropygomyia cayennensis* (Floch & Abonnenc) complex.

The terminalia of *M. brandaoi* sp. n. is very similar to that of the members of the *Micropygomyia cayennensis* complex. According to Young and Duncan (1994), the anterior femora in all subspecies of *M. cayennensis* is shorter than the anterior tibiae. However in five specimens of *M. cayennensis cayennensis* (numbers 3759, 6178, 55882 and 55883) as well as in a *M. cayennensis hispaniolae* (Fairchild & Trapido) paratype examined by us, the anterior femur was always longer than the anterior tibia, which ratio in *M. c. cayennensis* specimen 3759 and *M. c. hispaniolae* being 1.02:1. In *M. brandaoi* sp. n. this ratio is 0.75:1; the anterior femur thus being much shorter than the anterior tibia. The a/b ratio in those two subspecies are 1.78:1 and 1.77:1 respectively, while in this fossil species this ratio is 9.58:1. In *M. brandaoi* sp. n. the lateral lobe is longer than both the paramere and the gonocoxite, the lateral lobe/paramere and lateral lobe/basistyle ratios are 1.25:1 and 1.07:1, respectively. In *M. c. cayennensis* these ratios are only 0.78:1 and 0.69:1 respectively, while in *M. c. hispaniolae* they are 0.69:1 and 0.85:1. The gonostyle of *M. brandaoi* sp. n. also differs from that of species of the *M. cayennensis* complex. The external superior spine is implanted at some distance from the apex of gonostyle in *M. brandaoi* sp. n., while in *M. cayennensis* complex this spine is very close the apex. Given all these differences we concluded that the new species does not belong to the *M. cayennensis* complex.

The arrangement of the spines in the gonostyle is like that found in *Micropygomyia atroclavata* (Knab) and *Micropygomyia venezuelensis* (Floch & Abonnenc); however these species have tuft of bristles in gonostyle, absent in the new fossil species *M. brandaoi* sp. n. This characteristic distinguishes *M. brandaoi* sp. n. from those species belonging to subgenus *Coquillettimyia*. Thus, we do not include the new fossil species in any subgenus of genus *Micropygomyia*.

The small terminalia, especially with respect to length of lateral lobe, paramere and gonocoxite distinguish *M. brandaoi* sp. n. from the other sand fly fossils species.

### REFERENCES

- Andrade Filho JD, Brazil RP, Falcão AL, Galati EAB 2007. Description of *Pintomyia (Pifanomyia) paleotrichia*, a Miocene period new species from the Dominican Republic (Diptera: Psychodidae: Phlebotominae). *Mem Inst Oswaldo Cruz* 102: 901-903.
- Andrade Filho JD, Falcão AL, Brazil RP 2004. A new phlebotomine fossil species *Trichopygomyia killickorum* sp. n. (Diptera: Psychodidae), found in the Dominican Republic amber. *Parasite* 11: 71-73.
- Andrade Filho JD, Falcão AL, Galati EAB, Brazil RP 2006a. *Pintomyia (Pifanomyia) paleotowsendi*, a new sand fly from the Miocene amber of Dominican Republic (Diptera: Psychodidae: Phlebotominae). *Mem Inst Oswaldo Cruz* 101 (Suppl. II): 57-58.
- Andrade Filho JD, Galati EAB, Falcão AL 2006b. Description of *Pintomyia (Pifanomyia) brazilorum* sp. nov. a new fossil species from the Dominican Republic (Diptera: Psychodidae: Phlebotominae). *Mem Inst Oswaldo Cruz* 101: 141-142.
- Brazil RP, Andrade Filho JD 2002. Description of *Pintomyia (Pifanomyia) falcaorum* sp. n. (Diptera: Psychodidae: Phlebotominae) a fossil sand fly from Dominican amber. *Mem Inst Oswaldo Cruz* 97: 501-503.

- Galati EAB 1995. Phylogenetic systematics of Phlebotominae (Diptera: Psychodidae) with emphasis on American groups. *Bol Dir Malariol Saneam Amb* 35 (Supl. 1): 133-142.
- Iturralde-Vinent MA, MacPhee RDE 1996. Age and Paleogeographical origin of Dominican amber. *Scien* 273: 1850-1852.
- Peñalver E, Grimaldi D 2005. Assemblages of mammalian hair and blood-feeding midges (Insecta: Diptera: Psychodidae: Phlebotominae) in Miocene amber. *Trans R Soc Edin Earth Sci* 96: 177-195.
- Quate LW 1963. Fossil Psychodidae in Mexican amber, part 2 Diptera: *Insect J Paleontol* 37: 110-118.
- Young DG, Duncan MA 1994. *Guide to the Identification and Geographic Distribution of Lutzomyia Sand Flies in Mexico, the West Indies, Central and South America (Diptera: Psychodidae)*. Mem Am Entomol Inst 54, Associated Publishers, 881 pp.