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ABSTRACT

Morphological anomalies in phlebotomine sand flies are reviewed and updated with abnormalities observed in Venezuela on the species *L. trinidadensis*, *L. shannoni*, *L. lichyi* and *L. gomezi*, and the description of a teratological unidentified male.

In 1971 Abonnenc *et al.* reviewed the morphological abnormalities of sand flies. They pointed out that the more common anomalies were of the genitalia of the males particularly the presence of supernumerary spines on one side of the style.

They listed 34 sand fly specimens with supernumerary spines, nineteen of which belonged to 10 species of the Old World: *Sergentomyia minuta* (Rondani, 1843); *Phlebotomus papatasi* (Scopoli, 1786); *P. major* Annandale, 1910; *P. perniciosus* Newstead, 1911; *S. africanus* (Newstead, 1912); *P. mascittii* Grassi, 1908; *P. orientalis* Parrot, 1936; *S. clydei* (Sinton, 1928); *P. ariasi* Tonnoir, 1921; and *S. ingrani* (Newstead, 1914) and the remaining fifteen to 10 species of the New World: *Lutzomyia fischeri* (Pinto, 1926); *L. mangabeirana* (Barretto & Coutinho, 1941); *L. ayrozai* (Barretto & Coutinho 1910); *L. travassosi* (Mangabeira, 1941); *L. aragaoi* (Costa Lima, 1932); *L. baduelensis* (Floch & Abonnenc, 1941); *L. rorotaensis* (Floch & Abonnenc, 1944); *L. pacae* (Floch & Abonnenc, 1943); *L. whitmani* (Lutz & Neiva, 1912); *L. longipalpis* (Lutz & Neiva, 1912).

A reduction in the number of style spines, by atrophy or fusion, seemed to be much rarer, since the authors reported only 4 individuals of four species with this abnormality viz: one *P. major* which had two spines fused giving 4 spines in the abnormal style

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and 5 in the normal one; one *S. minuta* which had only three instead of four spines in both styles; one *L. pacae* with a unireduction to three spines, not four, and one *S. simillimus* (Newstead, 1914) with only one apical spine on one style and the normal number of 4 on the other.

Of particular interest are the anomalies in the cibarium of the females. A reduction of the number of the cibarial teeth was observed by Parrot & Habibi (1946) in *S. minuta parroti* (Adler & Theodor, 1927) and in *S. clydei* by Qutubuddin (1961), and the absence of the pigment patch in *S. ingrami* was noticed by Kirk & Lewis (1951).

A peculiar anomaly not referred by Abonnenc *et al.* (1971) was observed in Venezuelan sand flies. Ortiz (1963) found one male, classified by him as belonging to the group "cayennensis-micropygus", which showed one mid-leg with deformation and fusion of the 5th tarsal segment and one hind leg also deformed, reduced in size, and lacking the nails. One striking fact in Abonnenc's paper is the omission of the already known cases of gynandromorphism in *P. ariasi* (Rioux *et al.*, 1965) and in *L. longipalpis* (Sherlock, 1958), which may be considered as a teratological malformation.

Only a few other records of abnormalities have been reported in the Old World since Abonnenc's review. Damasceno & Chadli (1979) again observed one supernumerary spine on one style of *P. papatasi* and Leger *et al.* (1982) in *S. minuta* while, Kaul & Watal (1979) described the reduction of the number of spines of the dististyle in *P. papatasi* and *S. babu babu*. One female of *Sergentomyia dentata* (Sinton, 1933) was observed to have an unarmed cibarium (Leger *et al.*, 1982). Five more cases of gynandromorphism have been described, two of *P. orientalis* (Ashford, 1974) and three of *S. minuta* (Rioux *et al.* 1974; Addadi & Deded 1977; Leger *et al.* 1982).

