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(Diptera, Psychodidae)

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VIII. TWO NEW SPECIES OF WARILEYA¹

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It has been believed until quite recently that all the bloodsucking Psychodidae belong to the genus *Phlebotomus*. This genus is considered by Theodor (1948) to form the subfamily Phlebotominae, although Eaton (1904) and some earlier authors included *Nemopalpus*, *Sycorax* and *Trichomyia* in the subfamily as well. The haematophagous habit and its concomitant structural modifications, however, are not limited to this group, as Desportes (1942) has shown that *Sycorax silacea* feeds on frogs and is actually a vector of a frog filaria. *Horaiella*, a genus described by Tonnoir (1933) as having toothed mandibles in the female, may also possibly be haematophagous, although it does not bite man. Neither of these genera are believed by Tonnoir to belong in the Phlebotominae. More recently Hertig (1948) has described *Warileya phlebotomanica* from Peru, an avidly haematophagous species, while Fairchild (1949) in describing *Hertigia hertigi* from Panama indicated that the structure of the mouth parts of the single available specimen, a male, suggests a possible bloodsucking habit.

It is of some interest, therefore, to add two more species to *Warileya*, one of which at least is a feeder on human blood. The inclusion of these two additional species necessitates a re-characterization of *Warileya*, as some of the more outstanding characters of the type species are lacking in the present forms, and hence appear to be only of specific value. We were long doubtful of the proper placement of these two species and it may yet be necessary to place the second species elsewhere. Short of erecting new genera for them, however, we see no alternative to placing them in *Warileya*.

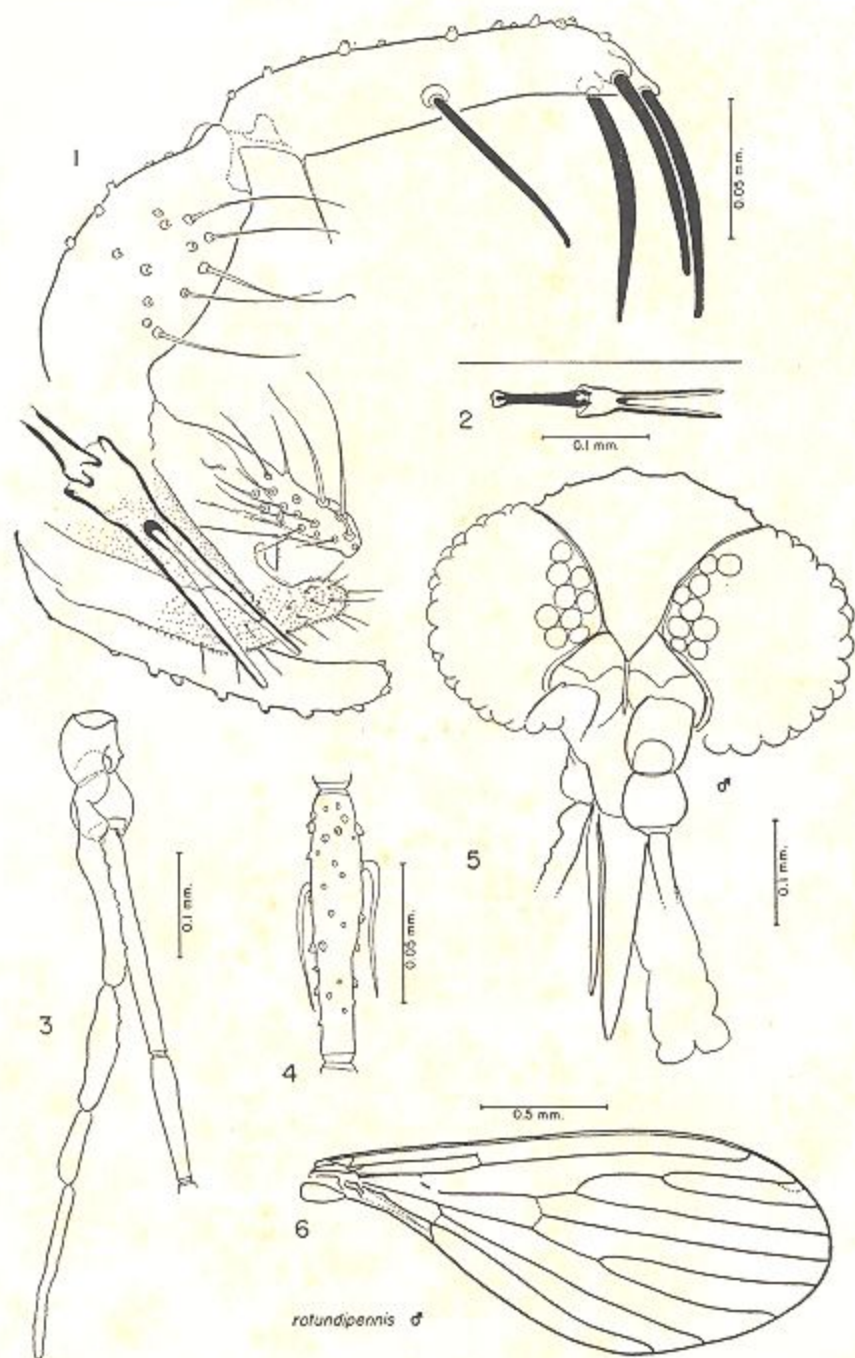
Warileya differs from *Phlebotomus* sensu lato in possessing the following combination of characters: A very broad and rounded wing, the ratio of length to width ranging from 2.2 to 2.7, alpha and delta

