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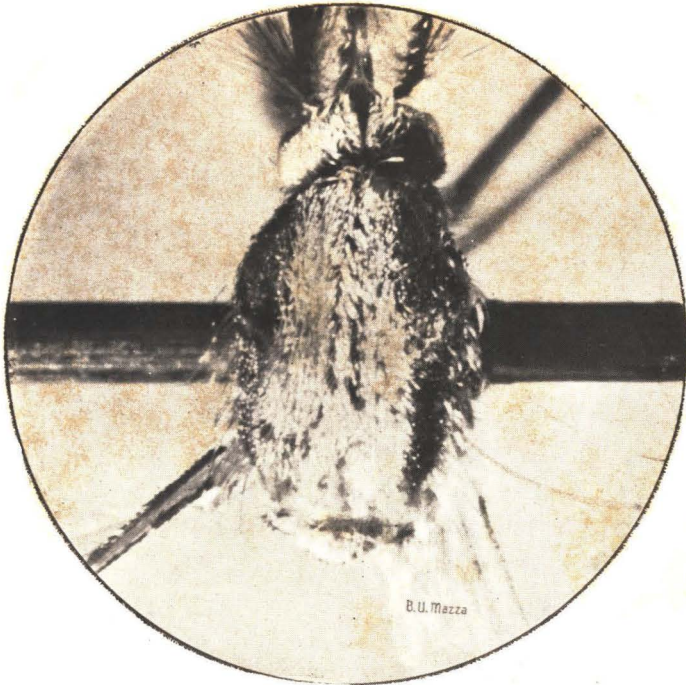


