

TAXONOMIC STUDIES OF THE SUBGENUS *HELCOCYRTOMYIA*. I. SERIES
OSWALDOI (DIPTERA, PSYCHODIDAE, PHLEBOTOMINAE)

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Attempting to review the species of sandflies in the series oswaldoi of the subgenus Helcocyrtomyia, we examined 7650 specimens collected in different Brazilian regions during 35 years and deposited in the collection of the Centro de Pesquisas René Rachou, FIOCRUZ, Belo Horizonte, MG. As main results of this study, two new species of Helcocyrtomyia were described (Lutzomyia pusilla and Lutzomyia capixaba), in addition to the females of Lutzomyia ferreirana and Lutzomyia peresi; which had been described only by the males. The geographic distribution of the material examined is also presented.

Key words: taxonomy - Phlebotominae - series *oswaldoi* - *Helcocyrtomyia* - geographic distribution

From the epidemiological point of view, the genus *Lutzomyia* França, 1924 is of particular importance amongst the phlebotomine sandflies. It comprises species involved in the transmission of visceral and cutaneous leishmaniasis, bartonellosis and also of some parasites of lizards, toads, bats, sloths and rodents from the genera *Plasmodium*, *Trypanosoma* and *Endotrypanum* (Anderson & Ayala, 1968; Ayala & Lee, 1970; Ayala, 1971 a,b; Forattini, 1973; Pessoa & Martins, 1986).

Although not commonly involved in the transmission of diseases, and only suspected as possible vectors of bartonellosis to humans (Shannon, 1929; Noguchi et al., 1929; Hertig, 1942) and of malaria and trypanosomiasis to coldblood animals (Anderson & Ayala, 1968; Ayala & Lee, 1970; Ayala, 1971 a,b), *Helcocyrtomyia* stands out as the most primitive subgenus of *Lutzomyia*. The finding of a fossil species, *Lutzomyia (Helcocyrtomyia) paterna* Quate, in Mexican amber (oligocen/miocen), very similar to those present today within the subgenus, their widespread geographic distribution and their feeding on reptiles have all been taken as evidence for their being primitive (Shannon, 1913; Packchianian, 1946;

Chaniotis & Anderson, 1964; Ayala & Lee, 1970; Ayala, 1971 a,b). This accounts for the great similarity of their morphological characteristics, which renders their identification, at the species level, difficult.

The subgenus *Helcocyrtomyia*, as defined by Barretto in 1962 (Martins et al., 1978), comprises species with a long fifth palpal segment, greater in length than the third segment and sometimes longer than the combined lengths of segments 3 and 4. The ascoids are usually short or very short.

The males show five spines in the distystyle, of which two are terminal and the others are unpaired. The basistyle has an inner basal tuft, which may be compact or diffuse or, at times, composed of so few hairs that the tuft seems to be absent. The paramere is simple and unadorned, and the lateral lobe is unarmed. The cibarium of the female has four horizontal teeth, and may or may not have vertical teeth; the pigment patch is well-defined or pale; the cibarial arch is incomplete, and often laterally flared. The pharynx of several species is armed with spines. The body of the spermatheca is capsulate, with or without annulations and with a well-developed "head"; individual spermathecal ducts are long and narrow and the common duct is very short or absent.

Attempting to make taxonomic studies of *Helcocyrtomyia* easier, Martins et al. (1978) proposed the division of the *Helcocyrtomyia* species

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into three series (*oswaldoi*, *peruensis* and *vexator*), based not only on morphological characters but also on some data concerning geographic distribution. Even though they lack taxonomic status, these series have been used throughout this study.

The present paper reviews the species pertaining to the series *oswaldoi*. In the series *oswaldoi*, as proposed by Martins et al. (1978), the cibarium of the female lacks vertical teeth, the body of the spermatheca is pear-shaped or weakly annulated with a globose terminal segment, or sausage-shaped with smooth walls.

MATERIALS AND METHODS

This work was based on material collected in different Brazilian states and also in some other South American countries (Peru, Venezuela and French Guyana) between 1955 to 1989 and deposited in the American Phlebotominae collection at the Centro de Pesquisas René Rachou (CPqRR), Fundação Oswaldo Cruz (FIOCRUZ), Belo Horizonte, Brazil.

Appropriate methods for phlebotominae capture were employed (Barretto & Coutinho, 1940; Sherlock & Pessoa, 1964). Three different attractive traps, based on luminous bait, were used: Shannon (Shannon, 1939), Chaniotis (Chaniotis & Anderson, 1968) and Falcão (Falcão, 1981) traps. The Damasceno trap (Damasceno, 1955) was used for capture in natural habits, such as tree trunks, wild animal burrows and stone crevices. Additionally, manual captures were made with the aid of a Castro aspirator, after disturbing the sandflies hiding-places with faggots or cigarette smoke.

The captured specimens were packed into hemolysis glass tubes containing commercial alcohol. Cotton compresses were finally introduced into the tubes for specimen protection during transportation. All the material was mounted on glass slides, using Canada balsam for the males and Berlese liquid for the females, and later examined in the laboratory.

The sandflies were identified using specific descriptions, taxonomic keys, comparison with species of the standard collection and micrometry data. Additional information was provided by drawing the available specimens in a light chamber.

The classification adopted in this work was that proposed by Martins et al. (1978).

RESULTS

In our work, 8887 specimens of *Helcocyrtomyia* sandflies were examined. Among these, 7650 belonged to the series *oswaldoi*; the remaining were from the series *vexator* and *peruensis*. Only the first series (*oswaldoi*) will be dealt with in the present paper. The Table summarizes the species distribution of the examined material.

Lutzomyia (Helcocyrtomyia) appendiculata
Martins, Falcão & Silva (Fig. 1: a, b)

Lutzomyia appendiculata Martins, Falcão & Silva, 1961. *Rev. Bras. Biol.*, 21: 297-299 (male).

Lutzomyia (Trichopygomyia) appendiculata Forattini, 1971. *Pap. Av. Zool.*, 24: 102 (male). Forattini, 1973, *Entomol. Med.* 4th vol.: 302 (male).

Type: holotype male deposited in CPqRR, FIOCRUZ, Belo Horizonte, MG, Brazil. *Type locality*: Uberaba Farm, Jequitinhonha town, Minas Gerais state, Brazil.

Geographic distribution: BRAZIL — Minas Gerais — Jequitinhonha (16°26'S; 41°00'W).

This species belongs, undoubtedly, to the subgenus *Helcocyrtomyia*, such as defined by Barretto (1962). The female of *L. appendiculata* has not yet been described, whereas the male has been observed out just once. *L. appendiculata* is easily identified by the presence of an appendix in the posterior part of the paramere, from which originated its name. This special character does not appear in any other species within the subgenus.

Lutzomyia (Helcocyrtomyia) borgmeieri
Martins, Falcão & Silva (Fig. 1: c, d, e, f)

Lutzomyia borgmeieri Martins, Falcão & Silva, 1972. *Studia Entomol.*, 15: 497-501 (male and female).

Types: holotype male (no. 32772) and allotype female (no. 32793), both deposited in CPqRR, FIOCRUZ, Belo Horizonte, MG, Brazil. *Type locality*: Belo Horizonte town, Minas Gerais state, Brazil.

Geographic distribution: BRAZIL — Espírito Santo — Colatina (19°31'S; 40°37'W;

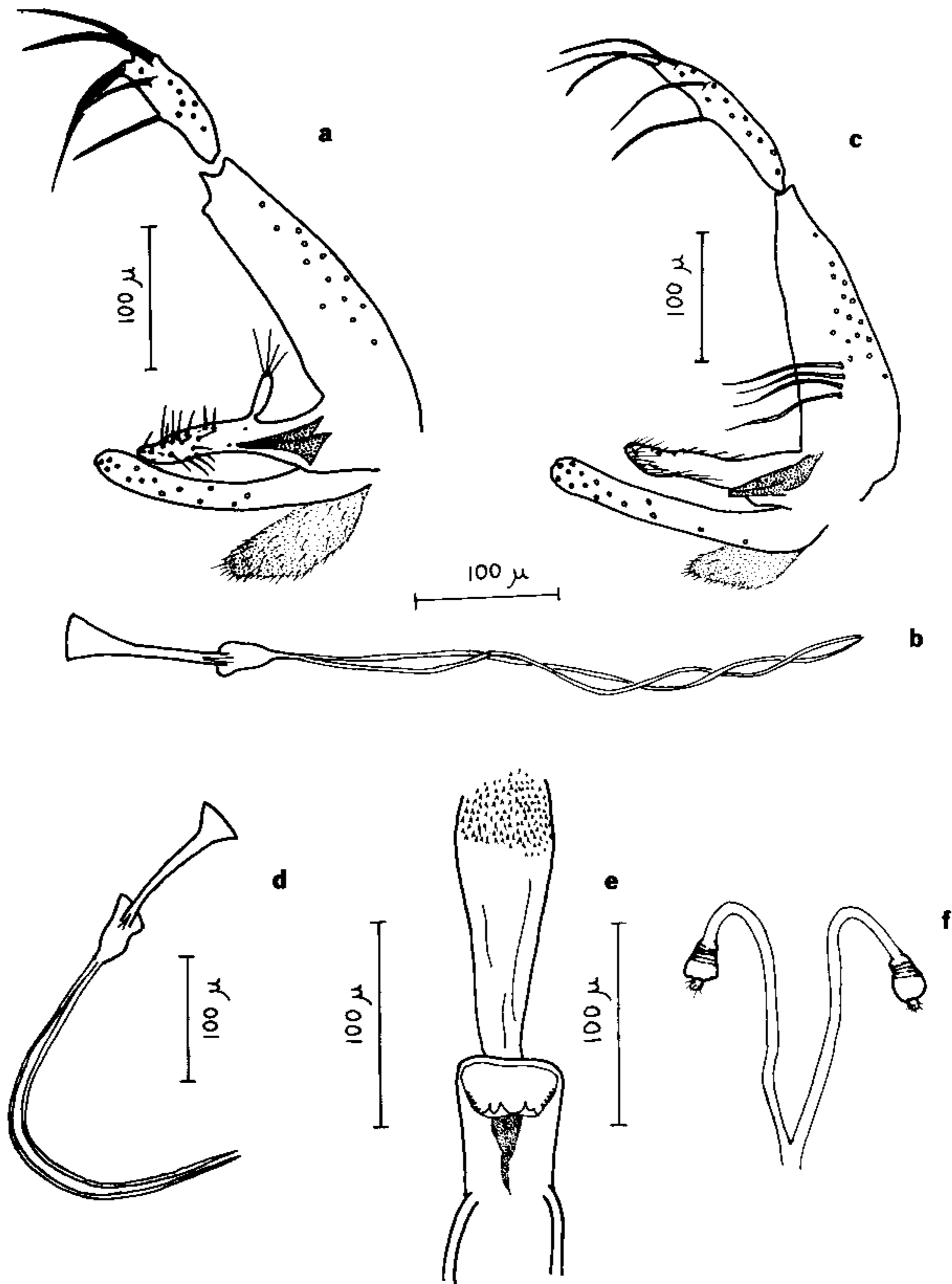


Fig. 1: *Lutzomyia appendiculata* — a: terminalia; b: genital pump and filaments. *Lutzomyia borgmeieri* — c: terminalia; d: genital pump and filaments; e: pharynx and cibarium; f: spermathecae.

