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THE EARLY STAGES OF SOME INDIAN MOSQUITOES: *ORTHOPODOMYIA*.

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In the following descriptions of the larvae of the Indian species of *Orthopodomyia* the nomenclature adopted by Edwards and Given (1928) for the five important pairs of hairs on the clypeus has been followed. The letters *A*, *B*, *C*, *d*, and *e*, are used for these hairs and their position will be understood by referring to Fig. 4 on Plate LIV. The hairs *A*, *B*, and *C* appear to be homologous with the frontal hairs of *Anopheles* larvae, *d* with the posterior clypeal hair, and *e* with the inner sutural hair. The inner and outer anterior clypeal hairs of *Anopheles* larvae appear to be represented in *Culicine* larvae by one pair of minute hairs situated externally and slightly dorsally to the preclypeal spines. In some *Culicine* larvae hairs *B* and *C* stand directly one in front of the other, in such cases the anterior hair is called *B* and the posterior *C*. In the larvae of several genera hair *d* is very small and difficult to see, but in the larvae here described it is well developed.

The fourth stage larvae of the Indian species of *Orthopodomyia* may be fairly easily distinguished from those of other genera by the following characters: siphon without pecten, a single pair of hair tufts situated at about the middle of the tube, comb with a row of large teeth and with a second row of smaller fringed teeth, some long single hairs on the abdomen, antennal shaft smooth, tuft at one-quarter or one-third from the base. In *O. anopheloides* and *O. flavicosta* there is a chitinized saddle on the 8th abdominal segment and in the former there is a well-developed saddle on the 7th segment also, but in *O. flavithorax* there is no very definite saddle on either segment, only some indefinite chitinization on the 8th, as indicated in Fig. 8.

The pupae do not show any marked modifications; respiratory horn of moderate length, wide at the apex in side view, dendritic tuft on abdominal segment 1 well developed, one of the five submedian and sublateral hairs on tergites 4 to 6

fairly long or very long, tufted lateral hairs on segments 7 and 8, paddles nearly twice as long as broad, rather flattened on the outer side towards apex, apical half very transparent, a short terminal hair, moderately developed midrib, an irregular dark marking across the base.

Key to the 4th stage larvae of the Indian species of *Orthopodomyia*.

(See Plate LIV).

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| 1. | 7th abdominal segment with a large chitinized saddle (Fig. 2); one branch of inner subdorsal hairs of anal segment much longer than the others (Fig. 2); a separate lateral chitinized strip at base of anal segment on each side (Fig. 2) | <i>O. anopheloides.</i> | |
| | 7th abdominal segment without a chitinized saddle; all branches of inner subdorsal hairs of anal segment about the same length (Fig. 8); no separate chitinized strip at base of anal segment | | 2 |
| 2. | Larger comb teeth ending in a single long point (Fig. 7); five pairs of clypeal hairs equally developed and with long plumose branches (Fig. 14); hairs on sides and dorsum of thorax remarkably developed and with long plumose branches | <i>O. flavithorax.</i> | |
| | Larger comb teeth ending in several sharp points (Fig. 6); five pairs of clypeal hairs not all equally developed, <i>d</i> being comparatively small with only 3 or 4 fine branches, <i>e</i> fine and single or split (Fig. 10); hairs on dorsum of thorax fine and inconspicuous, lateral hairs only being well developed | <i>O. flavicosta.</i> | |

Key to pupae. (See Plate LIV).

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|----|---|-------------------------|---|
| 1. | Longest hair on tergite 6 very long, reaching beyond the posterior margin of tergite 8, and either single or two branched (Figs. 11 and 12) | | 2 |
| | Longest hair on tergite 6 comparatively short, not reaching beyond posterior margin of tergite 7, and usually of four branches (Fig. 1) | <i>O. anopheloides.</i> | |
| 2. | Longest hair on tergites 4 to 6 single (Fig. 12) | <i>O. flavicosta.</i> | |
| | Longest hair on tergites 4 and 5 three-branched, that on tergite 6 two-branched (Fig. 11) | <i>O. flavithorax.</i> | |

