US Army Corps
of Engineers
Waterways Experiment
Station

Zebra Mussel Research Technical Notes

May 1994

Shell Shape Differences in *Dreissena* spp.

Background and purpose

Differences in shell shape and mass can be used to separate closely related species of freshwater molluscans. In addition, shell shape can be affected by physical and chemical conditions of habitat. The purpose of this technical note is to examine shell shape differences between zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena bugensis*) and to examine shell shape of *D. polymorpha* from a northern and southern habitat.

Additional information

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Shell shape differences between zebra and quagga mussels

There are two species of *Dreissena* in North America. The zebra mussel (*Dreissena polymorpha*) has been present in high numbers in selected areas of the Great Lakes since the late 1980s. In the early 1990s the quagga mussel (*Dreissena bugensis*) was first found in the Great Lakes. This species is also a biofouler, although as of late 1993 it is very uncommon. The purpose of this technical note is to describe shell shape differences between these two species of *Dreissena*.

Quagga and zebra mussels were collected in Toledo, OH, in September 1992. Eighteen individuals of each species, ranging from 14.5 to 28.2 mm, were sacrificed to measure shell length, shell area, length of the ventral margin of the shell, and total organism width (measured perpendicular to length). Images of the shell lying flat on the table were captured and stored on a personal computer with a video imaging system (Impro-Pro system, version 2.0).

The area of a single shell was measured by tracing the outline of the computer image. The length of the ventral line, obtained from the computer image, was considered to be the maximum posterior to anterior length of the ventral portion of the shell. For a given length, quagga mussels had slightly wider shells than zebra mussels. For a shell 2.2 cm long, the width of a quagga and zebra mussel was 1.76 and 1.42 cm, respectively (Figure 1).

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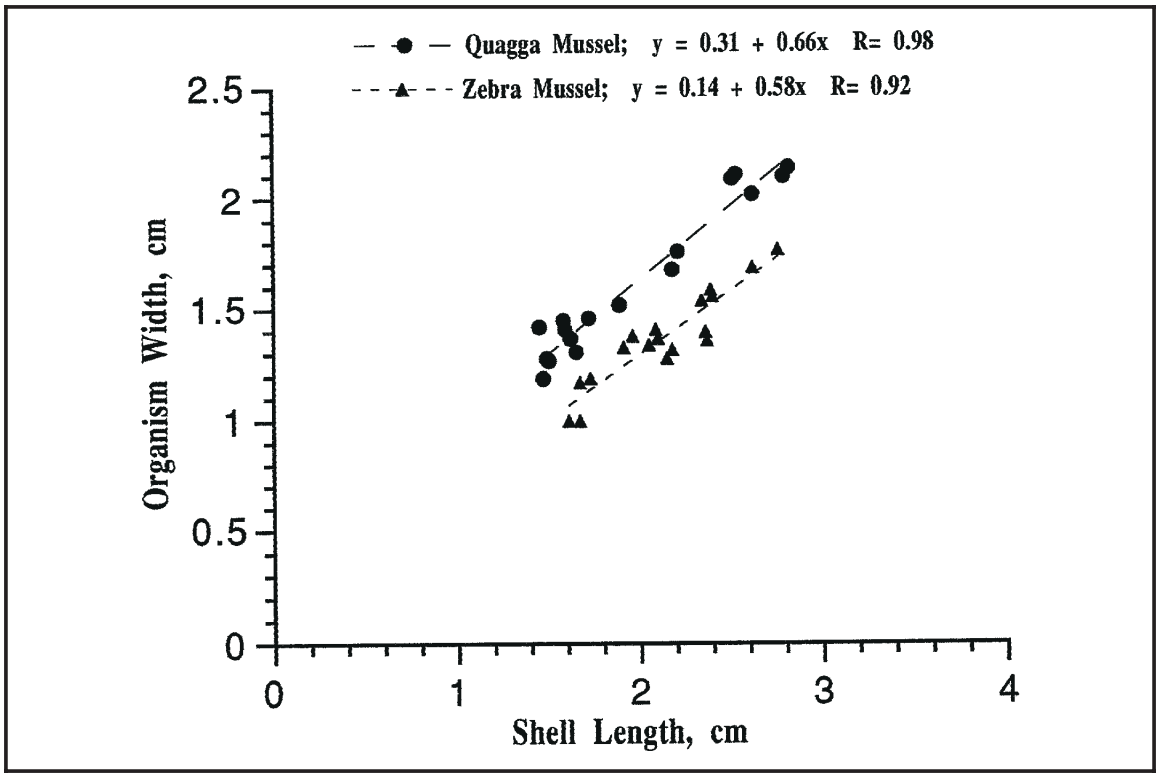

Figure 1. Relationship between total shell length and organism width for quagga mussels

Shells of quagga mussels had a comparatively greater area than zebra mussels. Shell area for an individual 2.2 cm long was 2.75 and 2.41 sq cm for quagga and zebra mussels, respectively (Figure 2).

