

# NOTES ON THE PHLEBOTOMUS OF PANAMA, XIV (DIPTERA, PSYCHODIDAE) *P. VESPERTILIONIS* AND RELATED SPECIES<sup>1</sup>

G. B. FAIRCHILD AND MARSHALL HERTIG

Gorgas Memorial Laboratory, Panama, Republic of Panama

## ABSTRACT

A key is given to the males of the seven known Central American species of this group, and a partial key to the females; among the seven there are three pairs of species whose females are not distinguished from one another. New species are: *P. viriosus*, Panama and Costa Rica;

*P. steatopygus*, Chiapas; and *P. isovespertilionis* (= *P. vespertilionis*, part, F. & H. 1947), Panama. Notes on distribution and habitats are given for *P. deleoni* F. & H., *P. vesiciferus* F. & H., *P. beltrani* Vargas & Diaz Najera, and *P. vespertilionis* F. & H.

The species treated here appear to be a mainly Middle American group, only one species having so far been reported from south of Panama. Several of the species seem to be associated with bat roosts, in caves, ruins, or hollow trees, though several attempts to feed one of the species on bats in the laboratory have been unsuccessful.

Structurally the group is characterized chiefly by the inflated lateral lobes of the male genitalia, a condition which, though striking, may eventually prove of less phylogenetic importance than the structure of the spermathecae. The lateral lobes bear numerous and evenly distributed setae on both the inner and outer aspects, most of which are lost during the manipulations of preparing the specimen for mounting. Their sockets have been omitted from the accompanying drawings, as their distribution appears similar in all the species. In addition, the males of all species have a basal tuft of setae on the inner aspect of the coxite, simple parameres, relatively short and thick genital filaments with expanded or modified tips, and a style with one spine situated quite close to the base of the segment. The females all possess broad unarmed pharynges, cibaria with four large median teeth and usually clusters of small lateral inwardly directed spines and a well developed chitinous arch. The abdominal

setae are largely erect; there are no setae on the eighth segment, while the ninth tergite bears long ligulate setae. The cerci are rather short and triangular. The spermathecae are of two quite distinct types. Those of *vesiciferus* F. and H. and *deleoni* F. and H., figured by us in 1947, have a very large bladder-like lateral expansion and a slender terminal knob which appears to protrude through an aperture in the side of the spermatheca. Both the individual and common ducts are slender. The remaining species have ovoid wrinkled spermathecae, with what appear to be internal spine-like processes arising from thickenings in the cuticle, short terminal knobs, and short, usually thick, individual ducts arising from a broad common duct. The males of *vesiciferus* and *deleoni* differ from the remaining species in having the basal spine of the style well developed, and the paramere with a small triangular protuberance below. Both sexes of all the species have the same palpal formula, 1-4-2-3-5, with a long fifth segment, long third antennal segment, simple slender ascoids, simple first three sternites, without median fenestrae, and very similar wing venation.

We present below keys to both sexes. That to females is based entirely on the spermathecae and depends on the appearance of these structures in phenol before mounting, so that it is of limited utility in separating specimens having the spermathecae shrunken. We are unable to find other key characters of utility, and in fact cannot separate the females of *vesiciferus* from *deleoni*, *vespertilionis* from *isovespertilionis*, or *beltrani* from *steatopygus*. They have been associated

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with their respective males on the the basis of geographic distribution or, in the case of *vespertilionis* and *isovespertilionis*, by rearing.

## KEY TO MALES

1. Style with basal spine long, nearly as stout as the other spines. Parameres with a small triangular tooth below. . . . . 2  
Style always with 3 spines, the basal spine reduced to a slender bristle. Parameres without a triangular tooth below. . . . . 3
2. Style with 4 spines and a subterminal seta. Lateral lobes longer than coxites. . . . . *deleoni*  
Style with 3 spines and a subterminal seta. Lateral lobes about equalling coxites. . . . . *vesciferus*
3. Style with 2 apical spines but no subterminal seta, rarely with a rudimentary bristle-like median spine. Lateral lobes very broad, less than 4 times as long as greatest width. Genital filaments over 3 times length of pump. . . . . *viriosus*  
Style with 1 apical and 1 median spine and a subterminal seta. Lateral lobes over 4 times as long as broad. Genital filaments about twice length of pump. . . . . 4
4. Style markedly shorter than coxite, the median spine about its middle, both main spines strongly spatulate. Lateral lobes broad, about 5 times as long as greatest breadth and nearly as long as coxite and style together. . . . . *steatopygus*  
Median spine of style inserted well distal to middle of segment. Lateral lobes 6 or more times longer than broad. . . . . 5
5. Style nearly as long as coxite, the median spine inserted at two-thirds the distance from base to apex of segment. Setae of basal tuft inserted in straight rows. . . . . *beltrani*  
Style about two-thirds length of coxite, the median spine more apical, inserted at about four-fifths the distance from base to apex of segment. . . . . 6
6. Parameres slender, about five-sixths length of coxite, their dorsal setae confined to the apical third of structure. . . . . *isovespertilionis*  
Parameres stouter, about three-fourths length of coxite, their dorsal setae more numerous, covering apical half of structure. . . . . *vespertilionis*

