reported on the feeding habits of *Deinocerites* that several mosquito species in Panama feed preferentially on cold-blooded animals. Three species of *Melanoconion* mosquitoes, *C. egcymon*, *C. tecmarsis* and *C. elevator*, fed almost exclusively on reptiles, while 1 other, *C. dunni*, apparently feeds on reptiles the majority of the time; the latter species also fed readily on birds and mammals.

These data further indicate that at least some groups of Neotropical mosquitoes have more extensive host ranges than those found among Nearctic groups.

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J. Med. Ent. Vol. 12, no. 2: 209–213 **30 June 1975**

8564 8

DIFFERENTIAL SUSCEPTIBILITY OF *CULEX TERRITANS* AND *AEDES TRISERIATUS* (DIPTERA: CULICIDAE) TO *FOLEYELLA FLEXICAUDA* (NEMATODA: FILARIOIDEA)[1]

By **Jorge L. Benach[2,3] and Wayne J. Crans[2]**

Abstract: Culex territans Walker, 1856 and *Aedes triseriatus* (Say, 1823) were fed on bullfrogs infected with *Folyella flexicauda* (Nematoda: Filarioidea) to compare vector susceptibility in 2 mosquito species known to accept blood meals from amphibians. Susceptibility to filarial larvae was interpreted in terms of the number of developing larvae and mortality of mosquitoes after feeding on an infected host, as well as reactions of the mosquitoes to the filarial larvae. *C. territans* ingested large numbers of microfilariae but only a small percentage were able to penetrate into the hemocoel of the mosquito. Most microfilariae were found dead in the midgut shortly after ingestion. Lysis of the frog red blood cells was observed within the same period of time. Development to the 3rd larval stage occurred in the fat body with no apparent defensive reactions to the worms. Developing larvae had no adverse effects on the survival of *C. territans* and 98% of the mosquitoes tested harbored filarial larvae. *F. flexicauda* was always lethal to *A. triseriatus*. Dissections as well as histological sections revealed that large numbers of microfilariae were able to gain access to the hemocoel, causing severe damage to the midgut epithelium and the eventual death of the mosquito. Events occurring in the alimentary canals of these 2 mosquito species appeared to be the major cause for the differences in vector susceptibility.

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Filarial worms of the genus *Foleyella* are restricted to cold-blooded vertebrate hosts, and numerous species are parasitic in lizards and frogs. Several species in the genus have been shown to develop to the infective stage in mosquitoes, but not all mosquito species are able to sustain complete development. Mosquitoes which regularly feed on cold-blooded hosts are the most likely vectors of *Foleyella* but amphibian or reptilian feeding habits are not common among the Culicidae. *Culex territans* Walker, 1856 has been shown to obtain the majority of its blood meals from amphibians (Crans 1970) and has been shown to transmit *F. flexicauda* to frogs in the laboratory (Benach & Crans 1973). In all probability *C. territans* is a natural vector of *F. flexicauda*.

Several workers have reported high mortality in mosquitoes which have fed on frogs harboring various species of *Foleyella*. However, most of these studies have utilized mosquitoes other than potential natural vectors. During the course of this investigation, many different mosquito species were exposed to frogs but could not be induced to feed. *Aedes triseriatus* (Say, 1823) was the only species tested other than *C. territans* which would accept blood from frogs without artificial stimulation. Although *A. triseriatus* never displayed much avidity for cold-blooded hosts, it provided an opportunity to compare the susceptibility and effect of *Foleyella* development in 2 different mosquito species, the presumed natural vector of *F. flexicauda* and an alternative species which might occasionally encounter the parasite in nature.

MATERIALS AND METHODS

Culex territans individuals were colonized and maintained as described by Benach (1970). The techniques for rearing *Aedes triseriatus* have been described by Gerberg (1970)[4]. Unless specified otherwise, mosquitoes acquired microfilariae by feeding on infected bullfrogs with a microfilaremia of 700–900 per 5 μliter of blood. All control mosquitoes took blood meals from uninfected bullfrogs. Maintenance of infected mosquitoes has been described by Benach & Crans (1973). Bullfrogs were kept as indicated by Nace (1968). Microfilaremia was established by the method of Crans (1969).

Susceptibility to the filarial larvae was interpreted according to the following criteria: (1) The number of developing larvae found at interval dissections, and the mortality of infected and control mosquitoes. Equal numbers of mosquitoes were fed simultaneously on infected and uninfected bullfrogs and maintained similarly for 18 days. Twenty-five mosquitoes were dissected at the following time intervals after feeding: immediately, 20 min., 1, 2, 3, 6, 12 and 24 hr, and daily thereafter for 18 days. Mosquitoes were immobilized by chilling and dissected in 0.85% saline; head, thorax and abdomen were examined separately and the number of larvae per individual was counted. The number of microfilariae ingested was determined by excising the entire and intact alimentary canal and diluting its contents in saline. (2) Pathological reactions of the mosquito to the filarial larvae. Infected and control specimens were immobilized by chilling and immediately fixed in Bouin's fluid. Sections from mosquitoes selected at the same post-feeding intervals as those used for dissections were cut at 8 μ and stained with hematoxylin and eosin.

RESULTS

Larval development and mosquito mortality: Microfilarial counts from the midguts of 64 *C. territans* showed that a mean number of 626 (range: 527–690) microfilariae was ingested with the blood meal. Although large numbers of microfilariae were ingested, less than 2% were able to penetrate into the hemocoel of the mosquito as judged by sub-

[4]The *Aedes triseriatus* mosquitoes used in these experiments were the progeny of wild-caught New Jersey females and the males from a colony established by Insect Control and Research Inc., Baltimore, Maryland, U.S.A.

TABLE 1. Rate of development, location and mean number of larvae of *Foleyella flexicauda* in *Culex territans*.*

No. mosq.	Dissection time	Mean no. parasites**	Stage of development	Location within mosquito
25	Immediately	7.8	Exsheathed	Hemocoel
25	20 min.	9.8	microfilariae	Fat body
150	1–24 hr	9.5	"	"
125	2–6 days	9.6	1st-stage larvae	"
175	7–13 days	9.5	2nd-stage larvae	"
125	14–18 days	9.2	3rd-stage larvae	Head; few in abdomen & thorax

*Microfilariae found dead in the gut are not included.
**Differences not statistically significant ($p < 0.05$).