The ventral line of the quagga mussels was slightly longer than ventral line length of zebra mussels. With a shell 2.2 cm long, the ventral line length of quagga and zebra mussels was 3.25 and 2.71 cm, respectively (Figure 3).

Comparison of zebra mussel shell shapes collected from two habitats

Zebra mussels have been found in Black Rock Lock, Buffalo, NY, since the late 1980s (see Technical Note ZMR 1-18, Dye 1994). In spring 1993, zebra mussels were found in New Orleans, LA, at water intakes and navigation locks along the intercoastal waterway. Comparisons were made of the shell shapes of zebra mussels taken from these two habitats.

Zebra mussels were collected at Black Rock Lock and in New Orleans in spring 1993. Approximately 12 individuals from each population were sacrificed for measurements of total shell length, shell height, and total organism width. Measurements were made to the nearest 0.1 mm with a digital caliper.

There was no apparent difference between shell length versus shell height (Figure 4), shell length versus organism width (Figure 5), and shell length versus dry shell weight (both values) (Figure 6). Although considerable differences in conditions of temperature and water quality occur at these locations, it is apparent that the habitat differences were not reflected in differences in shell morphometrics.

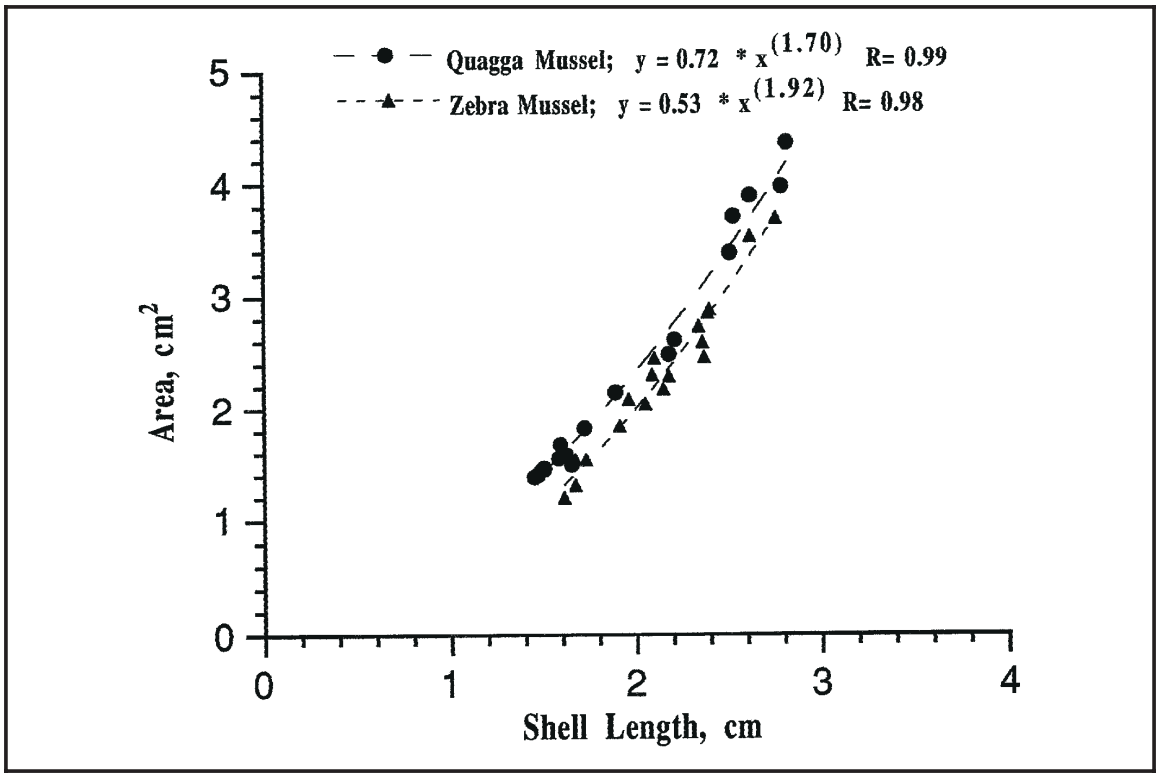

Figure 2. Relationship between total length and surface area of a single quagga mussel shell (image of the shell lying flat)