## KEY TO FEMALES

1. Spermathecae with large bladder-like lateral expansion. . . . . *vesciferus, deleoni*  
Spermathecae ovoid, wrinkled or irregularly and weakly annulated. . . . . 2
2. Individual ducts slender, longer than spermathecae, equalling the slender common ducts. . . . . *viriosus*  
Individual ducts very short, wide, less than length of spermathecae. . . . . 3
3. Common duct narrower, at least three times as long as broad. . . . . *vespertilionis, isovespertilionis*  
Common duct broader, not more than twice as long as wide. . . . . *beltrani, steatopygus*

*Phlebotomus deleoni* Fairchild and Hertig

1947, Ann. Ent. Soc. America 40 (4): 622, Pl. 3, figs. 1-3 (♂, ♀; Peten, Guatemala). Barretto, 1950, Arq. Hig. Saude Pub., S. Paulo 15 (46): 215. Vargas and Diaz Najera, 1953, Rev. Inst. Salub. Enf. Trop., Mexico 13 (4): 311 (Palenque, Chiapas, Mexico). Barretto, 1955, Rev. Brasil. Ent. 3: 183 (as *Sergentomyia*). Fairchild, 1955, Ann. Ent. Soc. America 48 (3): 194.

In addition to the types, we have now seen 16♂, 7♀ from Palenque and Santa Maria, near Cintalapa, Chiapas, Mexico, and from Lancetilla, Tela, Honduras, taken at light, in bat caves, and in tree buttresses.

*Phlebotomus vesciferus* Fairchild and Hertig

Figure 20

1947, Ann. Ent. Soc. America 40 (4): 620-622, Pl. 2 (♂, ♀; Panama). Barretto, 1950, Arq. Hig. Saude Pub., S. Paulo 15 (46): 225. Rosabal, 1954, Invest. Epidemiol. No. 3, Min. Salub. Pub., San José, Costa Rica p. 28, Pl. 8 (Costa Rica). Barretto, 1955, Rev. Brasil. Ent. 3: 186 (as *Sergentomyia*). Fairchild, 1955, Ann. Ent. Soc. America 48 (3): 194.

This species has proved not uncommon in Panama, especially on the Atlantic side of the Isthmus. We have taken it from 26 localities in Panama, 3 in Costa Rica and 1 in Nicaragua, from daytime resting places and in light traps. It does not bite man. We include a figure of the head for comparison with a representative of the subgroup having more simple spermathecae.

