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MOSQUITO, *URANOTAENIA BIMACULATA*
LEICESTER. (DIPTERA: CULICIDAE)**

BY

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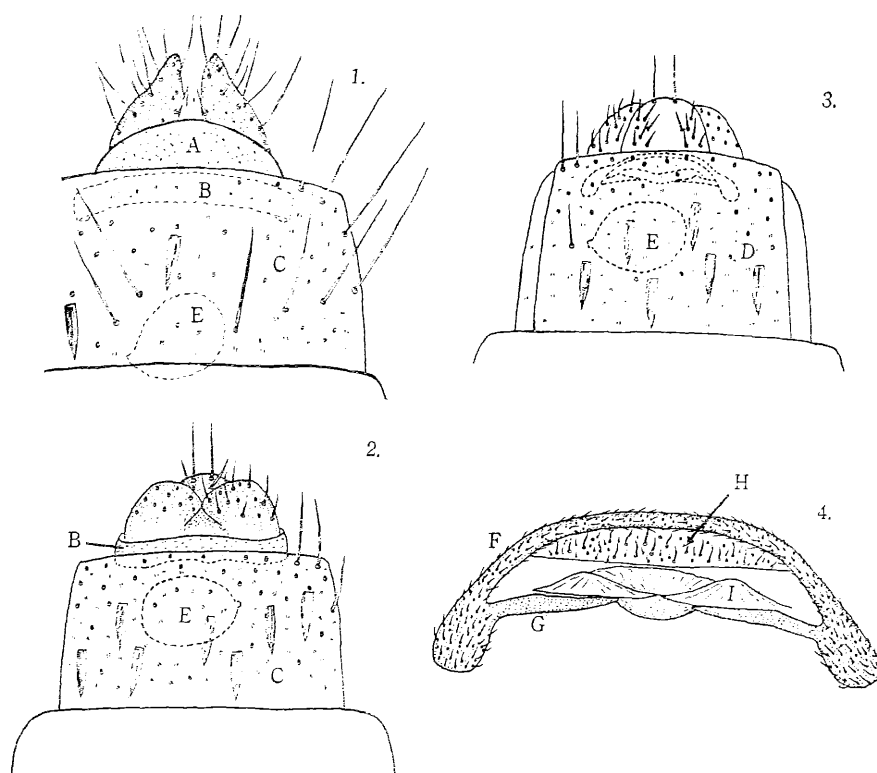
The phylogeny of mosquitoes can apparently be worked out very nearly by the studies of the male genitalia, but grouping based on genital structure of the male are not used in the practical problem of identifying a female mosquito, a pupa, or a larva, so that it would seem necessary that recognition characters be found for those other forms.

Edwards was largely responsible for the extensive use of the arrangement of the various bristles or setae of the thorax for generic grouping. The setal characters have the advantage of applying to both sexes and seem to result in grouping which are natural, judged by their correlation with larval characters and structural differences in the genitalia, and in 1932 he divided the mosquitoes into three Tribes, the Anophelini, the Megarhinini, and the Culicini. Edwards has regarded the anophelines and the megarhines as closer to the generalized mosquito ancestor than the culicines and divided culicines into five groups of genera, the *Sabethes* group, the *Uranotaenia* group, the *Theobaldia-Mansonia* group, the *Aedes* group, and the *Culex* group, which he listed in this order of specialization. The genus *Culex* is placed last because of the specialized character of the male genitalia and of the larval siphon. *Uranotaenia* group includes three genera, such as *Hodgesia*, *Zeugomyia*, and *Uranotaenia*; genus *Uranotaenia*, however, distinguished from all other Culicinae, even from other Culicidae by the form of microtrichia on wing membrane; these are very much smaller and denser than other genera and are overlooked by the usual magnification.

From this point of view, Shiraki (1954) established five Subfamilies, such as Anophelinae, Uranotaeniinae, Megarhininae, Sabethinae, and Culicinae in Family Culicidae.

The author has studied and described terminalia of the most of female mosquitoes available in Japan (49 species out of 60, and could find simple characteristics of the genera and even in the species with very few exceptions. (Hara, 1957) During studies, the author observed many characters of *Uranotaenia* differed from other genera belonging Culicini and some of those characters were even similar as those of Anophelini's. The author like to describe the female terminalia of *Uranotaenia bimaculata* together with other specific characters of larva, pupa, and both sexes, and to discuss the problem of tribe in this paper (Plate 1).

It is my pleasure to express my gratitude to Dr. M. Sasa from whom I received permission to use whole the specimens in the laboratory, constant encouragement and helpful criticism.

