



CATHERINE COREY

A female eastern pondmussel displaying a lure to attract hosts. The “white spot” moves rapidly along the edge of the mussel, and is very attractive to fish. When a fish attacks, the female releases a cloud of tiny larvae onto the attacker. Although the eastern pondmussel has been known since 1817, its display behavior was first described by IES and SUNY Albany graduate student Catherine Corey in 1999.

NORTH AMERICA: TOMB OF THE UNKNOWN SHELLFISH

In some ways, the pearly mussels are among the most familiar of freshwater animals. They live in rivers and lakes around the world, their shells conspicuously litter shorelines and beaches, and they are so large and abundant that even the least nature-savvy swimmer, angler, or boater has seen them. Humans have collected pearly mussels for food, pearls, and their mother-of-pearl shells since prehistoric times. Pearly mussel fisheries in the United States during the 20th Century harvested hundreds of thousands of tons of shells that were worth hundreds of millions of dollars.

Textbooks describe pearly mussels as filter feeders that eat plankton and other small particles of food suspended in the water. Their microscopic larvae are said to parasitize fish before settling to the bottom of freshwater ecosystems. Ecologists know a great deal about where each of the 300 species of pearly mussels in North America lived in the past and at present. And they recognize that pearly mussels are among the animals most imperiled by human activities, with dozens of species already extinct and well over a hundred species in danger of disappearing.

As many pearly mussel species vanish, scientists are recognizing the mystery surrounding their lives. IES ecologist Dr. David L. Strayer, author of *The Pearly Mussels of New York*, has joined with other mussel specialists to increase our ecological understanding of these animals. He and his colleagues are discovering that there is much to be learned.

Highly specialized animals, each mussel species uses specific fish species as hosts for its tiny larvae. The larvae drift downstream until making contact with a host fish, which they parasitize for several weeks. This is the primary means of mussel dispersal, as adult mussels are sedentary. Currently, scientists don't know what fish are used by most mussel species. Many mussels use elaborate devices and lures for attracting the correct fish species, but scientists are just beginning to describe these devices (see photo). Likewise, little is known about mussel diets; saying that pearly mussels eat particles that are suspended in the water is about as precise as saying humans eat the stuff inside a grocery store.

While there are anecdotal accounts of past mussel populations, ecologists don't know what roles huge beds of mussels played historically or what their absence might mean for the functioning of modern river ecosystems. Most critically, while ecologists know that activities like dam construction, channelization, and release of toxic pollutants to streams and rivers have been devastating to mussel populations, distressingly little is known about the impacts of more subtle activities like modern agriculture and suburbanization.

These knowledge gaps have important consequences. First, it's difficult to manage declining mussel populations effectively if ecologists don't have a working understanding of their basic biology or the causes of their population declines. Unfortunately, the conservation situation is so desperate that we don't have the luxury of waiting for research to provide full answers. Thus, Dr. Strayer and his colleagues are simultaneously and aggressively pursuing both rigorous research and conservation actions.

Second, it seems disconcerting that species are disappearing before we know even the simplest facts about their lives. Museum drawers are filled with the dry shells of species that no living human has ever seen alive. What hosts did these animals use? Did they have special ways to attract their fish hosts? What adaptations fit them to their peculiar existence? How did they interact with other species before humans modified their habitats? And what made these species so exquisitely sensitive to human alterations of their landscape?

While we will never have answers to these questions for extinct species, research at IES and elsewhere is trying to answer these questions for living pearly mussel species before they, too, vanish. As long-lived aquatic organisms, mussels may reveal a world of information about the freshwater habitats they reside in.

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