*Phlebotomus viriosus*, new species

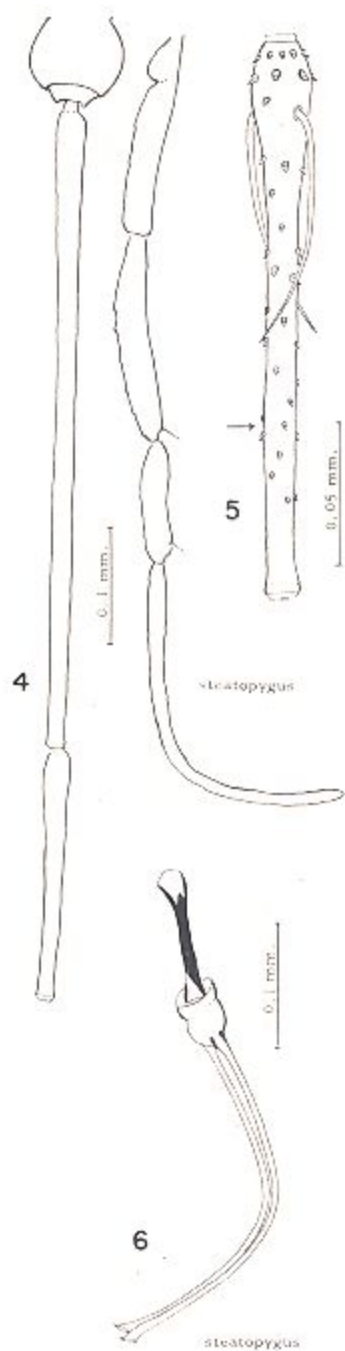
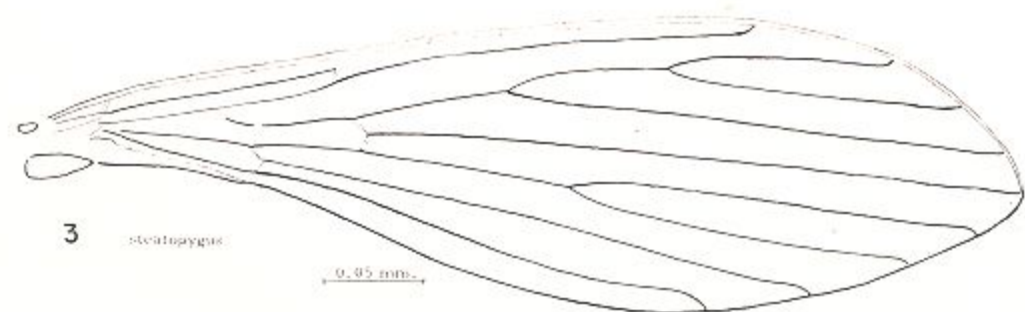
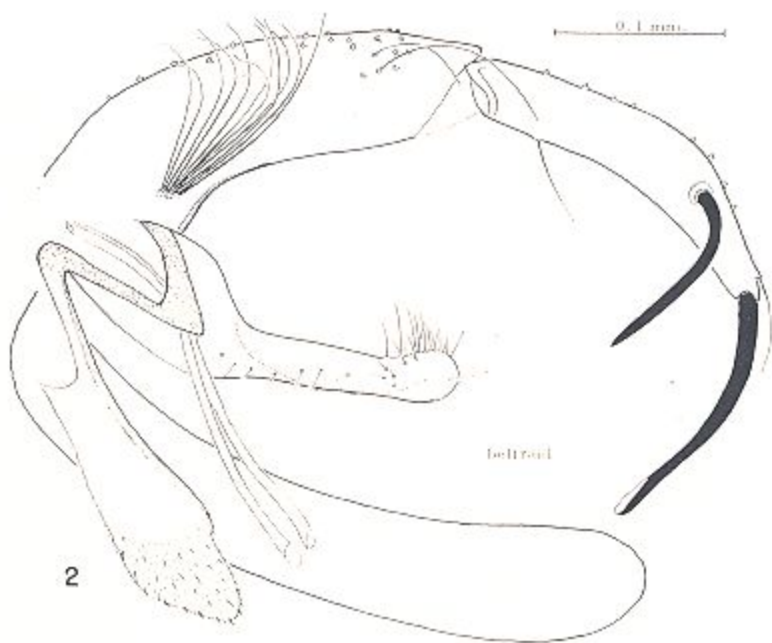
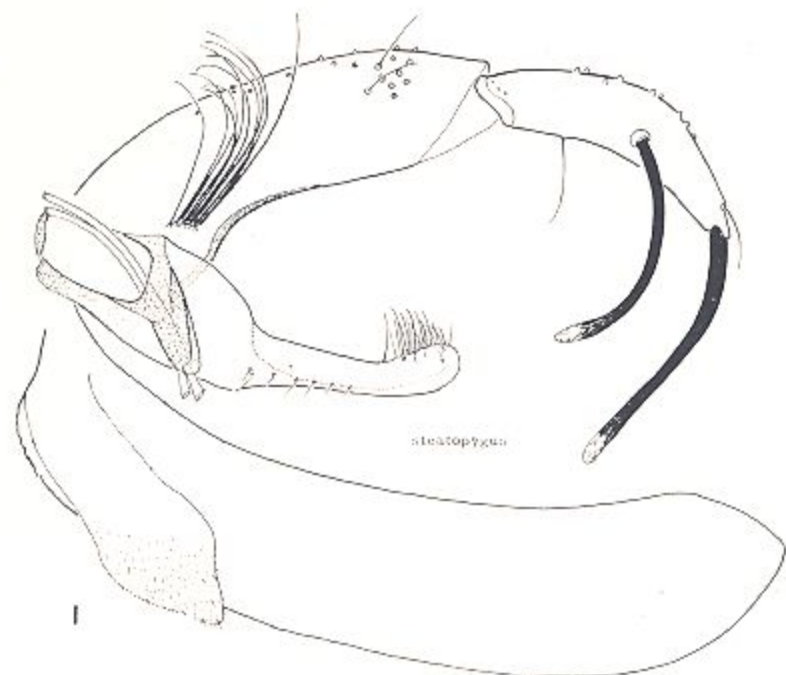
Figures 7, 9-12, 16-18

*Male*.—Length of wing 1.59 to 1.83 mm. Mesonotum, coxae, genitalia, and dorsum of abdomen moderately infuscated. Abdominal setae erect. Upper anepisternal setae 12 to 18, lower mesanepisternals 1 to 3, all slender. Eye a little less than three-fourths of head height. Proboscis less than head height. Pharynx slender, ridged at apex. Cibarium unarmed. Third antennal segment reaching well beyond end of proboscis, nearly to end of fourth palpal segment on intact head. Ascoids simple, slender, short, reaching about half the length of their respective segments, paired on all but the shortened terminal segment. Palpal formula 1-4-2-3-5, fifth segment less than second and third together, fourth greater than one-half third. Newstead's scales slender, on middle three-fourths of third segment. Genitalia as figured, differing from all others of this group in having two terminal spines on style and lacking a subterminal seta.

