

Deterioration of Thatch Roofs by Moth Larvae after House Spraying in the Course of a Malaria Eradication Programme in North Borneo

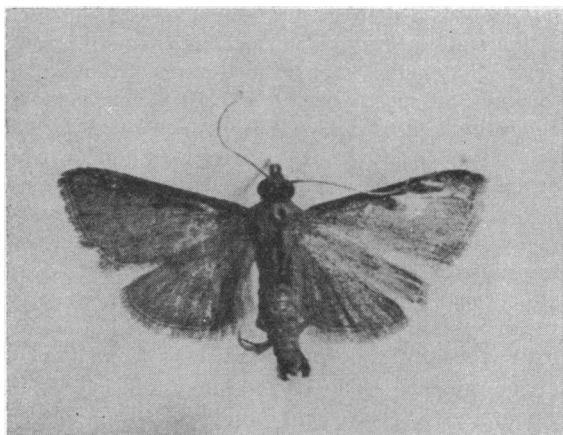
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During the Tenth Borneo Malaria Conference, the Sarawak representative referred to a complaint that spraying by DDT caused thatch (*attap*) roofs to rot, and the native chief, O. K. K. Sodomon, North Borneo, raised the same problem that the DDT spraying spoiled the thatch roofs of many local houses in his area.

Through careful examination, many old thatch strips collected from the rotten roofs were found harbouring a dirty-brown worm, a larva of the pyralid moth, *Herculia nigrivitta* Walker, belonging to the Family Pyralidae (Fig. 1-3).^a The larva has the habit of spinning a silken burrow beneath and between two pieces of thatch to which it retreats when not feeding. Usually each thatch strip is occupied by a single larva. As the infested thatch deteriorates with much damage from feeding, a new piece of thatch has to be inserted from time to time.

FIG. 1

ADULT *HERCULIA NIGRIVITTA* WALKER



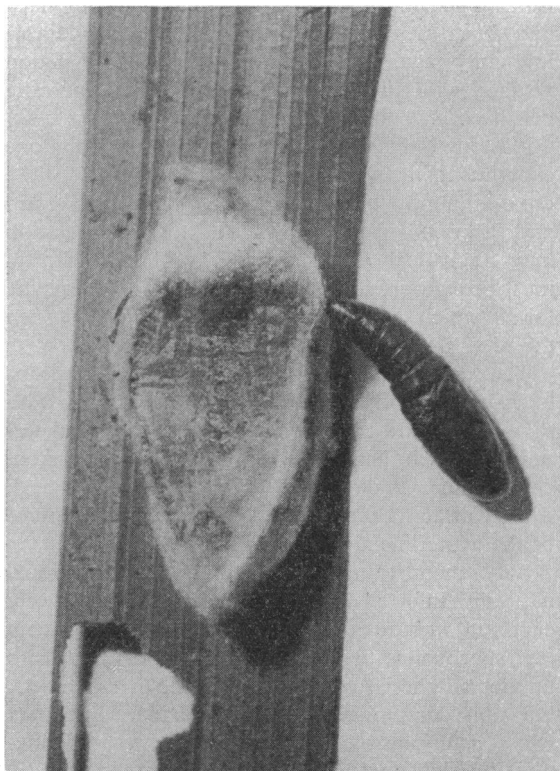
Density surveys of thatch-eating larvae in unsprayed areas and in areas sprayed with insecticides (DDT and dieldrin) were conducted with the following results:

^a The larvae and moths were kindly identified by Mr P. E. S. Whalley of the British Museum.

Areas surveyed	No. of live thatch-eating larvae per square foot of infested roof
Ranau (unsprayed)	4.2
Keningau North (DDT-sprayed)	6.6
Keningau South (dieldrin-sprayed)	0.2 (with 4.8 old cocoons)

