Pupa of *Toxorhynchites splendens* (Wiedemann) (Diptera: Culicidae)

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ABSTRACT. The detailed pupal chaetotaxy of *Toxorhynchites splendens* (Wiedemann) from Dacca is described and compared with the works of other workers.

The taxonomy of mosquito pupae has received very little attention in the Indian subcontinent. Brief and provisional description of pupae of the Indian Anophelini was given by Christophers (1933) and those of the Culicini and Megarhinini (=Toxorhynchitini) by Barraud (1934). Qutubuddin (1960) listed the various works on the taxonomy of eggs, larvae, pupae, and adult stages of mosquitoes of the Indo-Malayan area and the Philippines between 1900 and 1960. Recently Ameen and Talukdar (1974) described the detailed chaetotaxy of pupae of five common *Anopheles* species from Dacca along with a provisional key for their identification.

A single larva of *Toxorhynchites splendens* (Wiedemann) was collected from the forest near Shalna, about 25 miles north of Dacca University Campus. The larva was found in a tree-hole about 5 feet above the ground and containing 4-5 inches of water. The larva was kept alive and eventually pupated and an adult emerged, from which the species identification was made. Two other pupal skins were loaned to us by Mr. S. A. Talibi from the collection of the Malaria Institute of Bangladesh. The detailed chaetotaxy of *T. splendens* pupa is being described here based on these three pupal skins from around Dacca city. The Belkin system of nomenclature for the pupal chaetotaxy has been followed in the description.

In the description of the chaetotaxy the figures within parentheses after setal numbers show the range of branching and the usual number of branches. The abdominal hairs have been described as very long, long, medium, or short according to the following criteria. Hairs smaller than half the length of the succeeding segment have been called short; about half as long as the succeeding segment - medium; more than half the length of the succeeding segment - long; and those longer than the succeeding segment - very long.

Detailed Description of the Chaetotaxy

Cephalothorax (Fig. 1)

Trumpets are almost twice as long as the width at the apex. Most of the cephalothoracic hairs are short to medium in length, except hair 1 which is very long, barbed, and pendulous. Seta 1(1); 2(1); 3(1); 4(1); 5(3-4,3); 6(1-3,1); 7(1); 8(1); 9(1); 10(5-6,5); 11(2-4,2); 12(2-4,4).

Abdomen (Fig. 2)

Paddles more or less rounded, very wide, width about 85% of the length; divided by mid-ribs and without any paddle hair. The posterior margin of the paddle is fringed with minute hairs.

Seta 0 always single and minute. Most of the ventral hairs are short but hair 10 on III-V tends to be medium in length. In the following description where nothing is mentioned about the length of a particular hair, it is to be assumed that the hair is short.
I - Seta 1 (dendroid, the strong base is divided into 5-7 primary branches, each of which divides further to form more than 55 branches; each of these branches is barbed); 2(1-4,1); 3(2-4,3); 4(3-7,4); 5(2-7,5) long, tufted; 6(1) very long, barbed; 7(3); 9(1).
II - Seta 0(1); 1(10-20,13) small, tufted; 2(1); 3(1-2,1) long, barbed; 4(6-7,6); 5(1-2,1) very long, barbed; 6(1) very long, barbed; 7(1-2,1); 8(1); 9(1-3,2); 11(1).
III - Seta 0(1); 1(1-2,1) long to very long, barbed; 2(1); 3(1-2,2) long to very long, barbed; 4(3-6,5); 5(1) very long, barbed; 6(1) very long, barbed; 7(1-3,3); 8(1); 9(1) shifted ventrally; 10(1) short to medium; 11(1).
IV - Seta 0(1); 1(1) very long, barbed; 2(1); 3(4-7,6); 4(3-5,3); 5(1) very long, barbed; 6(1) very long, barbed; 7(2-3,2); 8(1); 9(1) shifted ventrally; 10(1) medium; 11(1).
V - Seta 0(1); 1(1-2,1) very long, barbed; 2(1); 3(2-3,3); 4(5-9,7); 5(1) very long, barbed; 6(1-2,1) very long, barbed; 7(3-4,3); 8(1); 9(1) shifted ventrally; 10(1) short to medium; 11(1).
VI - Seta 0(1); 1(1-2,1); 2(1); 3(3); 4(2-4,2); 5(1-4,1) very long, barbed; 6(1) very long, barbed; 7(2-3,2); 8(4-5,5)*; 9(1) shifted ventrally; 10(1); 11(1); 14(1).
VII - Seta 0(1); 1(1); 2(1); 3(2-4,2); 4(1) short to medium; 5(1) very long, barbed; 6(1-3,1) very long, barbed; 7(1-2,2); 8(4-5,4) shifted dorsally; 9 (1) shifted ventrally; 10(1); 11(1); 14(1).
VIII - Seta 0(1); 4(1); 9(1).
IX - Paddle and accessory paddle hair absent.
X - Seta 1 (3-5,4).

