

OPERATIONAL AND SCIENTIFIC NOTES

OBSERVATIONS OF MERMITHID NEMATODES IN FLORIDA MOSQUITOES

K. E. SAVAGE¹ AND J. J. PETERSEN²

Mermithid nematodes parasitizing mosquitoes have been reported by numerous authors, but only a few such observations have been made in the United States (New Jersey: Smith 1904; Pennsylvania: Stabler 1952; Colorado: Smith 1961; Wyoming: Tsai and Grundmann 1969) and, except for Louisiana (Petersen *et al.* 1967, 1968), none have been reported from the Gulf Coast States. During a survey of populations of mosquito larvae for the fungal parasite *Coelomomyces* between October 1967 and July 1968 near Gainesville, Florida, 7 of 47 breeding areas were found producing *Anopheles crucians* Wiedemann and *Uranotaenia* sp. parasitized with mermithid nematodes. Mermithoid nematodes were also found parasitizing a chaoborid, *Corethrella* sp. [probably *brakeleyi* (Coquillett)] in one breeding area. After these mermithids emerged from the mosquitoes, they were reared to maturity and preserved for identification. The nematodes from the culicids were tentatively identified as belonging to the genera *Gastromermis* and *Romanomermis* and are thought to be the same species as those reported from Louisiana (Petersen *et al.* 1968 and Petersen and Chapman 1970). The parasite from *Corethrella* sp. was identified as *Corethrellonema grandispiculosum* Nickle (Tetradonematidae), a nematode also reported from *Corethrella brakeleyi* in Louisiana (Chapman *et al.* 1967). All identifications were made by Dr. William R. Nickle, Plant Science Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland.

The *A. crucians* parasitized by the *Romanomermis* sp. were collected from the following five sites: (1) a drainage ditch about $\frac{3}{4}$ mile long in which the slow moving water was covered with hyacinths; (2) a temporary pool at the end of a culvert; (3) a depression permanently damp from underground seepage; (4) about 150 feet of shoreline on a small lake covered with hyacinths and other vegetation; and (5) a portion of a marsh covering a $\frac{1}{4}$ square mile area.

¹Insects Affecting Man and Animals Research Laboratory, Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture, Gainesville, Florida 32601.

²Gulf Coast Marsh and Rice Field Mosquito Investigations Laboratory, Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture, Avenue J—Chennault, Lake Charles, Louisiana 70601.

The incidence of parasitism in *A. crucians* ranged from 0.5 to 53 percent in the five sites. Also, two of the sites produced infected larval *Uranotaenia* sp. in which parasitism ranged from 7 to 65 percent. All five sites produced *Culex* sp., but none were parasitized.

The *A. crucians* parasitized by the *Gastromermis* sp. were collected from one site along a small creek where the infected larvae were concentrated on top of a mat of vegetation on both sides of the stream. Parasitism ranged from 0.5 to 13 percent in *A. crucians* but was absent in an undetermined *Culex* sp. taken from the same site. Also, one *A. crucians* larva parasitized by a single mermithid (genus undetermined) was collected from a temporary rectangular pond (200 x 400 feet) covered with floating vegetation.

The *Corethrella* sp. parasitized with *C. grandispiculosum* were collected from a shallow semi-permanent pond (200 x 400 feet) overgrown with large woody bushes; 4 of 15 larval *Corethrella* sp. were infected but *Anopheles* and *Uranotaenia* were not.

Also, nematodes (probably mermithids) were found in an adult female *Psorophora ciliata* (F.) from Gainesville and an adult female *Aedes sollicitans* (Walker) from New Smyrna, Fla., by E. I. Hazard, Entomology Research Division, ARS, USDA, Gainesville, Fla., during an examination for microsporidia; both were larval forms and were not identified. The nematode in *A. sollicitans* was probably *Agamomermis culicis* Stiles (Petersen *et al.* 1968).

The same three species of nematodes seem to appear in larval populations of culicids and chaoborids in both Florida and Louisiana. Therefore, these parasites are probably wide-spread throughout the southern United States and have been overlooked, possibly because of their limited distribution within a specific area. Also, the observation of the nematode in *Aedes sollicitans* in Florida indicates that *Agamomermis culicis* is probably wide-spread and occurs throughout the coastal range of *Aedes sollicitans*.

