

REDESCRIPTIONS OF SOME PHLEBOTOMUS SAND FLIES OF THE PHILIPPINES (Diptera: Psychodidae)¹

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Abstract: Redescriptions and illustrations are provided for *Phlebotomus philippinensis* Manalang, *hitchensi* M., *manganus* M., *nicnic* Banks and *heiseri* M. Specimens of *P. bigtii* M., *torrechantei* M., and *dayapensis* M. were not seen. A key to species is presented.

Introduction: Prior to projected taxonomic studies of Philippine sand flies individually by the authors, a study has been made of the described species. There are 8 species of *Phlebotomus* now known in the Philippines, one described by Banks (1919) and the others by Manalang (1930, 1931). Insofar as possible, these species are redescribed to define more clearly the features distinctive of each.

Banks and Manalang deposited most of their types in the entomological collection at the College of Agriculture, Los Baños, Laguna. During the war, the entomology building was burned and the collections destroyed. Like many other valuable and irreplaceable types, those of *Phlebotomus* have been lost. Fortunately, some were not at Los Baños and have survived. One ♀ paratype of *nicnic* was given to Sinton by Banks and is now at the British Museum (Natural History). Manalang retained some types in his private collection and these were made available to us. Lectotypes have been selected from this material and belong to the Philippine National Museum, but will be on indefinite loan to Bishop Museum until recalled.

In addition to the type material, this study has utilized specimens of *Phlebotomus* taken by us in Luzon. The junior author has collected sand flies at various times near the Tala Field Station, which is within a few kilometers of the former field laboratory at Tungkong Manga where Dr. Manalang collected many of his original specimens, and at Los Baños where *P. nicnic* was first taken. The senior author collected for short periods at the type localities in Rizal, Bulacan and Laguna Provinces in 1961 and 1962 and at Los Baños in 1959.

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directed us to the type localities of Philippine sand flies and obtained the important type material from Dr. Manalang. Miss Mercedes Delfinado and Dr. Clare Baltazar accompanied the Quates on collecting trips near Manila and were instrumental to our success in finding sand flies. Mr. José Santos, Malaria Division, also accompanied us much of the time and proved to be an able *Phlebotomus* collector. The senior author is grateful for the courtesies extended and help given by Dr. C. B. Cendaña, College of Agriculture, Los Baños, during the 1959 visit to Los Baños. Dr. Paul Freeman kindly examined the paratype of *P. nicnic* for us and supplied requested information.

Systematics: Of the 8 known species of Philippine *Phlebotomus*, we have examined material of 5 and types of all but one of those. The ensuing descriptions and illustrations are based on the types or topotypic specimens. A key to the 8 species has been constructed although it will soon be obsolete with the descriptions of additional species now on hand and suffers the disadvantage of having been partly constructed from literature only. Nonetheless, a key is a useful summary of characters and will be of value until future revisions are prepared.

The terminology of the wing veins is as used by Quate (1962, Pacific Ins. 4: 252). The palpal ratio is the relative lengths of segments 1 and 2 combined, 3, 4 and 5; the leg ratio is the relative lengths of the femur, tibia and basitarsus. Both the palpal and leg ratios are averages and some deviation from this can be expected in individual specimens. In cases where we have 20 or more specimens, the mean (M) and standard deviation (SD)⁴ are calculated and the number of specimens (N) indicated, in addition to the observed ranges of the lengths of antennal segment 3 and wing. Scale lines in the illustrations of the head and ♂ genitalia represent 0.1 mm, of the wings 0.5 mm, and of all others 0.05 mm.

KEY TO KNOWN SPECIES OF PHILIPPINE PHLEBOTOMUS

1. Palpal segment 4 nearly as long as or longer than 3, palpal formula 1-2-3-4-5 or 1-2-4-3-5; abdominal hairs recumbent (sockets smaller on tergites 2-6 than on 1); cibarium usually armed; ♀ spermatheca not strongly annulate; ♂ dististyle with 4 spines, all apical or subapical..... 2
- Palpal segment 4 short, about 1/2 length of 3, palpal formula 1-4-2-3-5; abdominal hairs erect (sockets as large on tergites 2-6 as on 1); cibarium weakly armed with scattered teeth; ♀ spermatheca strongly annulate; ♂ dististyle with 5 spines, 2 apical and 3 preapical..... **philippinensis**
- 2 (1). Females..... 3
- Males..... 9
- 3 (2). Pharynx unarmed, except minute denticles apically..... 4
- Pharynx with apical cluster of spines..... 5
- 4 (3). Cibarium slender, widest at arch, with 12-15 horizontal teeth and no vertical ones or pigment patch; palpal segments 3 and 4 subequal; delta about 2/3 length of R₂, R₂ about 2 × R₂₊₃; wing length 2.7-2.9 mm..... **hitchensi**
- Cibarium broad, widest at level of teeth, with more than 20 horizontal teeth and strong, mushroom-shaped pigment patch; palpal segment 4 considerably

4. $M \pm 1$ SD includes 68.27 % of the population; $M \pm 2$ SD includes 95.45 % of the population.

