A PICTORIAL FIELD GUIDE FOR THE RAPID IDENTIFICATION OF SANDFLIES (DIPTERA: PSYCHODIDAE), COMMONLY ENCOUNTERED IN PARÁ STATE, BRAZIL.

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SUMMARY

A pictorial field guide to the 30 species of sandfly most commonly encountered in Pará State is presented, based on the easily recognised external characters of the length of the 5th palpal segment, thoracic infuscation, abdominal colour and head and body size. In most cases this allows identification to the species. In others, especially with females, it gives an indication of the species, which may then be confirmed with data from more detailed taxonomic studies. This type of field guide helps in teaching, rapid sorting of flies prior to dissection and in acquainting visitors with the variety of species present in a given area.

A rapid technique for the taxonomic sorting of unmounted, freshly killed female sandflies is required, prior to the dissection of large numbers of a particular species. Such a method is useful in areas where numerous species occur in studies on natural flagellate infections, age determination and for ecological studies. With the above points in mind a pictorial field guide has been designed that enables the identification of unmounted, unmacerated specimens of the 30 more commonly encountered species of phlebotomine sandflies (*** in Pará State, North Brazil. It is based on the easily recognised external characters of the length of the 5th palpal segment, thoracic infuscation, abdominal colour and proboscis and body size.

Taxonomy of male phlebotomine sandflies is based on the structure of the genitalia and, as most of this is external, a wholly external character key is readily made. Female taxonomy, however, is based on the internal characters of the cibarium, pharynx and spermathecae. In order to produce an external character key we therefore return to an unso phisticated "phlebotometry" (see Martins et al., 1978 p. 3 for review), using relative

(*) This work was carried out under the auspices of the Wellcome Trust (London) and the Instituto Evandro Chagas, Fundação SESP, Belém, Pará, Brazil.
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(*** Authorities for all phlebotomines mentioned in the text are given by Martins et al. (1978).

ACTA AMAZONICA, 16/17 (n° único):635-642. 1986/87. 635
lengths of the proboscis, palpal segments and body, along with the degree of infuscation. This idea is not new; indeed many sandfly specialists presently use external characters to separate certain species (H. Fraiha, R. P. Lane, P. D. Ready, D. G. Young and R. D. Ward personal communications 1983 & 1984).

A key used to separate five anthropophillic sandflies by Biagi (1966), in Mexico, was based mainly on palpal segment length and infuscation. Flech and Abonnenc (1952) stressed the use of relative lengths of palpal segments in their keys to the sandflies of French Guiana, and four members of the shannoni group have been similarly separated according to the degree of infuscation by Morales et al. (1982). The use of thoracic infuscation as a reliable character seems to be gaining favour, having been used by Young & Fairchild (1974) and Ready & Fraiha (1981). Indeed Chaniotis (1974) showed the usefulness of thoracic infuscation to separate 7 anthropophillic species, during studies onvesicular stomatitis in Panama. Identification using external characters is essential for work on viral isolations from sandflies, where bulk samples of whole sandflies are used.

Perhaps the major advantage of a simple visual guide is for teaching purposes. Technical staff in this Institute are able to identify most of the species they encounter without having to use the standard, more unwieldly (and in many cases unavailable) internal character keys, and the guides presented below have allowed rapid species sorting prior to the dissection of sandflies in our leismaniasis study areas (Ryan et al., 1985).

DISCUSSION

This field guide to the sandflies of Pará has been found to work during the period between June 1983 and December 1984, in our study sites of Marajó (Lainson et al., 1983) Belém (Lainson & Shaw, 1968), Carajás (Ward et al., 1973), Santarém (Lainson et al., 1984 & 1985), Tucuruí, Porto Trombetas, Ruropolis, Presidente Médici and Paragominas. The phlebotomine fauna must first be studied in a given area; and a field guide for the common species may be produced which speeds the work rate and allows identification of the sandflies without mounting or maceration. Smaller samples may be examined in greater detail to check the validity of the identification made with the field guide.

We stress that this is not an alternative to the accepted characters in use at present in the few available keys, but rather an aid to field work in a given region. Where for example, one already knows Ps. davisi to be present in a given area the pictorial guide immediately reminds the field worker of its appearance. Again a relatively untrained dissector may give his opinion that a sandfly is Ps. davisi, and this can then be confirmed by the person of the dissecting team who is examining the spermathecae and guts.

In addition, for teaching purposes, this guide provides a useful starting point, or introducing to the sandflies of Pará. The small and medium 5th palpal segment groups function well, fortunately, as most of the anthropophillic flies belong to these groups. Even so difficulties may arise in separating Ps. amazonensis from Ps. clausbrei and the
Trichophoromyia subgenus generally. Within the series squamiventris it is at present impossible to separate female Ps. squamiventris squamiventris, Ps. s. maripaensis, Ps. complexus; Ps. chagasi and as yet undescribed members of the series found in Pará State: the males of these species, however, are all characteristic (Ready et al., 1982). Only Ps. wellcomei and Ps. complexus are figured in this guide as they are both present at our study site in the Serra dos Carajás, where recent studies (Ryan et al., 1985) have confirmed without doubt that the former is the proven vector of Le. b. brasiliensis. We use Lu. guyanensis assuming that Lu. geniculata is the junior synonym. We use here Lu. trinidadensis although this may eventually prove to be Lu. villelaei, should the latter be resurrected (H. Fraiha personal communication, 1985).