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EXPLANATION OF PLATE I

All drawings for this and other plates were made by the authors with the aid of the camera lucida from stained copal-balsam preparations, except as noted. Magnifications are indicated on the drawings.

Warileya rotundipennis, paratype males. FIG. 1. Male genitalia, inner aspect. FIG. 2. Pump and genital filaments. FIG. 3. Palp and antennal segments I-IV. FIG. 4. Antennal segment IV, with ascoids. FIG. 5. Head. FIG. 6. Wing.



very long, gamma very short. The wing of *Phlebotomus* is relatively slender and is usually pointed. In fifteen Panamanian species selected at random except for two species with very narrow wings, the ratio of length to width ranged from 2.85 to 4.7, with an average of 3.5. No definite armature of teeth in the cibarium in either sex. This character is shared by many Old World species of *Phlebotomus*, but by none in the New World. The species of *Brumptomyia* are often stated to have a "rudimentary" armature, but actually they have quite large teeth set in longitudinal rows. Male genitalia with the coxite short and broad, much shorter than the style. Style long and cylindrical, bearing up to four strong spines. Parameres simple. Aedeagus conspicuously divided, the genital filaments short, not exceeding twice the length of the genital pump. Lateral lobes unarmed, hardly exceeding the parameres in length. The relatively short and broad coxite is approached only by certain species of the subgenus *Shannonomyia* Pratt, which are otherwise quite different. In other respects the genitalia are not very distinctive, the remarkable development of modified setae on the coxite of *W. phlebotomanica* apparently being only a specific character. Spermathecae quite unlike in the three included species, opening by separate ducts into the vagina in two species, into a short common duct in the third. Genital fork with a rounded, flattened terminal expansion in at least two of the species, and all three with a pair of internal sclerotized flattened rods apparently arising near the bases of the lobes of the eighth sternite and passing forward ventral to the genital fork. These latter structures are present in most *Phlebotomus*, though much less developed in the species we have examined, where they vary in shape from species to species. These structures appear to be what Sinton (1925) believed are probably the gonapophyses of the eighth segment.