In the New World, Almeida (1970) noticed anomalies in "*L. anduzei*" (Rozeboom, 1942) = *L. umbratilis* Ward & Fraiha, 1977. One male of this species had three spines and another five spines instead of the normal four on the dististyle. Almeida (*loc. cit.*) also reported a similar anomaly in *L. rorotaensis* (Floch & Abonnenc, 1944) with six spines instead of the normal five on one style. Later (1971), Chaniotis (1971) described two examples of gynandromorphism in two females of *L. trinidadensis* (Newstead, 1922) and Llanos *et al.* (1975) found a female of *L. serrana* (Damasceno & Arouck, 1949), the spermathecae of which differed considerably from the typical, being completely smooth, possibly as consequence of the distention produced by an enormous number of spermatozoa. Williams & Carvalho (1979) publish a drawing of a female of *L. dispar* which lacked the hind teeth and showed the fore teeth clustered around the middle line while Young (1979), in over 103 females of *L. pia* (Fairchild & Hertig, 1961), noticed 3 specimens with 5 teeth instead of the normal four. In this note the anomalies observed in morphological studies of sand flies of Venezuela are described:

1. One teratological unidentified male (Fig. 1) (El Pilón de Valle Hondo, Cojedes State, 1.XII.1981). (Collector: Mr. Elio Fernández).
2. Four males of *L. trinidadensis* (Newstead, 1922) with one supernumerary spine in the dististyle (Figs. 2 to 5) (San Esteban, Carabobo State, 25. VII. 1979; 16. II. 1981 and 6. VII. 1981. Solano, Cojedes State, 13. X. 1981. (Coll.: Mr.

Elio Fernandez).

3. Two females of *L. trinidadensis* with five teeth instead of the normal four in the cibarium (Fig. 6) (San Esteban, Carabobo State, 1.III.1979 and 9.VII.1979). (Coll. : Mr. Elio Fernández).
4. One female of *L. shannoni* (Dyar, 1929) also with five teeth instead of four (Fig. 7) (El Pilón de Valle Hondo, Cojedes State, 7.X.1981). (Coll. : Mr. Elio Fernández).
5. Three females of *L. lichi* (Floch & Abonnenc, 1950) with the same anomaly (Fig. 8) (El Pilón de Valle Hondo, Cojedes State, 21.XI.1981, 3.XII.1981; Solano, 13.VI.1981). (Coll. : Mr. Elio Fernández).
6. One female of *L. gomezi* (Nitzulescu, 1931) with five teeth and another *L. gomezi* with only three teeth in the cibarium (Figs. 11, 12) (Sarare Abajo, Apure State 24.VII.1981; Chiricoca, Apure State, 20.VII.1981). (Coll. : Mr. Juan Pulido).

The abnormal male, shown in Fig. 1 has only one coxite with a small tuft borne on an elongate and hyaline tubercle. The single style has eight spines of different sizes. The single stout paramere shows a definite depression at the end. The lateral lobes and cerci are paired as usual. There is no trace of any pump or genital filaments. The F III (=antennal segment 5) of one antenna and the F IV (=antennal segment 6) of the other are abnormally swollen. There was no trace of teeth in the cibarium nor of other features typical of females which could support the idea of an intersex. It was impossible to ascribe this fly to a known species by the characters shown.

The identification of the anomalous males of *L. trinidadensis* was based on the size and the position of the five spines of the dististyle, the medial scattered hairs in the coxite and the sharpened parameres. All of them showed one extra spine on one style. As shown in the pictures (Fig. 2 to 5), the additional spine usually lies at about the same level as the basal spines. In one specimen (Fig. 3) the subapical spine appeared thicker than usual.

The first anomalous specimen of *L. trinidadensis* caught in San Esteban was in a sample of 892 males collected during one year work in the locality; this represents 0.11% of abnormality.

Among 481 females of *L. trinidadensis* collected in San Esteban during the same period as the males, two anomalous specimens were found (0.42%). They had a typical pharynx and spermathecae but the cibarium showed one supernumerary tooth (Fig. 6).