Viana (20°23'S; 40°29'W). *Minas Gerais*-Belo Horizonte (19°55'S; 43°56'W); Dom Joaquim (18°57'S; 43°16'W); Iapu (19°26'S; 42°13'W); Galiléia (19°00'S; 41°33'W); Jequitinhonha (16°26'S; 41°00'W); Lagoa Santa (19°38'S; 43°53'W); Patos de Minas (18°35'S; 46°32'W); Peçanha (18°33'S; 42°34'W); Marliéria (19°43'S; 42°45'W); Monsenhor Paulo (21°06'S; 45°33'W); Morro do Pilar (19°12'S; 43°23'W) Rio Preto (22°06'S; 43°52'W); Sabará (19°54'S; 43°48'W); São João Evangelista (18°32'S; 42°45'W); Simoné-

sia; Teófilo Otoni (17°51'S; 41°30'W). *Paraná* — Borrazópolis (23°56'S; 51°36'W); Formoso do Oeste (15°32'S; 47°20'W); Floresta (08°36'S; 38°36'W); Reserva (08°36'S; 38°34'W). *Rio de Janeiro* — Rio de Janeiro (22°54'S; 43°14'W). *Rio Grande do Sul* — Tenente Portela (27°20'S; 53°45'W). *São Paulo* — Apiai (24°31'S; 48°50'W).

The male can be distinguished from males of other species in the subgenus by the presence of a

tuft with four to five bristles arranged in a row on the anterior third of the basistyle and by the arrangement of the spines of the dististyle: two apicals, one subapical and two thinner ones inserted at different levels on the median region of the dististyle. The female of *L. borgmeieri* differs from the females of other species by having a pharynx armed with stout spines, a cibarium showing four horizontal well-developed teeth, a pear-shaped spermathecae with three to four segments, the last one being more developed; and thick individual ducts whose walls are chitinized at their nearest part.

Among all the species in the subgenus *Helcocyrtomyia*, *L. oswaldoi*, *L. capixaba* and *L. ferreirana* are those that most resemble *L. borgmeieri*, due to the similarity of their spermathecae. However, *L. oswaldoi* possesses an unarmed pharynx, differing from *L. borgmeieri*, *L. capixaba* and *L. ferreirana* the pharynx of which are armed with stout spines. The distinction between *L. borgmeieri* and *L. ferreirana* is by means of cibarium: *L. ferreirana* shows a chitinous structure among its horizontal teeth besides two vertical outstanding teeth whereas this structure is lacking in *L. borgmeieri*. The width of the pharynx distinguishes *L. capixaba* from *L. borgmeieri*, as it is much wider in the first species.

Lutzomyia (Helcocyrtomyia) capixaba

Dias, Falcão, Silva & Martins (Fig. 2: a, b, c, d)

Lutzomyia capixaba Dias, Falcão, Silva & Martins, 1987. *Mem. Inst. Oswaldo Cruz*, 82: 193-196 (male and female).

Types: holotype male (no. 40284) and allotype female (no. 40451), both deposited in CPqRR, FIOCRUZ, Belo Horizonte, Brazil. **Type locality:** Conquista, Baixo Guandu town, Espírito Santo state, Brazil.

Geographic distribution: BRAZIL — *Bahia* — Buerarema (14°57'S; 39°19'W); Canavieiras (12°13'S; 39°00'W); Guandu (13°45'S; 39°30'W); Ilhéus (13°01'S; 40°01'W); Itabuna (14°48'S; 39°16'W); Itajuípe (14°41'S; 39°22'W); Itapebi (15°56'S; 39°32'W); Jiquiriçá (13°14'S; 39°36'W); Milagres (12°50'S; 39°50'W); Ubaíra (13°16'S; 39°39'W); Ubatã (14°12'S; 39°31'W); Uruçuca (14°35'S; 39°16'W); Valença (13°22'S; 39°05'W). *Espírito Santo* — Baixo Guandu (19°31'S; 41°01'W); Itaguaçu (18°48'S; 40°51'W). *Minas Gerais* — Bocaiúva (17°07'S; 43°49'W); Itan-

homi (19°10'S; 41°52'W); Jacinto (16°10'S; 40°17'W); Mato Verde (16°05'S; 40°56'W); Monte Azul (15°09'S; 42°53'W); Porteirinha (15°44'S; 43°02'W); Janaúba (15°48'S; 43°19'W); Janaúria (15°29'S; 44°22'W); São João da Ponte (15°56'S; 44°01'W); *Pernambuco* — Goiana (07°33'S; 34°59'W); Recife (08°03'S; 34°54'W).

The male and female of *L. capixaba* were first described by Dias et al. (1987). The male most resembles *L. oswaldoi*. The distinguishing characteristics between these species are the greater size and the presence of a basal tuft in the basistyle of *L. oswaldoi*.

The spermathecae of both females is very similar, but *L. capixaba* possesses a wider pharynx armed with strong conspicuous spines and a simple cibarium with a complete chitinous structure among the cibarial teeth, plus a striking pigment patch. The chitinous arch is indiscernible in the middle. In *L. oswaldoi* the pharynx is unarmed and the chitinous arch is incomplete.

Lutzomyia (Helcocyrtomyia) ferreirana

(Barretto, Martins & Pellegrino) (Fig. 2: e, f, g, h)

Sergentomyia ferreirana Barretto, Martins & Pellegrino, 1956. *Fol. Clin. Biol.*, 26: 52-53, 56 (macho). Barretto, Martins & Pellegrino, 1958. *Rev. Bras. Malariol. D. Trop.*, 10: 187-188, 193 (male).

Lutzomyia (Trichopygomomyia) ferreirana

Forattini, 1971. *Pap. Av. Zool.*, 24: 102. Forattini, 1973. *Entomol. Med.* 4th vol.: 306 (male).

Lutzomyia (Helcocyrtomyia) ferreirana

Dias, Falcão, Silva & Martins, 1989. *Mem. Inst. Oswaldo Cruz*, 84: 245-248 (male and female).

Types: holotype male deposited in the collection of the Departamento de Parasitologia, Faculdade de Medicina de Ribeirão Preto, São Paulo, Brazil. Female deposited in CPqRR, FIOCRUZ, Belo Horizonte, MG, Brazil. **Type locality:** Itambacuri town, Minas Gerais state, Brazil.

Geographic distribution: BRAZIL — *Espírito Santo* — Santa Tereza (19°55'S; 40°36'W); São Roque da Terra Roxa (19°01'S; 40°32'W). *Minas Gerais* — Belo Horizonte (19°55'S; 43°56'W); Caratinga (19°37'S; 42°08'W); Dom Cavati (19°23'S; 42°06'W); Cássia (20°36'S; 46°56'W); Conselheiro Pena (17°10'S; 41°30'W); Curvelo (18°45'S; 44°25'W); Itambacuri (18°01'S; 41°42'W); Itanhomi (19°10'S; 41°52'W); Passa-

