



US Army Corps
of Engineers
Waterways Experiment
Station

Zebra Mussel Research

Technical Notes

Section 1 — Environmental Testing

Technical Note ZMR-1-17

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Distinguishing Zebra Mussels from Quagga Mussels by Sperm Examination

Background and purpose The quagga mussel (*Dreissena bugensis*) is a recently described invasive species that occurs in many of the same habitats in which zebra mussels are found. Both mussels have striped shells but generally can be differentiated by the shape of the shell. The zebra mussel has a sharp carina (angle) on the sides of the shell, whereas the quagga has a rounded carina (May and Marsden 1992).

Among mussels that are not quite full grown, however, positive differentiation between the two species is often difficult. The purpose of this technical note is to describe an alternative easy method of quickly distinguishing between male zebra and quagga mussels by sperm examination.

Additional information This technical note was written by Mr. Dana R. Denson and Dr. Shiao Y. Wang, Department of Biology, University of Southern Mississippi, Hattiesburg, MS. Dr. Ed Theriot, U.S. Army Engineer Waterways Experiment Station, (601) 634-2678, is Manager of the Zebra Mussel Research Program.

Identification Male zebra mussels can be positively distinguished from male quagga mussels by examining the sperm of the mussel. The body of the sperm of zebra mussels will be **straight**, short, and blunt. Those of quagga mussels will be **curved**, longer, and more tapered. Figure 1 illustrates the difference in shape between the sperm of the two mussel species.

To examine mussel sperm, only a small portion of the visceral mass is needed for viewing under the microscope. Dissect a mussel by first cutting the hinge ligament and gapping the two halves of the shell slightly (Figure 2). Reach into the shell with a scalpel, cut the adductor muscles that hold the two halves of the shell together, and pull the two apart. The white/yellowish tissue near the center of the mussel is the visceral mass, and a small piece from a male will contain many thousands of sperm. Remove a piece approximately 1 mm³ and place it on a microscope slide, cover it with a coverslip, and press down to flatten the sample. Examine the squash preparation under a microscope at 450 \times or at 1000 \times (oil immersion). Compare the sperm from the mussel to the illustrations in Figure 1.