Discussion

Previously the genus *Toxorhynchites* Theobald was known as *Megarhinus* Robineau-Desvoidy, but the latter name has been superseded by the former (vide 1959 *Int. Comm. Zool. Nomencl.*, Opinion 548). Barraud (1934) briefly mentioned the characters of *Megarhinus splendens* (Wiedemann); Knight and Chamberlain (1948) gave a drawing of the pupa of *Megarhinus amboinensis* (Doleschall) and made certain observations regarding the genus from a comparative study of 28 genera of mosquitoes. Belkin *et al.* (1970) gave illustrations and a very short account of *Toxorhynchites (Lynchiella) portoricensis* (von Röder) pupa.

*shifted dorsally

The following observations about the abdominal setae of *T. splendens* agree with those of Knight and Chamberlain (1948) on the genus *Toxorhynchites*.

1. That the ventral microseta 14 (13 of Knight and Chamberlain) is present only on segments VI-VII.
2. That the paddle and accessory paddle hairs are absent in this genus.
3. That hair 9(8 of Knight and Chamberlain) on VIII is single.
4. That hair 5 and 6 (5 and 7 of Knight and Chamberlain) on segments II-VI are extremely long and barbed.

However, the illustration of Belkin *et al.* (1970) shows seta 14 on segments VII-VIII of *T. portoricensis*. They further noted that hair 6-VI is very long and subequal to 5-VI; and hairs 6-II-V are usually all short with 6-V being variable, rarely as long as 6-VI.

On abdominal segment II of *T. amboinensis*, Knight and Chamberlain (1948) showed 12 pairs of setae, but in *T. splendens* we found only 11 pairs. By comparison with its position on other segments it was decided that ventral hair 10 (11 of Knight and Chamberlain) is absent on this segment.

Knight and Chamberlain (1948) noted that abdominal hair 8 (9 of Belkin), although usually lateral, may be either dorsal or ventral, on mounted skins at least. They showed this hair on the ventral side in segments II-VII for the genus *Toxorhynchites;* we found it ventrally on segments III-VII. As for hair 8 (9 of Knight and Chamberlain) they stated that it is distinctly dorsal on the more posterior segments in some genera and showed this hair dorsally on segments VI-VII of *Toxorhynchites;* this agrees with our observations.

Further, Knight and Chamberlain (1948) concluded from their comparative study (a) that hair 13 (14 of Belkin) on segment VIII was present in all the genera they studied except *Toxorhynchites*, and (b) that the genital hair (1 of Belkin) on segment X occurs only in this genus. In the present material the hair 14 was absent in segment VIII; but the hair was shown in segment VIII in *T. portoricensis* by Belkin *et al.* (1970). As to hair 1-X, we found it only in *T. splendens* out of 13 species belonging to the genera *Anopheles* (Ameen & Talukdar, 1974), *Culex*, *Aedes*, *Armigeres*, *Ficalbia* (to be published), and *Toxorhynchites*.

A small lateral hair on the anal flap (seta 1-IX) has been shown in *T. amboinensis* by Knight and Chamberlain (1948) and in *T. portoricensis* by Belkin *et al.* (1970). We did not see this hair in *T. splendens*.

Barraud (1934) stated that some of the long lateral and sublateral hairs (setae 5 and 6) on tergites of II-VII are black in *T. splendens*. However, we found these hairs reddish-black rather than black in colour. His observation that the paddles are wide and rounded, and less than 1½ times as long as greatest width in *T. splendens*, agrees with our own observation.

From the above discussion it may be concluded that the pupa of the genus *Toxorhynchites* may be distinguished from the others by the following characters. (1) seta 5-II-VII very long and barbed; (2) seta 1-CT long, barbed, and pendulous; and (3) presence of hair 1-X on the genital pouch.

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Figs. 1-2. Pupa of *Toxorhynchites splendens*. (1) Cephalothorax. (2) Metathorax and abdomen: the ventral surface on the left and dorsal surface on the right.