

Annotated List of the Phlebotominae (Diptera) of Suriname

AM Burgos^{*}, JE Hudson^{**}

Ministry of Health, Bureau of Public Health, P.O. Box 767, Paramaribo, Suriname

Phlebotomine sandflies were collected between 1952 and 1984 at 30 localities in the tropical rainforest and savanna regions of Suriname. Thirty-nine species were identified in the collections (2 Brumptomyia, 37 Lutzomyia), including two known vectors of cutaneous leishmaniasis, Lutzomyia flaviscutellata and L. umbratilis. Nineteen of the species are new records for Suriname. In the rainforest region, the commonest phlebotomines were L. squamiventris maripaensis (79.8%), L. umbratilis (8.4%) and L. flaviscutellata (6.3%) in human bait catches, L. umbratilis (26.2%), L. infraspinoza (23.9%) and L. trichopyga (8.3%) in CDC light traps and L. umbratilis (84.3%), L. whitmani (6.8%) and L. shannoni (4.3%) in collections from tree trunks. The mean incidence of cutaneous leishmaniasis from 1979-1985 was 4.9 per 1000 inhabitants for the rainforest region and 0.66 per 1000 for Suriname as a whole.

Key words: Diptera - Psychodidae - Phlebotominae - *Brumptomyia* - *Lutzomyia* - leishmaniasis - Suriname

Although cutaneous leishmaniasis was first reported from Suriname by Flu (1911) and continues to afflict people in the rainforest region, there has been little work on the sandfly vectors. Bonne-Wepster and Bonne (1919) were the first to report a phlebotomine sandfly in Suriname. They took females of "*Phlebotomus squamipennis* Lutz and Neiva" (probably *Lutzomyia squamiventris maripaensis* (Floch & Abonnenc)) "in shady places in the virgin forest of the interior". Nearly four decades later Bruijning (1957) reported capturing man-biting "*Phlebotomus*" of five species. Wijers and Linger (1966) made the first intensive study of leishmaniasis vectors in Suriname. They reported ten species from four different biotopes and found 12 females, which they identified as "*Phlebotomus anduzei*" (probably *Lutzomyia umbratilis* Ward & Fraiha), infected with promastigotes in the anterior part of the gut, but they were unable to identify the parasite further. Minter and Fraiha (unpublished data) identified seven species among sandflies collected on a short visit to Suriname in 1973. Hudson collected sandflies during surveys of malaria vectors from 1979-1982, and from these collections Hudson and Young (1985) reported

16 species, of which 11 were new records for Suriname.

In 1983 and 1984, Burgos used CDC miniature light traps to collect sandflies in primary and secondary rainforest at Patamacca, where cutaneous leishmaniasis was endemic, and at ten other localities in the savanna and rainforest areas of eastern Suriname. These collections included 25 species, of which 10 were new records. Burgos and DG Young have also reexamined sandflies collected by DW Heinemann of the Bureau of Public Health, Paramaribo, from 1971-73, and found three new records. The following list of species is based on all the above-mentioned collections.

Collection sites - The locations of all but two of the collection sites are shown on the map. Most of them are in the hilly interior of the country, which accounts for 75% of the total area. It is covered mostly with mesophytic rainforest, part of the northern Amazon forest system, and inhabited by about 32,000 maroons (the descendants of escaped African slaves) and 2,000 Amerindians, who live in scattered villages along the major rivers, or in camps near their garden plots. Some collections were also made in the savanna region, a narrow belt of white sand with low, sparse vegetation except for some gallery forest beside the rivers. It is thinly populated except for a few Amerindian villages. Sandflies have been collected at few sites in the coastal plain region, north of the savanna, except in the forests near the mining town of Moengo and the oil palm plantation of Patamacca. Most of the population of Suriname (425,000 in 1988) lives in the capital, Paramaribo, and the cultivated areas of the coastal plain. Some of the reported cases of cutaneous leishmaniasis have been in people from

Present address: *Nolensstraat 79, 1067 JZ Amsterdam, The Netherlands **1688, Grasmere Crescent, Ottawa, Ontario K1V 7V2, Canada

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this region, but they were all people who had visited the forest for activities such as hunting, logging, soldiering and tourism.

Two of the collection sites are not shown on the map because could not be located precisely. Foengoe Island is in the Coppename river somewhere between Bitagron and Raleigh Falls. 'Marchall Creek' may be near Maréchals-Kondre, which is on the west bank of the Suriname river, north of Bergen Dal. Bruijning (1957) collected at several sites on the upper Paloemeu river, such as Apsiké and Krapawaka Creek, which we have also been unable to locate precisely.

The climate of Suriname is hot and humid, with a heavy rainfall (mean values 27.3°C, 80% RH and 2,210 mm per year for Paramaribo). There are four seasons: the long rainy (April-July), the long dry (August-November), the short rainy (December-January) and the short dry (February-March), but they vary in times of onset and duration, and there is some rain every month.