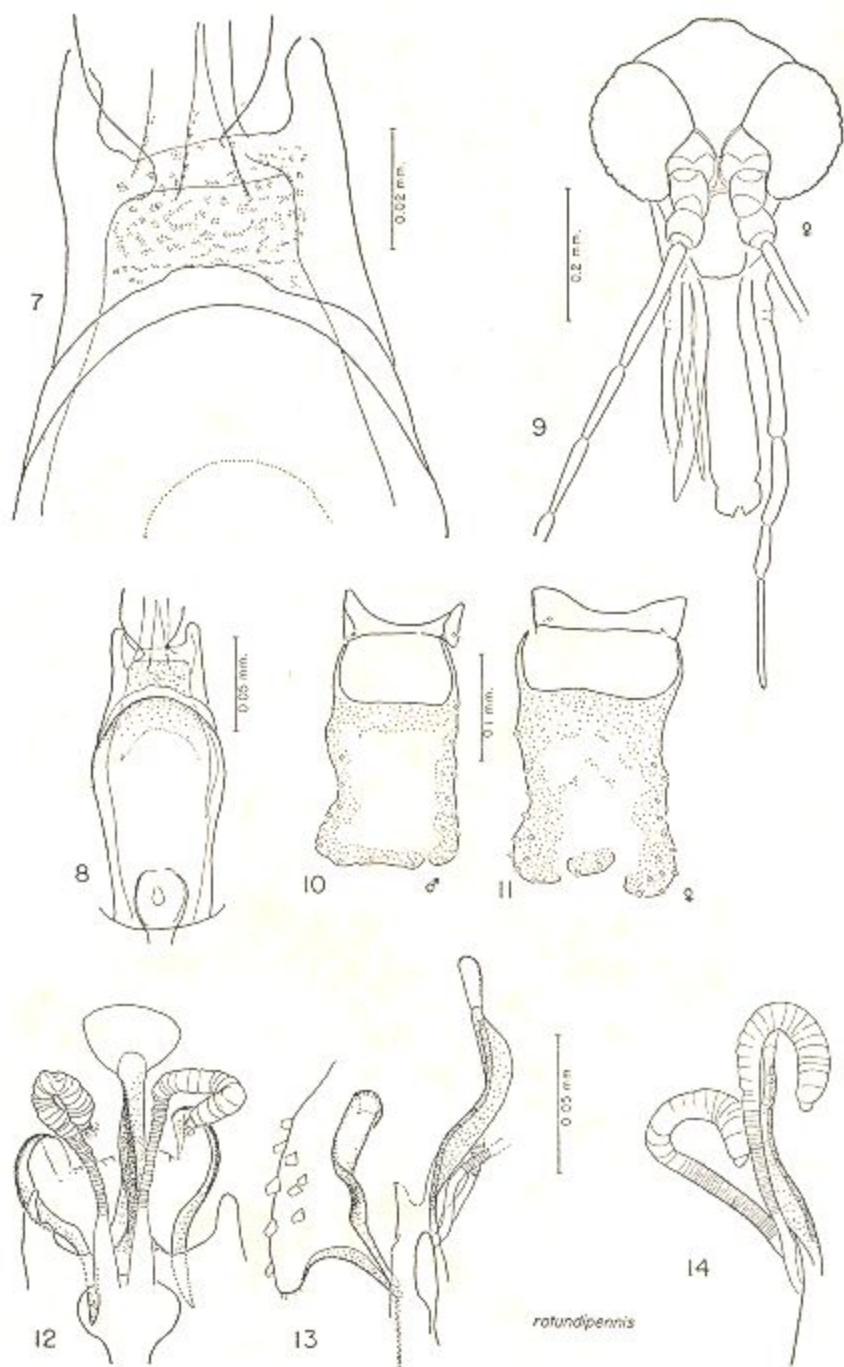
The thorax differs from *Phlebotomus* in lacking setae on the upper part of the anepisternum, these being present in all species of *Phlebotomus* we have seen. The abdomen is sparsely clothed with relatively long and stout erect hairs in two of our species, the third having much more numerous and finer setae which tend to be recumbent and many of which are scale-like.

Warileya rotundipennis sp. nov.

A medium sized, entirely pale colored insect closely resembling *Plebotomus* in appearance, stance and flight habits. Vestiture of wings moderately dense, wholly of slender hairs, without admixture of scales. Venation as figured. Thorax as in *Phlebotomus*, but lacking

EXPLANATION OF PLATE II

W. rotundipennis; Figs. 7, 8, 9, 12, allotype female, other figures paratypes. Figs. 7-8. Cibarium. Note absence of true armature; ventral wall studded with groups of minute spinules; chitinous arch with irregular flange-like posterior projection. FIG. 9. Head. FIGS. 10-11. Sternites I and II, male and female. FIG. 12. Spermathecae, genital fork, gonapophyses of eighth sternite, dorsal aspect. FIG. 13. Genital fork, gonapophyses, bases of spermathecal ducts, lateral aspect. FIG. 14. Spermathecae, after KOH, stained, in phenol.



setae on the upper margin of the anepisternum (postspiracular setae). Legs as in *Phlebotomus*, without spines on femora, and rather uniformly and densely clothed with lanceolate ribbed scales. Abdomen with relatively sparse, stout, erect setae, without scales. Second sternite as figured.