No further data than those listed can be added in relation to *L. shannoni* and *L. lichi*. The 2 abnormal females *L. gomezi* were in a sample of 47 females (4.25%).

Such sporadic abnormalities should be considered separately from the more common intraspecific variability as seen in *L. bahiensis* (Mangabeira & Sherlock, 1961) in which 20% of about a thousand specimens showed wide variations in the number of the spines on the style (Sherlock, 1963). This phenomenon seems also to be very common in *L. alphabetic* (Fonseca, 1936) and *L. torrealbai* Martins et al., 1979, and is therefore best

considered as a characteristic of an aberrant species (Martins *et al.*, 1979) rather than "common anomalies" (Forattini, 1973).

The type and frequency of abnormalities in the morphology of sand flies are important for correct specific identifications. However, the origin and significance of the abnormalities remain unknown. The possibility of a relationship with some form of paratitism has been suggested by Welch (1963) and by Lewis & Buttiker (in press).

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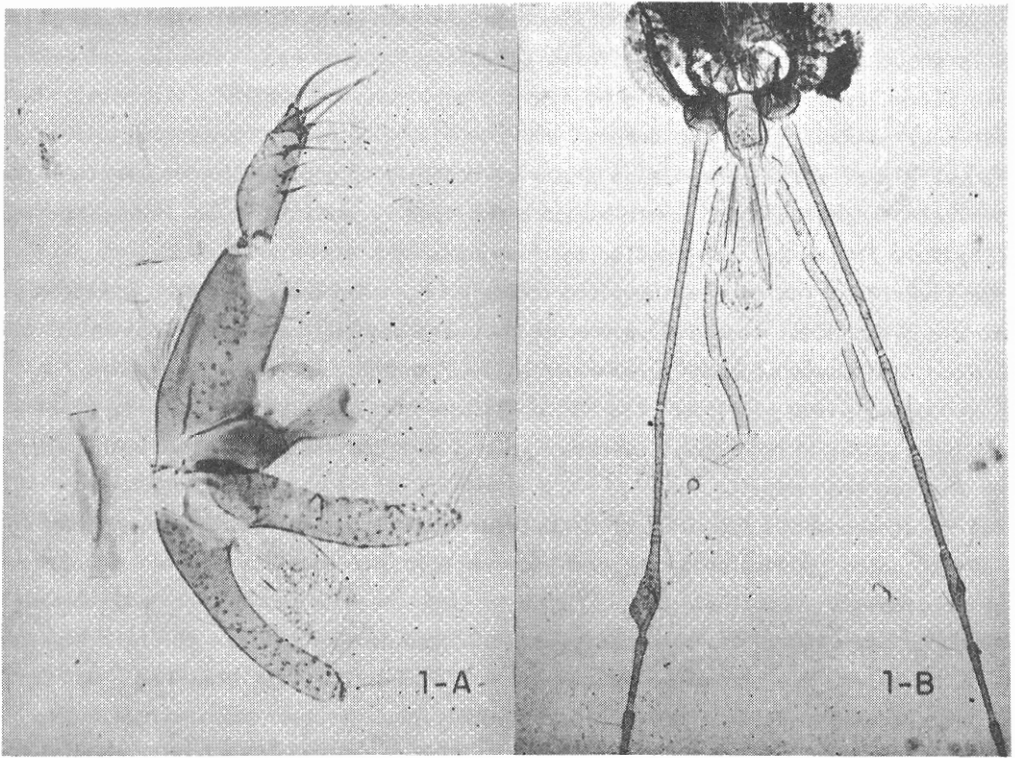


FIG. 1. Anomalous *Lutzomyia* sp.: A- Male Genitalia showing only one coxite, one style with 8 spines and one paramere. B- Head showing the FIII and FIV of the antenna abnormally swollen.