Collection, processing and identification of specimens - Female sandflies were taken in human bait catches at night near houses or in primary and secondary forest. A few specimens were caught at Matta on paddle traps, which were small rectangles of plastic flyscreen covered with cooking oil, mounted on sticks and whirled around the collectors. Resting adults were caught by aspirator, mainly from the bases of tree trunks. Many of Heinemann's specimens and ours were caught with CDC miniature light traps (Hausherr's Machine Works, Toms River, New Jersey, USA). For our collections, the standard holding cages were replaced by ones with meshes too small to let sandflies through. The traps were hung from trees at about 1.5 m above ground, and run from 18:00-06:00 hr. Most of our CDC trap catches were made at Aseli Kamp (14 trap-nights in 1981) and at Patamacca (45 trap-nights in 1983-84).

Our specimens were prepared according to the methods described by Young (1979) and identified with the aid of publications by Floch and Abonnenc (1952), Forattini (1973) and Young (1979). Dr DG Young of Gainesville, Florida, USA, identified or corrected our identifications of many of our specimens, and also some of the specimens collected by Heinemann from 1971-73. Some of our specimens were retained by Dr Young, and the rest were left at the Bureau of Public Health, Paramaribo. All previous records were taken from published and unpublished reports, and we have not examined any of the specimens. If any of the earlier specimens remain, they are most likely to be at the National Museum of Natural History, Leiden (Bonne-Wepster), the Royal Tropical Institute, Amsterdam (Wijers & Linger) or at the Instituto Evandro Chagas, Belém (Minter & Fraiha).

List of specimens collected - The nomenclature and arrangement of genera, subgenera, species groups and species follows that of Martins et al. (1978), with later amendments as given by Lebbe et al. (1987). The following abbreviations are used for collectors or authors: Br = Bruijning (1957); Bu = Burgos, unpublished records; Bu+Y = Burgos and Young, unpublished records; Hd = Hudson (1988); Hd+Bu = Hudson and Burgos, unpublished records; Hd+Y = Hudson and Young (1985); Hn+Bu = Collection of Heinemann, reidentified by Burgos; Hn+Y = Collection of Heinemann, identified by Young; Mn+Fr = Minter and Fraiha, unpublished records; W+Hs = Wijers and Huisenga (1967); W+L = Wijers and Linger (1966); W+Mn = Wijers and Minter, unpublished record. New records for Suriname are indicated by an asterisk (*) before the specific name.

The records of Phlebotomines collected at human bait, in CDC traps and on tree trunks are summarized in the Table. Some records where other methods of collection were used, or where the method of collection was not recorded, are not shown in the Table but are included in the list below.

Genus: *Brumptomyia* França & Parrot, 1921

* *pintoii* (Costa Lima, 1932)

Brownsberg, 1973, CDC trap in forest, 1♂ (Hn+Bu).

* *travassosi* (Mangabeira, 1942)

Powaka, 1973, armadillo burrow, 1 ♀ (Hn+Bu).

sp. indet.

Aseli Kamp, 1981, CDC trap, 1 ♀ (Hd+Y); Patamacca, 1983, CDC trap, 1♂ (Bu).

Genus: *Lutzomyia* França, 1924

Species group: *aragaoi* (Theodor, 1965)

barrettoii barrettoii (Mangabeira, 1942)

Aseli Kamp 1981, CDC trap, 3 ♀, 2 ♂ (Hd+Y);

Patamacca, 1983, CDC trap, 2 ♀, 5 ♂ (Bu)

Species group: *dreisbachi* (Lewis et al. 1977)

* *dreisbachi* (Causey & Damasceno, 1945)

Patamacca, 1983-84, CDC trap, 5 ♀, 8 ♂ (Bu).

Subgenus: *Evandromyia* Mangabeira, 1941

infraspinosa Mangabeira, 1941.

Berg en Dal, 1965, human bait catch, 11 ♀ (W+L); Aseli Kamp, 1981, CDC trap, 4 ♀, 2 ♂ (Hd+Y); Poika, 1982, CDC trap, 2 ♀, 1 ♂ (Hd+Bu); Kabo, 1982, CDC trap, 2 ♂ (Hd+Bu); Patamacca, 1983-84, CDC trap, 152 ♀, 175 ♂ (Bu); Blakawatra, 1983, CDC trap, 5 ♀, 7 ♂ (Bu); Nieuw Aurora, 1983,

TABLE
 Numbers of Phlebotomine sandflies (both sexes) recorded from Suriname in the rainforest region (human bait, CDC traps and tree trunks) and the savanna region (all methods of capture). Combined records from all investigators, 1952-84