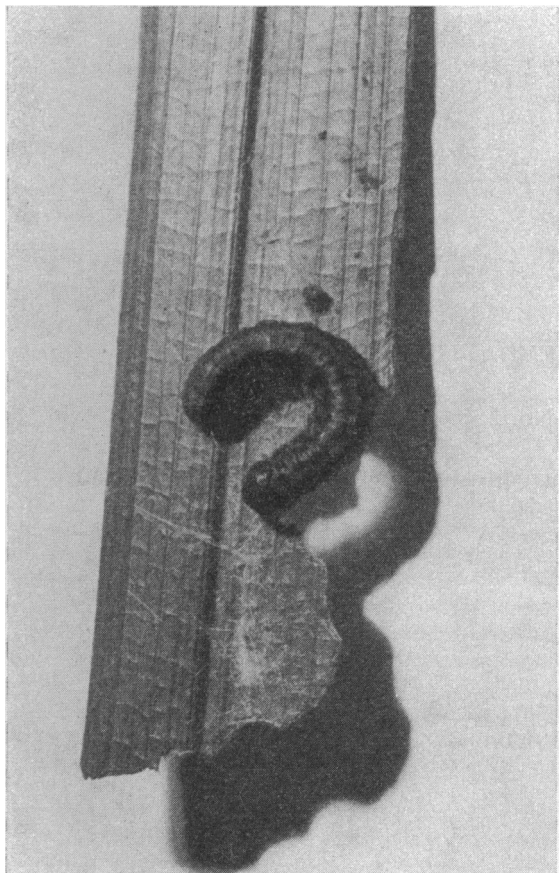
FIG. 2

HERCULIA NIGRIVITTA PUPA WITH COCOON



The above findings revealed that rotten thatch roofs also occurred in most of the local houses in Ranau, an unsprayed area. It is obvious that the deterioration of thatch roofs was not associated with DDT-spraying alone. However, the density of thatch-eating larvae in an unsprayed area is lower

FIG. 3
HERCULIA NIGRIVITTA LARVA EATING STRIP OF ATTAP
THATCH



than that in a DDT-sprayed area. Also, from the above, in the dieldrin-sprayed area, 0.2 live larvae and 4.8 old cocoons were found per square foot of infested roof. The live larvae were those which survived in the presence of dieldrin, while the old cocoons represented the number of larvae existing before spraying. The density of thatch-eating larvae, therefore, had been reduced from 4.8 to 0.2 larvae per square foot of the infested roof after dieldrin-spraying.^b

A test on the susceptibility to DDT of thatch-eating larvae indicated that the larvae have the ability to distinguish the presence of DDT and to

refuse to feed on DDT-sprayed thatch, although they have been starved for 24 hours. Deliberate avoidance of DDT, therefore, is a major factor in the survival potential of the thatch-eating larvae in the DDT-sprayed area.

Another test on susceptibility of thatch-eating larvae to dieldrin indicated that the larvae are very susceptible to dieldrin, with a mortality rate up to 92%. These findings explain why more damage was caused by the larvae in the DDT area than in the dieldrin area. The difference between DDT and dieldrin in relation to the density of thatch-eating larvae is probably due to the different toxicity and irritability of the two insecticides.

Fifty healthy and full-grown thatch-eating larvae collected from the unsprayed area were used for a rearing test. After a few days, the larvae, staying at the end of their burrows with heads pointing forwards, began to spin their thin, transparent, and elliptical silk cocoons. This done, the larvae lived perfectly motionless for one day and then transformed into black pupae inside their cocoons, together with their larval exuviae. The pupal stage lasted from 6 to 8 days. After this period, the pupa became active with wriggling movements. In a short time the exposed pupal skin became dry and split, and the moth escaped. The newly emerged moth climbed up on the thatch strip and shook out its wings until they were fully expanded and hardened.

During rearing, certain pupae remained unchanged and motionless for more than 10 days. Finally, a very active and small hymenopterous parasite, a chalcid-fly, *Antrocephalus* sp.,^c appeared. Altogether eight chalcid-flies were recorded, the parasite rate of chalcid-flies in the pupae of thatch-eating larvae being 16%.

A preliminary test was conducted by enclosing a chalcid-fly in a test-tube with a piece of DDT-sprayed thatch strip. It was found that all the chalcid-flies were knocked down after exposure for one hour.

Since the parasitic chalcids are very susceptible to DDT, the parasitic percentage of this natural enemy in the DDT-sprayed area becomes low and the parasites fail to control the thatch-eating larvae. This is probably why the density of thatch-eating larvae is higher in DDT-sprayed areas than in unsprayed areas.

^c The hymenopterous parasites belonging to the Family Chalcidae were kindly identified by Mr E. Adams of the British Museum.

^b In Labnan, a small island on which dieldrin was sprayed, thatch-eating moths have never been found.