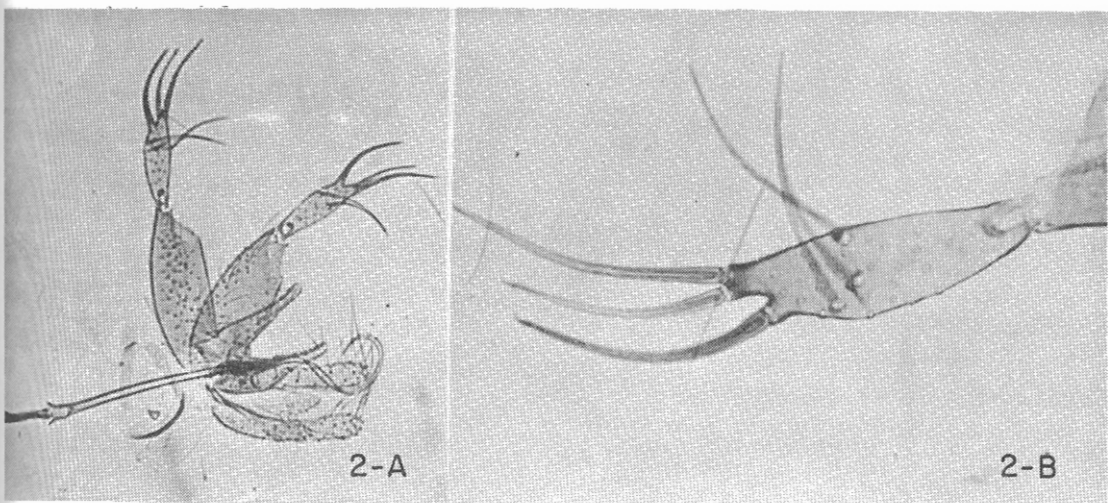


FIG. 2. Anomalous *L. trinidadensis* (specimen 1). Male showing one style with 6 spines. A-General view of the genitalia. B-Detail of the abnormal style.

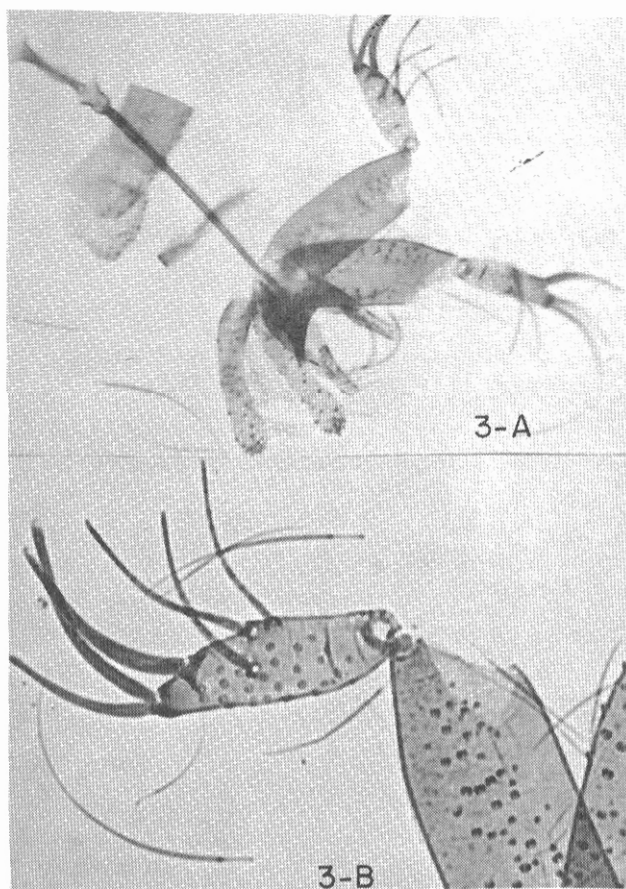


FIG. 3. Anomalous *L. trinidadensis* (specimen 2): Male showing one style with 6 spines. A-General view of the genitalia. B- Detail of the abnormal style.

