

NOTES ON THE PHLEBOTOMUS OF PANAMA.

V. THE SECOND STERNITE AS A TAXONOMIC CHARACTER
(DIPTERA, PSYCHODIDAE)

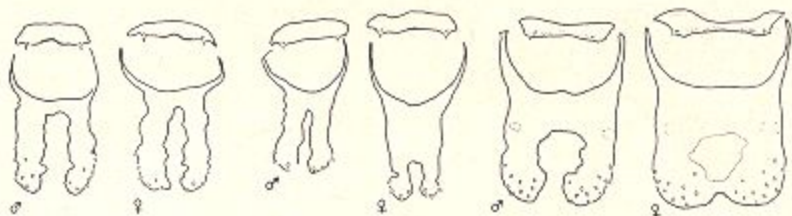
By MARSHALL HERTIG and G. B. FAIRCHILD, *Gorgas Memorial
Laboratory, Panama, R. de P.*^{1, 2}

While handling cleared and stained whole specimens of *Phlebotomus trinidadensis* it was noted under the dissecting binocular microscope that the second sternite was markedly different from the others. It was deeply divided longitudinally (Fig. 1). In another species in the same lot, *P. vesperitilionis*, this sternite was solid. The respective patterns were similar in both sexes. An immediate examination of various other species showed that this sternite exhibited a pattern which, together with the size and proportions, was often distinctive for a given species. Good taxonomic characters common to both sexes of *Phlebotomus* are rather limited in number. The need is particularly acute in matching males and females of new species. We therefore proceeded to explore the limits of usefulness and dependability of this character as rapidly as new specimens could be mounted. Our slide collection was of little value for this purpose. Sandfly specimens usually lie on their sides whether during preliminary handling and identification or after they are mounted. The sternites therefore are seen only on edge except for a few which by chance have been pushed out of their normal position. This is doubtless the reason that the taxonomic possibilities of the sternites have been overlooked.

We have now examined a series of over 500 mounted specimens of Panamanian sandflies, comprising 32 species (out of the 43 which we now have for that country), of which 23 species were represented by both sexes. In this series the first three sternites were dissected off so as to lie flat, a procedure which has been adopted as routine. The close similarity of sternite II in both sexes has been established and its value as a taxonomic character has been demonstrated. The drawings illustrate the range of different patterns, sizes and shapes in both sexes of several species. Thus far the second sternites have exhibited variations of two basic patterns. They are (a) bilobed, (b) solid, or they may be intermediate between these two conditions, with an apical notch and with or without irregular light or clear areas along the mid-line.

¹This work was done under a contract between the Army Medical Research and Development Board, Office of the Surgeon General, and Gorgas Memorial Laboratory.

²Entire publication costs paid by Gorgas Memorial Institute.

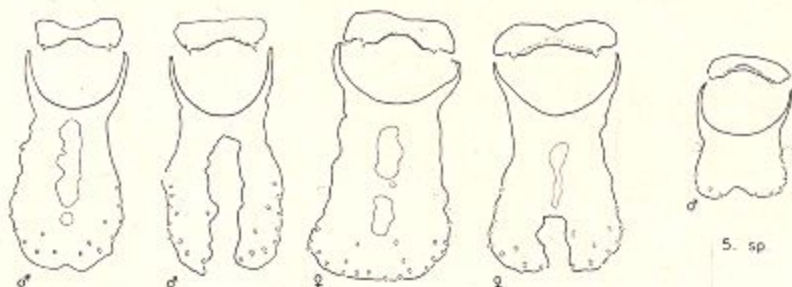


1. *trinidadensis*

2. sp. near *trinidadensis*

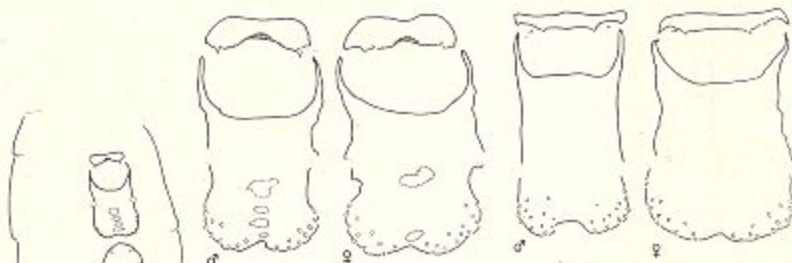
3. *spinus*

0.2 mm



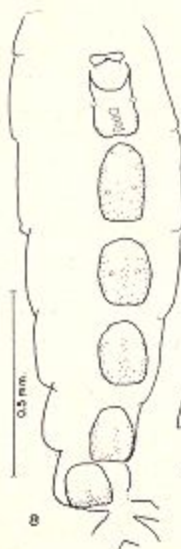
4. *shannoni*

5. sp

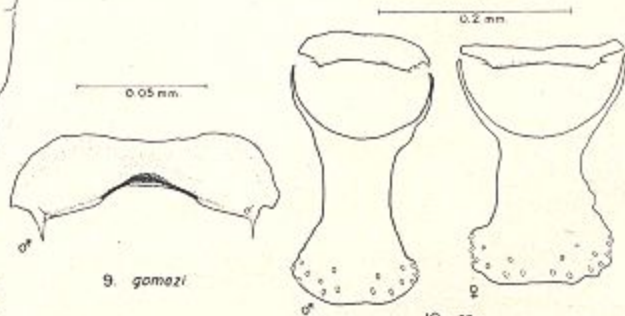


6. *gomezi*

7. *panamensis*



8



9. *gomezi*

10. sp.

