

DEFENSIVE CONSUMPTION OF PARASITIC MITES BY *ANOPHELES CRUCIANS* LARVAE

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Larvae of many species of the water mite genus *Arrenurus* parasitize adult mosquitoes. Normally, these mites attach to the pupal stage of the host, transfer to the emerging adult mosquitoes, and begin feeding. However, occasionally mites attach first to the terminal larval stage of the host.¹ To continue their life cycle, such mites must successfully transfer from larval to pupal to adult mosquitoes before feeding.

Mites attaching to mosquito larvae face a risk not experienced by mites attaching to mosquito pupae. In the laboratory, larval mites of *Arrenurus pseudotenuicollis* Wilson were exposed to 4th-instar larvae of *Anopheles crucians* Wiedemann, a known host species of this mite. Mites that attempted to attach were usually immediately shaken off by a thrashing response of the mosquito larvae. Occasionally, mites did not elicit an immediate reaction and were able to attach. Eventually, the larvae dislodged most of these mites by the thrashing response already mentioned and then tried to eat those remaining attached. Larvae reached most attached mites because of great body flexibility and sometimes pushed mites towards the mouth with the tip of the abdomen. Grooming sometimes occurred so rapidly that ingestion of mites was difficult to observe. Ingestion was confirmed by the presence of mites in the gut of 8/11 mosquito larvae tested. The mosquito larvae were usually dissected within 1 hour after they ingested mites. Most recovered, ingested mites had fractured dorsal plates, and all were nearly devoid of the internal organs seen in living mite larvae. Partial digestion probably had occurred.

These observations of mite ingestion by mosquito larvae were corroborated by a field collection of *An. crucians* larvae. Fifty-nine 4th-instar

larvae were collected on October 18, 1987 from Lake Alice in Gainesville, Florida. Each larva was inspected with a dissecting microscope first for attached mites and then for ingested mites as the alimentary canal was teased apart with fine-tipped tools. Two mosquito larvae each had 1 mite (*A. pseudotenuicollis*) attached to their thorax, and 2 other mosquito larvae each had 1 mite (*A. pseudotenuicollis*) in their gut. Whether these ingested mites had been defensively or just incidentally consumed, their presence in field-collected *An. crucians* larvae established that mite ingestion was not a laboratory anomaly.

The removal of attached mites by *An. crucians* larvae is adaptive: mites not dislodged or eaten can parasitize the emerging adult mosquitoes (unpublished data).

Other studies have also shown that host species are not defenseless against attack from parasitic water mites. Pupae of some mosquitoes dislodge mites by vigorous movements (Smith and McIver 1984). The surface-dwelling hemipteran *Mesovelia mulsanti* White eliminates attached mites (*Hydryphantes tenuabilis* Marshall) by consuming them, but unlike the mites on mosquito larvae, these mites are simultaneously parasites and prey of the immature stages of *M. mulsanti* (Lanciani 1985). Thus, host defensive behavior can reduce attachment success and even survivorship of parasitic water mites.

I thank Bruce Smith for calling my attention to Gary Mullen's dissertation to mites on mosquito larvae.

REFERENCES CITED

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¹ Mullen, G. R. 1974. The taxonomy and bionomics of aquatic mites (Acarina: Hydrachnellae) parasitic on mosquitoes in North America. Ph.D. Dissertation. Department of Entomology, Cornell University, Ithaca, NY.