

Mesothoracic hair 5 usually with 3 branches on one or both side, arising near the base.—*sundacus*

Mesothoracic hair 5 usually with 2 branches or simple, if with 3 branches on one side (rarely on both) the third branch is small, arising about half way along the hair.—*subpictus malayensis*

The larvae examined come from various parts of Malaya; those of *subpictus* from fresh water near Kuala Lumpur, and from near the sea in Province Wellesley and on Penang Island; those of *sundacus* from Selangor and Perak on the west coast, and Tioman island off the east coast.

#### References

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—J. A. Reid, Institute for Medical Research, Kuala Lumpur, Federation of Malaya.

FRESHWATER PLANARIANS (FLAT-WORMS) AS PREDATORS OF MOSQUITO LARVAE. In this Institute the early stages of the mosquito *Mansonia (Mansonioides) uniformis* are raised in a guinea-pig dung infusion in large glass jars, with the larvae and pupae attached to the roots of the water hyacinth *Eichornia crassipes* (Wharton, 1957). The plants are removed and washed when about 10 days old, and the larvae are counted and placed in a new jar with fresh infusion. On one occasion very few larvae were found and a search for the usual predators, may-fly and dragon-fly larvae, was unsuccessful, but several planarians (flat-worms) were found. They were placed in clean water with a few *Culex pipiens fatigans* larvae which they killed, withdrawing the body contents and leaving only crumpled, tangled larval skins. Authorities on planarian worms state that they will eat any animals they can capture but that they are unable to capture active swimming animals although the latter may sometimes get entangled in the mucous trails left by the planarians and thus fall victims. Further observations showed that the larvae were in fact usually trapped in this way but occasionally a larva at the surface of the water was directly attacked and captured. One Stage II larva of *C.p. fatigans* was seen to be caught in this way, the planarian attaching itself by a lateral extension of the head. The larva and planarian then fell to the bottom of the dish and while the planarian was sucking out the body contents two more larvae became entangled in the mucous trails and were drowned.

Predation by planarian worms on mosquito larvae has been reported previously by Lischetti (1919), who observed in Brazil that 6 planarians disposed of 106 out of 108 *Culex* larvae in four hours. In the present observations the planarians were less efficient, but still disposed of quite large numbers of larvae. In one experiment with one planarian to five larvae, 10/20 Stage IV and 13/20 Stage III *C.p. fatigans* larvae were eaten in a period of 24 hours. Since *Mansonia* larvae remain attached to the roots of plants one might expect them to be more susceptible to the attacks of roving planarians. However, in experiments similar to those with *C.p. fatigans* it was found that only 7/20 and 5/20 Stage III and IV *M. uniformis* larvae attached to the roots of *Pistia* plants were killed. Van den Assem (1958) has recently shown that *Mansonia* larvae are less subject to attacks by insect and fish predators when they are attached to the roots of plants than are the more motile larvae of *C.p. fatigans*. Direct observation showed that the *Mansonia* larvae "freeze" when a planarian is nearby and one was seen to pass over such a larva without attacking it. Predation by these flat-worms was therefore unlikely to have been the cause of the reduction in numbers of larvae which led to these observations.

The flat-worms varied in size from about 4 to 7 mm. in length, the largest when fully extended being about the size of a Stage IV *C.p. fatigans* larva. I am indebted to Dr. S. H. Chuang of the University of Malaya who identified specimens as belonging to the genus *Planaria*. As suggested by Dr. Libbie Hyman to whom the observations were referred, the predatory habits of the planarians are of little practical significance. If they could be established in breeding places such as treeholes they might reduce the output of mosquitoes, but the few observations which were made with planarians in bamboo pots showed that adults of *Aedes albopictus* continued to emerge despite their presence.

#### References

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—R. H. Wharton, Institute for Medical Research, Federation of Malaya.

A NOTE ON SALT-MARSH MOSQUITO BREEDING. During the past several years, the Jefferson County (Texas) Mosquito Control District has maintained graphs correlating the results of light trap catches, rainfall, wind direction, wind velocity and tides. It was noted that during the summer preceding a heavy flight of salt-marsh mosquitoes, the general tide level was significantly lower than during the summer preceding limited salt-marsh flights.