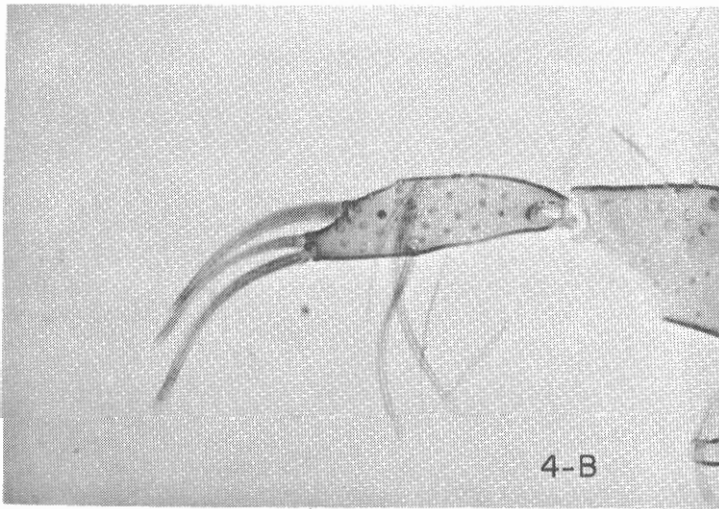
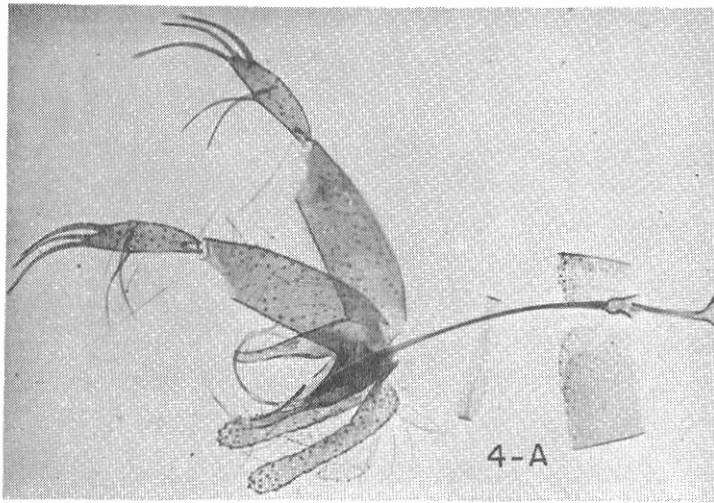


FIG. 4 - Anomalous *L. trinidadensis* (specimen 3): Male showing one style with 6 spines. A - General view of the genitalia. B - Detail of the abnormal style.

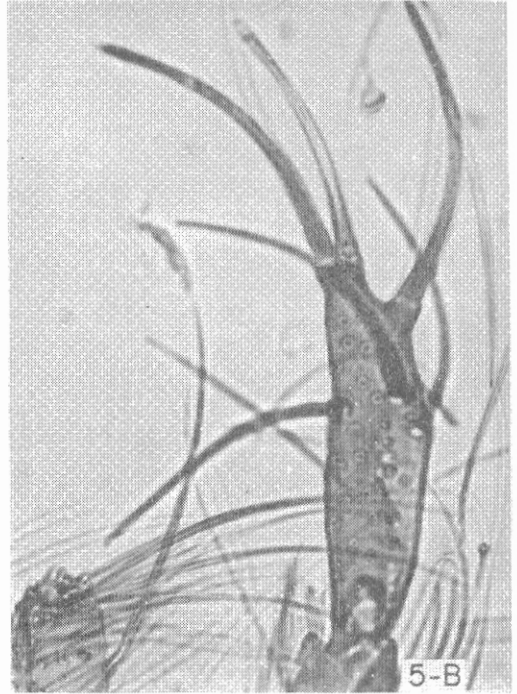
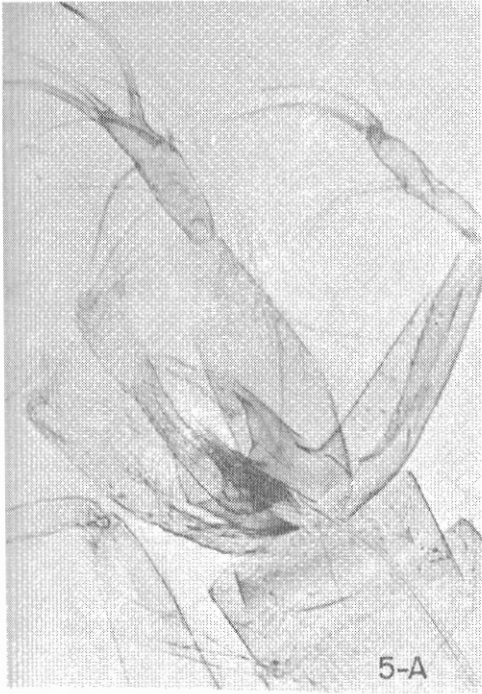