Genus, (Subgenus) or [species group], species	Rainforest							
	Human bait		CDC traps		Tree trunks		Savanna	Total
	No.	%	No.	%	No.	%	No.	No.
<i>Brumptomyia</i>								
<i>pintoii</i>	0	0.0	1	0.1	0	0.0	0	1
<i>travassosi</i>	0	0.0	0	0.0	0	0.0	1	1
<i>Lutzomyia</i>								
[<i>aragaoi</i>]								
<i>barr. barrettoii</i>	0	0.0	12	0.8	0	0.0	0	12
[<i>dreisbachi</i>]								
<i>dreisbachi</i>	0	0.0	13	0.8	0	0.0	0	13
(<i>Evandromyia</i>)								
<i>infraspinosa</i>	11	2.1	372	23.9	0	0.0	15	398
<i>monstruosa</i>	0	0.0	6	0.4	0	0.0	1	7
[<i>migonei</i>]								
<i>lenti</i>	0	0.0	1	0.1	0	0.0	0	1
<i>pacae</i>	4	0.8	0	0.0	0	0.0	0	4
<i>sericea</i>	0	0.0	6	0.4	0	0.0	0	6
(<i>Nyssomyia</i>)								
<i>antunesi</i>	1	0.2	4	0.3	45	2.5	0	50
<i>flaviscutellata</i>	33	6.3	101	6.5	0	0.0	17	151
<i>umbratilis</i>	44	8.4	408	26.2	1504	84.3	2	1958
<i>whitmani</i>	1	0.2	0	0.0	121	6.8	0	122
<i>yuilli pajoti</i>	0	0.0	33	2.1	0	0.0	0	33
[<i>oswaldoi</i>]								
<i>rorotaensis</i>	0	0.0	5	0.3	15	0.8	3	23
<i>trinidadensis</i>	0	0.0	29	1.9	0	0.0	0	29
[<i>pilosa</i>]								
<i>chassigneti</i>	0	0.0	13	0.8	0	0.0	2	15
(<i>Pressatia</i>)								
<i>choti</i>	0	0.0	13	0.8	0	0.0	0	13
(<i>Psathyromyia</i>)								
<i>abonnenci</i>	0	0.0	0	0.0	3	0.2	0	3
<i>dendrophyla</i>	0	0.0	0	0.0	4	0.2	0	4
<i>lutziana</i>	0	0.0	6	0.4	0	0.0	0	6
<i>punctigeniculata</i>	0	0.0	2	0.1	0	0.0	0	2
<i>scaffi</i>	0	0.0	0	0.0	1	0.1	0	1
<i>shannoni</i>	5	1.0	1	0.1	77	4.3	0	83

Genus, (Subgenus) or [species group], species	Rainforest							
	Human bait		CDC traps		Tree trunks		Savanna	Total
	No.	%	No.	%	No.	%	No.	No.
<i>(Psychodopygus)</i>								
<i>amazonensis</i>	0	0.0	11	0.7	0	0.0	0	11
<i>bispinosa</i>	0	0.0	1	0.1	0	0.0	0	1
<i>clauserei</i>	1	0.2	36	2.3	0	0.0	0	37
<i>corossoniense</i>	0	0.0	13	0.8	0	0.0	0	13
<i>davisi</i>	0	0.0	95	6.1	0	0.0	0	95
<i>guyanensis</i>	2	0.4	12	0.8	0	0.0	0	14
<i>hirsuta</i>	1	0.2	25	1.6	0	0.0	0	26
<i>paraensis</i>	1	0.2	2	0.1	0	0.0	0	3
<i>squamiventris</i>	418	79.8	60	3.8	2	0.1	0	480
<i>maripaensis</i>								
<i>(Trichophoromyia)</i>								
<i>auraensis</i>	0	0.0	39	2.5	0	0.0	1	40
<i>inirii</i>	0	0.0	92	5.9	0	0.0	0	92
<i>melloi</i>	0	0.0	2	0.1	0	0.0	0	2
<i>ubiquitalis</i>	0	0.0	13	0.8	0	0.0	4	17
<i>(Trichopygomyia)</i>								
<i>trichopyga</i>	0	0.0	129	8.3	0	0.0	1	130
<i>(Viannamyia)</i>								
<i>tuberculata</i>	1	0.2	1	0.1	12	0.7	0	14
Totals	523	100.0	1557	100.0	1784	100.0	47	3911

CDC trap, 4 ♀, 6 ♂ (Bu); Goensie, 1983, CDC trap, 10 ♀, 17 ♂ (Bu).

* *monstruosa* (Floch & Abonnenc, 1944)

Brownsweeg, 1973, CDC trap, 1 ♀ (Hn+Bu); Poika, 1982, CDC trap, 1 ♂ (Hd+Bu); Goensie, 1983, CDC trap, 2 ♀ (Bu); Patamacca, 1983, CDC trap, 1 ♀, 2 ♂ (Bu).