- longer than 3; delta about 1/2 length of R_2 , R_2 and R_{2+3} subequal; wing length 1.6 mm..... **dayapensis**
- 5 (3). Palpal segments 3 and 4 subequal 6
 Palpal segment 4 considerably longer than 3; cibarium with 65-70 fine, comb-like teeth in a straight row and strongly pigmented, top-shaped pigment patch; wing length 2.2-2.4 mm **manganus**
- 6 (5). Antennal segment 3 extends nearly to tip of proboscis or beyond..... 7
 Antennal segment 3 very short, extends only to center of proboscis; pigment patch approximately rectangular, extends to and overlaps arch, cibarial teeth small and conical **nicnic**
- 7 (6). Cibarium with less than 20 teeth..... 8
 Cibarium with numerous (perhaps 40 or more) fine, comb-like teeth and a strong, funnel-shaped pigment patch; wing with delta about 2x length of R_{2+3} , length 1.7 mm **torrechantei**
- 8 (7). Wing with R_{2+3} and delta subequal, length 1.7-1.9 mm; cibarium with pigment patch triangular with elongate apex reaching nearly to arch, arch strong.. **heiseri**
 Wing with R_{2+3} about 3/5 of delta, length 1.9-2.0 mm; cibarium with pigment patch top-shaped with short apex ending well before arch, arch apparently weak **bigtii**
- 9 (2). (Males) Palpal segments 3 and 4 subequal..... 10
 Palpal segment 4 from 1 1/2 to 2x length of 3; wing with R_{2+3} short, about 1/2 of R_2 ; cibarium with definite row of about 25 strong teeth; wing length 1.9-2.3 mm..... **manganus**
- 10 (9). Antennal segment 3 extending to or beyond tip of proboscis..... 11
 Antennal segment 3 short, ending well before tip of proboscis; cibarium with teeth in 2 irregular rows, pigment patch approximately rectangular, elongate; wing length 1.4-1.5 mm **nicnic**
- 11 (10). Cibarium with horizontal teeth only and no vertical ones..... 12
 Cibarium with 8 horizontal teeth and a double row of about 8 vertical ones, pigment patch triangular and faint or absent; dististyle with ventral seta at center; wing length 1.6-1.9 mm..... **heiseri**
- 12 (11). R_{2+3} not more than 1/2 of R_2 13
 R_{2+3} at least 3/4 of R_2 14
- 13 (12). Cibarium with top-shaped pigment patch, weak or obsolescent arch, and many fine teeth; pharynx armed apically; wing length 1.6 mm **torrechantei**
 Cibarium slender, without pigment patch and with strong arch, with about 10 strong teeth; pharynx unarmed; ventral seta of dististyle at basal 1/3; wing length 2.3-2.5 mm..... **hitchensi**
- 14 (12). Cibarium with triangular pigment patch and about 6 conical teeth; pharynx armed apically; ventral seta of dististyle at center; wing length 1.7 mm... **bigtii**
 Cibarium without pigment patch and with about 8 linear teeth; pharynx unarmed; wing length 1.4-1.5 mm..... **dayapensis**

Phlebotomus (Phlebotomus) philippinensis Manalang Fig. 1.

Phlebotomus philippinensis Manalang, 1930, Philip. Jour. Sci. 41: 175.

Phlebotomus (Euphlebotomus) philippinensis: Theodor, 1948, Bull. Ent. Res. 39: 108.

Moderate sized species with erect hairs on all abdominal tergites. Color light brown, pleuron little lighter than mesonotum and coxae. Palpal formula=1-4-2-3-5, ratio of segments = 10 : 10 : 5 : 12. Ratio of fore leg=45 : 60 : 40, mid leg=50 : 70 : 45, hind leg=50 : 80 : 50.

Male: Cibarium (fig. 1f) with few, weak teeth, widest at arch; arch usually weak, but may be moderately strong; pharynx very slender, spines weakly developed. Palpus short, spatulate Newstead's scales at about center of segment 3. Antenna with pair of simple ascoids on segments 3-13, apparently single on 14, 15; segment 3 extends beyond proboscis by about 1/4 its length, little longer than combined lengths of 4 and 5. Wing (fig. 1j), delta very short, R_2 about 1/3 longer than R_{2+3} . Genitalia (fig. 1i) with 5 spines on dististyle, 2 of which apical, 2 at distal 1/3 on dorsal tubercle and 1 at basal 1/3; basi-