FIG. 5 - Anomalous *L. trinidadensis* (specimen 4): Male showing one style with 5 spines. A - General view of the genitalis. B - Detail of the abnormal style.

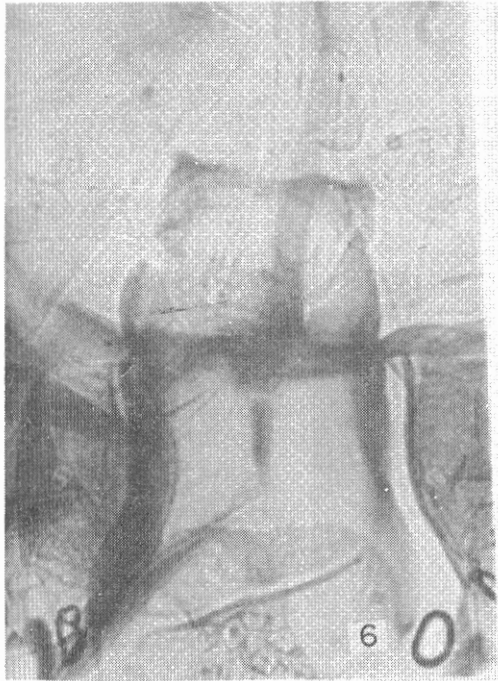


FIG. 6 - Anomalous *L. trinidadensis*: female cibarium showing five teeth instead of the normal four.

FIG. 7 - Anomalous *L. shannoni*: female cibarium showing five teeth instead of the normal four.



FIG. 8 - Anomalous *L. lichyi*: female cibarium showing five instead of the normal four.



FIG. 9 - Anomalous *L. gomezi*: female cibarium showing five instead of the normal four.

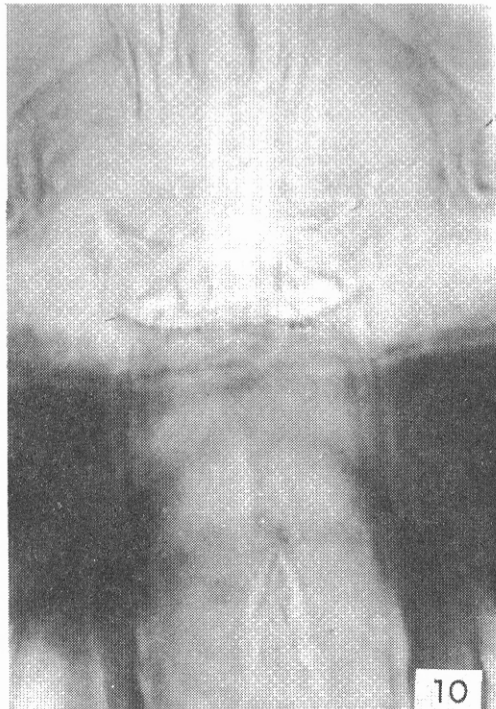


FIG. 10. Anomalous *L. gomezi*: female cibarium showing three teeth instead of the normal four.

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