Species group: *migonei* (Theodor, 1965)

* *lenti* (Mangabeira, 1938)

Patamacca, 1983, CDC trap, 1 ♂ (Bu).

pacae (Floch & Abonnenc, 1943)

Berg en Dal, 1965, human bait catch, 4 ♀ (W+L).

* *sericea* (Floch & Abonnenc, 1944)

Patamacca, 1983, CDC trap, 4 ♀, 1 ♂ (Bu).

Subgenus: *Nyssomyia* Barretto, 1962

antunesi (Coutinho, 1939)

Berg en Dal, 1965, on human bait, 1 ♀, on tree trunks, 45 ♀ (W+L); Aseli Kamp, 1979, CDC trap, 1 ♂ (Hd+Bu); Pakira Creek, 1985, CDC trap at forest edge, 3 ♂ (Bu).

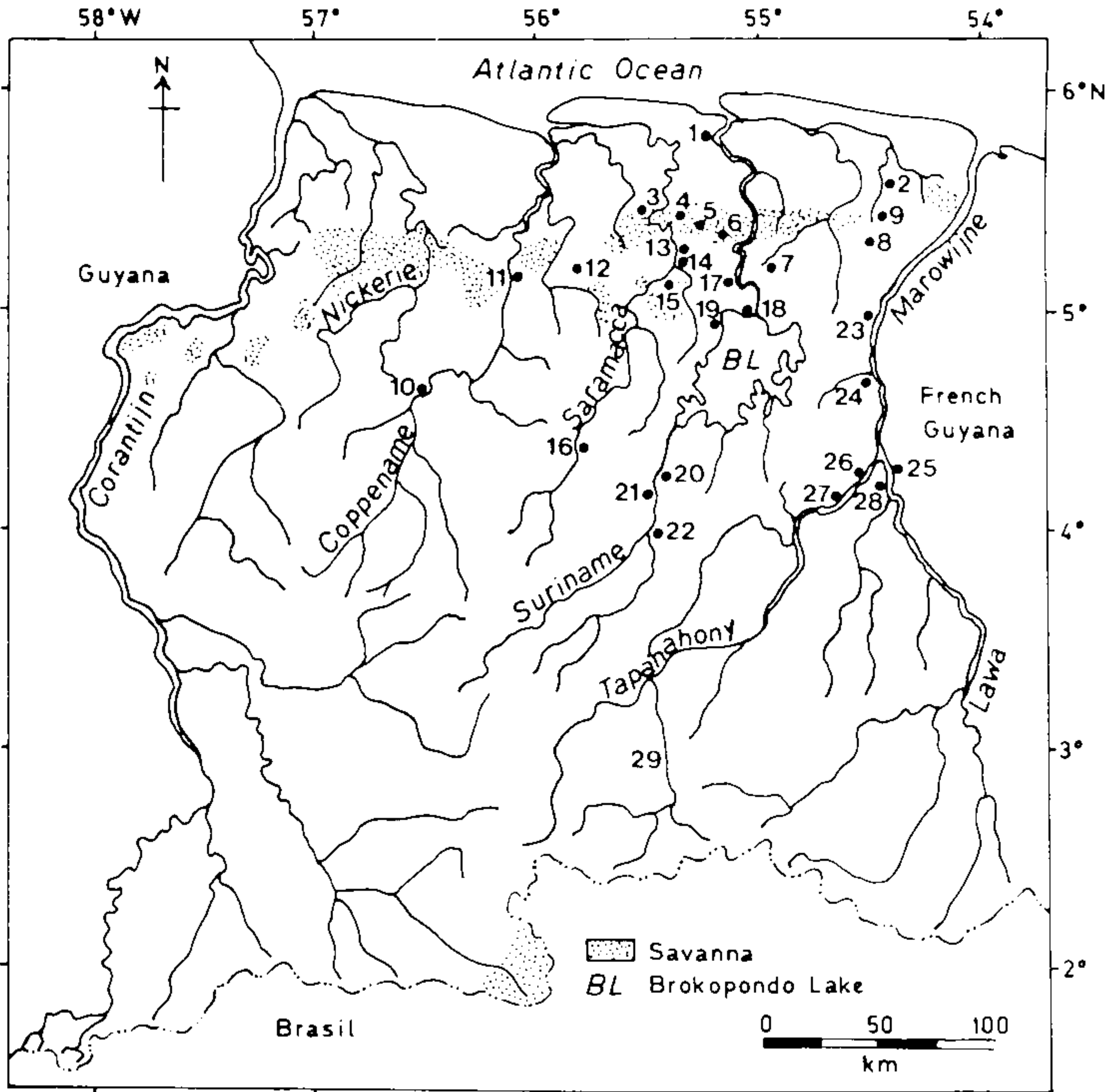
flaviscutellata (Mangabeira, 1942)