Male genitalia as figured. The aedeagus is poorly sclerotized and rather membranous, the pump and genital filaments unusually short, as figured. Head as figured, with very large eyes, especially in the male, the suture defining the upper border of the antennal plates Y-shaped in both sexes. Proboscis and clypeus well developed, together

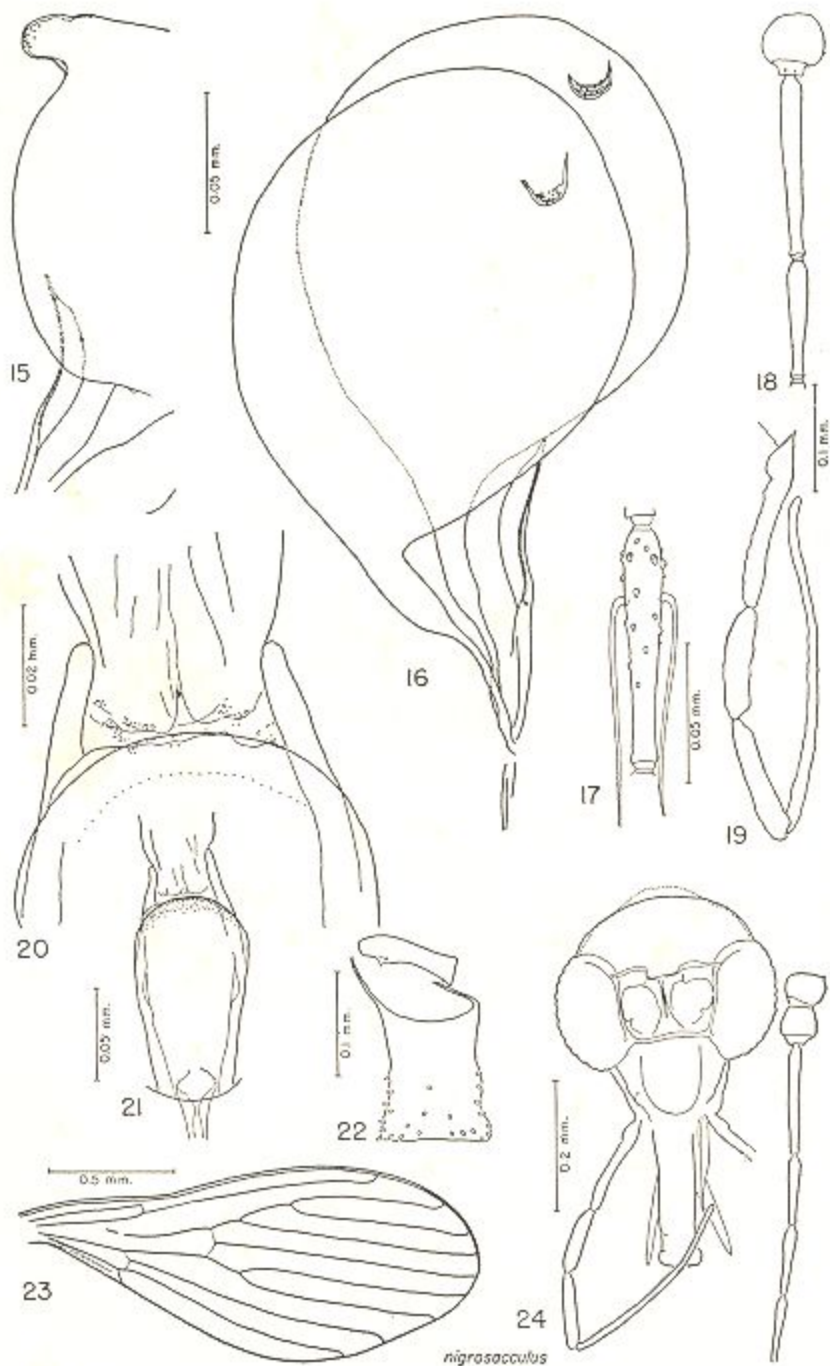
TABLE I
MEASUREMENTS IN MICRA

	<i>Warileya rotundipennis</i> (6 ♂, 6 ♀ measured)						<i>W. nigrosacculus</i> (1 ♀)
	Maximum		Minimum		Mean		
	♂	♀	♂	♀	♂	♀	
Ant. III.....	224	240	192	216	204	224	176
Palpi I-II.....	176	244	164	224	168	232	156
" III.....	128	176	98	136	115	133	104
" IV.....	76	92	64	80	66	86	116
" V.....	168	192	140	156	155	173	316
Wing, length.....	2160	2286	1962	2196	2052	2255	1890
Alpha.....	576	720	504	612	533	641	576
Beta.....	360	360	306	324	365	333	198
Gamma.....	144	162	126	90	126	137	126
Delta.....	378	450	288	360	333	410	342

greater than the distance from base of clypeus to vertex in both sexes. Antenna of 16 segments, the terminal segments not abruptly shorter. Ascoids long, as in *Phlebotomus*, paired on all flagellar segments in the female, apparently lacking or much reduced on last four segments of male. Newstead's scales in a rather dense patch just beyond the middle of the third palpal segment in both sexes.