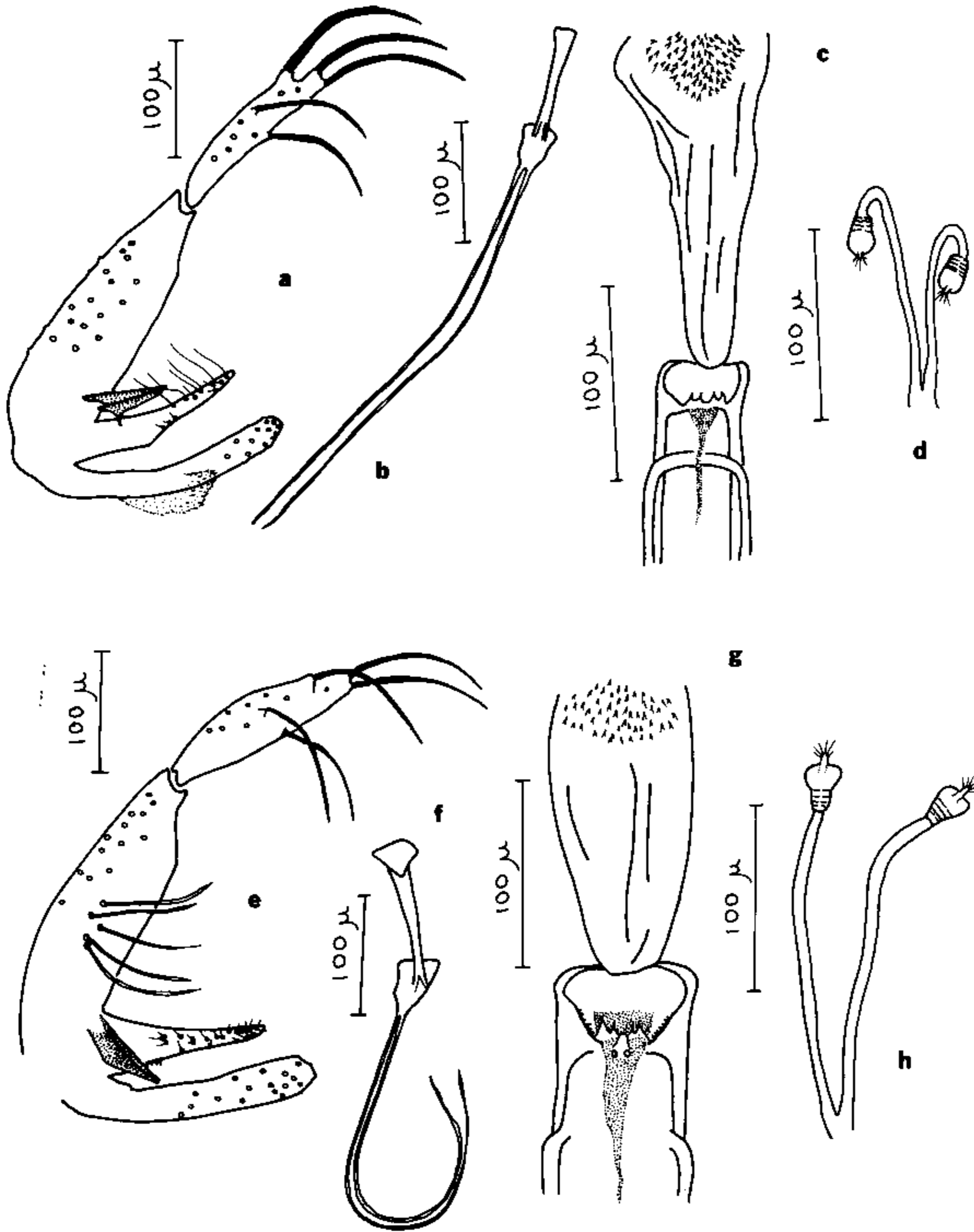


Fig. 2: *Lutzomyia capixaba* — a: terminalia; b: genital pump and filaments; c: pharynx and cibarium; d: spermathecae. *Lutzomyia ferreirana* — e: terminalia; f: genital pump and filaments; g: pharynx and cibarium; h: spermathecae.

bem (19°17'S; 43°31'W); Peçanha (18°33'S; 42°34'W); Prudente de Moraes (19°29'S; 49°52'W); São João Evangelista (18°32'S; 42°45'W); São João do Oriente (19°21'S; 42°09'W).

The male of *L. ferreirana* is very similar to that of *L. oswaldoi*, due to the number of setae of the basistyle tuft as well as the arrangement of the spines in the dististyle. The main differences

are the shapes of basistyle, dististyle, paramere and genital pump. Other males similar to *L. ferreirana* are those of *L. capixaba* and *L. longipennis*. *L. capixaba* lacks the basal tuft of setae that is observed in the basistyle of *L. ferreirana*. The distinction between *L. longipennis* and *L. ferreirana* is by the greater number of setae in the basistyle of *L. longipennis* (ca. 14), and by the arrangement of spines in the dististyle that differs between the species. The male of *L. ferreirana* was redescribed by Dias et al. (1989).

The females of *L. oswaldoi* and *L. borgmeieri* are those most like the female of *L. ferreirana*, but the latter shows two cibarial horizontal teeth, besides two outstanding vertical teeth.

The female of *L. ferreirana* was correlated to the male by Dias et al. (1989).

Lutzomyia (Helcocyrtomyia) goiana

Martins, Falcão & Silva (Fig. 3: a, b, c, d)

Lutzomyia goiana Martins, Falcão & Silva, 1962. *Rev. Bras. Malariol. D. Trop.*, 14: 383-385, 396, 397 (male and female). *Lutzomyia (Trichopygomyia) goiana* Forattini, 1971. *Pap. Av. Zool.*, 24: 102.

Lutzomyia (Trichopygomyia) trinidadensis (pro parte) Forattini, 1973. *Entomol. Med.*, 4th vol.: 321 (male and female).

Types: holotype female (numbered 14230) and allotype male (no. 14246) deposited in CPqRR, FIOCRUZ, Belo Horizonte, Minas Gerais, Brazil. *Type locality*: Poções farm, Sítio d'Abadia town, Goiás state, Brazil.

Geographic distribution: BRAZIL — *Bahia* — Barreiras (12°08'S; 45°00'W); Milagres (12°50'S; 39°50'W). *Ceará* — Icó (06°24'S; 38°51'W); Pacatuba (03°58'S; 38°37'W); Pacoti (04°13'S; 38°56'W); Maranguape (03°53'S; 38°40'W). *Goiás* — Amaro Leite (13°58'S; 49°09'W); Arraias (12°56'S; 46°57'W); Sítio D'Abadia (14°48'S; 46°16'W). *Maranhão* — Coroatá (04°08'S; 44°08'W); Cururupu (01°50'S; 44°52'W); Paço do Lumiar (02°35'S; 44°05'W); São Luiz (02°34'S; 44°16'W); Turiaçu (01°41'S; 45°21'W); Viana (03°13'S; 45°00'W). *Minas Gerais* — Januária (15°29'S; 44°22'W); Grão Mogol (16°34'S; 42°54'W); Jequitinhonha (16°26'S; 41°00'W); Manga (14°46'S; 43°56'W); Porteirinha (15°44'S; 43°02'W); São João da Ponte (15°56'S; 44°01'W). *Mato Grosso do Sul* — Aquidauana (20°28'S; 55°48'W). *Pará* — Ananindeua (01°22'S; 48°23'W); Belém (01°27'S; 48°29'W); Castanhal (01°18'S; 47°55'W); Irituia (01°46'S; 47°26'W); *Rondônia* — Ariquemes (09°55'S; 63°06'W); Guajará-Mirim (10°48'S; 65°22'W); Ji-Paraná (08°45'S; 62°20'W).

Among the *Helcocyrtomyia* species showing a tuft of bristles on the basistyle, *L. trinidadensis* is the most similar to *L. goiana*. They were considered as sibling species by Martins et al.

(1962), only distinguishable by the pharynx of the female: in *L. trinidadensis* there are stout and conspicuous spines on the central part of the distal segment of the pharynx, whereas in *L. goiana* there are small hardly-visible spines only in the distal part of the pharynx, disposed in parallel rows. Forattini (1973) considered them as synonymy, judging this slight difference insufficient to characterize them as different species.

In this work, we found some females showing morphological characters similar to those of *L. goiana* and *L. trinidadensis*, but without spines in the pharynx, in Maranhão State (Brazil). The males captured with these females were indistinguishable from *L. goiana*, without further study.

We examined a large number of specimens of *L. goiana* and *L. trinidadensis* from various Brazilian regions and some morphological differences were found between the species. *L. goiana* shows a simple enlarged-base paramere that narrows and bends slightly upwards. It is commonly observed that in a single specimen each paramere has a different shape. This is due to the fact that this structure is flattened dorso-ventrally and during the mounting on glass slides it can suffer some rotation. In this case, the paramere seems to be larger and with a little projection on the top. The paramere in *L. trinidadensis* is enlarged in the base, narrowing markedly to the top; moreover, the clypeus in both sexes is much more developed in *L. trinidadensis*.

The male of *L. goiana* can be easily distinguished from other similar males, such as *L. rorotaensis* and *L. longipennis*. The number of bristles in the basistyle is different in *L. goiana* and *L. rorotaensis* (10-14 for the first and 15-20 for the second). Both are distinguishable from *L. longipennis* by the insertion level of the basal pair of spines in the dististyle: in *L. goiana* and *L. rorotaensis* they are inserted at two different levels. Moreover, the tuft in the dististyle of *L. goiana* is composed of shorter narrower and more flexible bristles than in *L. longipennis* and the length/width ratio of the wings is greater in *L. longipennis*.

The female of *L. trinidadensis* is the most similar to *L. goiana*, due to the characteristics of the spermathecae. According to Martins et al. (1962) they can be distinguished by the distal third of the pharynx, but we verified an additional differ-

ence. *L. goiana* shows a chitinous structure projecting among the cibarial horizontal teeth, that is lacking in *L. trinidadensis*. This structure is also observed in *L. oswaldoi*, *L. peresi*, and *L. ferreirana*, but all of them show different-shaped spermathecae, as compared to *L. goiana*.

Lutzomyia (Helcocyrtomyia) longipennis
(Barretto) (Fig. 3: e, f, g, h)

Flebotomus longipennis Barretto, 1946. *Rev. Bras. Biol.*, 6: 427-429 (macho). *Lutzomyia longipennis* Martins, Falcão & Silva, 1962. *Rev. Bras. de Malariol. D. Trop.*, 14: 390-391, 393, 400, 401 (male and female).

Lutzomyia (Trichopygomomyia) longipennis Forattini, 1973. *Entomol. Med.* 4th vol., 307, 309 (male and female).

Types: holotype male deposited in the entomological collection of the Departamento de Parasitologia, Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazil. Allotype female (no. 20869) deposited in the collection of CPqRR, FIOCRUZ, Belo Horizonte, Minas Gerais, Brazil. **Type locality:** Monjolinho farm, Corumbá de Goiás town, Goiás state, Brazil.