Plate 1. Terminalia of *Anopheles* and *Uranotaenia*.

1. *Anopheles indesai japonicus*. 2, 3, 4. *Uranotaenia bimaculata*. A. 10th tergite. B. 9th tergite. C. 8th tergite. D. 8th sternite. E. Spermatotheca. F. Cowl. G. Sigma. H. Insula. I. Atrial plate.

DISCUSSION

1. External Characteristics of Genus *Uranotaenia*

Larva: Head usually longer than wide. Antenna short. mouth brush with pectinate hairs. Preclypeal spines usually stout and short, arising from projections of preclypeus. Inner and middle frontals very stout, sometimes weakly developed, resembling flattened leaf-like bristles. In all of the known American species, four species, the meso- and metathoracic dorsal principals and the metathoracic ventral are well developed, the latter being stellate. Pro- and mesothoracic dorsolaterals separate. Comb scales set in a single row along posterior margin of lateral sclerite. Siphon elongate, with scale-like pecten teeth, wide at tip, with lateral and terminal delicate fringes, and one pair of subventral hair tufts. Saddle completely ringed, with well developed, somewhat tufty saddle hair. Ventral brush on barred area [Barraud, 1943 and Yamaguti and LaCasse, 1951].

Pupa: CT-6 simple, stouter and longer than other prothoracic hairs. IX-1 usually present, longer than 1/2 of the length of 9th abdominal segment

(Asanuma and Nakagawa, 1954). Respiratory trumpet rather short, with small opening, paddle without distinct fringe, though apical margin may be serrated, part of paddle inside midrib wider than that of outside, one small terminal hair (Edwards, 1932).

Adult: Small mosquito, distinguished from all other Culicinae by the form of microtrichia on wing-membrane, these are very much smaller and denser than in any other genus, requiring a magnification of more than 80 for their detection; at this magnification the membrane appears clear (Barraud, 1934). Palpi short in both sexes. Proboscis long, dark, often somewhat swollen at tip, especially in male. One spiracular and one lower mesepimeral bristle present. Postspiracular bristle absent. Stenopleural bristle very few. Paratergite bare. Radius fork much shorter than its stem; analis ending opposite base of cubitus fork; squama and alula without fringe. Pulvilli absent. Dorsum of abdominal segment dark, sometimes irregularly banded or patched with pale scales.

The characteristics, of which head longer than broad (appearing more or less as rounded), antennae not inflated or very large; 8th abdominal segment with a lateral chitinous plate with one row of comb on its posterior margin and pecten teeth usually with fringe, observed in larvae, pupal characters, and that of spiracular and postspiracular bristles, radius fork, ending of analis, squama and alula positively distinguish from other genera of Culicini and the shape of microtrichia shows possibility that genus *Uranotaenia* should be separated from Culicini.

2. Genital Characteristics of Genus *Uranotaenia*

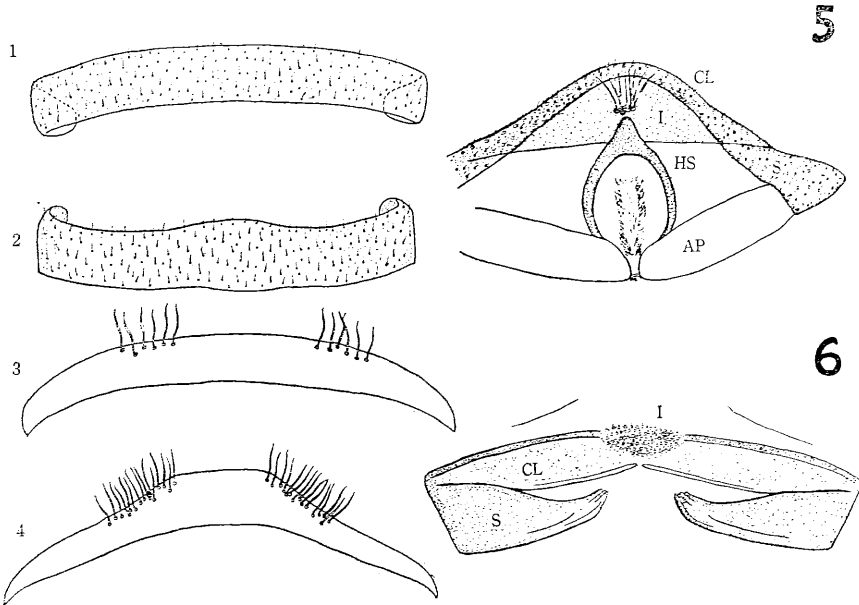
Male Terminalia: Basistyle conical, with ill-defined basal lobe bearing several long thick bristles; dististyle varying length in different species, usually swollen near apex, with small simple spine. Claspette absent. Mesosome consisting of heavily sclerotized symmetrical plates of complex structure. No definite paraproct as observed in other genera belonging Culicini. Anal membrane somewhat sclerotized basally and produced into paired submedian lobes, which correspond to the 9th sternite lobe of other genera.