Berg en Dal, 1965, on human bait, 30 ♀ (W+L, as *P. apicalis*. We have not examined any of these specimens, which may have included some *Lu. olmeca*); Aseli Kamp, 1982, CDC trap, 3 ♀, 11 ♂ (Hd+Y); Poika, 1982, CDC trap, 3 ♀ (Hd+Bu); Tonka, 1982, on human bait, 1 ♀ (Hd+Y); Poesoegroenoe, 1981, on human bait in village, 1 ♀ (Hd+Y); Matta, 1981-82, paddle trap, 4 ♀, 2 ♂, CDC trap, 1 ♀ (Hd); Patamacca, CDC traps, 37 ♂, 21 ♀ (Bu); Blakawatra, 1983, CDC trap, 6 ♀, 1 ♂ (Bu); Stoelmans Eiland, 1983, CDC trap in village, 2 ♀ (Bu); Goensie, 1983, CDC trap in village, 10 ♀, 17 ♂, on human bait, 1 ♀ (Bu).

umbratilis Ward & Fraiha, 1977

Note: We have not examined specimens for any of the records before 1981, and some of them may have included *Lu. anduzei* (Rozeboom, 1942).

Drietabbetje, 1952, on human bait, 2 ♀ (Br, as *P. intermedius*); upper Paloemeu river, 1952, on human bait, 1 ♀ (Br, as *P. in-*



Map of Suriname, showing collection localities and position of the savanna region. The area south of the savanna is covered with mesophytic rainforest. (1) Paramaribo, (2) Moengo, (3) Poika, (4) Matta, (5) Cola Creek, (6) Powaka, (7) Blakawatra, (8) Patamacca, (9) Ovia Ollo, (10) Raleigh Falls, (11) Bitagron, (12) Kabo/Tonka, (13) Pikien Saron, (14) Kwakoe Gron, (15) Goensie, (16) Poesoegroenoe, (17) Berg en Daal, (18) Brownsweg, (19) Brownsberg, (20) Nieuw Aurora, (21) Debiké, (22) Djoemoe, (23) Pakira Creek, (24) Skientabbetje, (25) Stoelmans Island, (26) Tabiki, (27) Drietabbetje, (28) Aseli Kamp, (29) Upper Paloemeu river (several sites, precise locations unknown).

termedius); Berg en Dal, 1965, on human bait, 37 ♀, on tree trunks, 1213 ♀ (W+L, as *P. intermedius* and *P. anduzei*); Moengo, 1965, on tree trunks, 270 ♀ (W+L, as *P. anduzei*); Brownsweg, 1973, on tree trunks, 5 ♀, 6 ♂ (Mn+Fr, as *L. anduzei*); Bitagron, 1973, on trees, 1 ♀, 3 ♂ (Mn+Fr, as *L. anduzei*); Foengoe Island (Coppename River), 1973, on trees, 2 ♀, 4 ♂ (Mn+Fr, as *L. anduzei*); Marchall Creek, 1973, method of capture unknown, 2 ♂ (W+Mn, as *L. anduzei*); Aseli Kamp, 1981, CDC trap, 2 ♀, 1 ♂

(Hd+Y); Pikien Saron, 1982, on human bait, 2 ♀ (Hd+Y); Kabo, 1982, on human bait, 1 ♀ (Hd+Y); Tonka, 1982, on human bait, 3 ♀ (Hd+Y); Poika, 1982, on human bait, 1 ♀, CDC trap, 1 ♀ (Hd+Bu); Blakawatra, 1983, CDC trap, 1 ♀ (Bu); Debike, 1983, CDC trap, 12 ♀, 5 ♂ (Bu); Nieuw Aurora, 1983, CDC trap, 2 ♀, 1 ♂ (Bu); Stoelmans Island, 1983, CDC trap, 1 ♀ (Bu); Goensie, 1983, CDC trap in village, 2 ♂ (Bu); Patamacca, 1983-84, CDC traps in forest and village, 184 ♀, 198 ♂ (Bu).

whitmani (Antunes & Coutinho, 1939)

Berg en Dal, 1965, on human bait, 1 ♀, on tree trunks, 94 ♀; Moengo, 1965, on tree trunks, 27 ♀ (W+L, as *P. elongatus/whitmani*).

yuilli pajoti Abonnenc, Léger & Fauran, 1978

Bitagron, 1973, on tree, 1 ♂ (Mn+Fr, as *L. yuilli*); Aseli Kamp, 1982, CDC trap, 21 ♀, 2 ♂ (Hd+Y).