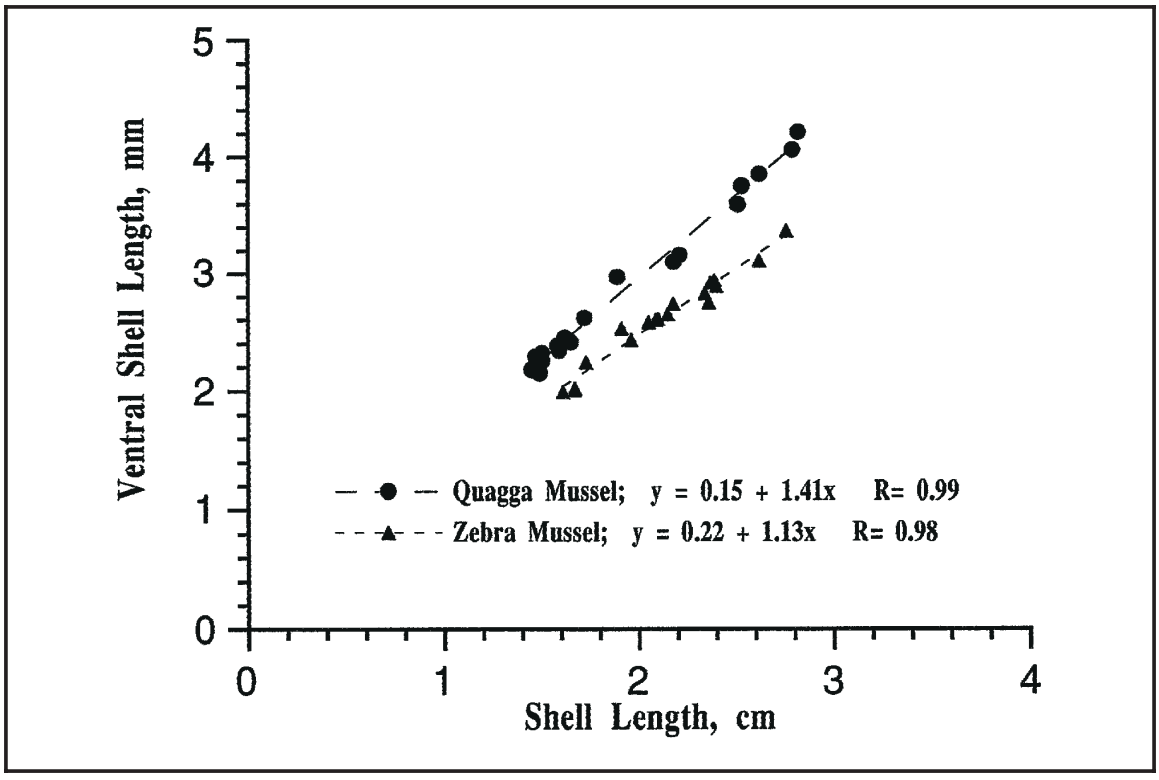

Figure 3. Relationship between total shell length of ventral margin of the quagga mussel shell