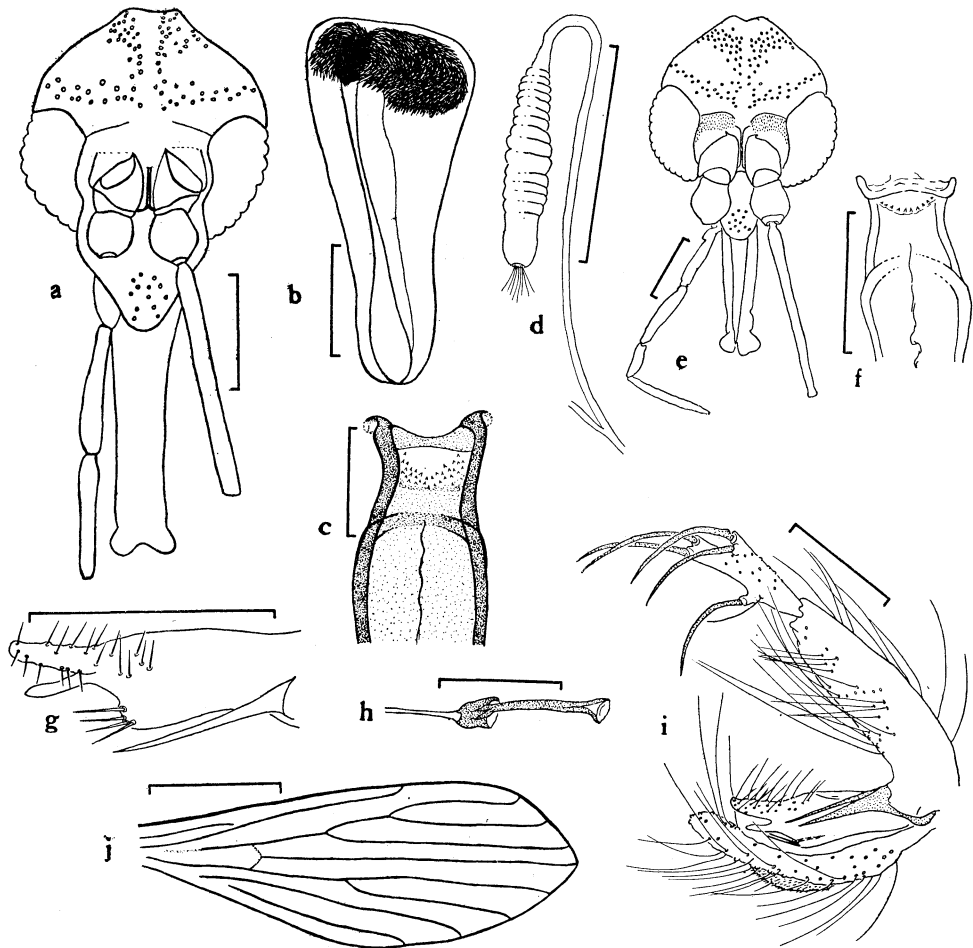


Fig. 1. *Phlebotomus philippinensis*: a, ♀ head; b, ♀ pharynx; c, ♀ cibarium; d, ♀ spermatheca and duct; e, ♂ head; f, ♂ cibarium; g, ♂ paramere and aedeagal spine; h, ♂ genital pump; i, ♂ genitalia, inner aspect, side view; j, ♂ wing.

style with group of non-deciduous hairs on inner face; paramere (fig. 1g) trilobed, dorsal lobe rather stout, median slender and finger-like, ventral lobe folded inwards and bearing row of 4 stiff setae along median margin; aedeagus with slender spine on each side; genital filaments about $3\times$ length of pump. Antennal segment 3: 0.26–0.37 mm ($M=0.32$, $SD=0.03$, $N=21$). Wing length 1.6–2.2 mm ($M=2.1$, $SD=0.1$, $N=21$).

Female: As ♂ except: Cibarium (fig. 1c) with stronger teeth, pharynx armed with dense cluster of spines at apex; arch moderately strong. Antenna with pair of ascoids on segments 3–15; segment 3 short, extends to distal 1/4 of proboscis, equal to combined lengths of 4 and 5. Spermatheca (fig. 1d) long and slender, strongly annulate basally with apical 1/4 smooth, ducts very long and slender. Antennal segment 3: 0.26–0.34 mm. Wing length 2.1–2.4 mm.

Type data: 2♂♂, 2♀♀, Novaliches (nr. La Mesa Dam, 18 km NE of Manila, Rizal Prov.), Luzon, V. 1929, Manalang; destroyed.

SPECIMENS EXAMINED. Luzon: Cavite Prov., Silang, 36 km S. of Manila, 7. II. 1962, from hole in santol tree (*Sandoricum koetjape*), M. Delfinado, 14♂♂, 1♀; Cavite Prov., Imus, 20 km S. of Manila, 7. II. 1962, from hole in *Averrhoa* tree, S. Quate, 5♂♂, 2♀♀; Rizal Prov., La Mesa Dam, 26. IX. 1961, tree hole, L. Quate, 1♀.

Although the types of this species are lost, it is easily identified by the features which place it in the subgenus *Phlebotomus* and the distinctive ♂ genitalia and ♀ spermathecae.