References Cited

- Chapman, H. C., Woodard, D. B. and Petersen, J. J. 1967. Nematode parasites of Culicidae and Chaoboridae in Louisiana. Mosq. News 27(4):490-492.
- Petersen, J. J., Chapman, H. C. and Woodard, D. B. 1967. Preliminary observations on the incidence and biology of a mermithid nematode of *Aedes sollicitans* (Walker) in Louisiana. Mosq. News 27(4):493-498.
- Petersen, J. J., Chapman, H. C. and Woodard, D. B. 1968. The bionomics of a mermithid nematode of larval mosquitoes in southwestern Louisiana. Mosq. News 28(3):346-352.
- Petersen, J. J. and Chapman, H. C. 1970. Para-

- sitism of *Anopheles* mosquitoes by a *Gastro-mermis* sp. (Nematoda: Mermithidae) in southwestern Louisiana. Mosq. News 30(3):420-424.
- Smith, J. B. 1904. Report of the New Jersey Agricultural Experiment Station Upon the Mosquitoes Occurring Within the State, Their Habits, Life History, etc. Macrellish and Wugley, Trenton, N. J., pp. 81-84.
- Smith, M. E. 1961. Further records of mermithid parasites of mosquito larvae. Mosq. News 21(4):344-345.
- Stabler, R. M. 1952. Parasitism of mosquito larvae by mermithids (Nematoda). J. Parasitol. 38:130-132.
- Tsai, Y. and Grundmann, A. W. 1969. *Reesimermis nielsenii* gen. et sp. n. (Nematoda: Mermithidae) parasitizing mosquitoes in Wyoming. Proc. Helminthol. Soc. Wash. 36(1): 61-67.

NOVEL COLLECTION RECORD FOR *Culex tarsalis* COQUILLET¹

WESLEY R. NOWELL, LT COLONEL, USAF, BSC,²
 ARTHUR T. O'NEAL, MASTER SERGEANT, USAF³
 AND ALLAN T. BULLARD, CAPTAIN, USAF, BSC²

An additional breeding source for *Culex tarsalis* Coquillett was discovered when 68 larvae of this mosquito were recovered from a container in an optometric examining room in an Air Force dispensary in Texas.

It is common practice in optometric fitting rooms to maintain a water bath to rinse lenses and cool frames after eyeglasses have been heated for adjustment in a frame warmer. The rinse container employed in this dispensary was a stainless steel pan (29 cm x 10 cm x 16.5 cm) which was generally filled to the 10 cm level (2330 ml volume) and, as indicated by the heavy mineral deposit around the inside, had been used for this purpose for many months.

The optometric technician reported to the fitting room, a small (2.4 m x 3.4 m) inner cubicle, on a Monday morning. He noted that the water level in the rinse pan was low (2.5 cm) and

filled it to the 10 cm mark. Later, while cooling the first frame, he noticed some "small wriggling dots", took the pan to a preventive medicine technician, and reported that he had "gotten the bugs out of the water system." The dots were identified as first instar mosquito larvae and an effort was made to discover their source.

The traps under all wash basins were checked for larvae: there were none. A careful search was made in the fitting room for an adult mosquito: none was found; but the room had not been closed over the weekend and an adult could have flown in or out, or a female could have died following oviposition in the rinse pan and fallen to the floor. There was no record of any plumbing work having been done either inside or outside the building, nor had any mains been tapped or left open which could have drawn standing water through when they were reconnected. The lines were under constant pressure, and since all systems are superchlorinated to 50 ppm by Air Force Regulation whenever work is accomplished on the lines, the possibility that the larvae might have been introduced through the water system was discarded. The only water catchments available for mosquito breeding noted in the Eye Clinic and adjacent offices were the sink traps and the rinse pan in which the larvae were found.

The larvae advanced to the third and fourth instars and were sent to the Epidemiology Division of the USAF School of Aerospace Medicine where they were identified as *Culex tarsalis*. Larvae of this species develop in a rather wide variety of aquatic situations. They are frequently found in bodies of water associated with irrigation. They may breed in waters containing large quantities of organic material from human wastes, and they have been recovered from artificial containers of various types such as tin cans, jars, rain barrels, drinking troughs, ornamental ponds, and catch basins. Females deposit between 150 and 300 eggs in rafts with hatching normally occurring 48 to 72 hours after oviposition (Brennan and Harwood, 1953). The larval and pupal stages develop rapidly and generations are continuous throughout the year in Texas (Horsfall, 1955).

The dispensary has self-closing doors at each entrance. However, the janitors were reported to prop the outside doors open each evening until 10:00 p.m. and this would provide access for adult mosquitoes. The eye lanes in the clinic are painted black and they could attract a mosquito.

It could be supposed that a gravid female entered the open building during Friday evening, was attracted to the fitting room and deposited her eggs in the rinse pan. The eggs would have hatched on Sunday or Monday. Upon close examination, remnants of third and fourth instar mosquito larvae were noted imbedded in the mineral crust on the bottom of the rinse pan. This would indicate that breeding had

¹ Further reproduction is authorized to satisfy the needs of the U.S. Government.

² Aerospace Medical Division, USAF School of Aerospace Medicine, Epidemiology Division, Entomology Branch, Brooks AFB, Texas.

³ USAF Medical Center (SGKP), Lackland AFB, Texas.