*Female*.—Length of wing 1.85 to 2.09 mm. Coloration as in male though slightly darker. Sides of eighth abdominal segment without setae. Ninth tergite with ligulate setae. Upper anepisternal setae 14 to 24, lower mesanepisternals 2 to 3. Eye as in male. Proboscis longer than in male but less than head height. Pharynx broad and well sclerotized, with fine ridges at apex. Cibarium with four horizontal teeth and strong chitinous arch. Third antennal segment reaching or slightly exceeding tip of proboscis, not

## EXPLANATION OF PLATE 1

FIG. 1.—*P. steatopygus*, male genitalia, paratype, slide 3110. FIG. 2.—*P. beltrani*, male genitalia, slide 3042, Sta. Maria, Chiapas. FIG. 3.—*P. steatopygus*, male wing, paratype, slide 2976. FIG. 4.—*P. steatopygus* male basal antennal segments and palpi, paratype, slide 3110. FIG. 5.—*P. steatopygus*, male antennal segment VII showing ascoids; the arrow indicates length of female ascoids; slide 2977, paratype. FIG. 6.—*P. steatopygus*, pump and genital filaments, paratype, slide 3110. Magnification is indicated by a scale line, the magnification for each structure being the same for all species.



reaching end of third palpal segment. Ascoids longer than in male, reaching about five-sixths length of segment. Palpi as in male, but Newstead's scales sparser. Spermathecae as figured, with relatively slender ducts.

Holotype male, slide 3927, Almirante, Bocas del Toro Prov., Panama, 24 March 1952, in rock crevices along stream near Yellow Fever Camp, A. Quiñonez coll. Allotype female, slide 4158, same locality and habitat as holotype, 18 Aug. 1952, W. Hils coll. Paratypes, 43♂, 13♀, mounted on slides, as follows: 42♂, 11♀, from same locality and habitat as holotype, May, Sept., Oct., Nov., 1951; Jan., Mar., May., June, July, Aug., Sept., Oct., Nov., 1952; Jan., 1953, Quiñonez, Hils, Trapido and Galindo colls.; 1♀, same locality, taken in tree buttress near camp 6 Jan. 1953, Hils coll.; 1♂, Pacuare, Costa Rica, 7 Feb. 1952, in rock crevices, M. Hertig coll.; 1♀, La Roca, Costa Rica, 29 April 1951 in tree buttress, R. Rosabal coll. In addition, we have examined and stored unmounted 161♂ from same locality and habitat as holotype with dates ranging from 15 Dec. 1951 to 7 April 1953; 1♂, same locality 17 Sept. 1952, taken in tree tops at night; 1♂, same locality, 20 Oct. 1952, taken in tree buttress near camp; 1♂, Lucas' Place, Water Valley, Almirante, 30 Jan. 1956, in tree buttress, Fairchild and Hertig colls.

The great preponderance of males and the fact that a single habitat in one locality furnished all but a very few specimens is noteworthy. This species differs most markedly from the remainder of the group in having two terminal spines on the style, and in lacking a median spine and subterminal seta. The presence in the figured specimen, though not in others, of a small seta at the point where a median spine would be expected, suggests the possibility that this spine has been rather recently lost and that the second terminal spine has replaced the subterminal seta of the other species.

#### *Phlebotomus steatopygus*, new species

Figures 1, 3-6, 15, 19, 21

*Male*.—Wing length 2.25 to 2.59 mm. Mesonotum slightly infuscated. Abdominal setae mostly erect. Upper anepisternal setae 10 to 14, lower mesanepisternals 3, all slender. Eye about two-thirds head height. Proboscis less than head height. Pharynx slender, cibarium unarmed. Third antennal segment much exceeding proboscis, reaching well beyond end of fourth palpal segment on intact head. Ascoids slender, simple, shorter than their respective segments, paired on all but the shortened terminal segment. Palpal formula 1-4-2-3-5, fifth segment slightly longer than second and third together, fourth about two-thirds of third. Newstead's scales long, slender, spatulate, on third segment only. Genitalia as figured, the specimens of this and *beltrani* selected for figuring have the basal tuft displaced

upward so that the numbers of setae are clearly seen. Normally the setae lie in a plane perpendicular to the observer and appear almost fused into a pencil.

*Female*.—Wing length 2.28 to 2.57 mm. Coloration as in male. Abdominal setae as in male, none on sides of eighth segment, those on dorsum of ninth tergite ligulate. Upper anepisternal setae 10 to 14, lower mesanepisternals 2 to 4, all slender. Eye as in male. Proboscis slightly longer than head height. Pharynx broad and well sclerotized, with fine ridges at apex. Cibarium with four slender horizontal teeth and strong chitinous arch. Third antennal segment exceeding proboscis, reaching to end of third palpal segment on intact head. Ascoids as in male though slightly longer, paired on all but the shortened terminal segment. Palpal formula 1-4-2-3-5, fifth segment about equalling second and third together, fourth over half third. Newstead's scales as in male but more numerous and on apex of second segment as well as most of third. Spermathecae apparently as in *beltrani*, though in none of our specimens is the common duct clearly visible.

Holotype male, slide 2977, Palenque, Chiapas, Mexico, 28 March 1951, in passage under ruined temple, Fairchild and Hartmann colls. Allotype female, slide 3080, same locality and collectors, 31 March 1951. Paratypes, 9♂, 8♀, same locality and habitat as holotype, 28 and 31 March 1951, all mounted on slides. In addition we have identified and stored unmounted 33♂, 1♀, from the same locality and habitat, collected 28, 29, 31 March 1951.