O. anopheloides Giles (*Mansonia*): Larva, 4th stage (Plate LIV, figs. 2, 4, and 5): Head and antenna deep brown or black, clypeal hair *A* with 9 to 11 branches, more usually 10, *B* and *d* with 6 to 8 branches, the latter well developed, *C* with 4 to 6 branches, *e* fine and long, often split into two towards the tip, preclypeal spines fairly long, slender and tapering; antennal shaft about 0.41 mm. long, stout on rather more than the basal half, tapering to the tip, tuft of 6 to 8 branches at one-third from the base, apical spines all at tip of shaft. Thorax with lateral tufted hairs well developed and some long single hairs. Abdomen usually reddish in colour, the first two segments with lateral tufted hairs, segments 3 to 8 with fine hairs some of which are single and long, segment 7 with a chitinized saddle covering rather more than the dorsal half in side view, a saddle on segment 8 nearly enclosing the segment, comb with 7 to 10 larger teeth and 25 to 30 smaller fringed teeth;

siphon dark brown or black, lighter at apex, 1 to 1.1 mm. long and about 5 times as long as the diameter at base, tuft of 8 to 14 strong subplumose branches arising at about the middle of the tube but very slightly nearer the base than the apex; anal segment enclosed in a chitinized ring, a separate chitinized strip on each side at the base, outer subdorsal hairs single and long, inner split into a number of branches one of which is much longer than the others, lateral hair with two or three fine branches, ventral pair of anal papillae about half the length of the dorsal, the latter rather more than half the length of the anal segment, anal fan well developed, the hairs arising from a fan plate and each splitting into a number of branches some distance from the base.

Pupa (Plate LIV, figs. 1, 3 and 9): this may be distinguished by the characters given in the key; the innermost submedian hair on tergites 3 to 7 is very small, whereas in the other two species it is larger and spine-like.

Habitat: tree-holes during the monsoon; found in the Western and Eastern Himalayas up to 8,000 feet, along the foothills to Bengal and Assam, in the Western Ghats from North Kanara to Malabar and in Ceylon.

O. flavithorax Barraud. *Larva*, 4th stage (Plate LIV, figs. 7, 8, 13 and 14): this has a very characteristic appearance even to the naked eye, owing to the remarkable development of the hairs on the head and thorax. Hairs *A*, *B*, *C*, *d*, and *e*, on the clypeus are all about equally developed and each has a number of subplumose branches which are as long, or longer, than the clypeus; antennal shaft about 0.58 mm. long, stout on the basal one-third, more slender apically, brown for the most part, paler at tip, tuft of about 5 subplumose branches, arising at about one-quarter from the base, apical bristles all very near tip of shaft, preclypeal spines long, slender, tapering. Thorax densely clothed dorsally and laterally with long tufted hairs with subplumose branches. Abdominal segments with some very long single or two-branched hairs, as well as shorter tufted hairs with subplumose branches, segment 7 without a chitinized saddle, segment 8 with indefinite chitinization as indicated in Fig. 8, not forming a definite saddle, comb with 10 to 12 larger teeth and 18 to 20 smaller delicately fringed teeth; siphon from 1.4 to 1.5 mm. long and 5 or 6 times the length of diameter at base, dark brown, a very narrow darker ring at base, paler at extreme tip, hair tuft of about 8 finely frayed branches, arising at about two-fifths of the length from the base; anal segment enclosed in a chitinous ring, no separate chitinization at base, outer subdorsal hairs single and long, 6 or 7 times the length of the chitinized part of the segment, inner pair split into a number of branches all about the same length and about two and a half times the length of the segment; ventral anal papillae about half the length of the dorsal pair, the latter only about half the length of the anal segment; lateral hair of 2 or 3 fine branches, anal fan well developed, about 14 hairs arising from fan plate, each hair split some distance from the base into a number of fine branches.

Pupa (Plate LIV, fig. 11) : distinguished by the presence of long three-branched hairs on tergites 4 and 5, and a very long two-branched hair on tergite 6.

Habitat : tree-holes during the monsoon, North Kanara and Malabar, near sea-coast.