P. philippinensis is a close relative of *P. argentipes*, which is not known from the Philippines but is in continental SE Asia (and Borneo⁵). The ♂ genitalia of the 2 species differ rather conspicuously in that *philippinensis* has a shorter dististyle and the paramere is broader, has the upper lobe shorter, the lower lobe less attenuate and bearing a row of 4 setae rather than a clump of 2 or 3. Sympatric ♀♀ of the 2 species would be quite difficult to separate, but *philippinensis* is smaller, has the cibarial teeth less developed, the chitinous arch stronger and antennal segment 3 a little longer.

Phlebotomus (Phlebotomus) hitchensi Manalang Fig. 2a–d.

Phlebotomus hitchensi Manalang, 1930, Philip. Jour. Sci. 42: 291.

Sergentomyia (Sergentomyia) hitchensi: Theodor, 1948, Bull. Ent. Res. 39: 112.

Large species with recumbent hairs on tergites 2–6. Thorax and abdomen brown, coxae and basal 1/2 or 3/4 of femora pale, rest of legs brown. Ratio of palpal segments = 10 : 10 : 10 : 19. Ratio of fore leg = 74 : 100 : 56, mid leg = 67 : 112 : 60, hind leg = 70 : 134 : 70.

Female: Cibarium (fig. 2c) slender, broadest at arch, with 12–15 triangular, separated, horizontal teeth and no vertical ones, no pigment patch, interspace between arch and teeth strongly pigmented, walls very dark; arch strong; pharynx unarmed. Palpus with thick cluster of Newstead's scales on basal 1/2. Antenna with pair of simple ascoids on segments 3–13; segment 3 is 1/2–1/3 longer than combined lengths 4 and 5. Wing (fig. 2a), delta about 2/3 of R_2 , R_3 about $2\times R_{2+3}$. Spermatheca (according to Manalang) cy-

5. The Borneo record is based on a single ♀ (Quate & Fairchild, 1961: 211) and in view of the similarity of ♀♀ of *argentipes* and *philippinensis*, confirmation of that record must await additional material.

lindrical (or ovoid?), double-walled, about 0.06 mm long. Antennal segment 3: 0.43–0.48 mm. Wing length 2.7–2.9 mm.

Male: As ♀ except: Cibarium (fig. 2d) more slender, with 10–12 horizontal teeth. Genitalia (fig. 2b), dististyle with 2 apical and 2 subapical spines, seta at basal 1/3; basistyle with cluster of non-deciduous hairs. Antennal segment 3: 0.48–0.62 mm. Wing length 2.3–2.5 mm.