This species seems separable from *beltrani* Vargas and Diaz Najera on the basis of more inflated lateral lobes and shorter style with the median spine at the middle of the segment. Two males of *beltrani* were taken together with the types of *steatopygus*. Females accompanying both types of males seem indistinguishable.

#### *Phlebotomus beltrani* Vargas and Diaz Najera

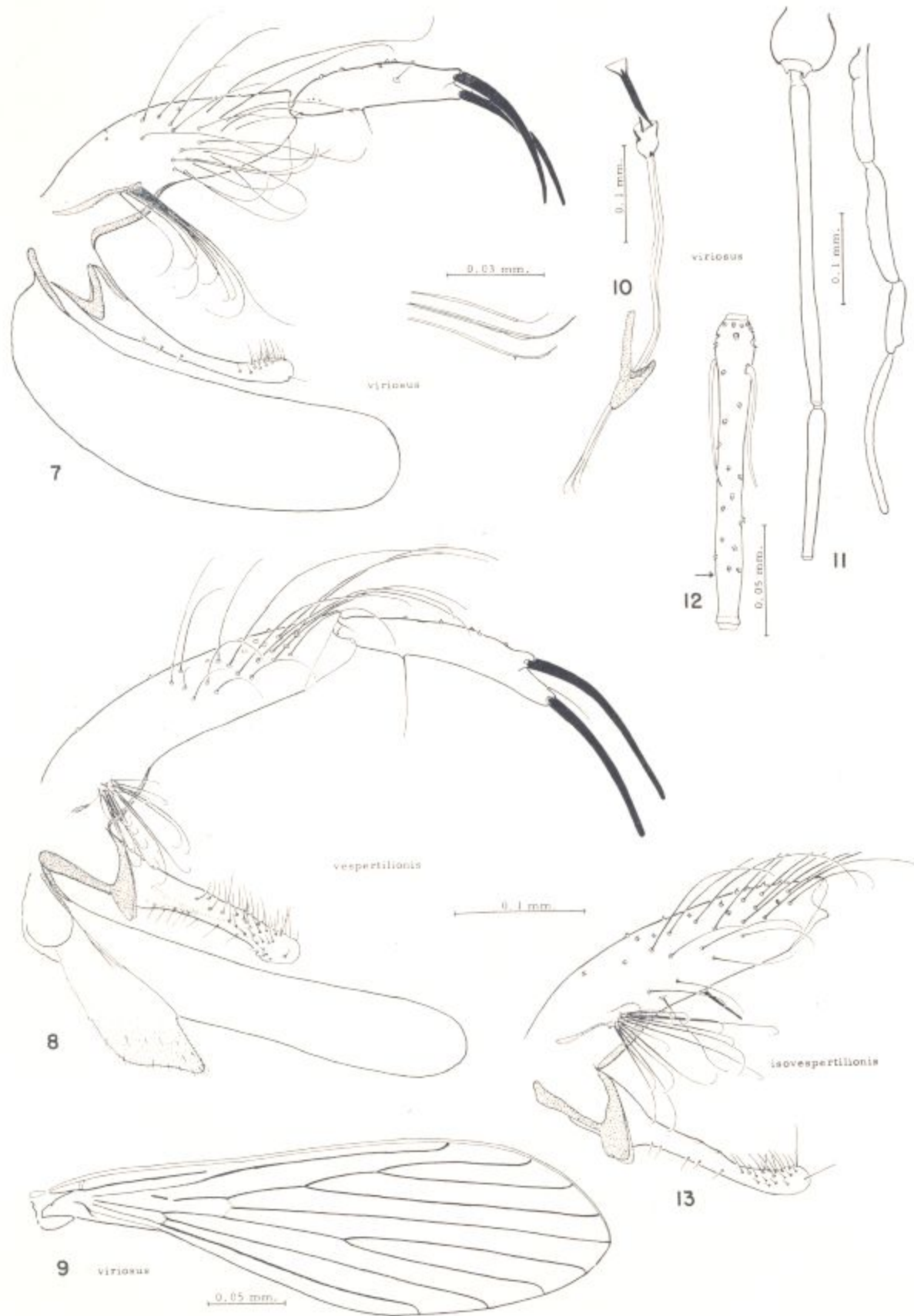
Figures 2, 14

1951, Rev. Inst. Salub. Euf. Trop. 12 (1-4): 101-103, 2 figs. (♂, San Andres Tuxtla, Vera Cruz, Mexico).

The original description and figures are rather brief and schematic, so that it may be useful to give a more extended description and figures of both sexes, based on more abundant material.