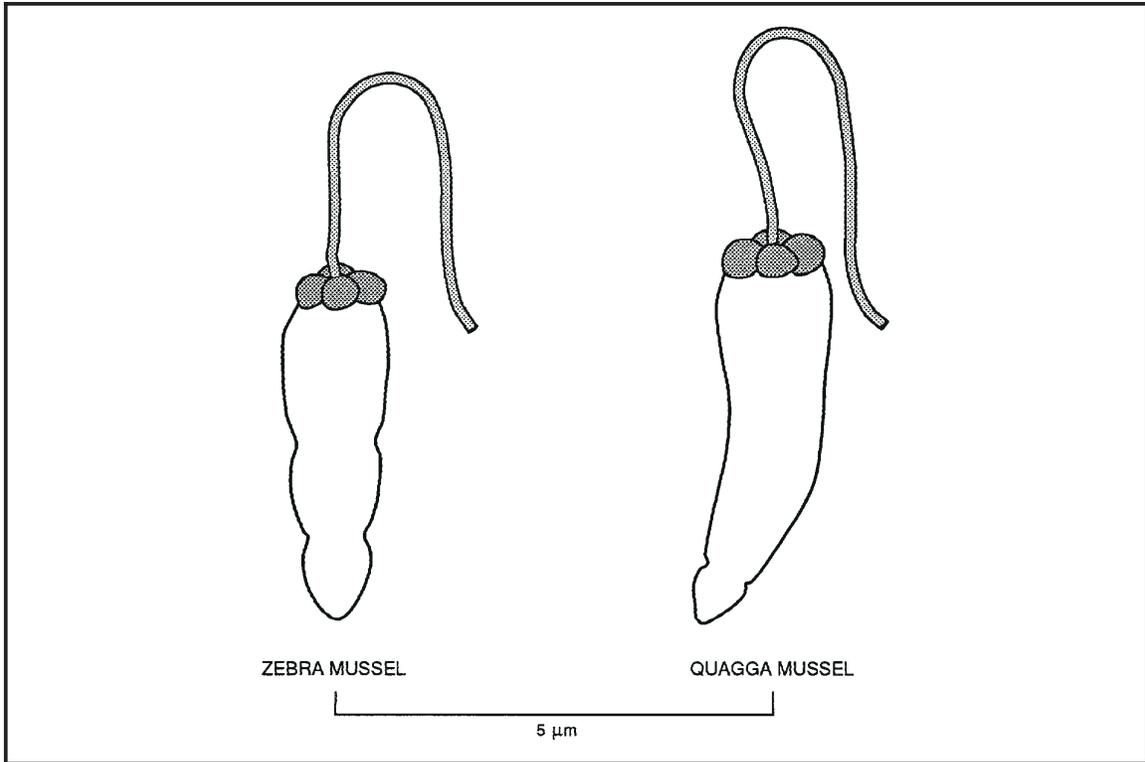


Figure 1. Zebra and quagga mussel sperm

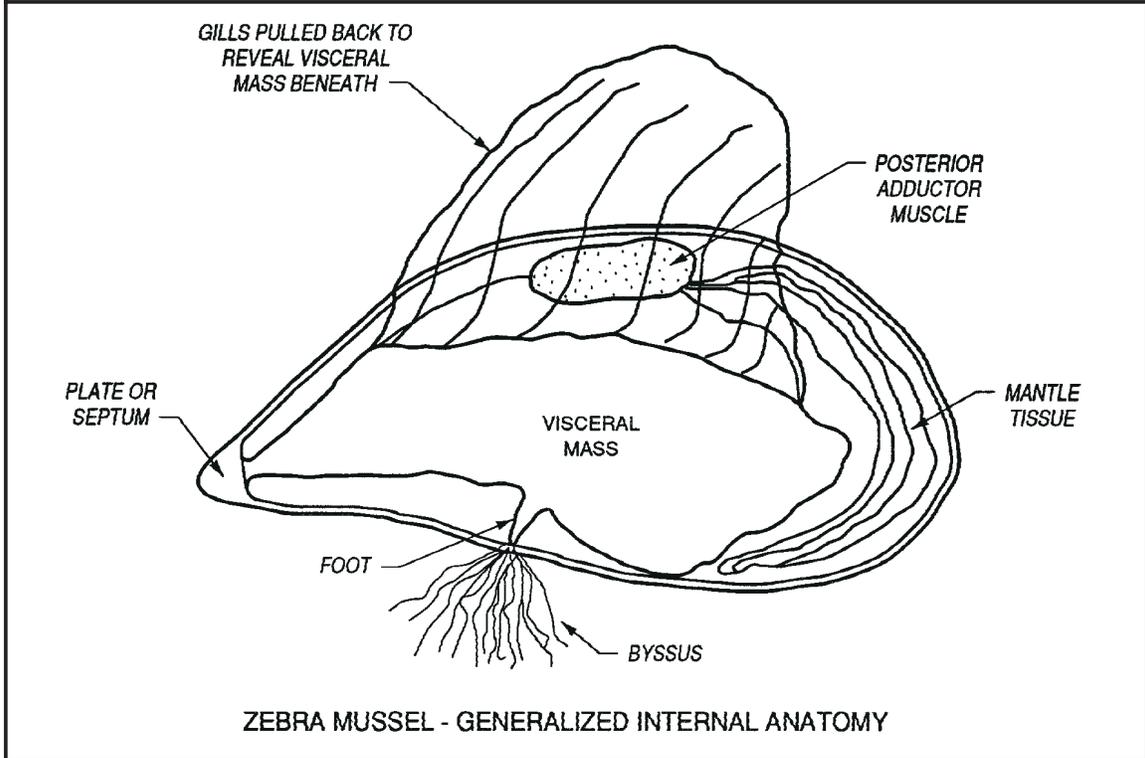


Figure 2. General internal anatomy of a mussel

Period of usefulness The above procedure should be useful during the months of April through September, when almost all adult mussels contain gametes. Some zebra mussels (for example, those at Black Rock Lock, Buffalo, NY) contain developing gametes as early as November, which extends the period of usefulness for the above procedure (see Technical Note ZMR-4-07, Denson and Wang 1994).

References Denson, D. R., and Wang, S. Y. 1994. "The Reproductive Cycle of Zebra Mussels," Technical Note ZMR-04-07, Zebra Mussel Research Program, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

May, B., and Marsden, J. E. 1992. "Genetic Identification and Implications of Another Invasive Species of Dreissenid Mussel in the Great Lakes," *Canadian Journal of Fisheries and Aquatic Science*, Vol 49, pp 1501-1506.