in diameter. By bending the cut end wires alternately one way and the other it is possible to fasten the cylinder without need of solder. The rough cut ends of the cylinder can be covered with masking tape to prevent tearing of the 2-inch-wide tubular gauze bandage which is now slipped over the hardware cloth. Enough gauze is allowed over each end to permit closing the cylinder with a rubber band and/or a snap clothes pin. A cage of this type is smaller, is cheaply and quickly constructed and can be easily cleaned and decontaminated if necessary.

The compactness of the cage is an added feature. With slight pressure one can bend the shape of the cage—making it more or less triangular in cross-section. In such fashion there is no rolling from side to side and the cages can be easily stacked two or three high if needed.

With a large number of these small cages it was soon apparent to us that rabbits provide a rather inconvenient and time-consuming means of providing the small numbers of adults per cage with a blood meal. To eliminate this problem we shaved the backs of hamsters and found that the *aegypti* females were readily attracted to them. A small retaining device for the hamsters was made (Fig. 3) in which the animals can be easily placed in each mosquito cage for the feeding period. This device consists of three parts: the hardware cloth cylinder and two end rings (A). These rings are fastened in such a fashion as to form slots into which the end pieces of the stand (B) will slide. A short length of wire (C) is slipped under the caged hamster to arch its back and make it more vulnerable to the mosquitoes and also prevent excessive movement.

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VARIATION IN THE STRUCTURES OF HAIRS FOUND IN ANOPHELINE LARVAE FROM EAST PAKISTAN

S. R. HAIDER *

Some remarkable diversities in the structures of larval hairs were observed by the author during routine examinations of larval collections made available from different parts of East Pakistan. In routine examination of thousands of anophelines for species identification, those with variation in structures of their hairs were kept separate for detailed study. All the larvae under observation appeared in the 4th instar. They were mounted in chloral gum and then examined under a compound microscope.

The variations observed in the specimens are described below in detail.

Anopheles annularis Van Der Wulp 1884. (a) In one of the specimens of *A. annularis* variation was noticed in the posterior clypeal hair which was trifid at the right side while at the left it was simple (Fig. 1).

(b) In another specimen of *A. annularis* variation was again noticed, but this time it was in the sutural hair. A pair of inner sutural hairs were placed quite approximately at the right side while only a single unbranched hair was found at the left (Fig. 2).

Anopheles pallidus Theo, 1901. Variation in the character of larval hair was observed in one of the specimens of *A. pallidus*. The posterior clypeal hair had seven branches and not 2 to 5 as is usually present in *A. pallidus*. The presence of such character sometimes causes confusion and leads to incorrect identification. Puri (1954) in his identification table for anopheline larvae has also pointed out the large range of variation in the number of branches of posterior clypeal hairs in case of *A. pallidus* which sometimes creates difficulties in their correct identification.

The filaments of abdominal palmate hairs were, however, more than half as long as blades of leaflets. (Figs. 3 and 4).

Anopheles subpictus Grassi. Theo, 1902. Variation in the character of post spiracular hair was observed in a single specimen of *A. subpictus* larvae. The post spiracular hair at the right side had seven branches while the hair at the left consisted of four branches as usually found in case of *A. subpictus*. This is shown in figure 5. This naturally may cause confusion because post spiracular hairs with seven or eight branches are found in *A. sundaicus* which is a vector species in East Pakistan.

Variations in the larval chaetotaxy of *Anopheles* mosquitoes have been reported by previous workers in other countries too. Yates (1943), during the study of the 4th instar larvae of *Culex tarsalis*,

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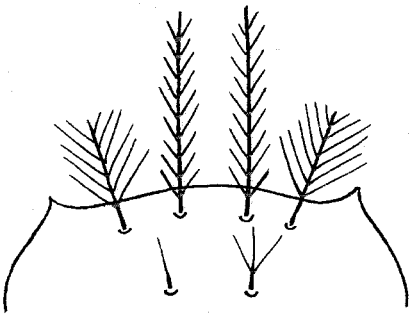