#### EXPLANATION OF PLATE II

FIG. 7.—*P. viriosus*, male genitalia, holotype, slide 3927, tips of genital filaments from slide 3629. FIG. 8.—*P. vesperitilionis*, male genitalia, slide 1556. FIG. 9.—*P. viriosus*, male wing, holotype, slide 3927. FIG. 10.—*P. viriosus*, pump and genital filaments, paratype, slide 3956. FIG. 11.—*P. viriosus*, male basal antennal segments and palpi, holotype. FIG. 12.—*P. viriosus*, male antennal segment VII showing ascoids; arrow indicates length of female ascoids, slide 3148. FIG. 13.—*P. isovesperitilionis*, male coxite and paramere, paratype, slide 1662.



*Male*.—Length of wing 2.15 to 2.59 mm. Mesonotum and genitalia rather faintly infuscated. Abdominal setae mostly erect, a few semirecumbent. Upper anepisternal setae 14 to 20, lower mesanepisternals 1 to 4. Eyes small, about two-thirds of head height. Proboscis less than head height. Antennae rather long, the first flagellar segment greatly exceeding the proboscis, reaching beyond the end of fourth palpal segment on intact head, well over twice the length of the second flagellar segment. Ascoids slender, simple, as figured for *steatopygus*, paired on all but the shortened terminal segment. Palpal formula 1-4-2-3-5, the fifth segment nearly equalling the second and third together, the fourth over half the third. Pharynx slender, cibarium unarmed. Genitalia as figured; pump and filaments as in *steatopygus*.

*Female*.—Length of wing 2.28 to 2.36 mm. Color a little darker than in male, but still a pale sandfly. Abdominal setae mostly erect. No setae on sides of eighth segment; ninth tergite with ligulate scales. Upper anepisternal setae 13 to 23, lower mesanepisternals 1 to 4. Eyes as in male. Proboscis longer than in male but still not exceeding head height. Antennae as in male, but first flagellar segment not reaching end of third palpal segment on intact head. Ascoids as in male, though slightly longer. Palpi as in male. Newstead's scales on tip of second and apical three-fourths of third palpal segment. Pharynx broad and well sclerotized, its apex with fine ridges. Cibarium with four horizontal teeth and a strong chitinous arch, not distinguishable from other species of this group. Spermathecae as figured.

Description based on the following slide mounted material: 10♂, 2♀, Sta. Maria, Cintalapa, Chiapas, Mexico, 17 Apr. 1951, in cave with bats, Fairchild and Hartmann colls.; 2♂, Palenque, Chiapas, Mexico, 28 Mar. 1951, in passage under ruined temple, Fairchild and Hartmann colls.; 1♂, 6♀, Lancetilla valley, Tela, Honduras, 16 Sept., 29, 30 Dec. 1953, 6 Jan., 24 Mar., 21 April 1954, in light trap, W. Hils. coll.

### *Phlebotomus vespertilionis* Fairchild and Hertig

Figure 8

1947, Ann. Ent. Soc. America 40 (4): 617-620, Pl. 1, figs. 1-7 (♂, ♀; Panama). Rosabal, 1954, Invest. Epidem. No. 3 Ministerio Salub. Pub., San José, Costa Rica, pp. 10, 28-29, figs. 55-58 (♀, Costa Rica). Rodriguez, 1946, Rev. Ecuatoriana Hig. Med. Trop. 13 (2): 80 (Ecuador).

The species we described under this name is in reality composite, consisting of two very closely similar species. Our failure to realize this resulted in our figuring one species in our description while selecting a specimen of the other species as holotype. Rearing of adults from eggs laid by isolated females has confirmed the distinctness of the two forms, but we are still unable to sepa-

rate female specimens with any degree of certainty. Rosabal (1954), who worked at our Laboratory in 1951 was informed of this situation at that time. The males he noticed as not agreeing with our figure, his species No. 12, agree with the holotype of *vespertonis*.