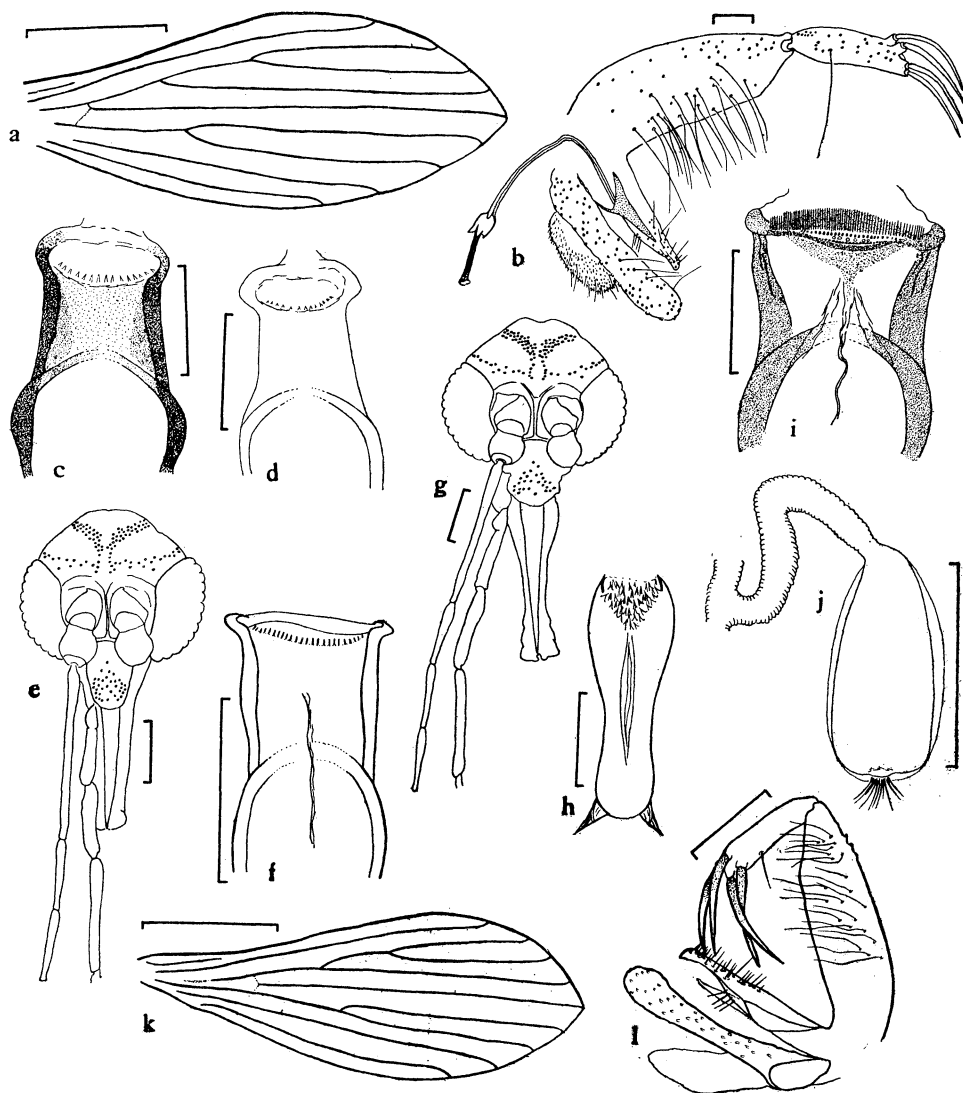


Fig. 2 a-d. *Phlebotomus hitchensi*: a, ♀ wing; b, ♂ genitalia, inner aspect, side view; c, ♀ cibarium; d, ♂ cibarium. e-l. *Phlebotomus manganus*: e, ♂ head; f, ♂ cibarium; g, ♀ head; h, ♀ pharynx; i, ♀ cibarium; j, ♀ spermatheca; k, ♀ wing; l, ♂ genitalia, inner aspect, side view.

Type data: (? 9 ♀♀, 4 ♂♂) Tungkong Manga (about 25 km NE of Manila), Bulacan Prov., Luzon, 22, 23.X. 1929, Manalang; 5 ♀♀, 3 ♂♂ in Manalang Coll'n. Lectotype ♀ selected; Philippine Nat'l Museum, on indefinite loan to Bishop Museum.

The slender, heavily pigmented cibarium, structure of the teeth and lack of a pigment patch is distinctive of this species.

Phlebotomus (Sergentomyia) dayapensis Manalang

Phlebotomus dayapensis Manalang, 1931, Philip. Jour. Sci. 45: 358.

Sergentomyia (Sergentomyia) dayapensis: Theodor, 1948, Bull. Ent. Res. 39: 110.

Type data: ♀, Dayap barrio, Laguna Prov., Luzon; destroyed.

We have seen no specimens of this species. The elongate palpal segment 4 and finely toothed cibarium with a large, mushroom-shaped pigment patch appear to be the distinctive features of *dayapensis* ♀. We question the association of sexes by Manalang in this instance. The 4th palpal segment of the ♀ is about 1/4 longer than the 3rd, but in the ♂ the 2 segments are equal or the 4th is a little smaller. Also, the cibarium of the presumed ♂ appears too narrow compared to the ♀. Further, the ♂♂ probably came from a different locality than the ♀, but apparently an error in the text makes this obscure. In the only reference to the origin and locality of specimens, Manalang states (1931: 355) he received a ♀ (of *dayapensis*) from Dayap and "Collections from Sipocot and Ragay, Camarines Sur, also showed a few *females* with the same shape of pigmented areas, but with wing veins and teeth somewhat similar to those of the *female*." (Italics ours.) If "females" were to read "males", the statement would be more lucid and it would explain the source of the ♂♂ which is otherwise unmentioned. The cotypes then would be a single ♀ from Dayap and several ♂♂ from Camarines Sur. We have not cited the ♂♂ in the type data because of the questionable association and regard the ♀ as the primary type.

Phlebotomus (Sergentomyia) manganus Manalang Fig. 2e-1.

Phlebotomus manganus Manalang, 1930, Philip. Jour. Sci. 42: 283.

Sergentomyia (Sergentomyia) manganus: Theodor, 1948, Bull. Ent. Res. 39: 111.

Moderate sized species with recumbent hairs on tergites 2-6. Scutum and lower parts of pleuron brown, remainder of pleuron and legs pale. Ratio of palpal segments=10:9:14:24. Ratio of fore leg=53:50:26, mid leg=53:63:30, hind leg=55:75:36.

Female: Cibarium (fig. 2i) broad, with 65-70 fine, comb-like, horizontal and 2 rows of 20-25 vertical teeth and 6-8 larger teeth between rows, pigment patch very dark, top-shaped; arch strong at margin but weak or obsolescent in center; apex of pharynx with small but easily discerned spines. Palpus extending to antennal segment 10, thick cluster of Newstead's scales on basal 1/3. Antenna with pair of simple ascoids on segments 3-15; segment 3 not quite reaching tip of proboscis, longer than combined length of 4 and 5. Wing (fig. 2k), delta long, longer than R_{2+3} and about 3/4 length of R_2 , R_{2+3} about 1/2 length of R_2 . Spermatheca (fig. 2j) elongate-oval, double-walled, without annulations, ducts short. Antennal segment 3: 0.28-0.32 mm (M=0.31, SD=0.01, N=15). Wing length 2.2-2.4 mm (M=2.3, SD=0.06, N=18).