Species group: *oswaldoi* (Theodor, 1965)* *rorotaensis* (Floch & Abonnenc, 1944)

Blakawatra, 1964, 14 ♂; Kwakoe Gron, 1964, 2 ♀, 9 ♂, methods of collection unknown (W+Mn); Raleigh Falls (Copename River), 1973, in rock hole, 1 ♀ (Mn+Fr); Foengoe Island, 1973, on tree trunk, 10 ♂ (Mn+Fr); Bitagron, 1973, on tree trunk, 1 ♀, 4 ♂ (Mn+Fr); Patamacca, 1983-84, CDC trap, 4 ♀ (Bu); Cola Kreek, 1983, CDC trap, 3 ♀ (Bu); Debiké, 1983, CDC trap, 1 ♂ (Bu).

* *trinidadiensis* (Newstead, 1922)

Matta, 1982, paddle trap, 1 ♀ (Hd); Patamacca, 1983-84, CDC trap, 14 ♀, 2 ♂ (Bu); Nieuw Aurora, 1983, CDC trap, 2 ♀, 9 ♂ (Bu); Skientabbetje, 1983, CDC trap, 2 ♀ (Bu).

Species group: *pilosa* (Theodor, 1965)* *chassigneti* (Floch & Abonnenc, 1944)

Blakawatra, 1964, on human bait, 2 ♀ (W+Mn); Patamacca, 1983-84, CDC trap, 10 ♀, 2 ♂ (Bu); Debike, 1983, CDC trap, 1 ♀ (Bu).

Subgenus: *Pressatia* Mangabeira, 1942* *choti* (Floch & Abonnenc, 1941)

Brownsberg, 1973, CDC trap, 1 ♂ (Hn+Bu); Aseli Kamp, 1979, CDC trap, 2 ♂ (Hd+Bu); Goensie, 1983, CDC trap, 4 ♀ (Bu); Patamacca, 1983-84, CDC trap, 3 ♀, 1 ♂ (Bu); Debike, 1983, CDC trap, 2 ♂ (Bu).

Subgenus: *Psathyromyia* Barretto, 1962* *abonnenci* (Floch & Chassignet, 1947)

Brownsberg, 1973, on tree trunk, 3 ♀ (Mn+Fr).

* *dendrophyla* (Mangabeira, 1942)

Brownsberg, 1973, on tree trunk, 1 ♀, 1 ♂ (Mn+Fr); Foengoe Island, 1973, on tree, 2 ♂ (Mn+Fr).

* *lutziana* (Costa Lima, 1932)

Patamacca, 1983-84, CDC trap, 3 ♀, ♂m (Bu); Goensie, 1983, CDC trap, 1 ♂ (Bu).

* *punctigeniculata* (Floch & Abonnenc, 1944)

Patamacca, 1983, CDC trap, 2 ♀ (Bu).

* *scaffi* (Damasceno and Arouck, 1956)

Brownsberg, 1973, on tree, 1 ♂ (Hn+Y).

shannoni (Dyar, 1929)

Berg en Dal, 1965, on human bait, 2 ♀, on tree trunks, 65 ♀ (W+L); Moengo, 1965, on tree trunks, 10 ♀ (W+L); Foengoe Island, 1973, on tree, 1 ♀, 1 ♂ (Mn+Fr); Kabo, 1982, on human bait, 1 ♀ (Hd+Bu); Tonka, 1982, on human bait, 2 ♀ (Hd+Bu); Debike, 1983, CDC trap, 1 ♂ (Bu).

Subgenus: *Psychodopygus* Mangabeira, 1941*amazonensis* (Root, 1934)

Aseli Kamp, 1981, CDC trap, 4 ♀ (Hd+Y); Patamacca, 1983-84, CDC trap, 3 ♀, 2 ♂ (Bu); Debike, 1983, CDC trap, 2 ♂ (Bu).

* *bispinosa* (Fairchild & Hertig, 1951)

Patamacca, 1983, CDC trap, 1 ♀ (Bu+Y).

claustreri Abonnenc, Léger & Fauran, 1971

Aseli Kamp, 1981, CDC trap, 10 ♀, 26 ♂ (Hd+Y); Kabo, 1982, on human bait, 1 ♀ (Hd+Y).

corossoniensis Le Pont & Pajot, 1978

Aseli Kamp, CDC trap, 11 ♀, 2 ♂ (Hd+Y).