Geographic distribution: BRAZIL — Acre — Rio Branco (08°14'S; 73°13'W). Amazonas — Careiro (03°12'S; 59°45'W); Manaus (03°08'S; 59°01'W); Amapá — Macapá (00°02'S; 51°03'W); Goiás — Amaro Leite (13°58'S; 49°09'W); Caldas Novas (17°41'S; 48°39'W); Ceres (15°17'S; 49°35'W); Corumbá de Goiás (15°55'S; 48°44'W); Corumbaíba (18°09'S; 48°34'W); Porto Nacional (10°42'S; 48°25'W); Rianópolis (15°30'S; 49°30'W); Sítio d'Abadia (14°48'S; 46°16'W); Uruaçu (14°30'S; 49°10'W); Maranhão — Coroatá (04°08'S; 44°08'W); Mato Grosso — Barra do Bugre (15°05'S; 57°11'W); Barra do Garças (15°53'S; 52°15'W); Diamantino (14°25'S; 56°27'W); Mato Grosso do Sul — Camapuã (19°30'S; 54°05'W); Maracujá (21°38'S; 55°09'W); Minas Gerais — Arinos (15°55'S; 46°04'W); Belo Horizonte (19°55'S; 43°56'W); Buritizinho (17°21'S; 44°58'W); Caeté (19°54'S; 43°40'W); Campos Gerais (21°14'S; 45°46'W); Carmo da Cachoeira (21°28'S; 45°13'W); Cássia (20°36'S; 46°56'W); Contagem (19°55'S; 44°06'W); Corinto (18°21'S; 44°27'W); Curvelo (18°45'S; 44°25'W); Esmeraldas (19°45'S; 44°19'W); Felixlândia (18°47'S; 44°55'W); Januária (15°29'S; 44°22'W); Lagoa Santa (19°38'S;

43°53'W); Matozinhos (19°35'S; 44°07'W); Oliveira (20°41'S; 44°49'W); Paracatu (17°14'S; 46°53'W); Sete Lagoas (19°27'S; 44°14'W); Taquaraçu (20°43'S; 46°29'W); PERU — Madre de Dios — Ibéria (05°48'S; 74°00'W); Loreto — Pucallpa (08°23'S; 74°23'W).

Lutzomyia longipennis belongs to the group of *Helcocyrtomyia* species possessing an inner basal tuft in the basistyle. *L. longipennis* is distinguished from the great majority of species in the subgenus by the number of setae in the tuft (ca. 14) and by the arrangement of spines in the dististyle. However, these same features are present in *L. trinidadensis*, and the distinction between these species is by the shape of the paramere and by the level of implantation of basal spines in the dististyle. *L. longipennis* also exhibits the narrowest and longest wings among the species within the series *oswaldoi* and it is unique in that the genital filament is slender and curved (comma-shaped).

The female of *L. longipennis* shows a peculiar feature: a large segmented spermatheca, with a globose well-developed terminal segment. The cibarium has four regularly separated horizontal teeth. The pigmented patch is well-defined but short and the cibarial arch is incomplete. *L. rorotaensis* is very similar to *L. longipennis* but: (1) The length/width ratio of the wings is greater in *L. longipennis*; (2) The cibarial horizontal teeth are bent inwards in *L. rorotaensis* while in *L. longipennis* they are more developed, nearly equidistant and the distance between the inner pair is greater than the distance between inner and outer teeth.

Lutzomyia (Helcocyrtomyia) machupicchu
Martins, Llanos & Silva (Fig. 4: a, b)

Lutzomyia (Helcocyrtomyia) machupicchu Martins, Llanos & Silva, 1975. *Rev. Brasil. Biol.*, 35: 652-653 (macho).

Type: holotype male (no. 46321) deposited in CPqRR, FIOCRUZ, Belo Horizonte, Minas Gerais, Brazil. **Type locality:** Machupicchu ruins, vale do Rio Urubamba, Provincia de la Convención, Cuzco Department, Peru.

Geographic distribution PERU — Cuzco — Machupicchu (13°07'S; 72°34'W).

The *Helcocyrtomyia* species that most resemble *L. machupicchu* are *L. capixaba*, *L. peresi*

and *L. pusilla*. Besides being the largest, *L. machupicchu* was found only in the Machupicchu region (Peru), while the other species are largely distributed over a large region of Brazil. According to Martins et al. (1975) *L. machupicchu* is characterized by having narrow and elongated wings (length/width = 5,53) and by the relationship between wing veins: alpha smaller than beta and beta smaller than gama.

Lutzomyia (Helcocyrtomyia) oswaldoi
(Mangabeira) (Fig. 4: c, d, e, f)

Flebotomus oswaldoi Mangabeira, 1942. *Mem. Inst. Oswaldo Cruz*, 37: 190-193 (male), 288-294 (female, pupa, larva, exuvia). *Lutzomyia (Trichopygomyia) oswaldoi* Forattini, 1971. *Pap. Av. Zool.*, 24: 102. Forattini, 1973. *Entomol. Med.*, 4th vol., 312-314 (male, female, pupa, larva).

Types: holotype male (no. 333) and allotype female (no. 485) deposited in Adolpho Lutz Laboratory, FIOCRUZ, Rio de Janeiro, Brazil. *Type locality*: Timbaúbas, Russas town, Ceará state.

Geographic distribution: BRAZIL — Bahia — Venceslau Guimarães. Ceará — Canindé (04°22'S; 39°19'W); Guaiúba (04°02'S; 38°38'W); Maranguape (03°53'S; 38°40'W); Pacatuba (03°58'S; 38°37'W); Minas Gerais — Francisco Sá (16°28'S; 43°30'W); Jequitinhonha (16°26'S; 41°00'W); Piauí — Oeiras (07°00'S; 42°05'W);

The arrangement of spines in the dististyle and the presence of a loose tuft in the inner part of the basistyle with c.a. six slender and flexuous setae are the main distinguishing features of *L. oswaldoi*. *L. ferreirana* and *L. capixaba* also exhibit a similar arrangement of spines but *L. ferreirana* shows a smaller and narrower dististyle as compared to *L. oswaldoi*, besides the paramere with a distinct shape. *L. capixaba* lacks basal tuft that is present in the basistyle of *L. oswaldoi*.

The spermathecae are very similar in three females of the series *oswaldoi*: *L. oswaldoi*, *L. borgmeieri* and *L. ferreirana*. But *L. oswaldoi* has a very characteristic cibarium with a chitinous structure projecting among the cibarial teeth and a striking pigment path. Moreover the pharynx in *L. oswaldoi* is unarmed while both, *L. borgmeieri* and *L. ferreirana*, show an armed pharynx.

Lutzomyia (Helcocyrtomyia) paterna (Quate)

Phlebotomus paternus Quate, 1963. *J. Paleontol.*, 37: 113-114 (male).

Type: holotype male (no. 12746) deposited in Calif. Mus. Paleo. California, USA. *Type locality*: B-1402, Simojovel area, Chiapas (17°00'N; 92°45'W).

Lutzomyia paterna was found in the Mexican amber (oligocen/miocen), showing morphological characteristics identical to the present *Helcocyrtomyia* species. According to Quate (1963) *L. paterna* resembles species from the genus *Brumptomyia*, group *vexator* (Fairchild, 1955).

Lutzomyia (Helcocyrtomyia) peresi
(Mangabeira) (Fig. 5: a, b, c, d, e)

Flebotomus peresi Mangabeira, 1942. *Mem. Inst. Oswaldo Cruz*, 37: 190-193 (male).

Phlebotomus (Brumptomyia) peresi Lucena & Almeida, 1965. *Rev. Bras. Malariol. D. Trop.*, 17: 261-262, 266, 268 (male and female).

Lutzomyia (Trichopygomyia) peresi Forattini, 1971. *Pap. Av. Zool.*, 24: 102. Forattini, 1973. *Entomol. Med.* 4th vol.: 314 (male).

Lutzomyia (Helcocyrtomyia) peresi Dias, Martins, Falcão & Silva, 1986. *Mem. Inst. Oswaldo Cruz*, 81: 215-219 (male and female).

Types: neotype male (no. 39846) and allotype female (no. 39827) both deposited in CPqRR, FIOCRUZ, Belo Horizonte, Minas Gerais, Brazil. *Type locality*: Lapão cave, Januária town, Minas Gerais, Brazil.

Geographic distribution: BRAZIL — Goiás — Amaro Leite (13°58'S; 49°09'W); Arraias (12°56'S; 46°54'W); Paraúna (17°02'S; 50°26'W); Minas Gerais — Buenópolis (17°54'S; 44°11'W); Diamantina (18°15'S; 43°36'W); Janaúba (15°48'S; 43°19'W); Januária (15°29'S; 44°22'W); Porteirinha (15°44'S; 43°02'W); São João da Ponte (15°56'S; 44°01'W); Mato Grosso — Diamantino (14°25'S; 56°27'W); Mato Grosso do Sul — Aquidauana (20°28'S; 55°48'W); Bela Vista (17°00'S; 49°00'W); Miranda (20°14'S; 56°22'W); Nioaque (21°08'S; 55°48'W).

This species fits well in the series *oswaldoi*. The male was redescribed by Dias et al. (1986)

