

NOTES ON THE PHLEBOTOMUS OF PANAMA
(Diptera, Psychodidae)

II. DESCRIPTIONS OF THREE NEW SPECIES¹

G. B. FAIRCHILD² AND MARSHALL HERTIG³

The three species here considered form an apparently closely related group which is set off from the large group of Neotropical species bearing a basal tuft on the coxite by their inflated lateral lobes and the extreme proximal position of the basal spine of the style. Within the group, *vesiciferus* and *vespertilionis* are most similar in respect to the structure of the male genitalia, both having but three spines on the style, while *deleoni* has four. *Vesiciferus* and *deleoni* have identically formed genital filaments, while those of *vespertilionis* are of a different type. In the females which we have associated with these males, the cibaria are of similar type in all, bearing four strong horizontal teeth and what appear to be two strong vertical teeth as well as a variable number of smaller teeth. The pharynges of all are relatively unarmed, having weak finger-like ridges at their proximal ends only. These ridges bear minute spines, visible only at high magnification. The spermathecae of *deleoni* and *vesiciferus* are of a distinct and unusual type, being apparently somewhat like those figured by Addis (1945, J. Parasit., 31, 2, 119-127) for *P. anthophorus*. The spermathecae of *vespertilionis* are less unusual in structure. Addis erected a new subgenus for his *P. anthophorus*, and indeed the peculiar genitalia, spermathecae and cibarium of his species seem to warrant such an action. However, various of the three species here considered share with *anthophorus* the unusual spermathecal structure and the 3-spined style of the genitalia, while the structure of the paramere is paralleled in a number of not apparently otherwise related species.

Phlebotomus vespertilionis sp. nov.

Plate I

Male—Genitalia as figured. The genital pump and filaments are short, the whole structure being but slightly longer than the lateral lobe. The filaments are rather heavy, finely annulated, and about twice as long as the pump. The basal tuft on the coxite shows considerable variation in the number of hairs, the specimen figured having about the maximum number, while others may have as few as half this number. The margin of the coxite below the basal tuft is quite heavily sclerotized and thickened in this as well as the other two species of the group, but this is not shown in the figures due to the difficulty of portraying it beneath the basal tuft. The parameres curve inward in

¹This work was initiated under a contract, recommended by the Committee on Medical Research, between the Office of Scientific Research and Development and the Gorgas Memorial Laboratory.

²Medical Entomologist, Gorgas Memorial Laboratory, Panama, R. de P.

³Major, Sanitary Corps, Army of the United States.

undistorted mounts as shown in the figure. In more flattened mounts the paramere may appear broader and straighter. The measurements of wings, palpi, etc., of the three species here considered will be found consolidated in Table I.

Female—Spermathecae, cibarium and pharynx as figured. Cerci rather short and blunt. Ascoids (in both sexes) simple, long, nearly attaining distal ends of segments.

Holotype male, Slide 761, Cerro Campana, Panama Province, Panama, 17 Jan., 1947, =2500 ft. elev. in a shallow cave with bats.