Fig. 1



Fig. 2

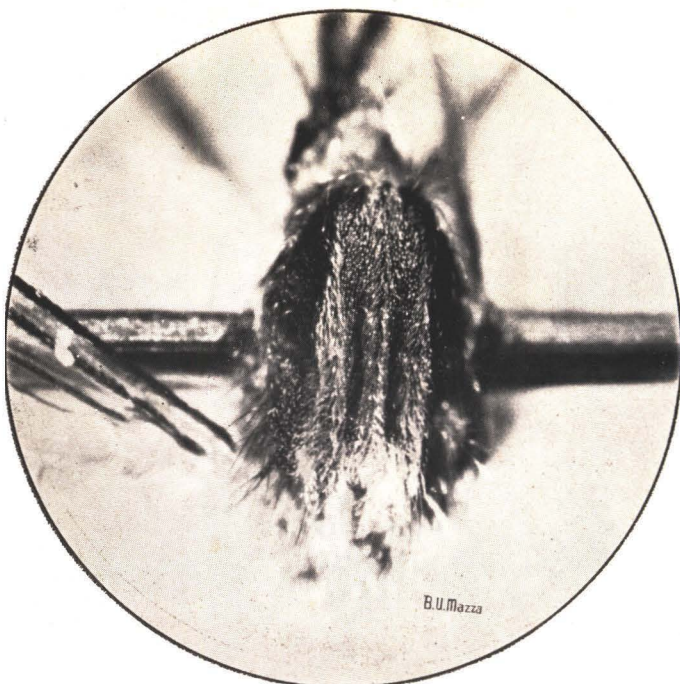


Fig. 3

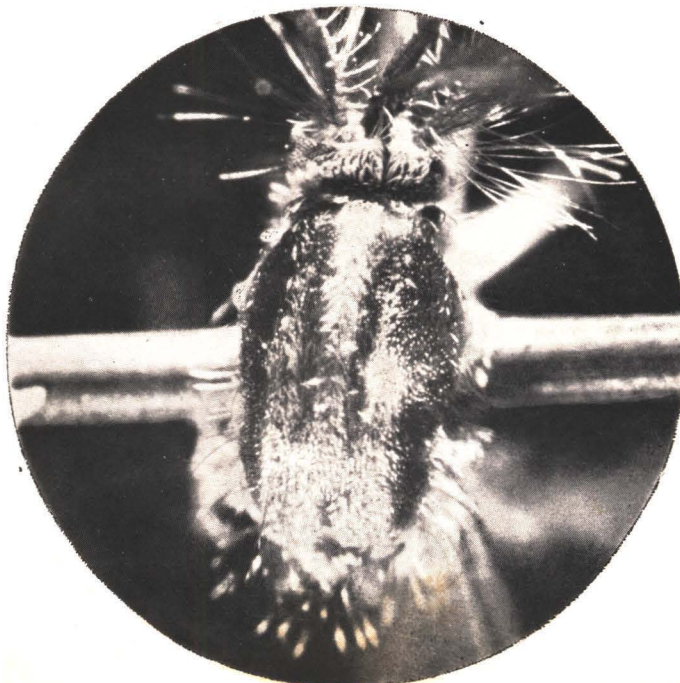


Fig. 4



Fig. 5



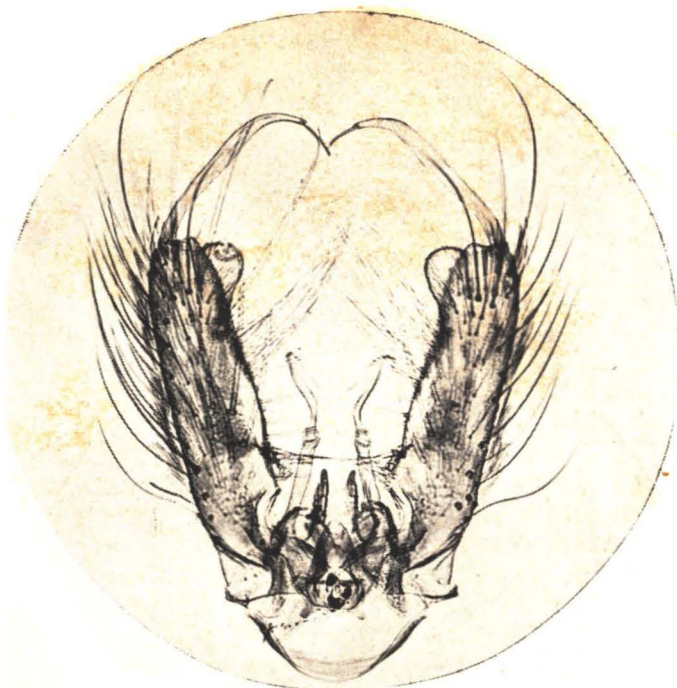


Fig. 6



Fig. 7

## NOTES ON SOME SPECIES OF *Aedes* (*Ochlerotatus*)\*

(Diptera, Culicidae)

By P. C. DE AZEVEDO ANTUNES and JOHN LANE

(With Plates I-IV)

CONSIDERING the epidemiological importance of several species belonging to the genus *Aëles*, we think it worthwhile to report below some observations we have made on *Aëles* (*Ochlerotatus*) *crinifer*, *nubilus* and *serratus*.

The morphological characteristics of the Culicidae in general are subject to variations which frequently make difficult the exact determination of a species. While certain species show characteristics which, once described, are always recognizable, there are others that vary so much that, without the help of other details such as larvae and male genitalia, their identification is liable to confusion. This is why a description frequently does not apply to the specimen we have at hand. To eliminate this cause of error, descriptions of a species should give not only the characteristics with which the species is most commonly found, but also all kinds of variations which may occur.

Although we believe that this is not always possible, we would like to point out that these variations should be more accurately studied and systematised by entomologists.

### I. *Aëles* (*Ochlerotatus*) *crinifer* Theobald 1903

Following this method in our studies on Culicidae, we observed that the mesonotal pattern of *Aëles crinifer* is subject to variations not yet coordinated. This is what we intend to do in this paper.

The specimens studied were bred from larvae captured in the neighbourhood of São Paulo, Brazil (Santo Amaro, 16th Sept. 1933 and Butantan, August 1933). Those from Santo Amaro were taken from water permanently collected in a large hollow, shaded, rich in vertical vegetation and organic matter. *Psorophora ciliata* was bred from specimens taken from the same place at the same time. Those from Butantan were captured in a temporary pool of water, more or less shaded and with aquatic vegetation, chiefly algae; associated with this species we found *Lutzia bigoti*, *Uranotania pulcherrima* and *Culex* sp.

The larvae were bred in isolated tubes to facilitate exact reference to larval moults and adults. Identification was based on adults, male genitalia and larval skins.

