few pupae were observed to contain fully developed insects. These insects did not emerge during the normal emergence period of eye gnats. After a period of 3 to 4 weeks from time of recovery, the fully developed insects were taken out by breaking the *Hippelates* pupal skins. The insect was determined as *Hexacola* sp., belonging to the subfamily Eucoilinae and the group Cynipoidea (determined by L. H. Weld, United States Department of Agriculture, Entomology Research Division, Beltsville, Maryland). The female parasite (Figure 1) has striate scutellum

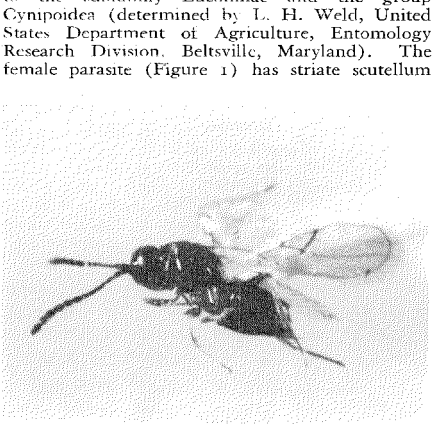

FIG. 1.—Female *Hexacola* sp. (Cynipoidea, Eucoilinae) recovered from *Hippelates* pupa

and the radial cell seems to be open. Wing characteristics, antennal form and segments and the ovipositor are readily noticeable from Figure 1.

Other Eucoilines such as *Cothonospis rapae* (Westd.), and *Kleidotoma* parasitize cabbage root maggot and carrion feeding larvae (James 1928). The former parasitizes small larvae of the root maggot and is therefore of limited benefit by being able to parasitize during a short period of development of host larvae (James 1928). Other Eucoilines such as *Psilodora* spp. parasitize maggots of blowflies. The parasites go through long hibernation even at high temperatures (Roberts 1935).

Members of the genus *Hexacola* have been reared from frit fly (*Oscinella frit*) larvae (Simmonds, 1952). No parasitism of eggs or pupae by *Hexacola* was observed. Under artificial conditions the parasites emerge 5–7 weeks after collection, and no such delay in emergence was observed in the field (Simmonds 1952).

It is possible that the *Hexacola* recovered from *Hippelates* also manifested such a delay in emergence under laboratory conditions. The degree of parasitism found in the recovered pupae was not over 5 percent. Although the parasite does not seem to be an effective control agent, the recovery of this parasite from *Hippelates* pupae may stimulate work on this as well as other natural enemies of this group of human and animal pests. As far as is known, the recovery of this parasite constitutes the first record of a parasite from *Hippelates* eye gnats.

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A MICROSPORIDIAN PARASITE OF *Aedes stimulans* (WALKER)

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Parasitized *Aedes stimulans* larvae were first noticed in northern New Jersey by the junior author in the spring of 1959. In this locality this mosquito has a larval period which extends from late March to early in May. A closer examination this past spring, however, revealed the parasite to be a microsporidian of the genus *Thelohania* (Kudo, 1924). Although no specific designation can be made at this time to the best of our knowledge, *Aedes stimulans* represents a new host record for *Thelohania* and this is the first microsporidian parasite recorded from a New Jersey mosquito (Thomson, 1960).

Heavily infected larvae were quite distinctive. They appeared either to have a lumpy and whitish fat body or to be completely an opaque green except for the head capsule and breathing tube. The green condition seems to be unique and no mention is made of it in the literature dealing with mosquito microsporidian infections. Both the lumpy and the green condition result from the immense concentration of spores in the cells of the fat body. In late stages of infection, the fat body disintegrates completely and the larva becomes a veritable sac of spores. The green condition is only an apparent one since, when the larvae are removed from a dark background, the green disappears and the larvae appear normal or slightly whitish.

The difference in appearance between the green and lumpy forms may be a function of the time in the larval period when an infection is initiated. None of the green larvae were observed to live

past the third instar. The lumpy larvae, however, often reached the fourth instar and sometimes pupated. Few larvae in which infection was obvious were even seen to complete their life cycle.

Unfortunately, no measurements of infection levels in the population as a whole were made this year although it is hoped that this information will be forthcoming next spring. It is evident, however, that larvae with an obvious infection constitute but a very small fraction of the population. It would seem that the large accumulation of fat which results in part from the relatively long larval period coupled with the relatively low water temperature is quite favorable for the development of large numbers of spores per infected larva.

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PRIMATE MALARIA INFECTIONS IN *Mansonia uniformis*

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The general assumption that primate malarias are infective only to *Anopheles* mosquitoes has remained virtually unchallenged. Mulligan (1935) made a brief reference, with no details, to the presence of *Plasmodium cynomolgi* oocysts in *Culex vishnui*. Williamson (1937) reported human malaria infections in *Culex bitaeniorhynchus* but this report has not been given wide credence. Russell *et al.* (1946) mentioned, without details, the experimental infection of *Aedes regimae* and *Armigeres obturbans* with *Plasmodium knowlesi*, with the production of sporozoites in both species. Finally, Jaswant Singh (1949) reported (unpublished results by Mohan) the experimental transmission of *Plasmodium knowlesi* by the inoculation of sporozoites from *Armigeres obturbans*.

During studies on simian malaria in our laboratories, *Mansonia uniformis* were exposed to *Macaca mulatta* which were infected with *Plasmodium cynomolgi bastianellii*, a vivax-type parasite of Malayan macaques. These were wild-caught mosquitoes from a swamp area near Kuala Lumpur where monkeys have been found to be infected with malaria. The mosquitoes which are responsible for transmitting the monkey malaria in this area are unknown.

Nine experiments have been conducted in which *Mansonia uniformis* and *Anopheles maculatus* were fed on infected monkeys. Laboratory reared *Anopheles maculatus*, which are quite susceptible to this species of *Plasmodium*, were used as controls on the infectivity of the donor animal at the time of the feeding. Dissections were made starting 5.5 days after feeding and continued at intervals until sporozoites were expected in the salivary glands, at which time gland dissections were also made. *Mansonia uniformis* from the same area were dissected as controls for possible natural infections. See Table 1 for data.

TABLE 1.—Result of dissection of mosquitoes

Mosquito species	No. diss.	No. pos.	Percent pos.
Mansonia uniformis	213	41	19
Anopheles maculatus	56	42	75
Mansonia uniformis (unfed controls)	221	0	0

The average oocyst load in the infected *Mansonia uniformis* is much lower than that seen in *A. maculatus*. *M. uniformis* showed an average of 25 oocysts/positive gut (maximum number for one gut, 327 oocysts) while *A. maculatus* showed an average of 327 oocysts/positive gut (maximum number for one gut, 800 oocysts). The general pattern of development of the oocysts in *M. uniformis* is comparable to that seen in *A. maculatus*. Sporozoite differentiation was apparent on the 9.5 day after infection and sporozoites were free around the guts on the 10.5 day. One sporozoite was observed in a gland preparation dissected on the 12.5 day after infection but this was an isolated finding and the impression given was that the great majority of the sporozoites fail to reach the glands. There may exist, under laboratory conditions, some barrier preventing invasion of the glands.

First attempts to transmit the infection to clean monkeys with *M. uniformis* have been unsuccessful. Work is currently in progress on this problem and preliminary results with *M. annulata*, *M. bonneae* and *M. dives* suggest that these species are not susceptible.

It should be noted that though none of the unfed controls were infected, one experimental *M. uniformis* had a midgut infection which was considered to be natural due to the large size (67–100 microns) of the oocysts 3.5 days after infection.