The long 5th palpal segment group contains many of the species that are encountered only as males and/or that are captured rarely. Anthropophilic species include Lu. gomezi, Lu. carvalhoi and Lu. longipalpis, and these are all characteristic. It is difficult to distinguish between females of species in the subgenus Pressiata, as well as between Lu. dasypodogeton and Lu. longispina females. Another recent complication is the discovery of a Lu. longipalpis complex (Ward et al., 1985), where note must be made of the presence of one two abdominal, white spots on males.

All the characters used are constant, but caution should be exercised when dealing with Lu. longipalpis, as this species exhibits a wide morphological range. A small, white form encountered in Câmara, Marajó Island and Santarém, Pará, is fortunately uncommon in our samples (1 = 1000).

ACKNOWLEDGEMENTS

We are grateful to Dr. D. G. Young for his comments on the manuscript.

RESUMO

É apresentado um "levantamento ilustrado" dos 30 flebotomíneos mais comumente encontrados no Estado do Pará, Brasil, usando-se características externas, com as medidas do quinto segmento das palpos, cor do tórax e do abdômen, e medidas da cabeça e do corpo. Com isto é possível, na maioria dos casos, levar à identificação até a espécie. Existem algumas espécies, entretanto, que são mais difíceis de serem identificadas, particularmente as fêmeas, havendo nestes casos, necessidade de um exame taxonômico mais detalhado, para que se possa concluir a identificação. Esta orientação ilustrada é particularmente útil a técnicos de laboratório, estudantes e entomólogos visitantes.
Fig. 1A. Field guide to the 30 most commonly encountered species of sandflies in Pará State, north Brazil.

A. Females.

I: The key - initially divides into 3 columns according to the relative length of the 5th palpal segment, where the ratio to the 5th:4th:3rd segments is as follows:

- **S** (short) 5th=0.5x3rd=4th= genus *Psychodopygus.*

| Q | S | M | L |
|---|---|---|---|
| 1 | S | Ps. carrerai | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 2 | M | Ps. amazonensis | | 3 | L | Ps. paracensis | | 4 | M | Ps. davisi | | 5 | L | Ps. welcomei complexus | | 6 | M | Ps. laisoni | | 7 | M | Ps. guyaresensis | | 8 | L | Ps. bispinosa | | 9 | M | Ps. hirsuta | | 10 | M | Ps. virata | | 11 | L | L. dendrophaga | | 12 | M | L. richardwardi | | 13 | L | L. gomezi | | 14 | M | L. bicuspidalis | | 15 | M | L. vivescens | | 16 | M | L. intrinsinosa | | 17 | M | L. triacantha | | 18 | M | L. nordestina | | 19 | M | L. carvalhoi | | 20 | M | L. terebralis | | 21 | M | L. truncal | | 22 | M | L. uncinata | | 23 | M | L. amputata | | 24 | M | L. vexillarii | | 25 | M | L. antunesi | | 26 | M | L. angustipalpis | | 27 | M | L. antigua | | 28 | M | L. antochaeta | | 29 | M | L. antorhiza | | 30 | M | L. antourenca |
cont. - Fig. 1A.

M (medium) 5th=3rd=2x4th & <(3rd+4th)= subgenera Viannamyia, Trichophoromyia, Nyssomyia, Psathyromyia and groups brasiliensis, lanei and driesbachi.

L (long) 5th=2x3rd=3x4th & > (3rd+4th)= all other subgenera and groups.

II. Using number 6, Ps. lainsoni as an example: the left figure indicates the degree of infuscation, represented by shading (increasing from white; light; medium; to dark), of 1: scutum; 2: pronotum; 3: scutellum; 4: sternopleuron.
The letters in the figures refer to:
5: Size of proboscis (from the clypeus to the tip) in proportion to:
the size of the antenna (shown as being equal in length to antennal segments 1 to n) and:
the size of the head (from read capsule to clypeus) thus:
vl (very long): n=6: > head,
L (long): n=5: = head,
M (medium): n=4: = head,
S (short): n < 4: < = head,
vS (very short): n < 4: 0.6 x head.

6: Overall size of the thorax and abdomen, excluding the head and male genitalia. This category is subjective in that the observer will consider Ps. wellcomei as a large fly, because of its long legs. However, as a guide we give the equivalent size in millimetres:
LR (large) = > 2.2mm & > 1.8mm,
M (medium) = 2-2.2mm & 1.6-1.8 mm,
S (small) = < 2mm & < 1.6mm for females and males respectively.

7: Colour of the abdomen where W = white, LG = light, M = medium and D = dark infuscation, Y = yellow, B = black.

8: When mounted or dissected the spermathecae (figured for each species) allow confirmation. Where (a) is the length of the spermathecal body, such that the common spermathecal duct is twice the length of (a) ie. 2a.
Fig. 18. As for females with the additional parameters of: (as in examples 21 Lu. dasypodogeton and 22 Lu. gomezi).

B. Males.

9: The overall size of the genitalia, this is only used when obviously LR (large) or S (small).
10: The arrangement and number of spines on the style.
11: The presence or absence of a basal tuft.
12: The structure of the paramere and, in some cases, the structure of the lateral lobe.
13: The formula 2sP1/2C is such that the genital filaments are 2x the length of the (s) small sized (P) pump which in turn is 1/2 the length of the (C) coxite. It may be determined after mounting or dissection.
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(Aceito para publicação em 26.11.1986)