Besides these bred specimens we studied also a few others captured in forests with human bait in other localities of the State of São Paulo such as Itapira (January, 1934) and Piracicaba (October 1933); others were caught in the city of São Paulo.

\* Read before the "Soc. de Biologia de São Paulo", at the session 8-3-934.

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THEOBALD's original description<sup>13</sup> of mesonotum coincides with those of BONNE & BONNE WEBSTER<sup>3</sup> and PERYASSÚ<sup>10</sup>. That of THEOBALD is as follows: "Female: Thorax black, with very thin narrow-curved bronzy-brown scales on each side and a broad median creamy area with two very marked parallel dark lines covered with similar bronzy-brown scales as the sides".

The description of the female in DYAR's Monograph<sup>6</sup> is the following: "Mesonotum brown scaled on the sides; a broad, even area of whitish-silvery scales through the middle, corresponding to the area inclosed by the yellow lines of *augustivittatus*".

The comparison of the above descriptions, not only in regard to the markings but also as to the coloration of the median area on mesonotum, shows that they are not in accord; thus, while THEOBALD speaks about a median creamy area subdivided in three stripes by two very marked parallel dark lines. DYAR describes a broad, even area of whitish-silvery scales.

In our specimens, the central mesonotal pattern shows a variation from three distinct stripes up to a single nearly even broad stripe with only very slight dark outline. This variation is well shown by the photographs at the end of this report. As to coloration of the light scales, our specimens are in accord with THEOBALD's description, showing a creamy median area.

The description of the mesonotum is as follows: narrow, curved, bronzy-brown scales on the sides; a broad median creamy area, gradually increasing in width from anterior extremity of mesonotum up to scutellum. This area varies from the nearly even pattern with only an outline of dark marking, to the presence of two parallel distinct dark submedian stripes formed by dark scales identical with those in the sides. The scales of the light coloured area are narrow and creamy; in the prescutellar region most of them are white or whitish; a small group of white ones is frequently present at the anterior extremity of this stripe. The white scales are broader than the creamy. Setae are abundantly found on the roots of the wings and ante-scutellar region; there are also a few on the creamy area.

As to mesonotal pattern, our specimens can be separated into three groups as follows:

1. Median creamy area nearly compact, with only an outline of dark markings; see photograph n. 1 of specimen n. 226 in the collection of the Instituto de Hygiene de São Paulo.
2. Median area formed by three distinct light coloured stripes and between them two dark stripes; see photograph n. 5 of specimen n. 229 in the collection of the Instituto de Hygiene.
3. In the group we placed the specimens that show intermediate types of pattern; see photographs ns. 2, 3 and 4, of specimens ns. 231, 222 and 232 in the collection of the Instituto de Hygiene.

There is presented below a table showing the number of specimens studied and also their distinction as to the markins.



TABLE I

MESONOTUM	MALES	FEMALES	TOTAL
Creamy area nearly compact. . . . .	10	—	10
Three distinct light bands . . . . .	4	29	33
Intermediate types . . . . .	8	2	10
	22	31	53

Our material is not sufficiently abundant for us to give any final opinion, but it appears that the three clear stripes predominate in the females while the males tend to a more compact mesonotal marking. Only the examination of a much larger number of specimens from different localities of the State could furnish us with an exact conclusion in reference to the variations of the mesonotum of *Aedes crinifer* in São Paulo and also to the existence of aspects peculiar to sex.

The following is our observation concerning morphological details found on the male hypopygium and larvae of this species.

**Male genitalia :** In reference to the filament of the claspette, DYAR's description<sup>6</sup>, and more recently that of PRADO<sup>1</sup>, mentions the presence of retrose teeth in the groove. We could not see this detail although we have very good slides. What we observed in the groove of the filament are not teeth but spines which are so small and delicate as to be undemonstrable in the photograph given (see phot. n. 6 of slide n. 18 of specimen n. 232 in the collection of the Instituto de Hygiene).