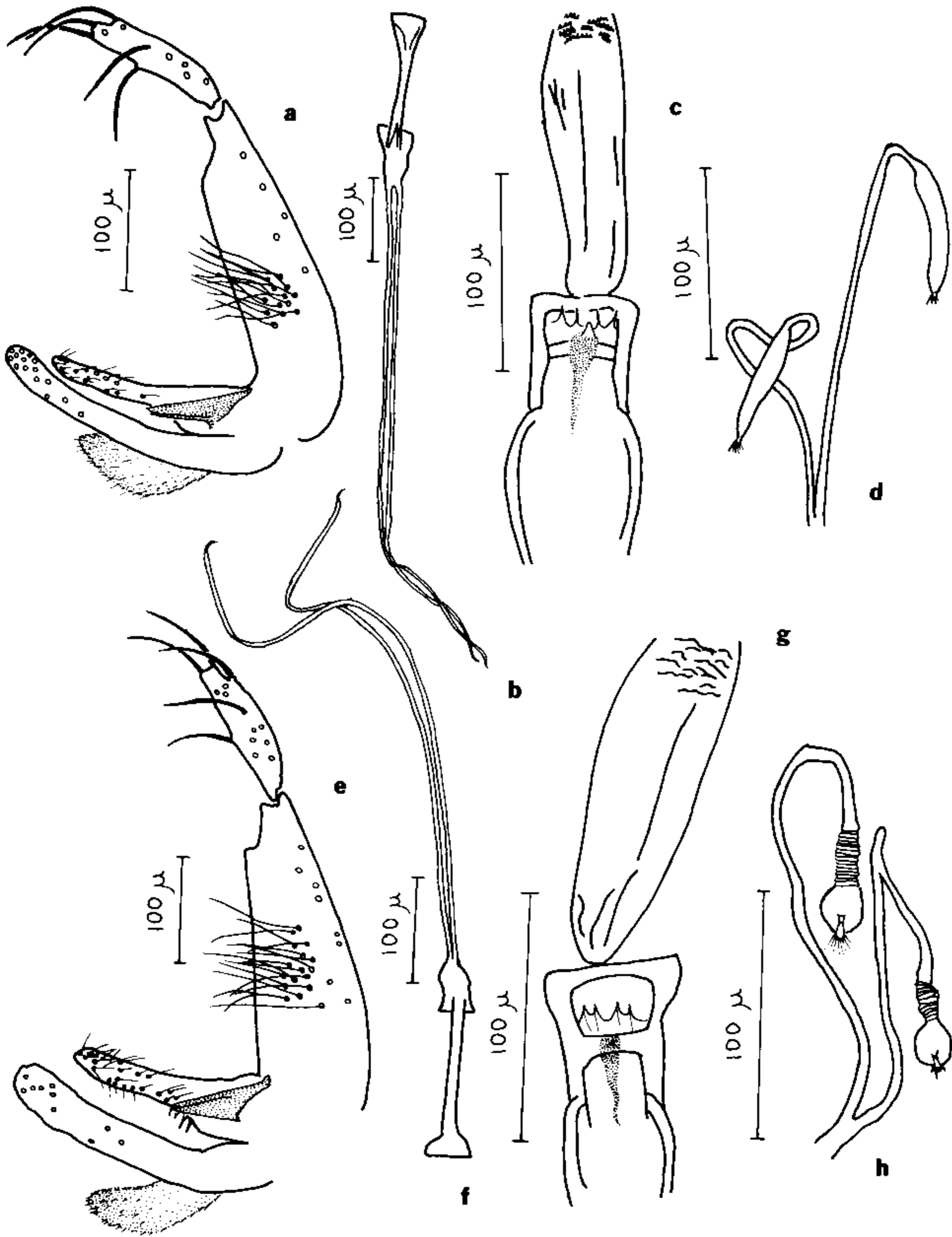


Fig. 3: — *Lutzomyia goiana* — a: terminalia; b: genital pump and filaments; c: pharynx and cibarium; d: spermathecae. *Lutzomyia longipennis* — e: terminalia; f: genital pump and filaments; g: pharynx and cibarium; h: spermathecae.

and it shows a small terminalia, shorter than its head.

The most similar *Helcocyrtomyia* species to *L. peresi* are *L. goiana*, *L. rorotaensis* and *L. trinidadensis*. The main features that character-

ize *L. peresi* are the most developed clypeus, the absence of setae in the inner part of the basistyle and the arrangement of spines in the dististyle.

The female of *L. peresi* was first described and associated with the male by Dias et al. (1986). It

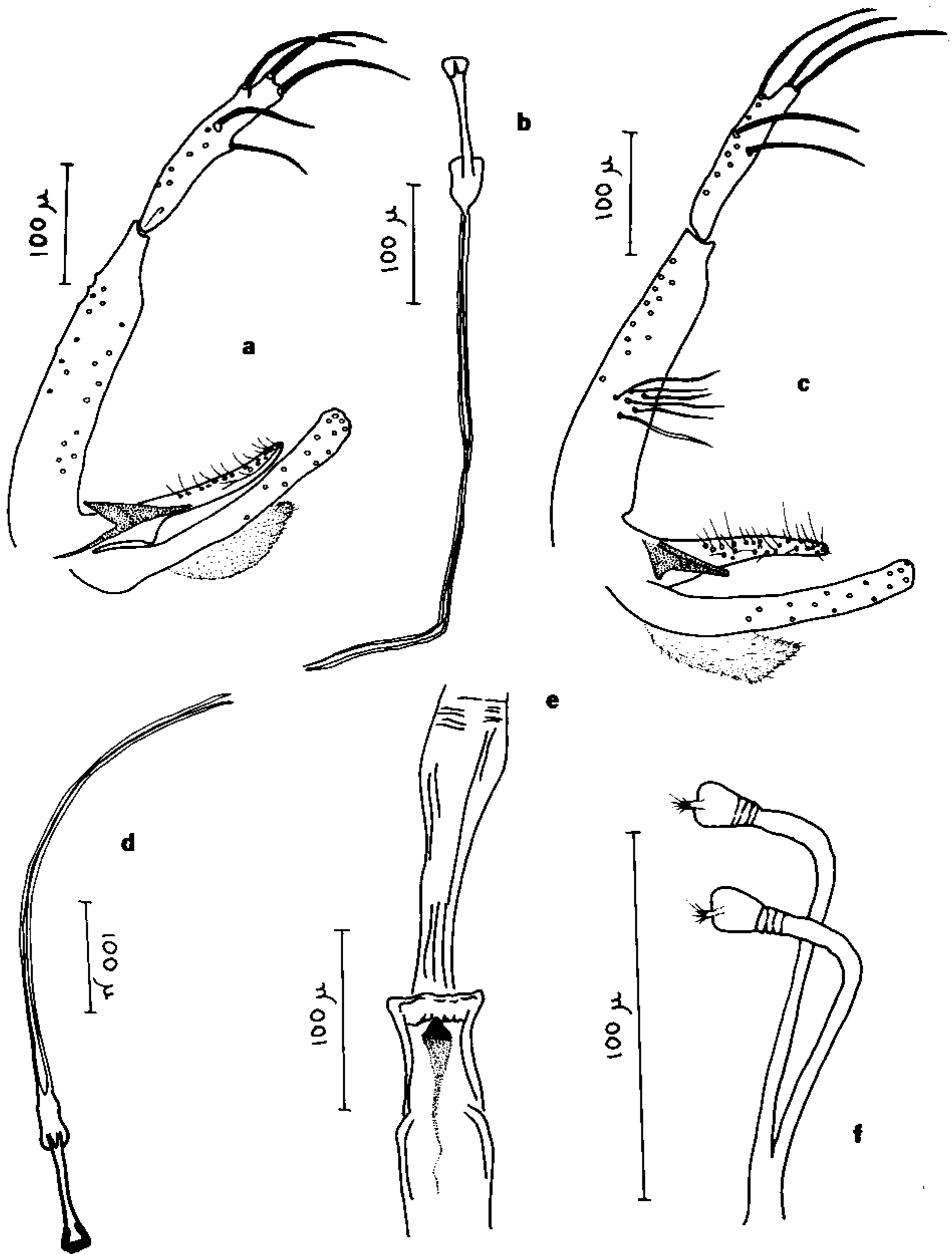


Fig. 4: *Lutzomyia machupicchu* — a: terminalia; b: genital pump and filaments. *Lutzomyia oswaldoi* — c: terminalia; d: genital pump and filaments; e: pharynx and cibarium; f: spermathecae.

shares a very unique feature with the females of *L. oswaldoi*, *L. goiana* and *L. ferreirana*: the presence of a chitinous structure projecting among

the cibarial horizontal teeth. But they can be differentiated by the shape of the spermatheca that in *L. peresi* is elongated and segmented, with the

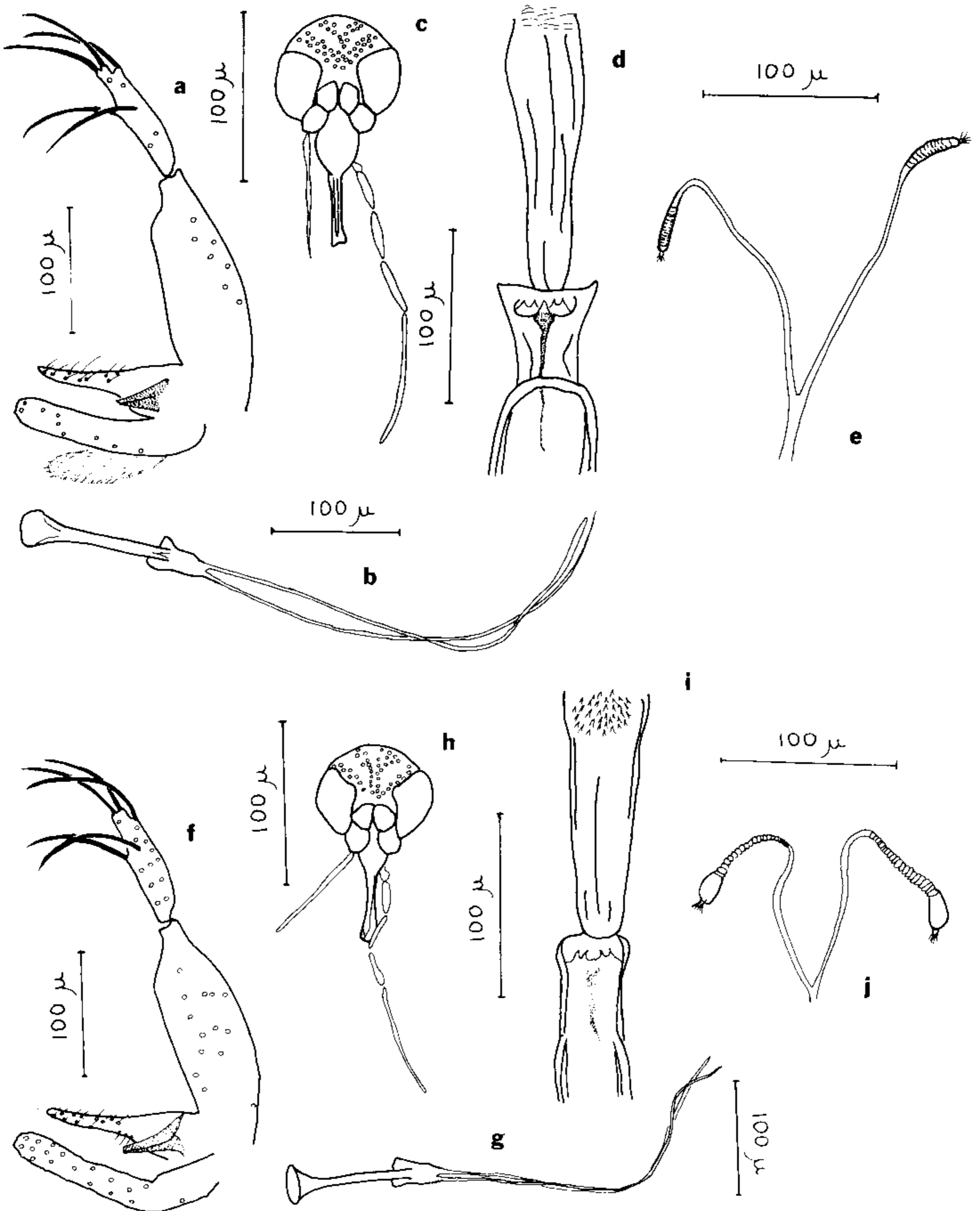


Fig. 5: *Lutzomyia peresi* — a: terminalia; b: genital pump and filaments; c: head; d: pharynx and cibarium; e: spermathecae. *Lutzomyia pusilla* — f: terminalia; g: genital pump and filaments; h: head; i: pharynx and cibarium; j: spermathecae.

last segmente more developed than in the others and showing a little "head".