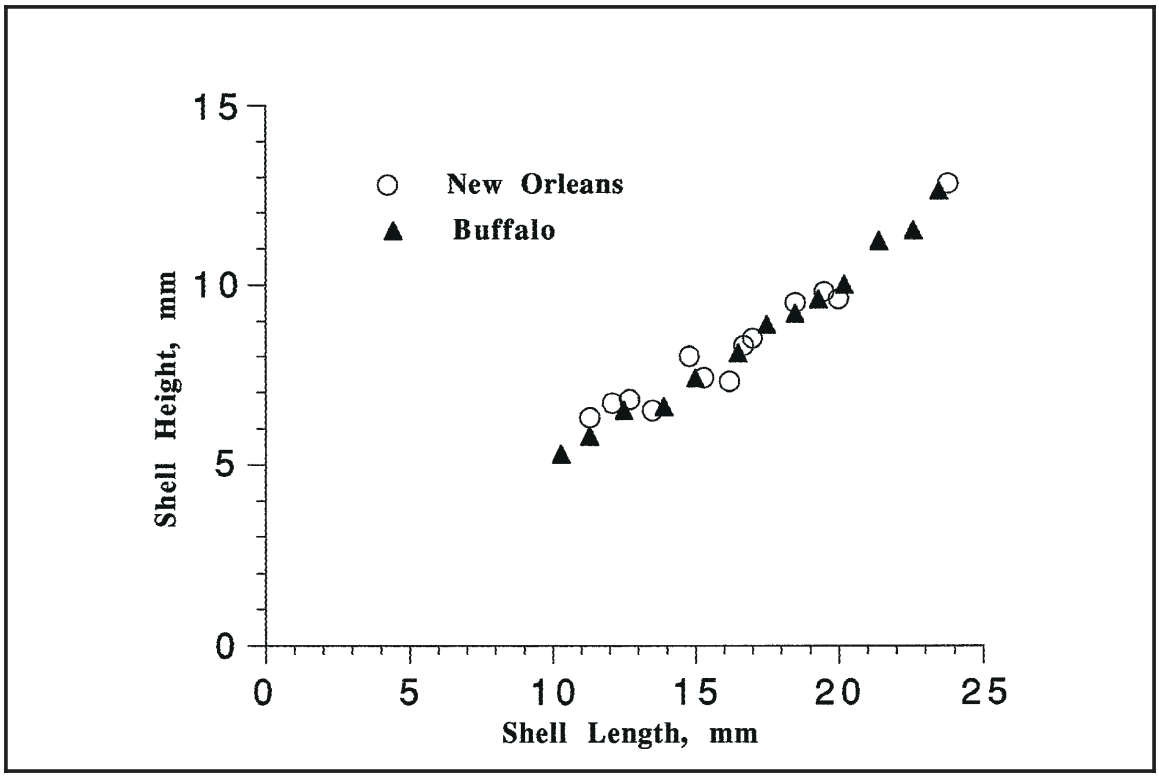

Figure 4. Relationship between total shell length and shell height for zebra mussels collected in the Mississippi River at New Orleans, LA, and the Niagara River at Buffalo, NY