* *davisi* (Root, 1934)

Debike, 1983, CDC trap, 3 ♀, 30 ♂ (Bu); Nieuw Aurora, 1983, CDC trap, 2 ♂ (Bu); Patamacca, 1983, CDC trap, 1 ♀, 59 ♂ (Bu).

guyanensis (Floch & Abonnenc, 1941)

Apsiké (Paloemeu River), 1952, on human bait, 1 ♀ (Br, as *P. geniculatus*); Krapawaka Creek (tributary of Paloemeu, near Brazilian border), 1952, on human bait, 1 ♀ (Br, as *P. geniculatus*); Aseli Kamp, 1981, CDC trap, 11 ♀ (Hd+Y, "near *geniculata*"); Patamacca, 1983, CDC trap, 1 ♀ (Bu). [Note by Dr DG. Young (*in litt.*, 1988): Forattini treated *L. geniculata* as a junior synonym for *L. guyanensis*. The holotype female of *L. guyanensis* is missing. Its description closely resembles the females of *L. corossoniensis*, *L. dorlinensis* and *L. geniculata*, and is probably conspecific with one of them, but the possibility that *L. guyanensis* and *L. geniculata* are separate species should not be excluded. Identifications should be based on males, but our specimens of *L. guyanensis/L. geniculata* were all females].

hirsuta hirsuta (Mangabeira, 1942)

Aseli Kamp, 1981, CDC trap, 5 ♀ (Hd+Y); Kabo, 1982, on human bait, 1 ♀ (Hd+Y); Patamacca, 1983, CDC trap, 2 ♀, 18 ♂ (Bu).

paraensis (Costa Lima, 1941)

Pico Ricardo Franco (Brazilian border), 1952, on human bait, 1 ♀ (Br); Patamacca, 1983, CDC trap, 1 ♀, 1 ♂ (Bu).

squamiventris maripaensis (Floch & Abonnenc, 1946)

Brazilian border, 1952, on human bait, 1 ♀ (Br, as *P. squamiventris*); Berg en Dal, 1965, on human bait, 414 ♀, on tree trunks, 2 ♀ (W+L, as *P. squamiventris*); Aseli Kamp, 1981, CDC trap, 13 ♀, 2 ♂; Kabo, 1982, on human bait, 1 ♀; Tonka, 1982, on human bait, 2 ♀ (Hd+Y); Patamacca, 1983-84, CDC trap, 31 ♀, 15 ♂; Ovia-Ollo, 1983, CDC trap, 1 ♀ (Bu). *Note*: Our female specimens have not been measured, and we call them ssp. *maripaensis* on distributional grounds.

Subgenus: *Trichophoromyia* Barretto, 1962

auraensis (Mangabeira, 1942)

Tabiki, 1979, CDC trap, 2 ♂ (Hd+Bu); Poika, 1982, CDC trap, 1 ♂ (Hd+Bu); Aseli Kamp, 1981, CDC trap, 37 ♂, plus 25 ♀ that might be *L. auraensis* or *L. melloi*, the female of which is undescribed (Hd+Y).

* *inonii* (Floch & Abonnenc, 1943)

Aseli Kamp, 1979-81, CDC trap, 33 ♀, 19 ♂ (Hd+Bu); Kabo, 1982, CDC trap, 5 ♀, 4 ♂ (Hd+Bu); Patamacca, 1983-84, CDC trap, 6 ♂, 8 ♀; Djoemoe, 1983, in water drum, 2 ♂; Nieuw Aurora, 1983, CDC trap, 8 ♀; Goensie, 1983, CDC trap, 7 ♀, 2 ♂ (Bu).

melloi (Causey & Damasceno, 1945)

Aseli Kamp, 1981, CDC trap, 2 ♂ (Hd+Y). *Note*: Dr D.G. Young (*in litt.*, 1988) states that *L. melloi* is probably a junior synonym for *L. inonii*.

* *ubiquitalis* (Mangabeira, 1942)

Kabo, 1982, CDC trap, 1 ♂; Poika, 1982, CDC trap, 4 ♂ (Hd+Bu); Patamacca, 1983-84, CDC trap, 4 ♀, 4 ♂; Skientabbetje, 1983, CDC trap, 2 ♀; Goensie, 1983, CDC trap, 2 ♀ (Bu).

Subgenus: *Trichopygomyia* Barretto, 1962

trichopyga (Floch & Abonnenc, 1945)

Powaka, 1973, animal burrow, 1 ♀ (Hn+Bu); Aseli Kamp, 1981, CDC trap, 1 ♀ (Hd+Y); Patamacca, 1983-84, 43 ♀, 74 ♂; Debike, 1983, CDC trap, 6 ♀, 2 ♂; Ovia-Ollo, 1983, CDC trap, 1 ♀; Goensie, 1983, CDC trap, 2 ♀ (Bu).

Subgenus: *Viannamyia* Mangabeira, 1941

tuberculata (Mangabeira, 1941)

Berg en Dal, 1965, on human bait, 1 ♀, on tree trunk, 1 ♀; Moengo, 1965, on tree trunks, 11 ♀ (W+L, as sp. nov.; W+Hs, as *L. munangi*); Brownsveg, 1973, CDC trap, 1 ♀ (Hn+Bu).

