OPERATIONAL AND SCIENTIFIC NOTES

OBSERVATIONS ON THE OPERATION OF MOSQUITO LIGHT TRAPS WITH A CYLINDRICAL VERTICAL SCREEN. One of the problems in the operation of light traps by mosquito control agencies is the amount of time required for sorting collections and separating mosquito specimens from heavy accumulations of other, unwanted, insects. Mulhern, in a paper presented before the American Mosquito Control Association at Salt Lake City in 1952, proposed the use of a cylindrical vertical screen of a quarter-inch hardware cloth fitted around the top of the trap cylinder and extending up to meet the underside of the hood, as a means of excluding larger insects.

An experimental trap fitted with this type of screen was operated in the latter part of July of 1958 simultaneously with the regular trap on a location here in Nassau County where the numbers of beetles as well as other insects had been particularly heavy in trap cups since early June. The test trap and the regular trap conformed in every way to Mulhern's specifications and were operated five feet apart for the same period each night for eleven nights. The regular trap, however, was fitted with the old type flat screen. A daily count of the two largest groups occurring in the collections, beetles and moths, was kept along with a rough count of other smaller insects and, of course, the careful count of mosquitoes. The nightly average collection of miscellaneous insects in the test trap during the eleven-night period was 215. The nightly average of insects in the regular trap in this same period was 580.

Five beetles per night was the average number caught in the test trap with an average of nine in the regular trap. The larger species, June beetles and others, were by this time of the season scarce in every trap, and the collections were affected by the fact that even the smaller species such as the Asiatic garden variety were past their peak in the adult stage. It was noted that one beetle slightly larger than the Oriental and Asiatic kinds persisted in collections in both traps. It was identified by Prof. J. Alfred Adams of the New York State Agricultural Experiment Station at Poughkeepsie as the northern masked chafer, *Cyclocephala borealis*, a turf-destroying pest occurring in great numbers in and around New York City and Nassau County.

Moths also are unwelcome invaders in mosquito light trap collections. During the test period an average of 105 moths was noted for each night in the regular trap. The average caught in the test trap was thirty.

Collections of all insects in the regular trap in the five-day period before the test trap was installed averaged 480 per night and on the night before the test began 66 beetles and 121 moths were caught. These counts seem to indicate that the cylindrical vertical screen helped to exclude miscellaneous insects more efficiently than the old type flat screen.

There was, however, an apparent proportional reduction in the number of adult mosquitoes caught in the test trap. The total collected in the eleven nights in the test trap was 99, including 91 *C. pipiens*, 7 *A. vexans* and 1 *A. sollicitans*. The regular trap collected 194, comprising 176 *C. pipiens*, 13 *A. vexans* and the rest *A. sollicitans*. Thirty-six male adults were taken in the regular trap in the period as compared to 26 in the test trap. Mosquito collection, therefore, in the test trap totaled about 50 percent of collection in the regular trap. Miscellaneous insect collection was reduced by the cylindrical screen by approximately 63 percent and the larger insect collection was reduced by more than 74 percent.— R. J. Hemmings, Nassau County (N. Y.) Department of Public Works.

A NOTE ON THE LARVAE OF *Anopheles subpictus* AND *sundaicus*. The larvae of *Anopheles subpictus* Grassi and *An. sundaicus* Rodenwaldt have usually been regarded as more or less indistinguishable, though several attempts have been made to separate them (see Bonne-Wepster and Swellengrebel, 1953). Gater (1934), writing of Malaya, concluded that "for practical purposes the larvae of *A. subpictus malayensis* Hacker and *A. sundaicus* cannot be differentiated with certainty." However, Christophers (1933, p. 247) refers to Ghosh's (1932) finding that in *sundaicus* mesothoracic hair 5 usually has 3 branches arising near the base, while in *subpictus* it usually has 2, only rarely 3, and they may arise anywhere along the length of the hair. Preliminary examination here by Mr. A. Ganapathipillai seemed to show that this character might be useful, but when a larger number of larvae, raised from eggs laid in the laboratory, were examined by Mr. Chee Sinn Lim a number of intermediates were found. There the matter rested until an opportunity arose to have some more specimens examined by a Zoology student from the University of Malaya, Mr. Ow-yang Chee Kong.

The combined results of these examinations and a few more of my own showed that in 108 specimens of *subpictus malayensis* the number of branches on mesothoracic hair 5 varied from 1–3 and was usually 2; only about 12 percent (13 specimens) had 3 branches on one or both hairs and then the third branch was usually small, arising about half way along the hair. In 86 specimens of *sundaicus* the number of branches varied from 2–4 and was most often 3, usually arising near the base of the hair; only about 10 percent (9 specimens) had 2 branches on both hairs. Thus Ghosh's findings are confirmed and the following couplet should identify the majority of the larvae of Malayan specimens of either species.

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

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 *sundaicus* from Selangor and Perak on the west coast, and Tioman island off the east coast.

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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 trials 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.

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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.