Lutzomyia (Helcocyrtomyia) pusilla

Dias, Martins, Falcão & Silva. (Fig. 4: f, g, h, i, j)

Phlebotomus peresi Floch & Abonnenc, 1944. *Inst. Pasteur Guyane et Territ. I'Inini*, no. 90: 7, 20 (male). *Phlebotomus* sp. de Saul, Floch & Abonnenc, 1944. *Inst. Pasteur Guyane et Territ. I'Inini*, no. 90: 21 (female). *Lutzomyia pusilla* Dias, Martins, Falcão & Silva, 1986. *Mem. Inst. Oswaldo Cruz*, 81: 395-399 (male and female).

Types: holotype male (no. 37937) and allotype female (no. 37891) both deposited in CPqRR (FIOCRUZ), Belo Horizonte, Minas Gerais, Brazil. *Type locality*: Serra do Navio, Macapá municipality, Amapá state, Brazil.

Geographic distribution — BRAZIL: *Amapá* — Macapá (00°02'S; 51°03'W); *Pará* — Castanhal (01°18'S; 47°55'W); Irituia (01°46'S; 47°26'W); Oriximiná (01°45'S; 55°52'W). *Maranhão* — Cururupu (01°50'S; 44°52'W); Turiaçu (01°41'S; 45°21'W).

Lutzomyia pusilla has been described by Dias et al. (1986) and it is distinct from nearly all other species in the subgenus because of its small body size plus a terminalia smaller than the head. The only species that shows similar characteristics is *L. peresi* but, in addition to some differences in the measurements of structures of the clypeus, genital filaments and palpi (Dias et al., 1986), *L. pusilla* shows an armed pharynx with numerous stout spines and an elongate, more segmented spermatheca. In *L. peresi* the pharynx is unarmed.

Lutzomyia (Helcocyrtomyia) rorotaensis

(Floch & Abonnenc) (Fig. 6: a, b, c, d)

Phlebotomus rorotaensis Floch & Abonnenc, 1944. *Inst. Pasteur G. Franc. et Territ. I'Inini*, no. 90: 18-19 (male and female). *Phlebotomus* sp. de Rorota, Floch & Abonnenc, 1941. *Inst. Pasteur G. Franc. et Territ. I'Inini*, no. 28: 10-11 (female). *Lutzomyia (Trichopygomyia) trinidadensis* (pro parte) Forattini, 1971. *Pap. Av. Zool.*, 24: 102. *Lutzomyia (Trichopygomyia) oswaldoi* (pro parte) Forattini, 1973. *Entomol. Méd.*, 4th vol.: 302.

Types: male (no. 119 bis) and female (no. 119) deposited in Instituto Pasteur de la Guyane Française. *Type locality*: Rorota, French Guyana.

Geographic distribution — BRAZIL: *Amapá* — Macapá (00°02'N; 51°03'W). *Amazonas* — Manaus (03°08'S; 59°01'W). *Maranhão* — Cururupu (01°50'S; 44°52'W). *Pará* — Ananindeua (01°22'S; 48°23'W); Belém (01°27'S; 48°29'W); Castanhal (01°18'S; 47°59'W); Irituia — (01°46'S; 37°26'W). *Roraima* — Caracarái (01°51'N; 61°08'W). COLOMBIA: *Antioquia* — Rio Anori (07°10'N; 75°05'W); Mutata (07°14'N; 76°25'W); *Choco* — Alto Curiche. *Valle del Cauca* — Buenaventura (03°53'N; 77°04'W); Lower Anchicaya Dam (03°46'N; 77°10'W); FRENCH GUYANA: *Cayenne* — Baduel (04°56'N; 52°19'W); Cabassou (04°53'N; 52°18'W); Crique Anguille (04°50'N; 52°31'W); Matoury (04°51'N; 52°20'W); Montabo (04°57'N; 52°18'W); Rorota (04°53'N; 52°15'W). *Haut Approuague* — Balourou (03°31'N; 53°06'W); Saut Conori (03°25'N; 53°04'W); Saut Japaigny (03°37'N; 53°12'W); Saut Machicou (04°21'N; 54°16'W); Souvenir. *Oyapock* — Maripa (03°48'N; 51°53'W); Saint Georges (03°45'N; 52°05'W); Tampac (03°12'N; 52°32'W). *Sinnamary* — Adieu-Vat (04°52'N; 53°00'W); Saint Elie (04°50'N; 53°17'W); Saut Tigre (05°01'N; 53°02'W); PERU: Puerto Maldonado (12°50'S; 69°20'W); Madre de Dios.

The *Helcocyrtomyia* species that most resembles *L. rorotaensis* is *L. trinidadensis* mainly due to the similarity between both males. Some distinguishing features are the ratios between the genital filament/genital pump and flagellomere I/labrum-epipharynx, which are greater in *L. rorotaensis* and also the number of setae in the basistyle (10-14 in *L. trinidadensis* and 15-20 in *L. rorotaensis*).

Despite the similarity observed for the males, the females can be readily distinguished by the shape of the spermathecae and by the spines in the pharynx. In *L. rorotaensis* the spermathecae are segmented with the last segment globose while in *L. trinidadensis* they are not segmented and are sausage-shaped. The great number of spines in the pharynx of *L. trinidadensis* are replaced by some creases in *L. rorotaensis*.

Lutzomyia (Helcocyrtomyia) trinidadensis
(Newstead) (Fig. 6: e, f, g, h)

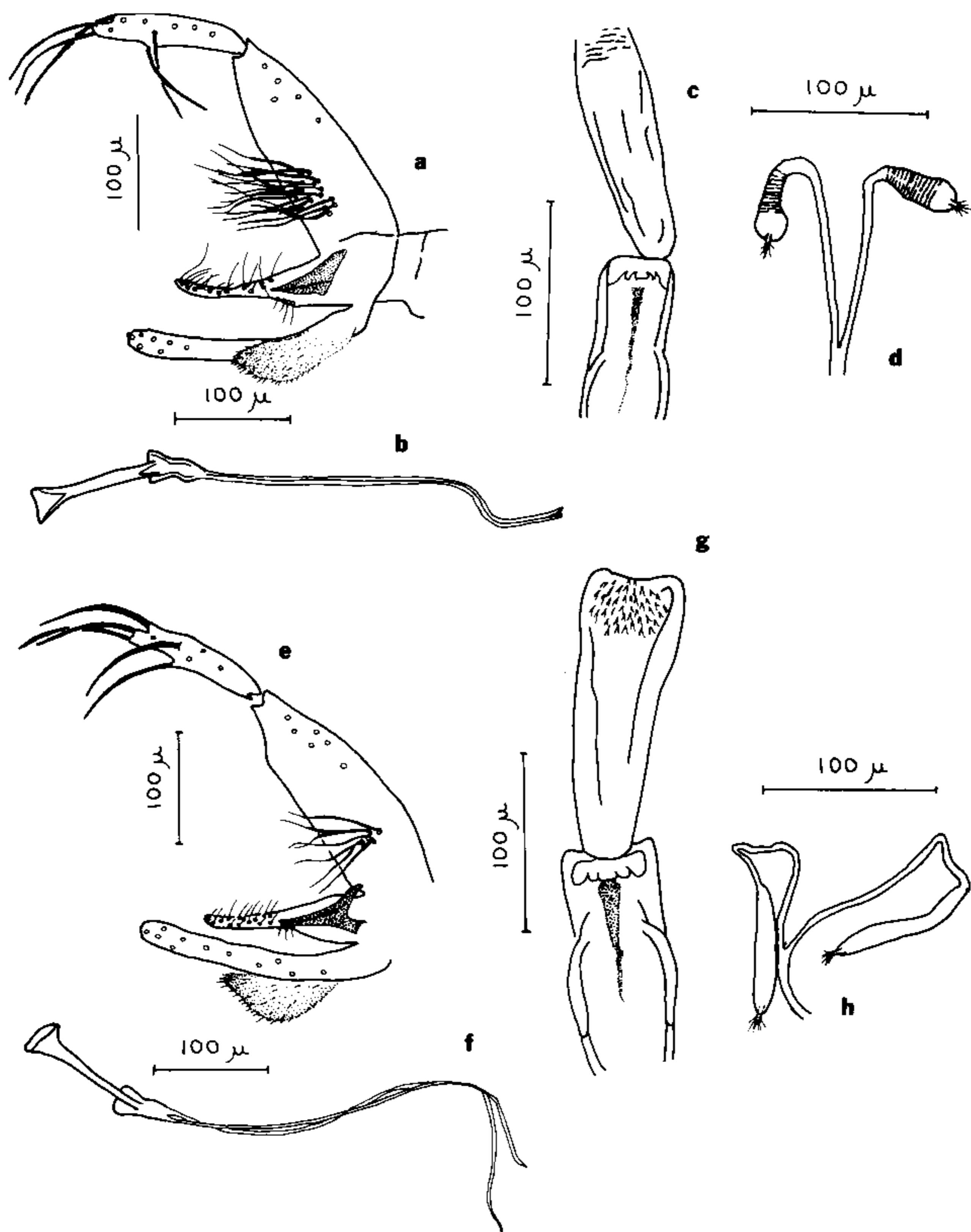


Fig. 6: *Lutzomyia rorotaensis* — a: terminalia; b: genital pump and filaments; c: pharynx and cibarium; d: spermathecae. *Lutzomyia trinidadensis* — e: terminalia; f: genital pump and filaments; g: pharynx; h: spermathecae.

