Freshwater Mussels

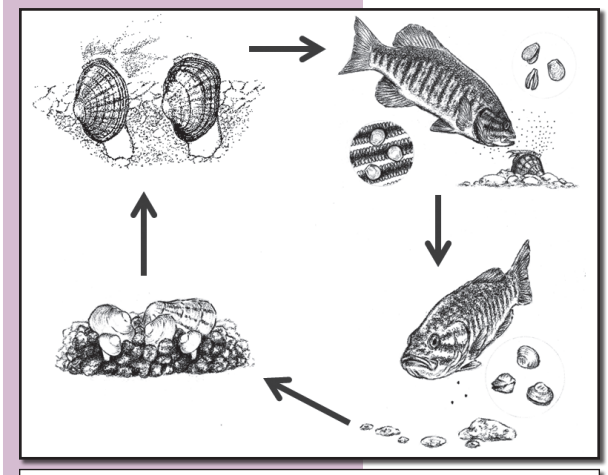
An Educational Series For Stream Teams To Learn and Collect

By Stephen McMurray, Resource Scientist

Unbeknownst to many people, a bonanza of colorful, fascinating, and often rare creatures sit quietly at the bottom of our streams filtering the water, serving as sentinels of water quality, and providing food for fish and wildlife. The greatest diversity of freshwater mussels, also known as clams, bivalves, or naiades, occurs in North America where nearly 300 species are found. Approximately 69 species of native freshwater mussels occur throughout Missouri in a variety of habitats, from prairie streams, to clear Ozark rivers, and even Bootheel ditches. Some species are widely distributed across the state, occurring in many rivers, streams, lakes, and even ponds. Others are restricted to certain regions, certain rivers, or even just a few locations!

Life Cycle

Freshwater mussels have a unique life cycle. The microscopic larvae of freshwater mussels, known as glochidia, are parasitic for a short time on a vertebrate host, usually a fish. During the breeding season, males release sperm directly into the water column. Female mussels deposit eggs into chambers in their gills. While the female siphons water, sperm enter the gills and fertilize the eggs. The modified gills then become brooding chambers for the developing glochidia.



Freshwater mussels have a unique life cycle that requires a host. (Adapted from "A Guide to Missouri's Freshwater Mussels.")

Mussels have evolved many ways to trick their host species into carrying their larvae. Some species release packets of unfertilized eggs and larvae, known as conglutinates, that look like food (i.e., worms or the larvae or pupae of aquatic insects). Other species have modified mantle flaps that resemble crayfish or small minnows used to "lure" fish. When the fish attempts to eat the lure they get a mouthful of glochidia instead. Other species actually sit with their shells open, waiting for a fish to come along, and then snap shut on the fish and pump their glochidia into the gills. To see videos of the various ways mussels attract host fish, visit Dr. Chris Barnhart's "Unio Gallery" at http://unionid.missouristate.edu/.

Some species, like this brokenray, have modified mantle flaps that resemble small fish to attract host fish. (Photo courtesy of Dr. Chris Barnhart.)

Once released, the glochidia clamp onto the gills or fins of the fish. The fish responds by encapsulating the glochidia in a cyst, providing a protective covering. If the fish is the right host species, the glochidia will remain attached for a few days to weeks, during which they transform into juvenile mussels. After transformation, the juvenile mussels rupture their cysts and drop to the stream

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MISSOURI STREAM TEAM

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bottom, hopefully landing in a suitable habitat where they will grow into adults and repeat the process all over again.

Feeding & Habitat

Known as "Nature's Vacuums", freshwater mussels use their gills to get not only oxygen, but also food, in the form of algae, bacteria, and small bits of organic matter, from the water. Undigested food and sediment are returned to the water as pseudofeces, which become food for other animals.

While freshwater mussels can live in a variety of habitats, most species require clean, flowing water and stable sand, gravel, or boulder stream bottoms to survive. Only a few species can live in reservoirs and ponds or tolerate excessive sediment.

Threats to Freshwater Mussels

Freshwater mussels are disappearing at a rapid pace throughout North America. Almost half of the mussel species in Missouri are considered to be Species of Conservation Concern. The largest threat freshwater mussels face is the loss of stable, natural riverine habitat due to dam and impoundment construction and waterway channelization. Many Missouri rivers have also been affected by poor land use practices, urbanization, and pollution. Excessive sediment and gravel interfere with feeding, smother young mussels, and result in unstable stream reaches. Contaminants such as ammonia, pesticides, and mining wastes are also detrimental to mussels.

The invasive Asian clam and zebra and quagga mussels pose impending threats to our native mussel fauna. Asian clams are found in most streams in Missouri and may be able to outcompete native mussels for food and other resources. The ammonia produced from periodic Asian clam die-offs can affect juvenile mussels. Zebra mussels can be found throughout a large portion of the Mississippi River system, including some rivers and lakes in Missouri. Zebra mussels attach to any hard substrate, including the shells of native mussels, and reproduce at such a high rate that they can easily take over, outcompeting native mussels for food, habitat, and possibly interfering with reproduction.

Observing Mussels

Searching for shells on gravel bars is an easy way to observe the diversity of freshwater mussels in a river. In shallow water live animals can be observed by wading, but deeper water requires snorkeling or SCUBA. Much like searching for birds or wildflowers, you must develop a search image to find mussels under the water. While some species always protrude from the substrate, others often remain hidden. Look for "puffs of smoke" under the water from the animal quickly closing its shell or the two siphons between the shell halves.

Missouri is home to approximately 69 species of freshwater mussels, including several endangered species and Species of Conservation Concern. *(Photo by J. Scott Faiman, Missouri Department of Conservation.)*

If you remove a mussel from the substrate, remember to keep it damp and out of direct sunlight. To replace mussels, make sure the opening of the two shell halves is down and the eroded top part of the shell is up. If you're unsure, just place the animal on its side. Always try to return mussels to the same spot (or as close as you can get!).

Adapted from *Missouri's Freshwater Mussels*

Don't forget to send your questions to streamteam@mdc.mo.gov or call 1-800-781-1989.

Sources:

Bruenderman, S.A., J. Sternburg, and M.C. Barnhart. 2006. Missouri's Freshwater Mussels. Missouri Department of Conservation, Jefferson City.

McMurray, S.E., J.S. Faiman, A. Roberts, B. Simmons, and M.C. Barnhart. 2012. A Guide to Missouri's Freshwater Mussels. Missouri Department of Conservation, Jefferson City.