THELOHANIA (NOSEMATIDAE:MICROSPORIDA) IN *AEDES* MOSQUITOES OF ALASKA

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Although 20 species of *Aedes* in North America are reported as hosts of *Thelohania,* no records existed until now from Alaska; the northernmost record for this continent has been from *Aedes communis* in Manitoba, Canada (Welch, 1960).

Recently, one of the authors (Gorham) collected larvae of eight species of *Aedes* infected with microsporidans in Alaska and sent them (some alive, some in formalin) to the Gulf Coast Mosquito Research Laboratory for identification of the pathogen. Giemsa and Heidenhain's iron-hematoxylin stained smears were made from the live larvae, and spores were measured from live larvae of each host where possible and from the formalin-preserved larvae when fresh material was not available. The pathogen in all infected larvae was identified as *Thelohania;* four of the *Aedes* (*fitchii, punctor, pullatus,* and *riparius*) were new host records (Table 1). Levels of infection in the field in all instances were very low; the most common host was *Aedes communis.*

Although spores from some of the mosquito species were different sizes, we prefer here to report the pathogen from all eight as *Thelohania* near *opacita* (Table 1) because dimensions were similar to those of *Thelohania opacita* and no room exists for descriptions of new species of *Thelohania* based on spore size. Also, no species of *Thelohania* in *Aedes* can be transmitted perorally and, therefore, information on host specificity cannot be obtained. Hence, the true identity of *Thelohania* species in *Aedes* (also in some other genera) remains unknown. Perhaps these *Thelohania* species have evolved to the point that they are now only transmitted transovarially. A study of the ultrastructure of these *Thelohania* is urgently needed.

The following 24 species of *Aedes* (all but 2 belonging to the subgenus *Ochlerotatus*) are now known as hosts of *Thelohania* from the listed areas: *Aedes abserratus*—Conn.; *A. canadensis*—Conn., La., Md., Pa.; *A. cantator*—Conn., Del.: *A. cataphylla*—Alaska, Calif.; *A. (Aedes) cinereus*—Conn., Nev.; *A. communis*—Alaska, Canada; *A. dorsalis*—Nev., Utah; *A. excrucians*—Alaska, Conn.;—*A. fitchii*—Alaska; *A. grossbecki*—La.; *A. hexodontus*—Alaska, Calif.; *A. increpitus*—Calif.; *A melanimon*—Calif., Nev; *A. pullatus*—Alaska; *A. punctor*—Alaska; *A. riparius*—Alaska; *A. sollicitans*—La.; *A. squamiger*—Calif.; *A. sticticus*—La.; *A. stimulans*—Conn., N. J.; *A. taeniorhynchus*—La.; *A. thibaulti*—La.; *A. (Finlaya) triseriatus*—La.; and *A. ventrovittis*—Calif.

Today, therefore, most host records for *Thelohania* in *Aedes* exist from Alaska followed in turn by those from Louisiana (Chapman *et al.,* 1966; Chapman *et al.,* 1969), from California (Kellen *et al.,* 1965), and from Connecticut (Anderson, 1968).

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TABLE 1.—Collection information and spore size of *Thelohania* near *opacita* occurring in Alaskan *Aedes* 1972.

Aedes	No. infected larvae	Location	Measurement of mature spores (mean±SE in μ; 25 spores)
cataphylla	6	Sagwon [c]	6.95±0.28×5.73±0.19 [a]
communis	92	Sagwon, Eielson AFB [d]	7.40±0.17×5.56±0.19 [a]
excrucians	2	Eielson AFB	6.50±0.30×5.05±0.24 [a]
fitchii	13	Eielson AFB	7.74±0.15×5.91±0.13 [a]
hexodontus	6	Sagwon, Eielson AFB	7.23±0.24×5.47±0.13 [b]
pullatus	1	Sagwon	8.24±0.30×6.16±0.20 [b]
punctor	1	Eielson AFB	7.86±0.31×5.55±0.20 [b]
riparius	2	Eielson AFB	7.90±0.22×6.03±0.24 [a]

[a] Fresh spores.
[b] Formalin-preserved spores.
[c] 69°22′N, 148°54′W.
[d] 64°40′N, 147°6′W.

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PREFERENCE OF *MANSONIA UNIFORMIS* (THEOB.) FOR SPECIFIC WATER HYACINTH PLANTS [1]

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The search for a more rapid means of surveying for immature *Mansonia uniformis* (Theob.) mosquitoes continues to be one of the most challenging activities in mosquito control work. With increasing emphasis on selective application of insecticides, source reduction, and avoidance of ecological contamination, we are concerned with determining the exact locations of the mosquito breeding sites. A more rapid detection of *Mansonia* breeding sites would be more efficient and far more economical in control programs concerned with this mosquito.

Due to the unconventional means of respiration of the larvae of *Mansonia,* it is difficult to detect their breeding sites. Instead of rising to the surface of the water to exchange gases, *Mansonia* immatures insert their syphons or trumpets into hollow roots and stems of aquatic plants, such as water hyacinths, to obtain air. As a result, the ordinary mosquito survey technique of dipping at the surface of the water fails to detect the presence of such immatures.

Although investigators Hodgkin (1939) and Chow (1949) collected *Mansonia* larvae from the roots of plants such as water hyacinth, *Eichornia,* for several years, finding plants with immatures was left to chance. Laurence (1960) noted that *Mansonia* larvae were firmly attached to their host plant; thus, when the plant was removed from the water the tiny larvae blended in with the myriad of roots. This problem of detecting *Mansonia* immatures is compounded by mud clinging to the roots.

One technique used by investigators is to put suspect plants in a bowl or pail of water and shake the plant vigorously to dislodge mosquito immatures that may be attached to the roots. Not only does the presence of mud on the roots make the water opaque and impossible to observe immatures but when larvae detach from the host plant they go to the bottom of the pond (in this case the container) and burrow into the sediment. Bidlingmayer (1954) developed a technique for surveying for immature *M. perturbans* (Wlk.) using a sheet metal cylinder, but this technique is slow and only a small area can be surveyed within a given period of time. McDonald (1970) showed that when water hyacinth plants were hosts for *M. uniformis* immatures, the larvae and pupae detach from the roots and rise to the surface of the solution immediately when the host plant is placed in either a 5 percent sodium hydroxide or a 15 percent sodium chloride solution.

However, the major problem is still present: Which plants will be examined to detect the presence of mosquito immatures? Van den Assem and Metselaar (1958) were unable to demonstrate that plants actually attracted *Mansonia* larvae. Laurence and Smith (1958), however, implied that *M. africana* (Theob.) and *M. uniformis* larvae preferentially attach to various species of healthy plants rather than brown paper and further suggested that when *Mansonia* larvae are attached to a grass that dies, the larvae die also. These results would indicate that live plants should be more attractive than dead plants. The present study was carried out to determine whether certain water hyacinth plants are more attractive to the *M. uniformis* immatures than others, and whether there are physical characteristics of the plant associated with this attractiveness.

It has been suggested that live healthy plants are more attractive than dead ones and we tested this hypothesis. Water hyacinth plants were taken from a nearby pond where they were growing. All plants were alive and healthy and judged to be of the same age due to selection based on uniform size. First, ten plants were removed from the pond and placed in an incu-

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