Phlebotomus trinidadensis Newstead, 1922. *An. Trop. Med. Parasit.*, 16: 47 (male and female). Fairchild & Hertig, 1948. *An. Entomol. Soc. America*, 41: 253, 255-257 (male and female). *Phlebotomus (Neophlebotomus) cruciatus* Dyar, 1929. *Am. J. Hyg.*, 10: 119, 124. *Phlebotomus yucatanensis* Galliard, 1934. *An. Parasitol. Hum. Comparée*, 12: 1-6 (male and female). *Phlebotomus yucatanensis* var. *baduelensis* Floch & Abonnenc, 1941. *Inst. Pasteur G. Franc. et Territ. I'Inini*, no. 15:

4-7 (male). Floch & Abonnenc, 1941. *Inst. Pasteur G. Franc. et Territ. I'Inini*, no. 28: 1-3 (female). *Phlebotomus longipalpis* Ristocelli & van Ty, 1941. *An. Parasitol. Hum. Comparée*, 18: 72, 251-254 (female). *Phlebotomus villelai* Mangabeira, 1942. *Mem. Inst. Oswaldo Cruz*, 37: 196-198 (male). *Phlebotomus villelai* Dampf, 1947. *An. Esc. Nac. C. Biol.*, 4: 432, 449 (female). *Phlebotomus baduelensis* Floch & Abonnenc, 1944. *Inst. Pasteur G. Franc. et Territ. I'Inini*, no. 90: 2-4, 16-17

(male and female). *Lutzomyia (Trichopygomyia) trinidadensis* Forattini, 1971. *Pap. Av. Zool.*, 24: 102. Forattini, 1973. *Entomol. Méd.*, 4th vol.: 321 (male, female, pupa, larva).

Type material — five males and five females deposited in the British Museum of Natural History, London, England. *Type locality*: Trinidad.

Geographic distribution — BELIZE: Augustine, Baking Pot (17°12'N; 89°01'W); Big Falls (17°31'N; 88°34'W); Bengue Viejo (17°05'N; 89°08'W); Arenal Road; Caves Branch (17°14'N; 88°35'W); Central Farm; Chiquibul Road; Esperanza (17°26'N; 89°02'W); Guacamallo (16°52'N; 89°02'W); Hunning Bird Highway; Iguana Creek (17°13'N; 88°55'W); Millionario (16°45'N; 88°59'W); Mountain Pine Ridge (16°53'N; 88°55'W); Never Delay (17°18'N; 88°46'W); Never Delay Road; Punta Gorda (16°07'N; 88°48'W); Roaring River (16°06'N; 88°59'W); San Antonio — Cayo District (16°15'N; 89°02'W); San Antonio — Toledo District (16°15'N; 89°02'W); San Pedro Colombia (16°17'N; 88°58'W); Sibun Camp (17°26'N; 88°16'W). BOLIVIA: *La Paz* — Los Yungas. BRAZIL: *Acre* — Feijó (08°09'S; 07°21'W); Rio Branco (08°14'S; 73°13'W); *Amapá* — Macapá (00°02'N; 51°03'W); *Amazonas* — Manaus (03°08'S; 59°01'W); Parintin (02°36'S; 56°44'W); *Bahia* — Feira de Santana (12°15'S; 38°57'W); *Ceará* — Aurora (06°57'S; 38°58'W); Ipu (04°20'S; 40°42'W); Itapipoca (03°30'S; 39°35'W); Maranguape (03°53'S; 38°40'W); Massape (03°31'S; 40°19'W); Pacatuba (03°48'S; 39°17'W); Santa Cruz do Norte; Santanople (07°11'S; 39°44'W); *Pará* — Abaetetuba (01°42'S; 48°54'W); Belém (01°27'S; 48°29'W); Igarape Açu (01°07'S; 47°37'W); Irituia (01°46'S; 47°26'W); João Coelho (01°16'S; 48°11'W); Monte Alegre (04°39'S; 52°49'W); Óbidos (01°55'S; 55°31'W); Ourem (01°33'S; 47°06'W); Peixe Boi (01°12'S; 47°18'W); Santarém (02°30'S; 54°51'W); São Domingos do Capim (01°41'S; 47°47'W); São Miguel do Guama (01°37'S; 47°27'W); *Roraima* — Boa Vista (02°49'N; 60°40'W); Caracarai (01°50'N; 61°08'W). COLOMBIA: *Antioquia* — Anori (07°10'N; 75°05'W); Chigorodo (07°41'N; 76°42'W); Mutata (07°14'N; 76°25'W); *Bolívar* — Mompos (09°14'N; 74°26'W); Simiti (07°58'N; 73°57'W); *Boyaca* — Puerto Boyaca (05°45'N; 74°39'W); *Caldas* — La Dorada (05°27'N; 74°40'W); Victoria (05°19'N; 74°55'W); Cesar — Codazzi (10°02'N; 73°14'W); Valledupar (10°29'N;

73°15'W); *Cudinamarca* — La Mesa (04°38'N; 74°28'W); Puerto Salgar (05°28'N; 74°39'W); Tocaima (05°06'N; 73°47'W); *La Guajira* — Maicão (11°23'N; 72°13'W); Uribia (11°43'N; 72°16'W); Urumita (10°34'N; 73°01'W); *Huila* — Baraya (03°10'N; 72°50'W); La Plata (02°23'N; 75°53'W); Neiva (02°56'N; 75°18'W); Palermo (02°54'N; 75°26'W); Pitalito (01°51'N; 76°02'W); Tello (03°04'N; 75°08'W); *Magdalena* — Mamatoco (11°14'N; 74°10'W); Minca (11°09'N; 74°07'W); Parque Nacional Tayrona; Rio Don Diego (11°16'N; 74°57'W); Santa Marta (11°15'N; 74°13'W); *Meta* — Guanal (03°52'N; 73°44'W); Villa Vicencio (04°09'N; 73°37'W); *Nariño* — Valle del Capuli (01°21'N; 77°22'W); *Norte de Santander* — Cucuta (07°54'N; 72°31'W); Villa Del Rosario (07°50'N; 72°28'W); *Santander* — Guespsa (06°01'N; 73°34'W); Lebrija (07°07'N; 73°13'W); San Vicente de Chucuri (06°54'N; 73°25'W); *Tolima* — Armero (05°05'N; 74°50'W); Dolores (03°33'N; 74°54'W); Honda (05°12'N; 74°45'W); Melgar (04°12'N; 74°39'W); Purificacion (03°51'N; 74°55'W); Saldana (03°56'N; 75°01'W). COSTA RICA: Esquinas (09°57'N; 84°04'W); Finca Socorrita; Jimenez de Guapiles (10°13'N; 83°43'W); Palmar (10°01'N; 84°06'W); San Carlos (10°00'N; 85°10'W). EQUADOR: *Napo* — Limoncocha (00°24'N; 76°30'W). FRENCH GUYANA: *Cayenne* — Baduel (04°56'N; 52°19'W); Cabassou (04°53'N; 52°18'W); Illet la Mere, Montabo (04°57'N; 52°18'W); Rorota (04°53'N; 52°15'W); *Sinnamary* — St. Elie (04°50'N; 53°17'W). HONDURAS: *Lancetilla Valley* — Tela (15°44'N; 87°27'W). NICARAGUA: Villa Somoza (12°08'N; 84°58'W). PANAMÁ: *Colon* — Quebrada Bonita (09°51'N; 79°43'W); *Darien* — Altos de Duia (08°08'N; 77°41'W). *Canal Zone* — Gamboa (09°07'N; 79°42'W); Limbo Field Station. PERU: *Cuzco* — Chacoc (12°43'S; 72°37'W); Cuquipata (13°55'S; 71°38'W); Pilcopata (13°03'S; 71°10'W); *Loreto* — Pucallpa (08°23'S; 74°23'W); Yarinacocha; *Madre de Dios* — Iberia (05°48'S; 74°00'W). TRINIDAD: Bus Bush Forest (10°25'N; 61°04'W). VENEZUELA: *Aragua* — Barbacoas (10°25'N; 64°14'W); Casupito; Choroní (10°29'N; 67°37'W); Curiepe; El Conejo; El Paraparo; El Rincon; Ingenio La Cruz; Jabillos; La Leiba; La Majada; La Pousada; Los Destiladores; Macapo; Ocumo; Onoto; Paya; Pedregal; Pie de Cerro; Porto Columbia; Rancho Grande (10°22'N; 67°41'W); Riacho Los Dos Hermanos; Sabana Grande; Tucupido (09°18'N; 65°48'W); *Falcon* — Mene de Mauroa (10°43'N; 71°01'W); Lara — Duaca (10°18'N; 69°10'W); *Miranda* —