Male: As ♀ except: Cibarium (fig. 2f) with about 25 teeth; pigment patch top-shaped and faint or absent; pharynx with very weak spines. Antenna with segment 3 ex-

tending little beyond tip of proboscis. Genitalia (fig. 21), dististyle with 2 apical and 2 subapical spines, seta little proximal of all spines, basistyle with few non-deciduous hairs on inner face; genital filaments about $3\times$ length of pump. Antennal segment 3: 0.28–0.37 mm ($M=0.33$, $SD=0.02$, $N=50$). Wing length 1.9–2.3 mm ($M=2.1$, $SD=0.06$, $N=50$).

Type data: (? 3♀♀, 3♂♂), Tungkong Manga (about 25 km NE of Manila), Bulacan Prov., Luzon, 28.VIII.1929, Manalang. Lectotype selected from 1 of 2 remaining ♀♀; Philippine Nat'l Museum, on indefinite loan to Bishop Museum.

Other specimens. Luzon: Bulacan Prov., San Jose del Monte, 25 km N. of Manila, 25.IX.1961, on dead tree trunk, M. Delfinado, J. Santos, ♀; Bulacan Prov., Bigti, Compre, 25.IX.1961, from hole in santol tree (*Sandoricum koetjape*), mango, and cashew (*Anacardium occidentale*), J. Santos, S. Quate, 6♀♀, 10♂♂; Bulacan Prov., Tungkong Manga, 23.IX.1961, from hole in santol tree and *Bauhinia*, L. & S. Quate, ♀, 17♂♂; Bulacan Prov., near Tala, about 20 km N. of Manila, 6.II.1962, from hole in mango tree, M. Delfinado, S. Quate, 5♀♀, 5♂♂; Rizal Prov., La Mesa Dam area, 25.IX.1961, tree hole, J. Santos, L. Quate, 3♀♀, 17♂♂; Rizal Prov., San Mateo, 8.II.1962, hollow *Acacia* tree, M. Delfinado, L. Quate, 1♀; Cavite Prov., Silang, 7.II.1962, M. Delfinado, S. Quate, 3♀♀, 25♂♂; Laguna Prov., Los Baños, 27.IX.1961, M. Delfinado, 7♂♂.

This species is readily recognized by the long palpal segment 4 and finely toothed, heavily pigmented ♀ cibarium. The ♂ cibarium and genitalia are not distinctive. Specimens of *manganus* were the most abundant of any of the species collected in Luzon. Its feeding habits are entirely unknown.

Phlebotomus (Sergentomyia) nicnic Banks Fig. 3a–i.

Phlebotomus nicnic Banks, 1919, Philip. Jour. Sci. **14**: 163, 175.—Sinton, 1928, Ind. Jour. Med. Res. **16**: 317; 1930, *ibid.* **18**: 165.—Manalang, 1930, Philip. Jour. Sci. **41**: 169. *Sergentomyia (Sergentomyia) nicnic*: Theodor, 1948, Bull. Ent. Res. **39**: 113.

Small species with recumbent hairs on tergites 2–6. Scutum and abdomen brown, pleuron and coxae pale. Ratio of palpal segments=9 : 10 : 11 : 23. Ratio of fore leg=46 : 38 : 20, mid leg=50 : 50 : 25, hind leg=53 : 67 : 33.

Female: Cibarium (fig. 3b) slender and short, with 20–30 small, conical, horizontal teeth in an irregular double row and no vertical teeth, pigment patch rectangular but constricted in center, extending from teeth to below arch, interspace between arch and teeth pigmented; arch strong; pharynx (fig. 3a), armed apically with few faint spines. Palpus extends to antennal segment 12, with cluster of Newstead's scales at basal 1/3 of segment 3. Antenna with pair of simple ascoids on segments 3–13; segment 3 very short, ending before center of proboscis, equal to combined lengths of 4 and 5. Wing (fig. 3e), R_{2+3} little longer or shorter than R_2 , delta about 1/2 length of R_2 . Spermatheca (fig. 3f) obovate, smooth and double-walled, setose knob small and sunken, duct shorter than spermatheca, finely rugulose. Antennal segment 3: 0.16 mm. Wing length 2.1–2.2 mm.