Doubtful records

Lutzomyia (Psychodopygus) arthuri (Fonseca, 1936)

Krapawaka Creek (tributary of Paloemeu, near Brazilian border), 1952, on human bait, 1 ♀ (Br). We have not seen Bruijning's specimen.

Lutzomyia (Psychodopygus) panamensis (Shannon)

Martins et al. (1978) include this among the 12 species of Phlebotomines they list for Suriname, but give no details.

According to Dr DG Young (*in litt.* 1984), both *L. arthuri* and *L. panamensis* are unlikely to occur in Suriname.

Relative abundance - The relative abundance of the 3911 sandflies of 39 species caught in different regions by the main collecting methods is shown in the Table. Most of the specimens (3865) were caught in the rainforest region at human bait (524 females), in CDC light traps (720 females, 837 males) and resting on the bases of tree trunks (1749 females, 35 males). Females of 14 species were taken on human bait, the most abundant being *Lutzomyia squamiventris maripaensis* (79.8%), *Lu. umbratilis* (8.4%) and *Lu. flaviscutellata* (6.3%). Males and females of 32 species were caught in the CDC light traps, the commonest being *Lu. umbratilis* (26.2%), *Lu. infraspinoza* (23.9%), *Lu. trichopyga* (8.3%), *Lu. flaviscutellata* (6.5%), *Lu. guyanensis* (6.1%) and *Lu. inonii* (5.9%). Sandflies of 10 species were caught resting on tree trunks, the most common being *Lu. umbratilis* (84.3%), *Lu. whitmani* (6.8%) and *Lu. shannoni* (4.3%). The relative abundance of different species by the three methods of capture was not the same, except that all three methods showed *Lu. umbratilis* among the three most abundant species.

Only 47 sandflies of ten species were caught in the savanna region, including single specimens of two species caught resting in animal burrows. *Brumptomyia travassosi* (one male), was the only sandfly found exclusively in the savanna region. Of the four females caught at human bait in the savanna, two were *Lu. umbratilis*, both caught in the same patch of gallery forest on the same night; and of the 35 males and females caught in CDC light traps, 15 were *Lu. infraspinoza* and 12 were *Lu. flaviscutellata*.

Collections by Burgos at Patamacca in 1983-84 showed a unimodal seasonal distribution of female *Lu. umbratilis* in CDC traps at ground level, with a peak in July and a positive correlation with rainfall. Specimens of *Lu. flaviscutellata* were more often found in secondary forest (9.2%

of total) than in primary forest (1.7% of total), and were never found resting on tree trunks.

Leishmaniasis in Suriname - Two of the most commonly collected sandflies in Suriname are known vectors of leishmaniasis to humans. *Lu. flaviscutellata* is a vector of *Le. amazonensis*, which causes cutaneous and diffuse cutaneous leishmaniasis. *Lu. umbratilis* is the principal vector of *Le. (Viannia) guyanensis*, which causes the simple cutaneous leishmaniasis known as "pian-bois" in French Guyana and "Bos Jaws" in Suriname. Some of the other sandflies that have been recorded in Suriname, such as *Lu. amazonensis*, *Lu. paraensis*, *Lu. tuberculata* and *Lu. whitmani* are suspected but not confirmed vectors of leishmaniasis (Killick-Kendrick 1990). There has been one reported case of visceral leishmaniasis in Suriname (Winckel & Aalstein 1953), which is caused by *Le. infantum chagasi*, but the principal vector, *Lu. longipalpis*, has never been recorded in Suriname.

Flu (1911), the first person to report the presence of cutaneous leishmaniasis in Suriname, mentioned that the disease was contracted mainly in the rainy seasons. Epidemiological evidence to support this generalization was not obtained until the recent studies of Sabajo (1986) and Burgos (unpublished data). Sabajo reported an average annual incidence for the whole country of 0.66 per 1000 inhabitants for the years 1979 to 1984. The highest infection rate was in the age range 20-29 years, and the ratio of male to female patients was 5:1. The highest monthly incidence was in May, during the long rainy season. Burgos analysed the records from hospitals and clinics of the Medical Mission (Stichting Medische Zending Suriname) in the rainforest area for 1979-1985, and found an incidence of 4.9 per 1000 inhabitants, based on the 1984 population of 33,963, more than twice as high as previously estimated (Hudson & Young 1985). The highest seasonal incidence was in the sixth reporting period (24 May - 20 June), during the long rainy season, and a positive correlation was found between rainfall and leishmaniasis incidence.

Most of the observed cases of leishmaniasis in Suriname have been the simple cutaneous type. In 1986, parasites from wound tissue of maroon patients were identified by the Liverpool group as *Le. (Viannia) guyanensis*, using the DNA buoyant density method (Dr WJ Terpstra, *in litt.*). Cases have also been seen in Paramaribo with satellite lesions and mucocutaneous involvement, which suggest that other species of leishmaniae occur in Suriname.

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