The first and second sternites together roughly resemble a baby's bib, the two slender projections curving forward from the anterior corners of sternite II representing the strings and sternite I a knotted bow. The outlines of these sclerites are sharp and bold in some species, e.g., *shannoni*. In many others the limits of sclerotization are poorly defined. In stained preparations they give the impression of successive washes of water color carelessly applied. The outline in any case is rarely perfectly smooth or regular. Bilateral symmetry is only approximate.

Sternite II. On either side of sternite II is a small circular or oval spot, unsclerotized and lacking the very fine setae which otherwise cover both sclerites and surrounding membranous integument (Figs. 3-8). These clear spots may be within or completely outside the sclerotized area, or one or both spots may merely indent the edges. In some species, e.g., *panamensis* (Fig. 7) they are always conspicuous. These spots are also found, usually as two pairs, on some of the succeeding sternites (Fig. 8).

The number and distribution of the deciduous hairs vary somewhat but nevertheless contribute to the characteristic pattern.

In those species with a characteristically bilobed sternite the tips of the lobes may be slightly coalesced. This has been noted a few times in a large series of *trinidadensis*. It is frequent in *spinus* (Fig. 3). The most variable species in our series is *shannoni* (Fig. 4). About half the males have the two lobes completely separated, while their tips coalesce slightly or completely in others. In the females, however, the great majority (15 out of 18) have the lobes fused apically.

PLATE 6. STERNITES OF PHLEBOTOMUS

Figs. 1-7, 10, sternites I and II of eight species of *Phlebotomus*, illustrating differences in pattern, size and proportions between species, and the general similarity as between the sexes (stained mounts, camera lucida drawings, all to the same scale); fig. 1, ♂ and ♀, *P. trinidadensis*; fig. 2, ♂ and ♀, undescribed species near *P. trinidadensis*; fig. 3, ♂ and ♀, *P. spinus*; fig. 4, ♂♂ and ♀♀, *P. shannoni*; fig. 5, ♂, undescribed species; fig. 6, ♂ and ♀, *P. gomezi* (syn. *swis*); fig. 7, ♂ and ♀, *P. panamensis*. fig. 10, ♂ and ♀, undescribed species near *P. heckenrothi*; fig. 8, sternites I to VII, ♂ *P. gomezi* (cleared and stained specimen in phenol); sternites III to VII vary somewhat, at times distinctively, in different species, but tend to be rectangular or oval in shape and lack the striking patterns of sternite II; fig. 9, sternite I ♂ *P. gomezi*, same preparation as fig. 6; the two pointed processes are found on the posterior margin of most species; near each process is a minute seta; the posterior margin may be heavily sclerotized and indented as in this instance, or may be more or less straight, with various degrees of sclerotization.

In the male the sternites tend to be narrower than in the female and in a few species are markedly elongate.

Figures 1 and 2 illustrate conspicuous differences between two closely related species, *trinidadensis* and an undescribed species. In the case of the latter, sternite II furnished the initial clue in the matching of the sexes and was definitely useful in separating the males from *trinidadensis*, from which they otherwise differ only slightly in wing venation and in having the apical pair of spines of the style markedly unequal.

Sternite I. We have included figures of sternite I although its taxonomic value is not nearly as great as that of sternite II. This narrow, transverse sclerite exhibits fairly constant characters as to the configuration of the posterior margin between the two projecting points (Fig. 9). This border is sometimes heavily sclerotized. Two minute setae arising from relatively large bases are always present near the two points, usually being located on the sclerite but at times on the membrane. In some species their position is distinctive, e.g. *panamensis* (Fig. 7), where they are placed some distance from the points toward the outer edges. In one species a third seta has been noted occasionally on the mid-line. Similar setae have never been found on sternite II but they occur regularly on other sternites, usually as two pairs near the anterior margin.

Other sternites. The size, shape and hair pattern of sternites III to VII (Fig. 8) are conspicuously different in many species and may prove to have some taxonomic value although no special study has been made. We include sternite III in our routine dissection as more or less representative of the other sternites. Sternite VII, however, the last obvious sternite, is sometimes oddly shaped and may merit special attention.

Dissection. The whole specimen, previously treated with KOH, stained with acid fuchsin dissolved in phenol, and infiltrated with a phenol-copal mixture, is dissected in a drop of the latter (1). The abdomen is cut off between the third and fourth segments. The first three segments thus form a short open sleeve. With a needle knife a longitudinal cut is made through the lateral membrane on both sides. The strip with the sternites is then detached from the thorax and arranged so that they lie as flat as their natural curvature will permit. It is desirable that the KOH treatment be stopped short of the point where much of the natural pigment is removed from the integument. A satisfactory routine has been found to be one hour in cold 20-per cent KOH, or 90 seconds over a boiling water bath.

SUMMARY

The second sternite has been found to have characters useful in the taxonomy of *Phlebotomus*. The pattern, size and proportions, often distinctive, are closely similar in both sexes. These features are of particular value in matching the sexes of new species, but have also served to separate closely related species.

REFERENCE

- (1) Fairchild, G. B., and Hertig, M., 1948. An improved method for mounting small insects. *Science* 108: 20-21.