EXPLANATION OF PLATE III

W. nigrosacculus, holotype female. FIGS. 15-16. Spermathecae. FIG. 16, unstained, in phenol, lateral aspect; the "terminal knobs," both on inner surfaces, are irregularly thickened evaginations of the thin wall of the bladder-like spermathecae. After treatment in KOH (fig. 15) one terminal knob seen in profile; tiny refractive dots may indicate bases of "hairs" usually present in *Phlebotomus*. FIG. 17. Antennal segment IV, with ascoids. FIG. 18. Antennal segments II-IV. FIG. 19. Palp. FIGS. 20-21. Cibarium. No true armature, but ventral wall with groups of minute spinules. Chitinous arch with irregular flange-like posterior projection; this part of specimen foreshortened downward from plane of drawing. FIG. 22. Sternites I and II. FIG. 23. Wing. FIG. 24. Head. Specimen somewhat flattened in mounting; probable outline of vertex dotted.



Female cibarium as figured, without a true armature, but with scattered groups of minute spinules on the membranous ventral wall of the cibarium. Chitinous arch with irregular flange-like posterior projection. Pharynx quite heavily sclerotized and dark colored, without spines, but with ridges and digitate processes which may be minutely spinulose. Spermathecae as figured, the walls lacking the imbricated and heavily sclerotized character of portions of the ducts as found in *W. phlebotomanica*, and lacking the elongate terminal knob. Genital fork in dorso-ventral view with the anterior stem ending in a flattened disc. Gonapophyses of the eighth sternite (Sinton), broad, curved, strap-like sclerotizations in lateral view, slenderly S-shaped in dorsal view. Cerci short and slender.

Holotype male, slide 2335, *allotype* female, slide 2312; 5 *paratype* males, slides 2336 to 2340, and 5 *paratype* females, slides 2309 to 2311 and 2313-2314; 13 *paratype* males in alcohol; Cerro Campana, Panama Province, Panama, 24 August, 1950, M. Hertig and G. B. Fairchild colls.; taken at lighted Shannon trap in dense forest at Yellow Fever Station F, 1900 ft. elevation, the allotype and 3 other females taken biting the collectors. The latter four females all had partly developed eggs, indicating a previous blood meal. One *paratype* male, slide 2389, La Victoria, Cerro Jefe, Panama Province, 29 August, 1950, M. Hertig and P. Galindo colls.; taken at light, Shannon trap, Yellow Fever Station C, 1200 ft. elevation.

This species differs from *W. phlebotomanica* Hertig in smaller size, relatively shorter fifth palpal segment, and in characters of the male genitalia and spermathecae. From *W. nigrosacculus* n. sp. it differs in larger size, much shorter fifth palpal segment, larger eyes, and the very different spermathecae.

Warileya nigrosacculus sp. nov.

A small dusky insect with unusually dark integument. Vestiture of wings moderately dense, of slender, lorate or narrowly lanceolate scale-like hairs. Venation as figured. Thorax as in *Phlebotomus*, but lacking post-spiracular setae. Legs as in *Phlebotomus*, the femora unarmed, clothed with striate scale-like hairs. Abdomen densely clothed with recumbent or semi-recumbent fine setae, those of the venter at least lorate or narrowly lanceolate and scale-like. Second sternite as figured.

Spermathecae relatively enormous, thin-walled balloon-like structures, their ducts fusing very close to the vagina, as figured. Stem of genital fork simple, not expanded. Gonapophyses of eighth sternite simple curved rods. Cerci rather small and slender.

Cibarium without true armature but with scattered groups of minute spinules on ventral wall. Pharynx broad and rather strongly pigmented, quite smooth except for a few wrinkles at the extreme posterior end. Eyes rather small. Proboscis and clypeus relatively long.

Newstead's scales in a small patch proximal to the middle of the third antennal segment. Ascoids long and slender, exceeding the ends of their respective segments, but apparently absent from the six terminal segments.

Holotype, slide 705, Cerro Campana, Panama Province, Panama, 7 January, 1947, M. Hertig coll. Taken from a hollow tree in heavy wet forest at about 3000 ft. elevation. Although this area and the tree where this specimen was taken have been visited on numerous subsequent occasions, no other specimen has been collected.

This species differs markedly from the other species of *Warileya* in the structure of the spermathecae and character of the vestiture. It is so similar in wing and head characters, however, that we believe it is best placed here, at least until the male can be studied.

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