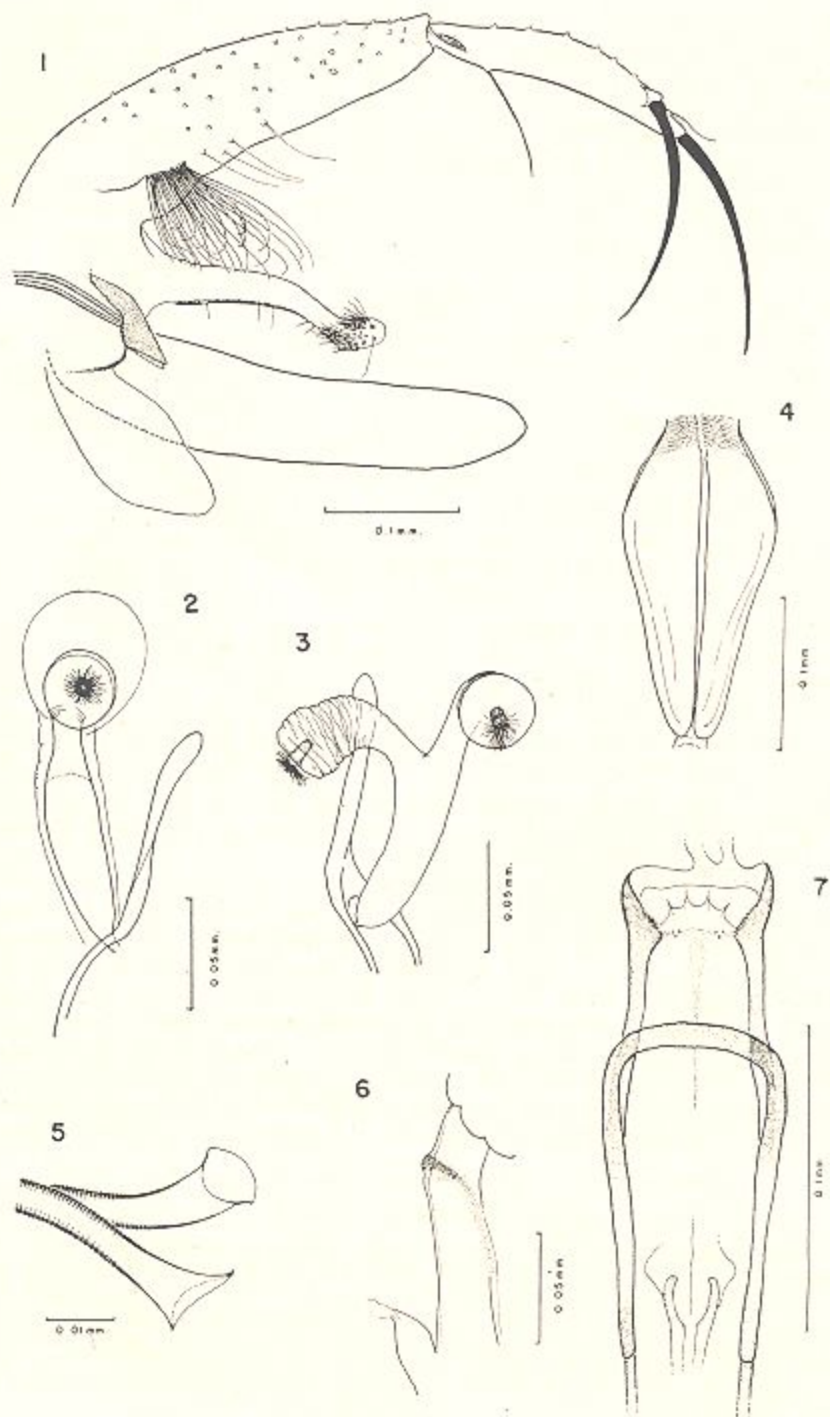
TABLE I
MEASUREMENTS IN MICRA

	<i>P. vesiciferus</i>						<i>P. vespertilionis</i>						<i>P. deleoni</i>	
	Maximum		Minimum		Mean		Maximum		Minimum		Mean		♂	♀
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀		
Ant. III.....	388	368	328	260	358	313	428	400	304	324	380	352	368	380
Palpi I+II...	140	160	112	120	132	142	148	180	120	148	136	176	160	192
Palpi III.....	140	160	120	112	132	138	152	160	124	140	140	145	160	172
Palpi IV.....	88	100	72	76	80	84	92	100	72	88	80	93	120	128
Palpi V.....	224	224	200	180	206	200	264	272	204	212	228	236	...	332
Head height...	236	252	212	200	226	236	284	304	236	256	266	278	224	224
Clypeus.....	140	152	92	112	110	134	120	160	100	124	113	140	128	160
Proboscis.....	192	268	148	200	173	238	216	260	172	220	191	248	180	260
Eye height....	176	192	128	144	153	170	212	236	160	180	182	209	148	180
Wing length...	1740	1940	1450	1540	1570	1780	1960	2160	1580	1850	1780	1960	1530	1800
Alpha.....	522	630	396	500	439	550	486	630	396	522	450	552	414	558
Beta.....	216	252	162	180	192	217	288	306	216	252	252	275	198	252
Gamma.....	306	360	216	234	261	293	324	360	252	270	288	302	234	306
Delta.....	270	360	162	270	212	315	216	342	144	252	180	280	126	306

Allotype female, Slide 742, Chorrera, Panama, 1 Dec., 1946, in forest S. E. of town in hollow tree with bats. *Paratypes*, 33♂, 34♀ mounted on slides and 539♂, 687♀ in alcohol, from the following localities: Canal Zone—Juan Mina Sta., Chagres River region; Rio Pequeni, head of Madden Lake; Gatuncillo, Chagres River region; Chiva Chiva road; Cruces Trail, Canal Zone Forest Reserve. Republic of Panama—Panama Province; Pacora; near Arraijan; Chorrera; Cerro Campana; La Victoria, Cerro Jefe, nr. Tocumen; Chilibrillo bat caves, nr. Chilibre; Bejuco. Veraguas Prov.—Santa Fe. Colon Prov.—Puerto Pilon.