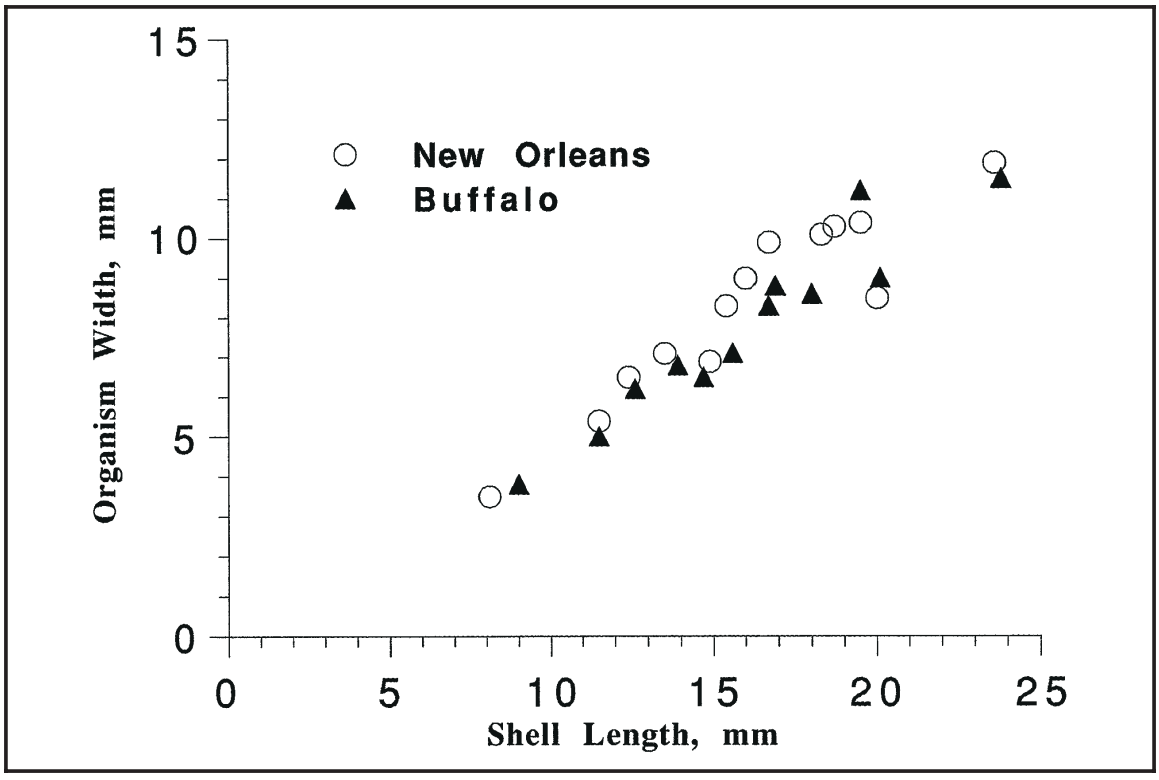

Figure 5. Relationship between total shell length and organism width for zebra mussels collected in the Mississippi River at New Orleans, LA, and the Niagara River at Buffalo, NY

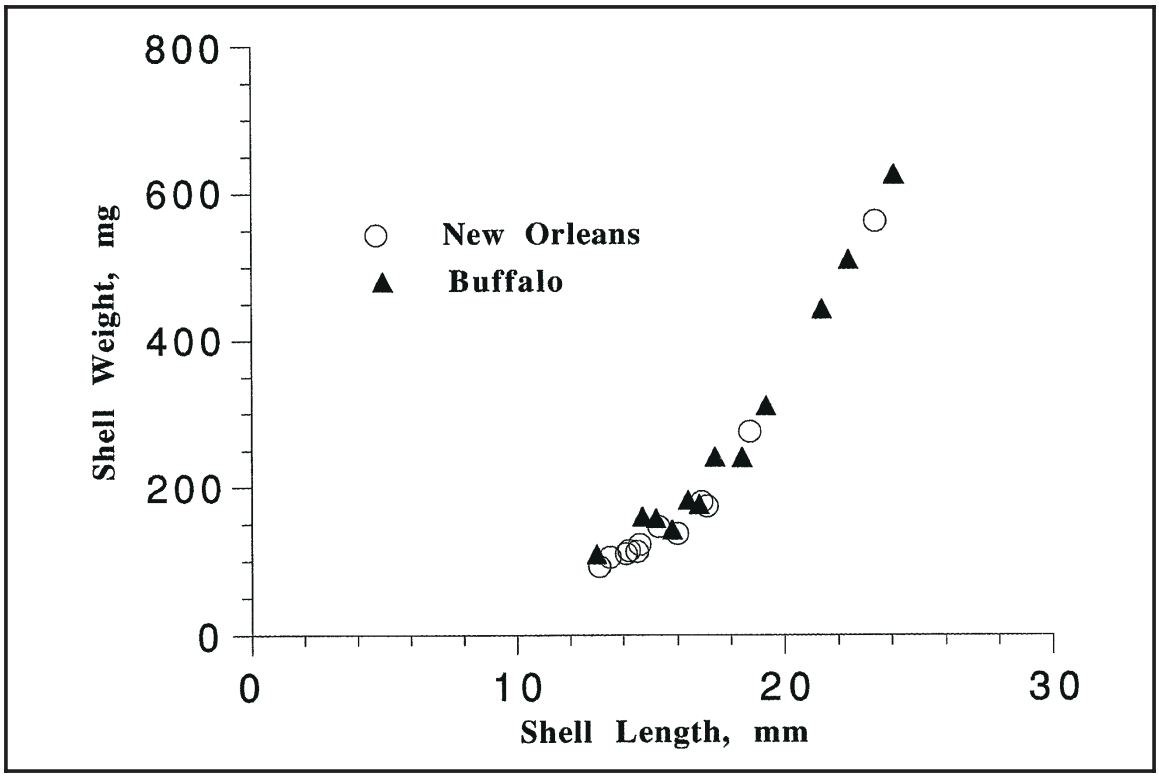

Figure 6. Relationship between total shell length and shell weight for zebra mussels collected in the Mississippi River at New Orleans, LA, and the Niagara River at Buffalo, NY

Reference Dye, G. 1994. "Zebra Mussel Infestation at Black Rock Lock, Buffalo, New York," Technical Note ZMR-1-18, Zebra Mussel Research Program, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.