Malacological Review, 1994, 27: 113-114

GLOCHIDIAL HOST OF *VILLOSA TAENIATA* (MOLLUSCA: UNIONOIDEA). — **Mark E. Gordon, James B. Layzer** and **Lesa M. Madison.** — The relative paucity of specific data on the reproductive biology of North American freshwater mussels is reflected by the low percentage of species for which glochidial hosts have been identified. Despite an influx of recent studies (*e.g.*, Trdan & Hoeh, 1982; Yeager & Neves, 1986; Gordon & Layzer, 1993), little more than approximately 20% of the indigenous species of the United States have been considered (*fide* Fuller, 1974; Gordon & Layzer, 1989). With severe declines of mussel populations due to habitat degradation, pollution, and competitive exclusion by exotic species (*e.g.*, *Dreissena polymorpha* (Pallas 1771)), identification of glochidial hosts is essential in the restoration and management of rare species. We examined host associations for a species endemic to the Cumberlandian region, *Villosa taeniata* (Conrad 1834).

Methods. Host specificity for glochidia of *Villosa taeniata* was assessed through laboratory-induced infestations of fish following the procedure described in Gordon & Layzer (1993). Gravid mussels with infective glochidia were obtained from Buck Creek, Pulaski County, Kentucky in December 1990, and March 1991. Fish were electroshocked from the Blackburn Fork and Spring Creek drainages of the Roaring River system, Jackson, Overton, and Putnam counties, Tennessee, and acclimated to tank conditions for a week prior to infestation. Following the initial trial, fish on which glochidia had metamorphosed successfully were reinfected and freshly-acclimated individuals of several other selected species were retested.

Results and Discussion. During the initial test period, water temperatures were maintained at 18 ± 4°C. Of the 16 species of fish infested (Table 1), *Luxilus chrysocephalus* (Rafinesque 1820) sloughed all glochidia during the first 24-hour period. Other species continued to slough rejected glochidia for 6-34 days, reflecting a tenacity for non-hooked glochidia to remain attached to fish similar to that previously noted for hooked forms (Gordon & Layzer, 1993). Metamorphosed juvenile mussels of *Villosa taeniata* were first recovered 27 days post-infestation from *Ambloplites rupestris* (Rafinesque 1817). Unlike some previous investigations (*e.g.*, Gordon & Layzer, 1993; Gordon *et al.*, in press), juveniles did not excyst simultaneously but were recovered for 4-11 days following the initial excystment (specimens of *A. rupestris* were maintained with one fish/aquarium). Comparable results were obtained from the second trial infestation (water temperature = 20 ± 01°C); juvenile mussels metamorphosed only on *A. rupestris* following 29-33 days of encystment.

TABLE 1. Species of fish subjected to laboratory-induced infestations of *Villosa taeniata* (numbers in parentheses indicate the greatest number of days that glochidia were retained by any specimen of a particular species of fish; * denotes the period over which metamorphosed juvenile mussels were re-covered).

Campostoma anomalum (34)	*Lepomis macrochirus* (21)
Luxilus chrysocephalus (1)	*Lepomis megalotis* (15)
Hypentilium nigricans (11)	*Etheostoma blennioides* (15)
Ameiurus nebulosus (29)	*Etheostoma caeruleum* (17)
Noturus flavus (11)	*Etheostoma flabellare* (8)
Fundulus catenatus (14)	*Etheostoma rufilineatum* (14)
Ambloplites rupestris (27-39)*	*Etheostoma spectabile* (29)
Lepomis cyanellus (20)	*Cottus carolinae* (22)

There is a tendency among many mussel species to utilize widely-distributed fish as glochidial hosts. In some instances, species may be maximizing dispersal or potential for infestation through the utilization of multiple hosts (Gordon, unpublished data; also see Trdan & Hoeh, 1982). However, the geographic range of a particular mussel species often is more narrowly restricted than that of its host(s) (Gordon & Layzer, 1993). The concordance of *Villosa taeniata* to this trend suggests that regional endemism may indicate a relatively stenotopic adaptation to physiochemical conditions of the physiographic province(s) inhabited rather than a direct reflection of the distribution of the host organism. Strayer (1983) demonstrated that habitat-mediated phenomena (*e.g.*, water chemistry specific to the underlying geologic strata of a particular region, substrate particle composition, etc.) may affect distributions of mussels locally. On a broader scale, similar limiting factors in conjunction with vicariant and historical events may control the geographic range of species, although effects may be so subtle as to not be discernible or to not allow differentiation by the relative coarseness of current ecological methodology.

Evolution of host affinities also may have been influenced by habitat; species which utilize

the same habitat as a mussel at the time of glochidial release would be reasonable candidates for infestation and subsequent excystment of juveniles in suitable habitat. Although a regionally-endemic fish may be locally abundant, many of the more widely-distributed species often occur commonly throughout many streams and, as such, would increase the probability of association and successful infestations.

Presumably, glochidia that infest a fish at the same time should excyst almost simultaneously following metamorphosis. Some variation might be attributed to slight differences in individual developmental rates or attachment to tissue which is relatively inactive metabolically (*e.g.*, cartilaginous gill arch). However, we found that excystment continued for up to 11 days after it was initiated. Alternatively, prolonged excystment might represent a mechanism to maximize dispersal through the potentially increased movements of the host over a wider area during this period. Dispersal may enhance survival of juvenile mussels by minimizing the chances of an entire brood being deposited in unsuitable habitat or by creating a more rarefied environment with respect to predators.

Acknowledgments. Funding was provided by the National Ecology Research Center, U. S. Fish and Wildlife Service, Fort Collins, Colorado. Additional support was received from the Center for Management, Utilization, and Protection of Water Resources, Tennessee Technological University.

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Mark E. GORDON, James B. LAYZER[1] and Lesa M. MADISON, *Tennessee Cooperative Fishery Research Unit*[2], *Department of Biology, P.O. Box 5114, Tennessee Technological University, Cookeville, Tennessee 38505, U.S.A.*

[1]National Biological Survey personnel.

[2]Unit cooperators are the U.S. Fish and Wildlife Service, the Tennessee Wildlife Resources Agency, and Tennessee Technological University.