EXPLANATION OF PLATE I

Phlebotomus vespertilionis. FIG. 1, male genitalia, inner aspect. FIG. 2, spermatheca, drawn from a specimen cleared in phenol without treatment in KOH to show cellular envelope surrounding spermatheca. FIG. 3, spermatheca, drawn in water from a specimen treated with KOH. FIG. 4, female pharynx, balsam mount. FIG. 5, tips of male genital filaments. FIG. 6, female chitinous arch, lateral view, as seen in mount of whole head cleared in phenol. The ventral side is to the left. FIG. 7, female cibarium, stained and mounted specimen, ventral view.



Bocas del Toro Prov.—Changuinola District, United Fruit Company Plantation.

This material was collected on 52 different occasions in every month of the year, from 1944 to 1947. Females were invariably associated with bats, either in hollow trees or in hiding places near the entrances to bat caves. Males were taken fairly frequently between the buttressed roots of large trees in the forest and once beneath boulders in a dry stream bed, as well as in bat roosts. Collecting data seem to show greater abundance from June to December, the rainy season, than from January to June, the dry season, although we have insufficient records to plot the seasonal abundance in detail. Specimens have been taken from sea-level up to about 2500 ft. elevation.

We feel quite confident that this species, if not restricted to bats as its host, at least shows a great preference for these mammals as a source of its blood meal. Only rarely have we failed to find this species present in bat roosts in hollow trees, and the females have never been secured in other situations. Some bat trees have yielded enormous numbers of this species, and this species only, and it is customary to find a high proportion of the females engorged with fresh or partially digested blood.

Phlebotomus vesiciferus sp. nov.