O. flavicosta Barraud. *Larva*, 4th stage (Plate LIV, figs. 6 and 10) : this larva differs in several respects from that of *O. flavithorax*, with which it is found breeding in association, the hairs on the head and thorax being much less developed, and the larger comb teeth being of different form. Head yellowish, slightly darker posteriorly, antennal shaft about 0.5 mm. long tapering from base to apex, paler on apical part than towards base, tuft of about 6 branches, arising at a point between one-quarter and one-third of length of shaft from base ; clypeal hair *A* usually of 9 branches, variation 9 to 12, *B* of 6 or 7 branches, *C* of 4 or 5, *d* of 3 or 4 fine branches much shorter than *B* or *C*, *e* fine and usually single but may be split into two towards the tip, preclypeal spines fairly long and tapering, pale in colour. Thorax with lateral tufted hairs well developed but hairs on dorsum fine and inconspicuous. The first two abdominal segments with lateral tufted hairs, the following segments with fine hairs, some of which are long and single as usual, 7th segment without a chitinized saddle, 8th segment with a definite saddle nearly enclosing the segment, comb with 7 to 10 larger teeth and about 20 smaller fringed teeth, the larger teeth end in a number of sharp points and resemble a hand, there being usually 5 flattened leaf-like points ; siphon 1.2 mm. long, 5 or 6 times the length of the diameter at the base, hair tuft of about 6 branches, finer than in the other two species here described, arising very slightly nearer the base than the apex of the tube ; anal segment very similar to that of *O. flavithorax*.

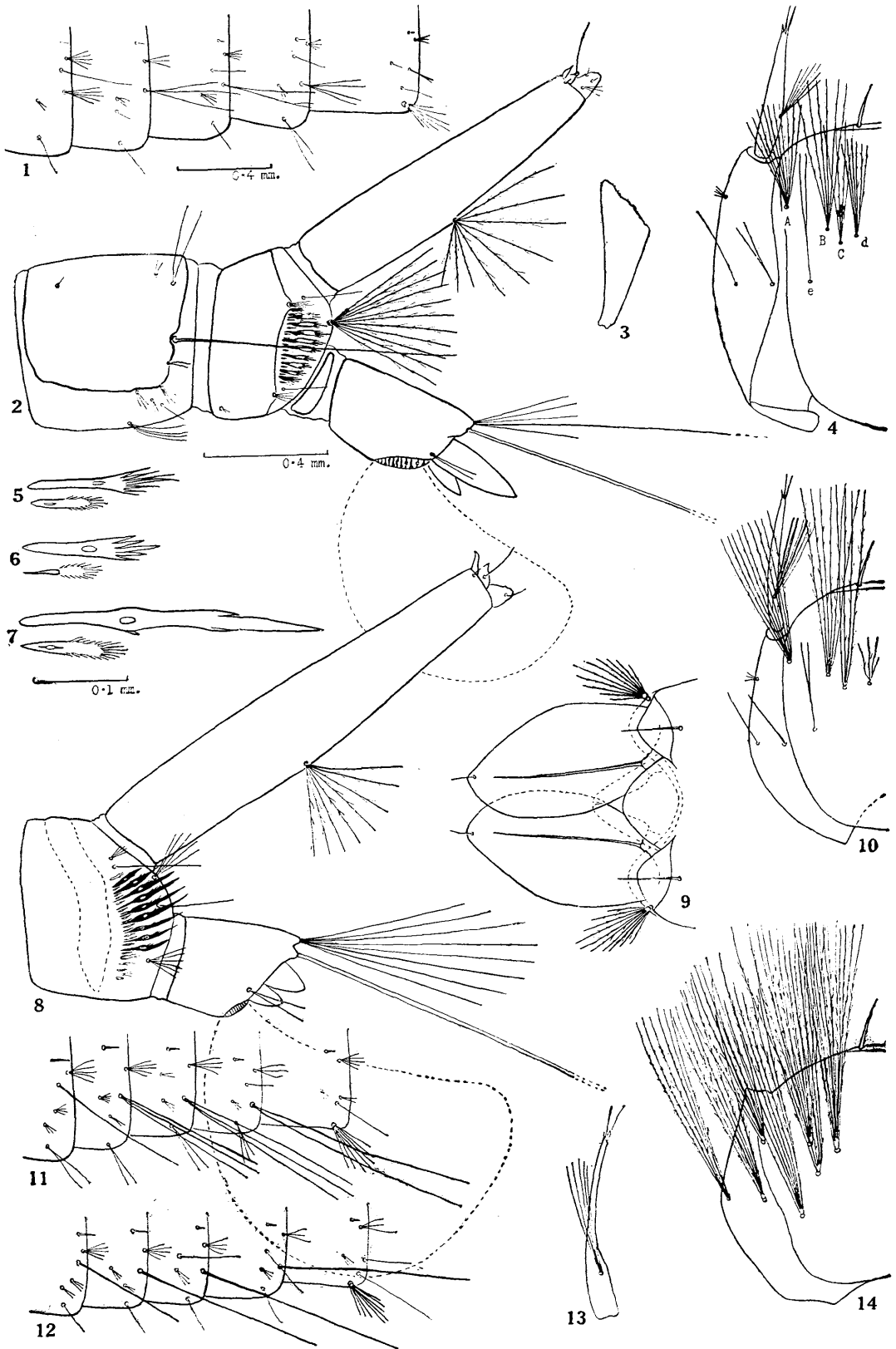
Pupa (Plate LIV, fig. 12) : distinguished by the characters given in the key, except for these it is very similar to that of *O. flavithorax*.

