A NATURAL EPIZOOTIC OF THE AQUATIC FUNGUS *LAGENIDIUM GIGANTEUM* IN THE MOSQUITO *CULEX TERRITANS*

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ABSTRACT: A natural epizootic of the fungus *Lagenidium giganteum* in larval populations of *Culex territans* in a black gum swamp was monitored from 1975 to 1977. Collections made after the fungus 1st appeared each year showed that 61% of the larval populations of *Cx. territans* was infected and eliminated over the 3-year period.

The aquatic fungus *Lagenidium giganteum* was described by Couch (1935) from a combined collection of copepods and mosquito larvae (*Culex* and *Anopheles*) in North Carolina. Interest in this fungus was renewed some 30 odd years later when additional isolates were found in mosquitoes from North Carolina (Umphlett and Huang 1970) and North Carolina and India (Couch and Romney 1973); however, the material was isolated from relatively few larval specimens. Several small field tests were conducted with *L. giganteum* in North Carolina (Umphlett and Huang 1972) and in California (McCray et al. 1973).

The present study was initiated after the authors found a natural epizootic of *L. giganteum* occurring in larval populations of *Culex territans* in a black gum swamp in southwestern Louisiana, September 16, 1975.

MATERIALS AND METHODS

The site was an oval black gum swamp located about 3 miles from Moss Bluff, Louisiana. This shaded swamp possessed no aquatic vegetation; sufficient pine needles, leaves, and other debris were available on the water surface adjacent to the shore to support substantial breeding of *Cx. territans* and occasionally *Cx. peccator, Uranotaenia sapphirina,* and *Anopheles crucians.* After September 16, 1975, January 7, 1976, and March 8, 1977, mosquito larvae were usually collected weekly and returned to the laboratory for identification and examination for infections. Visibly infected larvae were removed, and the remaining larvae were reared in a small plastic container and examined daily. Dead or moribund larvae were removed, examined, and counted. Records were kept of other pathogens that occurred in *Cx. territans.*

A maximum-minimum thermometer was immersed in the swamp, and water temperatures were monitored weekly.

RESULTS AND DISCUSSION

The results of the surveillance of the swamp for portions of 3 years are presented in Table 1. In 1975, all collections positive for *Lagenidium* revealed a mean infection of 87% for September through November.

In 1976, the epizootic recrudesced (38%) the 1st week of May when the water temperature reached 18.3°C; it averaged 86% for the next 16 weeks. The swamp dried in late August and remained dry until early December.

Surveillance of the swamp was begun again in March 1977, but the fungus failed to reappear until June 3 when 93% of the larvae of *Cx. territans* were infected and water temperatures exceeded 22°C. The site dried in mid-June but was reflooded a week later, and the fungus then produced infection levels of 90 and 84% the next 2 weeks. The site again dried and remained dry for about 6 weeks. Although rains reflooded the site in mid-August, 13 weekly collections of mosquitoes through November were negative for the fungus. The reasons for the dis-

Table 1. Monthly incidence of *Lagenidium giganteum* in larval populations of *Cx. territans* from a black gum swamp and water temperatures (1975–77).

Month	1975			1976			1977		
	Mean water temp (C°)	No. larvae	% infection	Mean water temp (C°)	No. larvae	% infection	Mean water temp (C°)	No. larvae	% infection
Jan	—	—	—	6.7	153	0	—	—	—
Feb	—	—	—	11.7	248	0	—	—	—
Mar	—	—	—	14.4	155	0	12.8	155	0
Apr	—	—	—	18.3	151	0	17.2	260	0
May	—	—	—	20.0	325	57	20.1	235	0
June	—	—	—	22.8	291	96	24.0	148	82
July	—	—	—	24.4	230	99	[1]	62	84
Aug	—	—	—	24.4	215	90	25.6	22	0
Sept	NC[2]	312	100	—[3]	—	—	24.9	186	0
Oct	17.2	316	87	—	—	—	20.4	260	0
Nov	15.6	217	69	—	—	—	15.4	150	0
Dec	11.1	219	0	—	—	—	—	—	—
Totals	—	1064	69[4]	—	1768	84[4]	—	1478	21[4]
Means									

[1] Water level too low for temperature reading.
[2] Infected larvae were first found September 16, water temperature not recorded.
[3] Site dry to December.
[4] Includes only data obtained after the first positive collections.

appearance of *L. giganteum*, even though water temperatures in August and September were around 25°C, are not known or understood.[1]

If one ignores collections of larvae made prior to the 1st positive collection each year, 61% of the larval populations of *Cx. territans* were infected and eliminated over a 3-year period. Data from positive collections only produced a mean infection level of 85% for this period.

When the epizootic of *L. giganteum* was 1st noted in mid-September of 1975, many dead infected larvae of all instars of *Cx. territans* were floating on the water surface. Since larvae of *Cx. territans* were extremely scarce during the next 2 weeks, large numbers of 1st instar larvae from our laboratory colony of *Cx. territans* were placed in floating screened plastic containers (Chapman et al. 1970). All of these larvae were killed by *L. giganteum*. Larvae of *Cx. peccator, An. crucians,* and *Ur. sapphirina* were present in the swamp at the same time these studies were conducted; however, none of these species became infected. Also, larvae of *Psorophora howardii, Aedes atlanticus,* and *Ae. tormentor* were present the 3rd week in June 1977 when the swamp was reflooded by rains, but none developed infections. Thus, though all previously studied isolates of this fungus seem to have a fairly broad host range, this isolate infected only *Cx. territans* in the site.

The only other pathogen found in larvae of *Cx. territans* was a microsporidian (*Amblyospora opacita*) that occurred in 37 of the 79 weekly collections. This pathogen was more common during the cooler months (October-April) than during the warmer months. It ranged to a high of 16% for a weekly collection and produced a mean infection level of 1.9% over the 3 years.

This is the 1st report of a natural epizootic of *L. giganteum* occurring in field populations of a mosquito. Though

[1] A check of 2 larval collections from the site in early July 1978 indicated 100% infection by the fungus.

Cx. territans is not important as a vector or pest, these observations certainly indicate the potential of this aquatic fungus as a biocontrol agent of mosquitoes.

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