

EFFECT OF THE WATER MITE
ARRENURUS PSEUDOTENUICOLLIS
(ACARIFORMES: ARRENURIDAE) ON THE LONGEVITY
OF CAPTIVE *ANOPHELES QUADRIMACULATUS*
(DIPTERA: CULICIDAE)

CARMINE A. LANCIANI
Department of Zoology
University of Florida
Gainesville, Florida 32611

Some species of the water mite genus *Arrenurus* are common parasites of mosquitoes. The larvae of these species find and cling to the external surfaces of host pupae and then attach to the adult hosts as they emerge. After approximately 6 days, the mites have become engorged and drop off their hosts, although mites held in small enclosures in the laboratory may remain attached throughout the entire life span of adult hosts. Engorged larvae that return to water metamorphose to the nymphal stage, which is predatory on crustaceans. After a period of feeding, the nymphs metamorphose to the adult stage, which has feeding habits like those of the nymphal stage.

As parasites, larval water mites can be expected to harm their hosts, and in fact, several studies have demonstrated a reduction in the longevity of mosquitoes by these mites (Miyazaki 1936, Lanciani and Boyt 1977, and Allan 1979), although Smith and McIver (1984b) found no mite-induced decline in the longevity of *Coquillettidia perturbans* (Walker).

In this study, the effect of the mite *Arrenurus pseudotenuicollis* Wilson on the longevity of the mosquito *Anopheles quadrimaculatus* Say was noted in a laboratory experiment. Mite cultures were established using engorged larvae collected from a parasitized population of *Anopheles crucians* Wiedeman in Gainesville, Florida. Eggs of a laboratory strain of the host were obtained from the USDA Insects Affecting Man and Animals Research Laboratory in Gainesville. Larval mosquitoes were reared on a diet of commercial fish food and brewers yeast in white enamel pans containing approximately 500 ml of tap water. Pupae were removed and transferred individually to small, screen-covered plastic vials containing approximately 10 ml of water. Larval mites in various numbers were added to some of the vials. A drop of corn syrup placed on the screen provided nutrient to the adult mosquito. The vials were held in partially covered plastic boxes housed in an environmental chamber maintained at 27°C and with a 12-hour light-dark cycle. The vials were checked daily, and for each mosquito death observed, the number of days survived and the number of engorged mites were recorded.

Unparasitized mosquitoes had significantly greater survivorship than parasitized mosquitoes of the same sex during their entire adult life span (Table 1; $P < 0.005$, logrank test; Peto et al. 1977), but the 2 groups had similar survivorship over the first 6.5 days of adult life, a period when most parasite growth is accomplished. Mite-induced death is normally due at least in part to the extraction of nutrient from the host hemolymph. However, since in this case no differential host death occurred when mite larvae were most actively draining host energy stores, these mites reduced long-term survivorship probably in other ways, some of which may be peculiar to the laboratory environment, e. g., the mite's presence on the host beyond the normal engorgement period might have upset the host's water balance (Åbro 1982, Smith and McIver 1984b).

Despite the suitability of *A. quadrimaculatus* to *A. pseudotenuicollis* in the laboratory, this mosquito is not as commonly parasitized by the mite as is *A. crucians* in local

TABLE 1. AVERAGE LONGEVITY IN DAYS OF ADULT MALE AND FEMALE MOSQUITOES BEARING VARIOUS NUMBERS OF PARASITIC WATER MITES. LUMPING WAS DONE TO INCLUDE AT LEAST 20 INDIVIDUALS IN EACH GROUP OF ENGORGED MITES PER HOST.

Engorged mites per host	Males			Females		
	Sample size	Longevity	Standard error	Sample size	Longevity	Standard error
0	94	20.73	0.82	79	17.99	0.90
1-2	61	19.28	0.93	51	14.39	0.78
3-5	33	17.85	1.26	36	14.36	1.17
6 or more	35	13.57	0.91	41	13.07	0.76

natural populations. Differences between host acceptability in the laboratory and host emphasis in the field may be caused by environmental factors, such as spatial and temporal nonoverlap between mites and mosquitoes, that prevent the mite from more thoroughly exploiting some host species in nature (Smith and McIver 1984a).

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