Habitat : tree-holes during the monsoon, North Kanara, near sea-coast.

REFERENCE.

- EDWARDS, F. W., and GIVEN, D. H. C. *Bull. Ent. Res.*, **18**, p. 338. (1928).

PLATE LIV.



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EXPLANATION OF PLATE LIV.

Drawings illustrating points of structure of diagnostic importance of the 4th stage larvae, and pupae, of Indian species of *Orthopodomyia*.

Figs. 1, 9, 11 and 12 drawn to the scale shown under Fig. 1.

Figs. 2, 3, 4, 8, 10, 13 and 14 drawn to the scale shown under Fig. 2.

Figs. 5, 6 and 7 drawn to the scale shown under Fig. 7.

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| Fig. 1. | <i>O. anopheloides</i> | Pupa : showing hairs on dorsum of one side on abdominal segments 3 to 7 (segt. 7 on right). |
| „ 2. | <i>O. anopheloides</i> | Larva : terminal segments showing chitinized plates on segments 7 and 8, comb, siphon, and anal segment. |
| „ 3. | <i>O. anopheloides</i> | Pupa : respiratory horn, side view, from flattened preparation. |
| „ 4. | <i>O. anopheloides</i> | Larva : one side of head showing hairs on dorsum, drawn from cast skin, mouth brush omitted. |
| „ 5. | <i>O. anopheloides</i> | Larva : two comb teeth enlarged. |
| „ 6. | <i>O. flavicosta</i> | Larva : two comb teeth enlarged. |
| „ 7. | <i>O. flavithorax</i> | Larva : two comb teeth enlarged. |
| „ 8. | <i>O. flavithorax</i> | Larva : terminal segments showing indefinite chitinization on segment 8, comb, siphon, anal segment. |
| „ 9. | <i>O. anopheloides</i> | Pupa : extremity of abdomen. |
| „ 10. | <i>O. flavicosta</i> | Larva : one side of head showing hairs on dorsum, mouth brush omitted. |
| „ 11. | <i>O. flavithorax</i> | Pupa : showing hairs on the dorsum of one side on abdominal segments 3 to 7 (segt. 7 on right). |
| „ 12. | <i>O. flavicosta</i> | Pupa : showing hairs on the dorsum of one side on abdominal segments 3 to 7 (segt. 7 on right). |
| „ 13. | <i>O. flavithorax</i> | Larva : antenna. |
| „ 14. | <i>O. flavithorax</i> | Larva : one side of head showing hairs on dorsum, mouth brush omitted. |