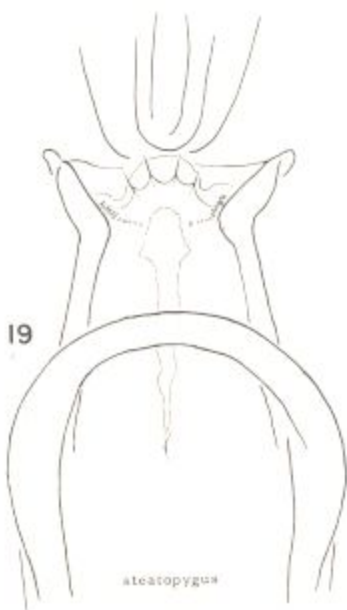
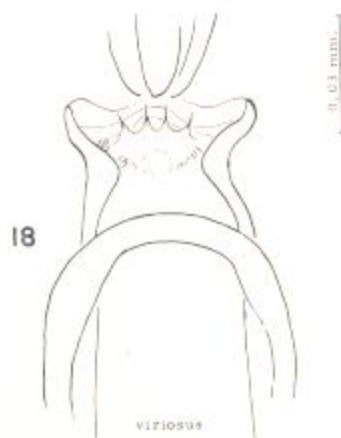
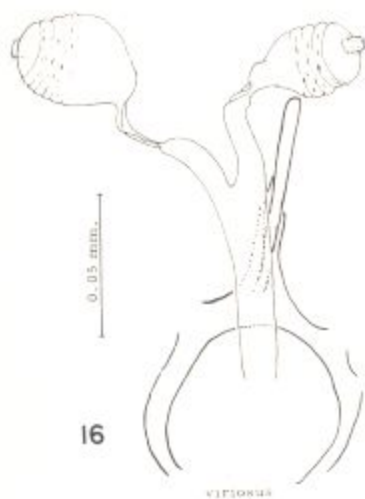
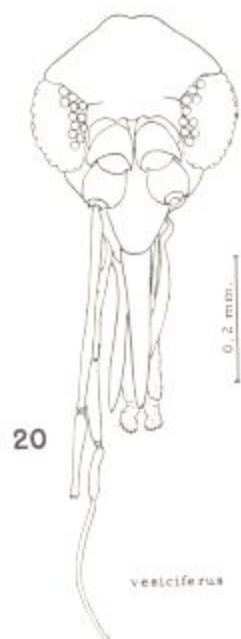
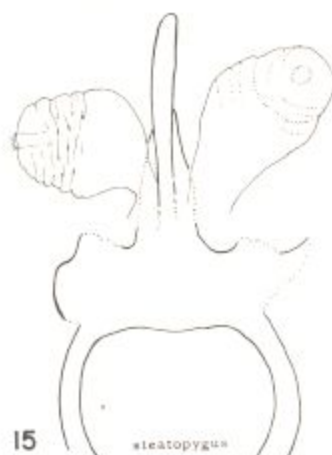
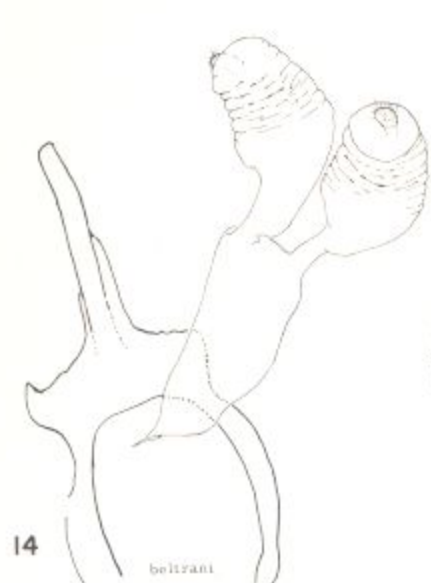
We give below a revised description of *vespertonis* based on bred material, a formal description of the species whose male genitalia we figured in error, and a discussion of the two species.

*Male*.—Wing length 1.60 to 1.80 mm. Mesonotum and pleura lightly infuscated. Abdominal setae mostly or all erect; a few spine-like setae on base of seventh sternite. Upper anepisternal setae 7 to 10, lower mesanepisternals 2 to 4. Eye about four-fifths head height. Proboscis about three-fourths head height. Pharynx slender, cibarium unarmed. Third antennal segment reaching well beyond tip of proboscis, to end of fourth palpal segment on intact head, and being about twice as long as antennal segment four. Ascoids slender, simple, much shorter than their respective segments, paired on all but the last segment. Palpal formula 1-4-2-3-5, the fifth segment equalling the first three, the fourth over one-half the third. Genitalia as figured, the paramere stouter, straighter and with more setae than the following species. The basal tuft in the specimen figured has the setae pointed towards the observer so that they are somewhat foreshortened and the hooked tips exaggerated.

*Female*.—Wing length 1.76 to 1.93 mm. Color as in male. Abdominal setae as in male, absent on eighth tergite, ligulate on ninth. Upper anepisternals 8 to 16, lower mesanepisternals 2 to 4. Eye as in male. Proboscis slightly less than head height. Pharynx broad, well sclerotized, finely ridged at apex. Cibarium with four teeth and a strong chitinized arch, as figured by us in 1947. Third antennal segment reaching about end of proboscis and to middle of third palpal segment on intact head, about twice length of fourth segment. Ascoids slender, simple, longer than in male, but failing to reach ends of their respective segments, paired on all but the last segment. Palpal formula 1-4-2-3-5. Fifth segment equalling second and third, fourth over one-half third. Newstead's scales long and slender, on end of second and middle half of third segment. Spermathecae as figured by us in 1947.

### EXPLANATION OF PLATE III

FIG. 14.—*P. beltrani*, spermathecae and genital fork slide 4506. FIG. 15.—*P. steatopygus*, spermathecae and genital fork, allotype, slide 3080. FIG. 16.—*P. viriosus*, spermathecae and genital fork, slide 4156. FIG. 17.—*P. viriosus*, spermathecae of slide 4156 drawn in phenol before mounting. FIG. 18.—*P. viriosus*, female cibarium, slide 4156. FIG. 19.—*P. steatopygus*, female cibarium, allotype. FIG. 20.—*P. vesiciferus*, female head, slide 3856. FIG. 21.—*P. steatopygus*, female head, slide 3079.



**Phlebotomus isovespertilionis**, new species

Figure 13

*Phlebotomus vespertilionis* Fairchild and Hertig 1947.  
Ann. Ent. Soc. America 40 (4): 617-620, Pl. I, fig. 1  
(in part).