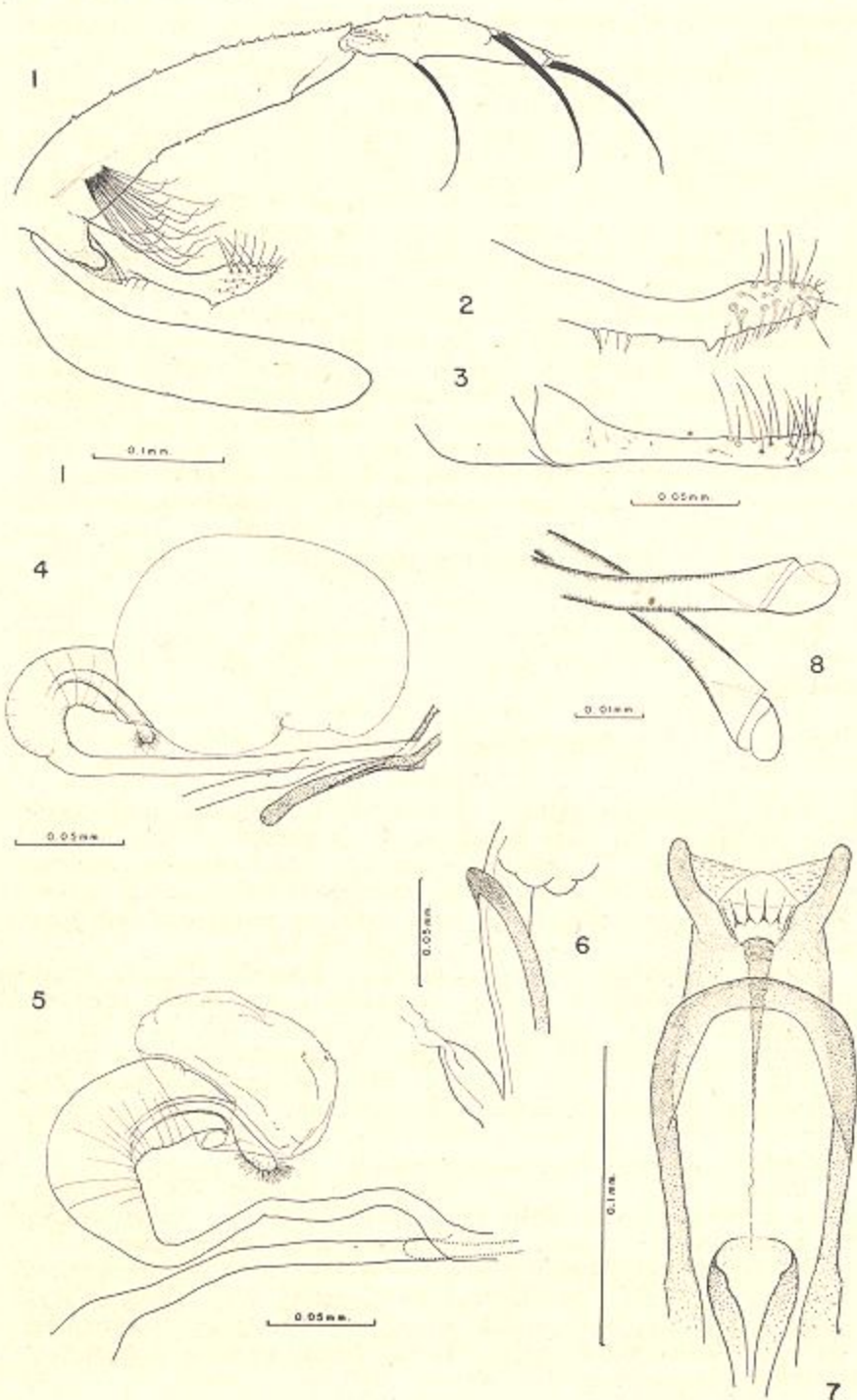
Plate II

Male—Genitalia as figured. The shorter lateral lobes and heavier basal spine of the style are characteristic. The genital pump and filaments are short, but slightly longer than the lateral lobes, and except for their tips, like those of *vespertilionis*. The basal tuft on the coxite shows variation in the number of hairs, but these are generally fewer than in the preceding species. The cerci are relatively longer and somewhat more acutely pointed than in *vespertilionis*. Ascoids in both sexes simple, nearly reaching ends of their respective segments.

Female—Cibarium and spermatheca as figured. Pharynx as in *vespertilionis*. The unusual structure of the spermatheca seems to be due to an enormous asymmetrical inflation of the terminal portion of the body of the spermatheca, which enfolds and overgrows the head, displacing it laterally so that it appears to emerge through an aperture at the side of the body of the spermatheca. From the figures given by Addis (1945) a somewhat similar situation seems to obtain in *P. anthophorus*, though here what we take to be the inflated portion is lobulated, while in our species it is simple and bladder-like. The true appearance is difficult or impossible to discern in permanent mounts, as the exceedingly tenuous walls of the inflated portion invariably

EXPLANATION OF PLATE II

Phlebotomus vesiciferus. FIG. 1, male genitalia, inner aspect. FIGS. 2 and 3, parameres of another example, showing variation of appearance due to orientation, fig. 3 being a dorsal view. FIG. 4, spermatheca, cleared in phenol. FIG. 5, spermatheca in water after KOH treatment. The specimen is somewhat flattened and the bladder collapsed and shrunken. FIG. 6, chitinous arch of female, side view, for comparison with Plate I, fig. 6. FIG. 7, female cibarium, ventral view. FIG. 8, tips of genital filaments.



collapse during mounting. Our figures were drawn from a specimen cleared in phenol and from one mounted in water after treatment with KOH. The name is from Latin *vesicus*=a bladder.

Holotype male, Slide No. 680, Cruces Trail, Canal Zone Forest Reserve, 24 Nov., 1946. Taken in a large hollow tree containing bats.

Allotype female—Slide No. 667, Cruces Trail, Canal Zone Forest Reserve, 16 Nov., 1946. Taken in a large hollow tree containing bats.

Paratypes—7 ♂, 5 ♀, mounted on slides and 44 ♂, 1 ♀, in alcohol from the following localities: Cruces Trail, C. Z. Forest Reserve, in hollow tree with bats, 24 Nov., 1946 (1 ♀); Bocas del Toro, Panama, 1 Feb., 1947, in bat caves (1 ♂, 1 ♀); La Victoria, Cerro Jefe, near Tocumen, Panama, ≈2500 ft. elev., 23 Jan., 1947, in animal burrows (44 ♂, 1 ♀) and in rock crevices (1 ♀); Cerro Campana, Panama, ≈2500 ft., 18 Jan., 1947, in hollow tree with opossum (1 ♀); Changuinola District, United Fruit Co. Plantations, Bocas del Toro Province, Panama, 16 Aug., 1944, in buttresses of large tree (1 ♀); Cerro Tute, Santa Fe, Veraguas Province, Panama, 20 March, 1947, in buttress of tree (1 ♂); Canal Zone Police Substation, Rio Pequeni, Madden Lake, C. Z., 22 June, 1944, in buttresses (1 ♂); Juan Mina, Chagres river region, C. Z., 30 May, 1944, in hollow tree with bats (1 ♂); Puerto Pilon, Colon Province, Panama, 2 Feb., 1947, in buttresses (3 ♂).

