

Molariform Teeth Essential for Freshwater Drum to Crush Zebra Mussels

In food habit studies of freshwater drum (*Aplodinotus grunniens*) in western Lake Erie, I found that volumetric percent of food made up by zebra mussels (*Dreissena polymorpha*) increased from 6 in the 25–29-cm length class to 88 in the 38–50-cm length class. Guts of drum over 25 cm long were packed with zebra mussels with crushed shell fragments, but no shells were observed in small drum under 25 cm long. I investigated tooth morphology to determine why small drum could not crush zebra mussels.

Changes in Tooth Composition Initiated Shell-crushing

The morphology of pharyngeal teeth of freshwater drum (total length [TL] = 13–56 cm) collected from western Lake Erie in 1991 was examined to correlate composition of pharyngeal teeth to the initiation of shell-crushing. Drum have three tooth types: cardiform, villiform, and molariform (Fig. 1). Cardiform teeth (0.2 mm wide) are slightly curved, conical, and sharp-pointed (Fig. 1a). Villiform teeth (0.2–0.5 mm wide) resemble an intestinal villus (Fig. 1b) with a concave-shaped stalk and an upside-down, tear-shaped crown with a blunt-pointed cusp. Molariform teeth range from 0.5 mm to more

than 4 mm wide, and the cusp is more terminal (Fig. 1c). Excessive grinding flattens cusps (Fig. 1d) in some of the molariform teeth.

The smallest drum (13 cm long) had only cardiform and villiform teeth. The first molariform teeth occurred in a 17-cm-long drum and composed 39% of the total surface area of teeth (Fig. 2). The total surface area of molariform teeth increased from 39% in the 13-cm-long drum to 87% in the 26-cm-long drum to 92% in the 28-cm-long drum. Cardiform teeth were absent from drum more than 46 cm long. The freshwater drum begins to crush zebra mussels at a total length of 25 cm when molariform teeth compose 85% of surface area of pharyngeal teeth (Fig. 2).

Teeth Are an Important Indicator of Predation by Fishes on Zebra Mussels

Three fish families native to eastern North America—sciaenids, centrarchids, and catostomids—are known to possess pharyngeal teeth for crushing molluscan shells. Their teeth, however, are morphologically different. Molariform teeth are absent in the New World cyprinids, although they are present in several species of Old World cyprinids, including common carp (*Cyprinus carpio*) that are

now abundant in the eastern United States. Morphological studies of pharyngeal teeth provide a useful tool for determining the ability of fishes to crush shells and for determining the minimum length of fishes at which predation on exotic mussels is initiated. Such studies can assist fishery biologists and natural resource managers in better understanding fishes as predators of mollusks.

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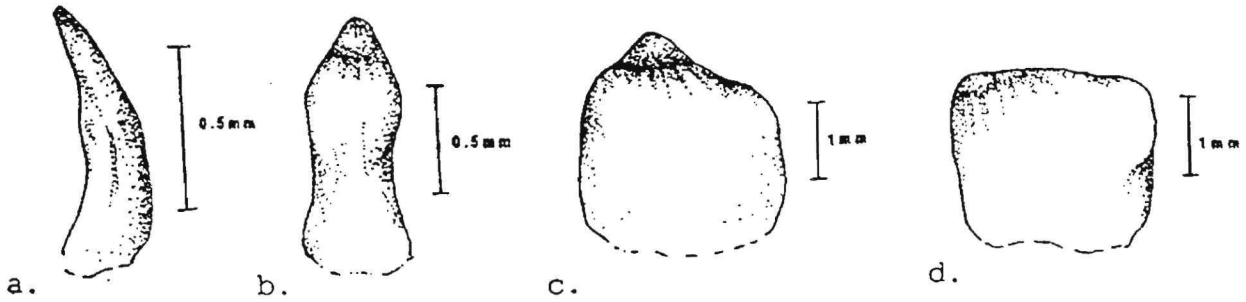


Fig. 1. Types of teeth of freshwater drum: *a*, cardiform; *b*, villiform; *c*, molariform; and *d*, molariform with flattened cusp.

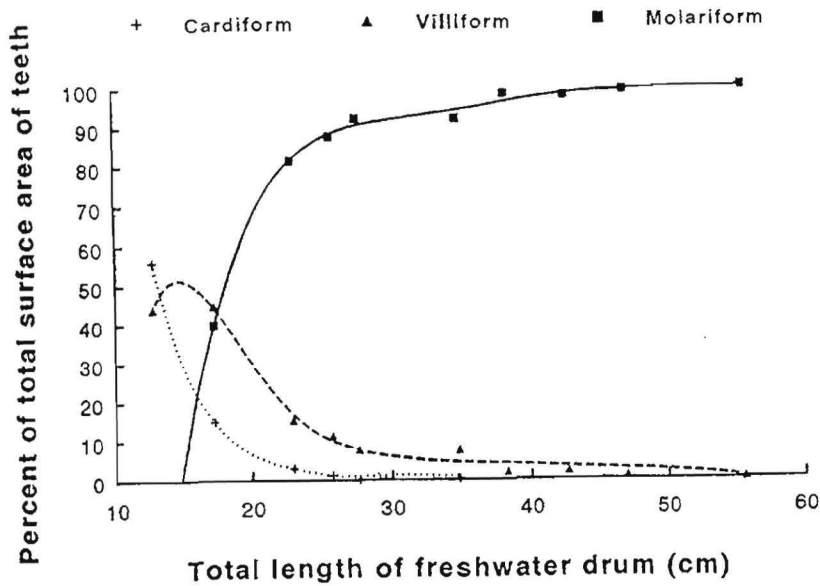


Fig. 2. Pharyngeal tooth composition of freshwater drum.