**Larva :** Head rounded, bulging at the sides. Antennae slender, long, more or less constricted after antennal tuft, with a stout longer spine in the extremity and two others smaller and more slender also present : covered by short pillosity. Antennal tuft on proximal half of antennae, near the middle, and formed by 5 or 6 hairs. Ante-antennal tuft multiple, formed by 5 or 6 setae. Upper frontal tuft of 4 setae, and the lower one of 3 ; between these, a tuft of 2 or 3 setae. Two or three outer occipital setae. Inner occipital has a single seta. The lateral comb of the eighth segment has from 16 to 22 thorn shaped scales. Air tube is short and stout ; pecten running beyond the middle and formed by 16 spines which gradually enlarge from base towards distal portion, leaving the last spine quite detached from the others. A tuft beyond pecten of air tube with 6 to 8 setae. On the dorsal aspect there are four tufts of 4 to 5 setae each. The anal segment is ringed by the plate and has a ventral brush formed by 13 to 15 tufts of hairs. Anal gills long and ending in a sharp point. Dorsal tuft of the anal segment formed by a tuft and a long hair. The lateral hair is single.

About the larval details we desire to emphasize the presence of a median tuft between the lower and upper frontal tufts ; also the existence of 4 dorsal tufts on air tube instead on only 3 tufts as has already been described (1 and 10). (See phot. n. 7).

## II. *Aëles (Ochlerotatus) serratus*, Theob. 1901, & *nubilus*, Theob. 1903

Below are given the results of observations made on one hundred and five specimens of *Aëles* from different localities of the State of São Paulo. From the very beginning difficulty was found in separating specimens of *nubilus* and *serratus* as will be shown.

This difficulty does not refer to male specimens whose genital parts are sufficiently characteristic to permit distinction. In a general way, authors establish a separation between females of *nubilus* and *serratus*, the latter being characterized by a light coloured longitudinal band on the mesonotum, which would be absent in *nubilus*. See DYAR's Monograph<sup>6</sup>.

Our observations, however, are in accordance with the doubts raised by MARTINI<sup>9</sup>, for we verified that the female specimens of the two species cannot be distinguished when the light mesonotal stripe is present.

We can divide our material into two lots: One, coming from the coastal localities of São Paulo (Juquiá, Itanhaem (Rio Branco), São Sebastião and Bertioga) and the other from the inland localities (Itapira, Piracicaba, Porto Martins, Porto São Pedro \*, Lussanvira \* and the Capital of the State).

Of twenty-five specimens from Juquiá, a lot of six was bred. These latter, taken from a single small collection of water, gave four females and two males; one of the males was unfortunately lost. The examination of the genital parts of the remaining male undoubtedly leads to its being classified as *nubilus*; the four females, evidently specimens of the same species, showed the presence of a light band on the mesonotum. From the remaining nineteen specimens, all captured, two are males and of the species *nubilus* as indicated by the examination of genitalia; upon the examination of the seventeen females three were found to have mesonotum entirely dark and fourteen a light coloured stripe. As can be seen, only males of *nubilus* were obtained in this locality, by handcatches or breeding. In the females, though found in identical conditions, various aspects were encountered, varying from entirely dark mesonotum up to a light, distinct, longitudinal band of noticeable width. We will point out later, in connection with the remaining specimens, the gradative variation observed.

The specimens from the other localities in the coastal region, all female and taken in handcatches, are thirty-eight in number. Of these, twenty-four show dark mesonotum and fourteen a light coloured longitudinal band.

As to all the female specimens from the coastal region, we find twenty-seven with dark mesonotum and thirty-two with longitudinal light stripe.

We were unable to ascertain the existence of *serratus* in the above lot, on the basis of the examination of male genitalia. The fact that we did not find a dark unmarked mesonotum in the small lot of bred females, makes it impossible for us to state that the females captured in handcatches and showing a clear stripe belong to the species *serratus*. The bred material, obtained from the single water collection referred to above, having yielded one male of *nubilus* and females with banded mesonotum, leads us to think that the females belong to the species *nubilus*. The references of THEOBALD<sup>14 15</sup>, HOWARD, DYAR and KNAB<sup>8</sup> and MARTINI<sup>9</sup> corroborate our classification of the females in this species.