We have only once encountered this species in numbers, in an animal burrow, and nearly all were males. It seems to show no special predilection for bats, and we have no clear indication of what its preferred host may be.

Phlebotomus deleoni sp. nov.

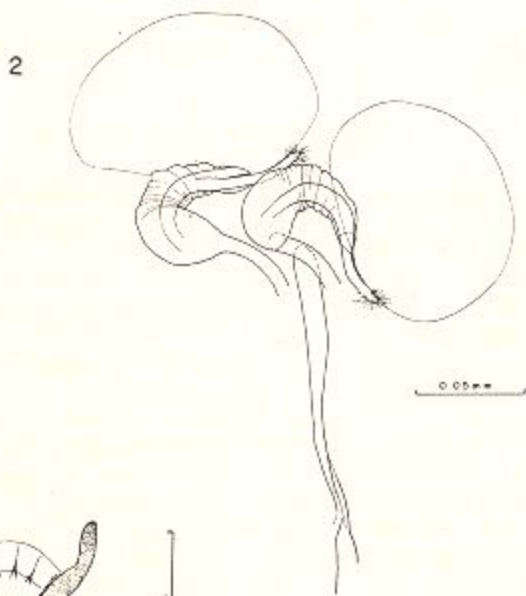
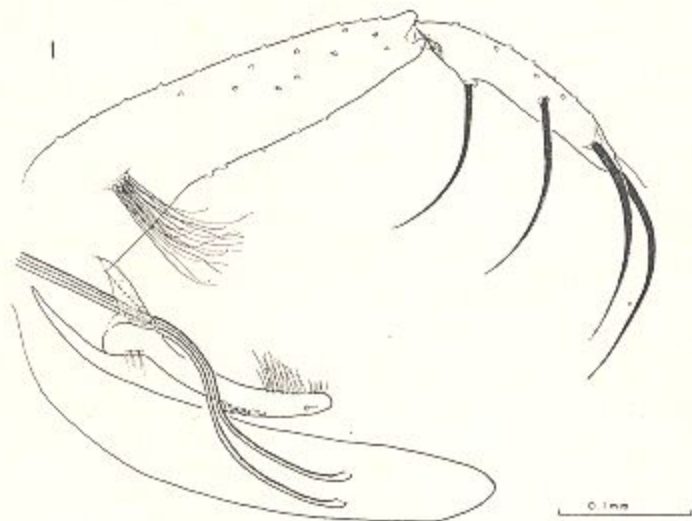
Plate III

Male—Genitalia as figured. This species differs most conspicuously from *vesiciferus* and *vespertilionis* in the possession of an additional spine on the style. The parameres have a ventral hook as in *vesiciferus*, not well shown in the figure, but are more slender than in that species. The genital filaments are of the same structure as those of *vesiciferus*, while the lateral lobes are long, as in *vespertilionis*.

Female.—Spermatheca and cibarium as figured. Pharynx apparently as in *vespertilionis*. The spermatheca was drawn from the *Allotype* cleared in phenol before mounting. The body of the spermatheca is smaller, the head longer and the inflated portion smaller than in *vesiciferus*, though these differences are hardly perceptible in mounted and shrunken material. The cibarium of our single specimen seems to show the teeth more widely separated and not so deeply set between the posterior arms as in *vesiciferus*.

Holotype male, Slide 777, and *allotype* female, Slide 778, Canchacan, Peten, Guatemala, July, 1946, Dr. J. R. de Leon coll. Taken in holes in limestone rock in association with a species of *Nemopalpus*.

The differences between this and *vesiciferus*, with the exception of the style, are slight, and the two are obviously very closely related. Cases such as this indicate the difficulty of attempting to group the species of *Phlebotomus* by means of such obvious genitalic characters as the number of spines on the style.



Phlebotomus deleoni. FIG. 1, male genitalia, inner aspect. FIG. 2, spermathecae, from specimen in phenol after KOH and staining. Ducts not further visible. FIG. 3, female cibarium, remainder not clearly visible.