Female Terminalia: Usually 9th tergite band-like, without submedian group of setae; postgenital lobe small; cerci scoop shaped, enclosing postgenital lobe; atrial plate present. Horse shoe structure absent. Spermatheca single (Yamaguti and LaCasse, 1951).

Female Genitalia of U. bimaculata: 8th sternite and tergite truncate with scales; 9th tergite with narrow chitinous pilose band, somewhat swollen antero-medianly; 10th tergite absent. Insula with sparse setae. Cowl with well sclerotized edge, flattened apically. Sigma with pointed inner ends. Atrial plate present. Postgenital lobe hemispherical, setose ventrally, with two setae longer than others. Cerci small, incurved. Spermatheca single. Horse shoe structure absent.

The characteristics, of which paraproct and claspette absent, 9th tergite band-like, without subapical setae and spermatheca single, positively distinguish from other genera of Culicini (Plate I, II). 9th tergites of genera belonging Culicini, differ by genera, such as band-like, plate-like, or propeller-like, but they have usually subapical or submedian groups of setae. Only Tribe Anophelini has no seta on 9th tergite. The number of spermatheca of Culicini is 2 to 3, but Anophelini and Genus *Uranotaenia* have single spermatheca. Moreover, shape of sigma, that pointed inward, is the character-

Plate II. 9th Tergite and Genitalia



1.~4. 9th Tergite. 5.~6. Genitalia. 1. *Anoph. lind. japonicus*. 2. *Uranotaenia bimaculata*. 3. *Culex* sp. 4. *Megarhinus towadensis*. 5. *Culex pallidothorax*. 6. *Anoph. lind. japonicus*. AP: Atrial plate. CL: Cowl. HS: Hose shoe structure. I: Insula. S: Sigma.

ristics of Genus *Anopheles* and Genus *Uranotaenia*, and the fact that absence of horse shoe structure observed in *Anopheles lindesai japonicus*, Genus *Tripteroides*, *Culiseta*, *Aedes*, and *Armigeres* shows Genus *Uranotaenia* belongs in Primitive Groups. Genus *Culex* and some species of Genus *Anopheles* have horse shoe structure.

Thus having many characteristics together with external ones differed from Tribe Culicini. it seems to prove that Genus *Uranotaenia* does not belong Tribe Culicini and new tribe should be established for this species as Sabethini for *Tripteroides* (Nakagaw, 1954)

3. Key to Tribe of Japanese Culicinae based on Female Terminaria

- 1.-a Spermatotheca single..... 2.
- b Spermatotheca two or three..... 4.
- 2.-a 10th tergite present.....Tribe Anophelini
- b 10th tergite absent..... 3.
- 3.-a 9th tergite with narrow chitinous band, without setae.....
-Genus *Uranotaenia*
- b 9th tergite saddle-like, with submedian group of setae.....
- *Aedes niveus* Group
- 4.-a 7th and 8th tergite with strong marginal hairs and sigma with several narrow crevices..... Tribe Megarhinini

- b Such structure absent..... 5.
- 5.-a One spermatheca smaller than other two..... Trib Sabethini
- b One spermatheca larger than other two or similar in size.....
..... Trib Culicini

SUMMARY

The author studied the most of female genitalia of mosquitoes available in Japan and found specificities of genitalia of *Uranotaenia bimaculata*, which has been known as different species from other genera belonging Culicinae by the form of microtrichia of wings.

Having these characteristics listed below, the author proved that Genus *Uranotaenia* does not belong Culicini.

Characteristics

1. Larval head longer than broad, 8th abdominal segment with a lateral chitinous plate with one row of combs on its posterior margin.
2. Form of CT-6 and IX-1 of Pupae.
3. Spiracular and postspiracular bristles, radius fork and ending of analis of Adult.
4. Absence of paraproct and Claspette in the Male genitalia.
5. Number of spermatheca, setae of 9th tergite, and shape of cowl and sigma which are similar as those of *Anopheles*.

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