Male: As ♀ except: Cibarium (fig. 3d) longer, teeth smaller, pigment patch more slender and does not reach arch; antennal segment 3 extending to distal 1/4 of proboscis. Wing more slender, delta about 1/4 of R_2 . Genitalia (fig. 3h), dististyle short, with 3 apical and 1 subapical spine, seta near center little before subapical spines; basistyle with dense cluster of long, non-deciduous hairs on inner face; paramere unusually enlarged api-

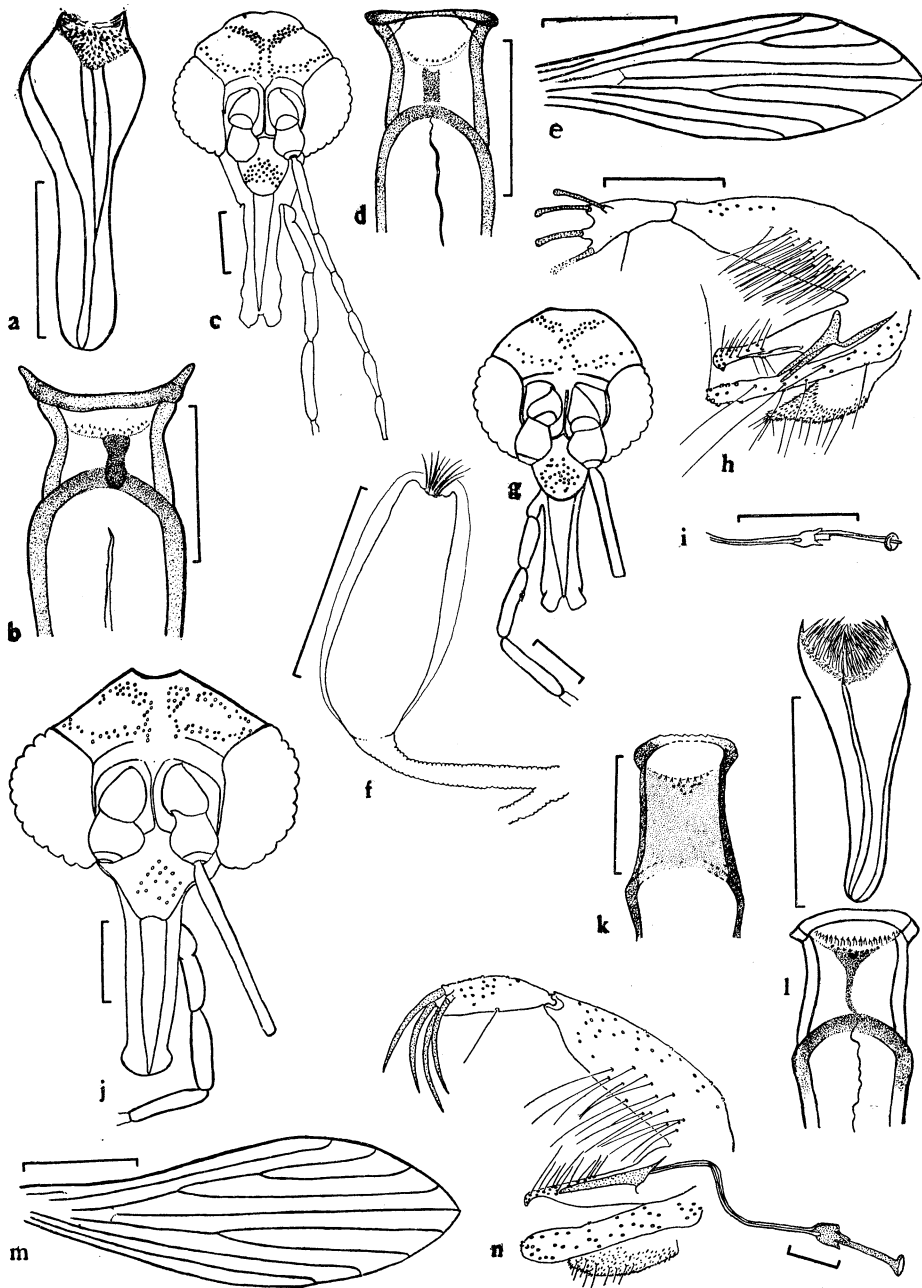


Fig. 3 a-i. *Phlebotomus nicnic*: a, ♀ pharynx; b, ♀ cibarium; c, ♀ head; d, ♂ cibarium; e, ♀ wing; f, ♀ spermathecae and duct; g, ♂ head; h, ♂ genitalia, inner aspect, side view; i, ♂ genitalia pump. j-m. *Phlebotomus heiseri*: j, ♀ head; k, ♂ cibarium; l, ♀ pharynx and cibarium; m, ♀ wing; n, ♂ genitalia, inner aspect, side view.

cally. Antennal segment 3: 0.20–0.21 mm. Wing length 1.4–1.5 mm.

Type data: Holotype ♂, allotype ♀, Los Baños, Laguna Prov., Luzon; destroyed; ♀ paratype in British Museum (Nat. Hist.).

SPECIMENS EXAMINED. Luzon: Laguna Prov., Los Baños, 19. IX. 1959, on tree trunk, L. Quate and 27. IX. 1961, hole in mango tree, J. Santos, 1 ♀, 1 ♂; Laguna Prov., Bay, 27. IX. 1961, tree hole and trunk, M. Delfinado & S. Quate, 2 ♀ ♀; Bulacan San Prov., Jose del Monte, 25 km N. of Manila, 25. IX. 1961, dead tree trunk, M. Delfinado, 1 ♀.