**Male.** Wing length 1.66 to 1.89 mm. Mesonotum and pleura somewhat infuscated. Abdominal setae mostly or all erect. Upper anepisternal setae 10 to 16, lower mesanepisternals 1 to 3. Eye about three-fourths head height. Proboscis about three-fourths head height. Pharynx slender, cibarium unarmed. Third antennal segment reaching well beyond end of proboscis, to end of fourth palpal segment on intact head. Ascoids slender, simple, shorter than their respective segments, paired on all but shortened terminal segment. Palpal formula 1-4-2-3-5, fifth segment equal to or greater than sum of second and third, fourth about two-thirds of third. Genitalia as in *vespertilionis* except for more slender parameres with setae only on distal third, as here figured. Our previous figure shows far too many setae in basal tuft and tip of paramere curved toward the observer, a condition seen in many mounts.

**Female.**—Wing length 1.79 to 1.92 mm. Color as in male. Abdominal setae as in male, lacking on eighth segment, ligulate on ninth tergite. Upper anepisternal setae 14 to 17, lower mesanepisternals 2 to 4, all simple. Eye about seven-tenths head height. Proboscis slightly less than head height. Pharynx and cibarium as figured for *vespertilionis* by us in 1947. Third antennal segment reaching nearly to end of proboscis and to about middle of third palpal segment on intact head. Ascoids slender, simple, reaching to ends of their respective segments, paired on all but shortened terminal segment. Palpal formula as in male, fifth segment slightly less than second and third together, fourth greater than half third. Newstead's scales long, slender, clubbed, on tip of second and most of third segment. Spermathecae not distinguishable from those of *vespertilionis* as figured by us in 1947.

Holotype male, slide 6130, laboratory-reared from egg from female collected in a hollow bat tree on K-19 road on a tributary of Rio Cocoli, west side of the Canal Zone, 5 April 1956. It bears our lot number R-1093. Allotype female, slide 6135, laboratory-reared from egg from same female as holotype. Paratypes, 1♂, 7♀, bred from same egg batch as holotype; only the females mounted; 10♂, 8♀, bred from eggs from female collected at same locality 20 June 1956, lot number R-1120. Thirty-eight males from the following localities, the first 12 specimens

part of the original paratype series of *vespertilionis*: 1, Barro Colorado Id., C.Z., 4 May 1947, in tree buttress; 1, La Victoria, Cerro Jefe, Panama Prov., Jan. 1947, in animal burrow; 4, Juan Mina, Chagres River, C.Z. 30 May 1944, 25 July 1945, in hollow bat tree; 3, Canal Zone Police Station, Pequeni River, Madden Lake, C.Z., 22 June 1944 in tree buttresses; 1, Cruces Trail, C.Z. Forest Reserve, 24 Jan. 1945, in bat tree; 1, Canal Zone Forest Reserve, 25 March 1945, under stones near waterfall; 1, Chiva Chiva Road, C.Z., 21 May 1944, in bat tree; 7, Cruces Trail, C.Z., 7, 18 Sept., 18 Oct. 1949, in hollow tree; 3, Cerro Campana, Panama Prov., R.P., 20 Oct. 1949, in buttresses and hollow tree; 5, Palenque, Colon Prov., R.P., 14-15 Sept. 1949, in hollow tree; 10, Rio del Medio, Rio Gatun, C.Z., 13-15 Oct. 1949, in buttresses and hollow tree; 1, La Victoria, Cerro Jefe, Panama Prov., R.P., 21 April 1951, in buttresses. In addition we have identified 322 unmounted male specimens from 16 additional localities in Panama and the Canal Zone.

The two species may be separated in the male by the shape and relative length of the parameres. The females appear to show no certain characters by which they may be separated, though averages of measurements from available bred material show that in *vespertilionis* the proboscis is slightly shorter, the third antennal segment and fifth palpal segment slightly longer than in *isovespertilionis*. Individual specimens cannot be placed on this basis, however, as there is very considerable overlapping of measurements. Based on captures of males only, there appear to be some differences in habits and habitat preferences. Thus of a total of 360 *isovespertilionis* males only 0.5 percent were taken in light traps, compared with 34.9 percent of 1170 males of *vespertilionis*. 71.9 percent of *isovespertilionis* were taken in hollow trees with bats and 24.4 percent in tree buttresses as against 35.8 percent and 17.7 percent in the case of *vespertilionis*. Only 2.2 percent of *isovespertilionis* were taken in other daytime resting places, (rock crevices) as against 11.8 percent of *vespertilionis* (rock crevices and caves). The geographical distribution in general seems to be about the same for both species, though *isovespertilionis* seems slightly less widespread and less tolerant of dryer areas. *Vespertilionis* has been taken at 43 localities in Panama, together with *isovespertilionis* at 14 and alone at 29, while we have *isovespertilionis* from an additional 9 localities unaccompanied by *vespertilionis*. We have not examined the larvae for possible distinguishing characters as yet.