FIG. 1

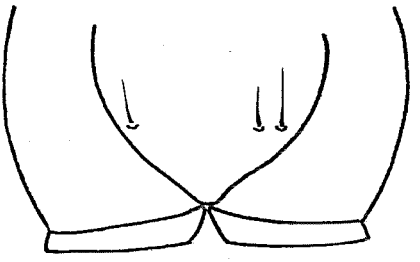

FIG. 2

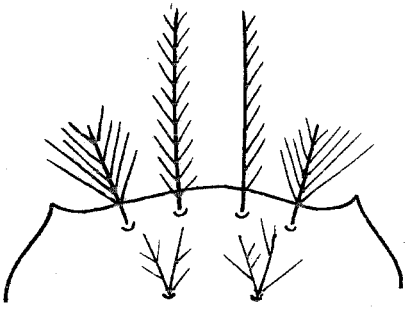

FIG. 3

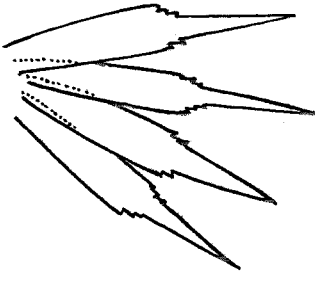

FIG. 4

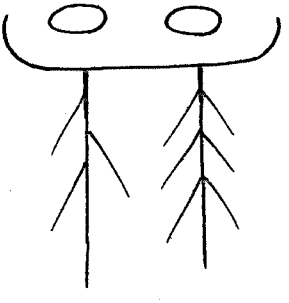

FIG. 5

observed considerable variations in several of their features.

Burton (1953) observed variation in the inner clypeal hair of *Anopheles quadrimaculatus* larvae. An abnormal specimen was found having three inner clypeal hairs instead of two. Mosquito larvae with abnormal gills, siphon and siphonal hairs were also reported by him previously.

Barr (1954) during identification of *Aedes vexans* larvae from Minnesota noticed a great deal of variability in the branching of the upper and lower head hairs.

White (1956) also observed variation in the number of branches in the head hairs. Fourth instar larvae collected from the field were examined for structural variation and compared with larvae reared in the laboratory.

According to Barr (1954) the amount of branching may not be rigidly determined genetically but environmental factors such as temperature may alter the expression of such a genetic trait.

But it was observed during the present investigation that the frequency of occurrence of variations in the larval chaetotaxy in the mosquito population was very low. Only four specimens of *Anopheles* mosquitoes were found with variations in their larval hairs out of thousands examined. The characters of larval chaetotaxy in *Anopheles* mosquitoes therefore appear to be quite normal in nature, and isolated samples which may exhibit variations are not statistically significant. Moreover these larvae were collected from all over the Province of East Pakistan from different types of breeding places.

It is therefore considered that the variations occurring in case of some of the larvae in the mosquito population may be just a freak of nature.

It is not possible to establish any correlation between the presence of variations in the larval chaetotaxy and any change in the environmental conditions such as temperature and types of breeding places.

Before any definite conclusion is made on environmental factors, experimental work will have to be done. The experiments should be done under different constant temperatures in the laboratory, with different types and quantities of food supplied to the growing larvae to observe their effect on variations in larval chaetotaxy. Comparison should also be made between the larvae bred in the laboratory and those occurring in nature.

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** This was not seen in original.

FURTHER RECORDS OF MERMITHID PARASITES OF MOSQUITO LARVAE *

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The occurrence of mermithid nematode parasites in mosquito larvae was reviewed in 1954 by Jenkins and West, who reported finding high infestation by the worms (subsequently described as *Hydromermis churchillensis* by Welch, 1960a) in larvae of *Aedes communis* (DeG.) in northern Canada, with light incidence in two other species of *Aedes*. In 1956 Laird reviewed world records, and later Welch (1960b) summarized mermithid parasitism in North American species of mosquitoes. In 1953 and 1955 Frohne also reported the presence of mermithids in *Aedes* larvae in Alaska, with heavy infestations in *A. communis*, and added several species to the list of known mosquito hosts given by the preceding authors.

In 1959 two instances of parasitism were observed by the author in *Aedes* larvae collected in the vicinity of the Rocky Mountain Biological Laboratory in Gothic, Colorado, at elevations of about 10,000 feet.

On July 3, a last instar larva of *Aedes pullatus* (Coq.), collected at the Gothic Picnic Area of the Gunnison National Forest, was observed exhibiting abnormal body thrashings. Upon examining the specimen, a mermithid worm was seen in the process of emerging from a large hole on the side of the thorax of the larva; a second one followed shortly. The two parasites differed markedly in length and diameter, the first being about 17 mm. long and the second one about 7.5 mm. Parasitism of this species of mosquito by mermithids had not previously been reported.

On July 15, 138 living nematodes, along with many dead culicid larvae, were taken from the bottom of a rearing jar which had contained larvae of *A. pullatus* and *A. communis* collected earlier in Elko Park (White River National Forest). Many of these parasites were larger than those found emerging from the *pullatus* larva, some attaining a length of about 22 mm. It was not determined whether only one or both of the species had served as host.

Dr. H. E. Welch, to whom the specimens were sent for examination, reported that the parasites were larval mermithids, which lack characters for

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