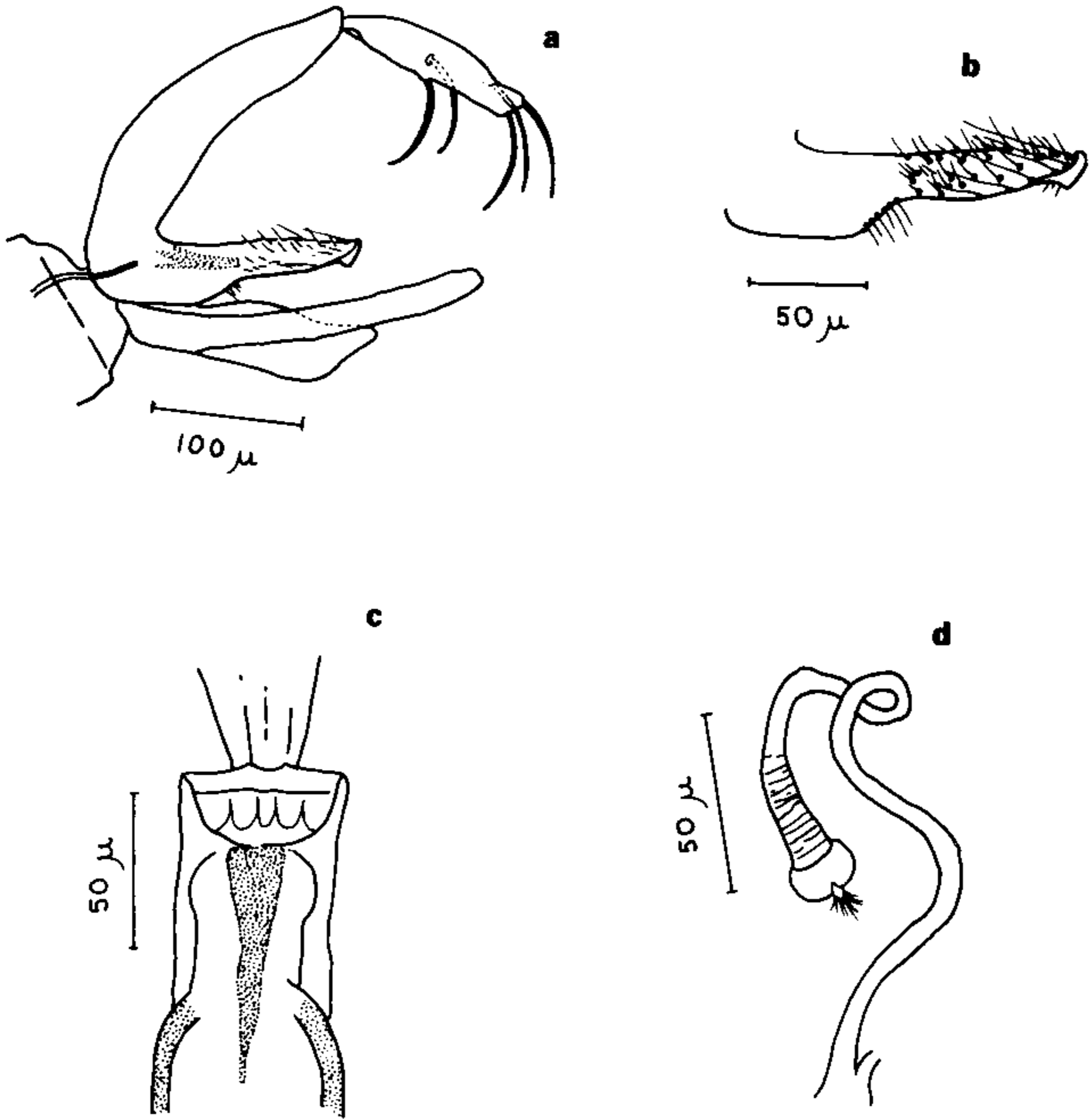


Fig. 7: *Lutzomyia zikani* — a: terminalia; b: paramere; c: cibarium; d: spermathecae (drawing by Barretto, 1950).

Guatopo; *Nueva Sparta* — Isla de Margarita (11°00'N; 64°00'W); *Sucré* — Concamure; Congrejal de Tres Picos (07°48'N; 67°49'W); Los Destiladores; Montaña do Bentine; Montes (10°15'N; 63°55'W); Saboneta de Cedeno; San Fernando (08°00'N; 67°30'W); Sotillo de Arriba; *Trujillo* — Bolivia Capital (17°06'S; 64°00'W); El Carrizal; El Manon; Mesa de Galliaro; Sabana Grande; *Yaracuy* — San Felipe (10°20'N; 68°44'W); *Zulia* — Bachaquero (09°56'N; 71°08'W); Rio Negro (09°40'N; 72°01'W); Selva de Tamamaco (09°49'N; 68°20'W); Zipayare.

The subgenus *Helcocyrtomyia* possesses two other species very akin to *L. trinidadensis*, *L. rorotaensis* and *L. goiana*, due to the similarity observed between the males and between both sexes, respectively. The distinction between *L. trinidadensis* and *L. rorotaensis* is mainly due to the ratio between genital filament/genital pump,

and flagellomere I/labrum-epipharynx that are respectively greater and smaller in *L. trinidadensis*, and to the number of bristles in the basistyle (10-14 for *L. trinidadensis* and 15-20 in *L. rorotaensis*).

The main important difference between the males of *L. trinidadensis* and *L. goiana* are the shape of the paramere and the size of the clypeus. Both males show an enlarged-base paramere that narrows towards the top, but in *L. goiana* there is also a slighter bending upwards. The clypeus in *L. goiana* is also more developed than in *L. trinidadensis*.

The females of *L. trinidadensis* and *L. goiana* show very similar spermatheca, but they can be distinguished by the arrangement and the size of the spines in the distal third of the pharynx: they are stout and easily visible in

L. goiana (Martins et al., 1962). Additionally, *L. goiana* possesses a chitinous structure projecting among the cibarial horizontal teeth, which is absent in *L. trinidadensis*.

From the point of view of geographic distribution *L. trinidadensis* is found in the North of Brazil and Central America, whereas the incidence of *L. goiana* is restricted to Brazil.

Lutzomyia (Helcocyrtomyia) zikani
(Barretto) (Fig. 7: a, b, c, d)

Phlebotomus zikani Barretto, 1950. *Fol. Clin. Biol.*, 16: 143-145, 147 (male and female).

Lutzomyia (Trichopygomyia) zikani Forattini, 1971. *Pap. Av. Zool.*, 24: 102. Forattini, 1973. *Entomol. Méd.*, 4th vol.: 325-326 (male and female).

Type: holotype male and allotype female, both deposited in the Departamento de Parasitologia da Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazil. *Type locality*: Jerusalém farm, Espírito Santo state, Brazil.

Geographic distribution: BRAZIL — *Es-pirito Santo* — Alegre (20°46'S; 41°32'W).

Unfortunately, this species was not examined as it was not present in the material studied. Although the male shows its own morphological characteristics, we observed a great similarity between the female described as *L. zikani* and the examined female of *L. longipennis*, that may suggest both as being a single species.

REMARKS

Throughout this work we have examined 7650 specimens of *Helcocyrtomyia* from the series *oswaldoi*. This series, as originally proposed by Martins et al. (1978), comprised the following fifteen species: *L. appendiculata*, *L. borgmeieri*, *L. breviductus*, *L. ferreirana*, *L. goiana*, *L. longipennis*, *L. machupicchu*, *L. oswaldoi*, *L. paterna*, *L. peresi*, *L. pratti*, *L. rorotaensis*, *L. sordelli*, *L. trinidadensis*, *L. zikani*.

According to our review, *L. sordelli* has been excluded from the subgenus as it was previously considered synonymy of *L. nordestina* (Young & Morales, 1987). *L. breviductus* and *L. pratti*

have been considered as species *inquerenda*. The first was described only by the male (Barretto, 1950) and showed five spines in the dististyle with only one in a terminal position instead of two, as it is typical of *Helcocyrtomyia*. *L. pratti*, also described only by the male, showed in a single specimen a different number and a distinct arrangement of spines in the dististyle as well: in one side, five spines of which two were terminal; in the other side six spines of which three were terminal (Vargas & Diaz-Najera, 1951).

The type material of *L. trinidadensis* deposited in the British Museum of Natural History, London, England, has been recently reexamined by Williams (1988), attempting to refine the original description by Newstead (1922). The material available comprises five males and five females, and not six males and seven females as designed originally (Newstead, 1922). An holotype male plus a paralectotype female have been designed by Williams (1988), and the specimens examined in our work have showed morphological characters according to them. Among the species considered as synonymy of *L. trinidadensis*, *Phlebotomus baduelensis* (Floch & Abonnenc, 1944) and *Phlebotomus villelai* (Mangabeira, 1942) were questioned by Williams, and he pointed to the necessity of a critical examination of both species before a definitive conclusion. So, we have maintained them as synonymys, until further studies.

Two new species have been described and incorporated in the subgenus *Helcocyrtomyia*: *L. pusilla* Dias, Martins, Falcão & Silva, 1986, and *L. capixaba* Dias, Falcão, Silva & Martins, 1987. The females of these new species lack cibarial vertical teeth, according to the first characteristics of the series *oswaldoi*. Other characteristics, spermathecae pear-shaped weakly annulated with a globose terminal segment, are observed only in *L. capixaba*. *L. pusilla* has elongated spermathecae, strongly annulated with the last terminal segment globose. Despite of this, we considered that the species fits well within the series *oswaldoi*.

Additionally, the males of *L. peresi* and *L. ferreirana* have been redescribed and their females have been described, as a result of this work. *L. ferreirana* has also been included in the series *oswaldoi*, although presenting two prominent cibarial vertical teeth.

From the classical systematics point of view and according to our study, the series *oswaldoi* of the

subgenus *Helcocyrtomyia* comprises fourteen species, of which twelve were examined (see Table). Other species, named *Lutzomyia saccai*, from the series *oswaldoi* has been recently described in Venezuela by Feliciangeli (1989). *L. zikani* and *L. paterna* were not available for examination.

TABLE

Frequency of species of the examined material from the series *oswaldoi*, subgenus *Helcocyrtomyia*, genus *Lutzomyia* (Diptera, Psychodidae, Phlebotominae)

Species	Number of specimens		
	♂♂	♀♀	subtotal
<i>L. appendiculata</i>	1	—	1
<i>L. borgmeieri</i>	602	154	756
<i>L. capixaba</i>	330	66	396
<i>L. ferreirana</i>	123	38	161
<i>L. goiana</i>	660	128	788
<i>L. longipennis</i>	508	88	596
<i>L. machupicchu</i>	1	—	1
<i>L. oswaldoi</i>	73	15	88
<i>L. peresi</i>	252	114	366
<i>L. pusilla</i>	128	25	153
<i>L. rorotaensis</i>	2423	499	2922
<i>L. trinidadensis</i>	922	500	1422
Total	6023	1627	7650

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