

THE MUSSEL BEHIND ONTARIO'S AQUATIC BIODIVERSITY

Charismatic creatures of Ontario's lakes, rivers, and streams.



QUESTION: What type of animal lives in Ontario's lakes, rivers, and streams, produces young that parasitize fish, and matures into free-living adults that can survive for more than 100 years?

ANSWER: Freshwater mussels.

Nicknamed naiads after the mythological Greek nymphs of fresh waters, adult female freshwater mussels live up to this moniker: they are full of alluring tricks aimed at attracting fish, or less commonly amphibians, to act as hosts for their parasitic young. To attract a predacious bass, for example, female lampmussels use a fascinating lure—a fleshy exten-

Endangered freshwater mussels from the Sydenham River in southwestern Ontario. Top row (from left): round pigtoe, snuffbox, and kidneyshell; second row: snuffbox and two kidneyshells; third row: northern riffleshell, rayed bean, and northern riffleshell.

sion of the mussel's mantle, attached to the inside of its shell. This lure may have eyespots, fins, and colouring re-

CLAIRE J. HEALY & DAVID T. ZANATTA

markably similar to a small prey fish. Other freshwater mussel species produce lures that resemble aquatic in-

sects, leeches, and even crayfish. These lures are not motionless mimics; like a master angler, a mussel is able to twitch, jerk, and wave its lure. To see videos of these behaviours, visit <http://unionid.missouristate.edu/> and click on the images, such as *Lampsilis reeveiana* (fish mimic) or *Villosa iris* (crayfish mimic). Another group of freshwater mussels called riffleshells lure a host fish and then trap it between the two valves of its shell. This is an effective way to infest it with the mussel's young, called glochidia larvae.

Despite the fact that they spend their entire adult lives buried in lake sediments or riverbeds, freshwater

mussels exhibit these and other surprising behaviours unknown to the casual observer. Adult mussels can only crawl slowly from place to place, but their glochidia larvae can really travel. That's because, unlike the young of other bivalves—which are free-living and often planktonic, distributed at the whim of water currents—glochidia larvae are parasitic. They attach themselves to their host to gain sustenance, and as they are transported to new waters, they disembark, bury themselves in the sediment, and mature into adulthood.

Because of this partially parasitic lifestyle, freshwater mussels are found only where fish occur. Some glochidia larvae require a particular fish species to survive, while other species can live off various fish species. The host fish preferences of most North American mussel species have not been completely documented, and the hosts of some species are entirely unknown.

There are nearly 1000 species of freshwater mussels worldwide, but



The lure of the wavy rayed lampmussel with its prominent eyespot resembles a minnow or other small prey fish. The lure—a fleshy extension of the mussel's mantle attached to the inside of its shell—is indicated by the arrow.

more species live in North America than anywhere else on earth. Ontario has 41 native species and the lakes and rivers of the Greater Toronto Area are home to at least 10 species, including elktoe, plain pocketbook, fatmucket, black sandshell, and pink heelsplitter mussels. Many species of freshwater mussels are extremely long-lived. Eu-

ropean pearlshells (native to northern Europe and eastern North America) are among the longest-lived animals on earth—individuals have been recorded at more than 150 years old.

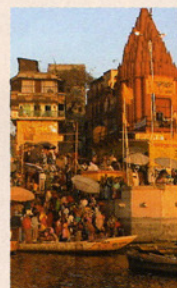
Since prehistoric times, humans have used freshwater mussels in a variety of ways. Native peoples in North America, for example, used the shells of these mussels to make tools and ornaments. Mussels were once an important food source for some native peoples, but are no longer eaten because of their unpleasant flavour and the high levels of pollutants, such as mercury and PCBs, that can become concentrated in their flesh.

Through early and modern times people have also harvested freshwater mussels in search of pearls that can form naturally, if infrequently, within their shells. North American mussels, mainly from the Midwest, are still harvested and their shells exported for use in the cultured pearl industry. Beads made from the shells are used as the nucleus for forming

BURMA (MYANMAR) NOV. 17-DEC. 3 2006 / NOV. 30-DEC. 16 2006 • NORTH INDIA JAN. 23-FEB. 5 2007 • LIBYA MAR. 15-29 2007

TRAVEL WITH THE ROM

LET OUR EXPERTS BE YOUR GUIDES!



SEE DATES AND DETAILS IN ROM MEMBERS' NEWS



ROMTravel

For further information or a brochure, contact ROMTravel: 416.586.8034 / travel@rom.on.ca

ETERNAL RUSSIA MAY 11-24 2007 • MADAGASCAR OCT. 19-NOV. 4 2007 • PERU NOV. 16-DEC. 2 2007

cultured pearls in marine oysters. Aside from their usefulness to people, freshwater mussels are truly irreplaceable members of the aquatic ecosystems they inhabit. In fact, freshwater mussels have been shown to promote the diversity and abundance of other aquatic organisms. Adult mussels are filter feeders, and individual mussels can filter 3.5 litres (a gallon) of water per hour, or more. This is an incredible rate—the native mussel community in Lake St. Clair in southwestern Ontario, for example, filters 1.4 to 5.3 percent of the lake's total volume every day. The process of filtering material from the water column and converting it into food readily used by other organisms is one of the ways scientists believe mussels promote aquatic biodiversity.

Unfortunately, the impressive diversity of freshwater mussels is threatened, and this is now one of the most endangered groups of animals in North America. Seventy percent of the 300 North American species are considered to be at risk of extinction, and as

many as 35 others are already extinct. In Ontario, nine endangered and one threatened species of freshwater mussels are currently protected under Canada's *Species at Risk Act*. Many more of the province's species require an assessment of their conservation status.

In the effort to conserve freshwater mussels, scientists have identified numerous forces that contribute to their extinction and local extirpation. Particularly devastating to mussel diversity has been the construction of dams. These structures limit the passage of fish and alter the physical characteristics of a waterway—such as water temperature and nutrient cycling—causing mussel populations both upstream and downstream of a dam to perish. Other threats include pollution and the introduction of exotic species, which crowd out and devastate native mussel populations.

Collecting freshwater mussels is prohibited in Ontario because of the sensitive conservation status of many species. There are many ways, however,

to enjoy these surprising creatures. Next time you are wading at the water's edge, look for the odd empty shell or piles of discarded shells in muskrat middens and admire their inner, pearly beauty. If you are swimming, look for the telltale sign of living mussels: small siphons delicately protruding from the sediment below. Fishers may find glochidia larvae on the fins and gills of their catch or may even accidentally snag a mussel on their fishhook. Appreciating these fascinating, useful, and ecologically important creatures is just a matter of looking beneath the surface.

For more information on these and other animals at risk of extinction in Ontario, visit <http://www.rom.on.ca/ontario/risk.php>.

Claire J. Healy is associate curator of Invertebrate Zoology in the ROM's Department of Natural History and David T. Zanatta is a PhD candidate in the Department of Zoology, University of Toronto, and the ROM's Department of Natural History.

ALL AFLUTTER



STERLING SILVER PIN AND EARRINGS BASED ON A BLACK SWALLOWTAIL BUTTERFLY FROM A SPECIMEN IN THE ROM'S COLLECTIONS.

Authentic Reproductions from the ROM's Own Collections

VISIT THE ROM REPRODUCTIONS SHOP ON THE LOWER LEVEL BY THE TOTEM POLE.

20% OFF MEMBERS HOLIDAY SALE
Friday, November 24,
to Sunday,
November 26, 2006

Royal Ontario Museum
416.586.5896
www.rom.on.ca
(click on Plan Your Visit)