The short antennal segment 3, rectangular pigment patch, irregular teeth and short, pigmented cibarium will separate *nicnic* from the other Philippine *Phlebotomus*. Our specimens agree well with previous redescriptions of *nicnic* with two exceptions. The single ♂ is smaller than that studied by Manalang (1930), but not enough, we believe, to be significant. (The lower ranges of measurements above are from our specimen and the upper limit is from Manalang.) The pigment patch shape of neither our ♀ specimens nor Manalang's agree with that described by Sinton (1930) and we believe the circular shape shown by him is erroneous. Re-examination of the paratype by Dr. Freeman (in litt.) confirms this error.

P. nicnic is described as a serious man-biter by Banks (1919: 175), but in view of the difficulty in identifying sand flies and the inadequate knowledge of Philippine species at that time, his observations need to be corroborated.

***Phlebotomus (Sergentomyia) heiseri* Manalang** Fig. 3j–m.

Phlebotomus heiseri Manalang, 1930, Philip. Jour. Sci. 42: 299.

Sergentomyia (Sergentomyia) heiseri: Theodor, 1948, Bull. Ent. Res. 39: 111.

Moderate sized species with recumbent hairs on tergites 2–6. Ratio of palpal segments=9:8:8:17. Ratio of fore leg=54:52:27, mid leg=53:65:32, hind leg=60:80:40.

Female: Cibarium (fig. 31) with 12–18 elongate diamond-shaped, horizontal teeth and 8–12 vertical teeth, pigment patch triangular with elongated apex and dark anteriomedian spot, interspace between arch and teeth pigmented; arch strong and only a little weakened in center; apex of pharynx with thick brush of large spines. Palpus extending to antennal segment 7, Newstead's scales not apparent. Antenna with pair of simple ascoids on segments 3–15; segment 3 extending nearly to tip of proboscis, little longer than combined lengths of 4 and 5. Wing (fig. 3m), delta about 2/3 length of R_2 and subequal to R_{2+3} . Spermatheca (not seen in phenol mount) ovoid, smooth, apparently single-walled, setose knob thumb-like, about 0.05 mm long. Antennal segment 3: 0.28–0.33 mm. Wing length 2.2–2.4 mm.

Male: As ♀ except: Cibarium (fig. 3k) with 8 prominent, horizontal and 8 vertical teeth in semicircular pattern, pigment patch faint or absent, interspace between teeth and arch pigmented, arch indistinct; pharynx apparently unarmed. Genitalia (fig. 3n), dististyle with 2 apical and 2 subapical spines, seta at center; inner face of basistyle with sparse, non-deciduous hairs. Antennal segment 3: 0.37–0.43 mm. Wing length 1.6–1.9 mm.

Type data: (♀ ♀, ♂ ♂), Bulacan and Rizal Prov., Luzon, X, XI. 1929; destroyed, except 4 ♀ ♀, 4 ♂ ♂ (no locality label) in Manalang Coll'n. Lectotype ♀ selected; Philippine Nat'l Museum, on indefinite loan to Bishop Museum.

Other specimens. Luzon: Laguna Prov., Los Baños, 20. IX. 1959, L. Quate, ♀.

The diamond-shaped cibarial teeth of the ♀ and ♂ are distinctive of *heiseri* and the double row of vertical teeth in the ♂ also seems unique. The central position of the ventral seta of the ♂ genitalia may be characteristic, but the position is not known in all other Luzon species.

Phlebotomus (Sergentomyia) bigtii Manalang

Phlebotomus bigtii Manalang, 1931, Philip. Jour. Sci. 45: 356.

Sergentomyia (Sergentomyia) bigtii: Theodor, 1948, Bull. Ent. Res. 39: 110.

Type data: 1 ♀, 3 ♂♂, Bigti (NE of Manila near Angat Dam), Bulacan Prov., Luzon, III, VI. 1930, Manalang; 2 ♀♀, 1 ♂, Malinao, Camarines Sur Prov., Luzon, V. 1930; destroyed.

No specimens of this species have been seen by us, but the cibarial structure and other characters described by Manalang should expedite its recognition.

Phlebotomus (Sergentomyia) torrechantei Manalang

Phlebotomus torrechantei Manalang, 1931, Philip. Jour. Sci. 45: 361.

Sergentomyia (Sergentomyia) torrechantei: Theodor, 1948, Bull. Ent. Res. 39: 111.

Type data: 2 ♀♀, 1 ♂, Sipocot, Apali and Malinao, Camarines Sur Prov., Luzon, IV. (and V. or VI. ?) 1930, Torrechante; destroyed.

No specimens of this species have been seen by us. It appears similar to *manganus*, but has a shorter palpal segment 4 and a differently shaped cibarial pigment patch. The numerous, fine cibarial teeth, armed pharynx and wing venation seem to be much the same in the 2 species.

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