DYAR<sup>6</sup>, SHANNON<sup>11</sup> and BONNE & BONNE WEPSTER<sup>3</sup> describe the females of this species as having a dark mesonotum, although, as we have said, this

\* We obtained specimens from these localities through the kindness of Prof. S. B. Pessoa of the Depart. of Parasitology of the Faculdade de Medicina de São Paulo.

is not always the case. That the mesonotum varies, the following authors have already noticed. THEOBALD<sup>14</sup> at the end of his description of *Protonotus quasiserratus* says on the second paragraph of his observations: "This species is very variable, some show only a trace of the median pale line, in others it is practically absent". HOWARD, DYAR & KNAB<sup>8</sup> at page 704 make the following observation: "The thoracic median line of the adult is variable in width and in one female of Dr. Grabham's original series is nearly obsolete; it is broader in the male". The same authors, on page 797, speaking about *serratus*, write the following in the last paragraph of their description: "*Aedes serratus* varies in coloration and specimens occur with a very narrow thoracic median stripe".

The second lot of material, obtained from the inland region, is composed of forty-two females and one male, all specimens being taken in handcatches. The male and one female were captured in the Capital. This male was classified by the examination of genitalia as *serratus*. The other specimens, in variable number, come from the already mentioned localities in the inland region. It is interesting to note that all females with one exception had a median light stripe on the mesonotum. We can easily classify the male from the Capital as *serratus*, but the remaining specimens, except the unmarked one, might be either *serratus* or *nubilus*. This is exactly the point we want to emphasize and that lack of bred material makes it impossible for us to clarify. CESAR PINTO<sup>4</sup> and A. PRADO<sup>1</sup> dealing with inland regions material, only mention *serratus*. Studying these two species in relation to place of capture, we at first thought that *serratus* was an inland species while *nubilus* was from the coastal region. This idea was later abandoned in view of the fact that in a recent capture (Itapira, Jan., 1934) we found a female with unbanded mesonotum, evidently *nubilus*.

Our conclusion as to the identification of female specimens of these two species is, according to descriptions in the literature and our observations: *nubilus*, when the specimen, has dark, unmarked mesonotum; those with a median longitudinal light coloured stripe may be either *serratus* or *nubilus*.

We want to show now the variations observed in our specimens not taking in consideration their determination as to species. Dimensions of width in band were taken by means of micrometrical ocular and are referred to below in terms of micra.

TABLE II. COASTAL REGION

LOCALITY	STRIPE ABSENT	A FEW MEDIAN WHITE SCALES	WIDTH OF STRIPE IN MICRA									TOTAL
			53	79	106	132	159	185	212	265	479	
Juquía . . .	3	—	1	—	4	—	1*	3*	9	2	1*	24
Itanhaem . .	1	—	—	—	—	—	—	—	—	—	—	1
Bertioga . .	19	1	—	1	1	—	—	—	—	—	—	22
S. Sebastião .	4	3	1	—	3	—	1	—	3	—	—	15
Total . .	27	4	2	1	8	—	2	3	12	2	1	62

\* Male specimens, except two females of the three specimens from Juquía under the heading of 185 micra.

TABLE III. INLAND REGION

LOCALITY	STRIPE ABSENT	A FEW MEDIAN WHITE SCALES	WIDTH OF STRIPE IN MICRA								TOTAL	
			53	79	106	132	159	185	212	265		479
Itapira . . .	1	—	—	—	—	1	2	2	12	2	—	20
P. Martins . .	—	—	—	—	—	—	—	—	5	1	—	6
P. S. Pedro . .	—	—	—	—	—	—	—	—	3	—	—	3
Lussanvira . .	—	—	—	—	—	1	—	—	10	1	—	12
Capital . . .	—	—	—	—	1	—	—	—	1*	—	—	2
Total . . .	1	—	—	—	1	1	3	2	31	4	—	43

The above tables bring out the following facts :

1. There are quite a few (43,5%) non-striped specimens in the lot from the coastal region, while only one (2,3%) non-striped is found in the inland lot.
2. Striped specimens are well represented in both lots.
3. In the lot from the coastal region the marking varies gradually from a few light coloured scales up to a wide band (479 micra); in the other lot the stripes vary from 106 up to 265 micra width.

Aknowledgment. We are indebted to Messrs. A. Federman and B. U. Mazza for their kindness in furnishing us with the photographs illustrating this work.

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\* Male specimens, except two females of the three specimens from Juquiá under the heading of 185 micra.