



Life in the Rocks



The Newsletter of the Arkansas Game and Fish Commission Nongame Aquatics Program

The Snuffbox Mussel

Epioblasma triquetra (Rafinesque, 1820)

By Bill Posey



Female snuffbox mussel. *Photo by Bill Posey.*



Male snuffbox mussel. *Photo by Bill Posey.*

The snuffbox is a small, triangular shaped mussel that only grows to about 3.5 inches in length. The specific epithet “triquetra” comes from the Latin “triquetrous” meaning having three acute angles, in reference to the shell shape, which is most prominent in females. The periostracum (external shell surface) is yellow to tan with green chevrons or rays, especially around the umbo (swollen area above the hinge). This pattern tends to fade as the individual ages. The nacre (mother-of-pearl) is white. Males are typically larger than females. The shell of females is more inflated on the posterior end to allow room for brooding of glochidia (larvae). Only females have serrations or “teeth” along the posterior edge of each valve. Females are bradyctictic (long-term brooders) and the glochidia overwinter in the female and are released in the spring. The known host fishes are the logperch (*Percina caprodes*), blackside darter (*P. maculata*), blackside topminnow (*Fundulus olivaceus*), banded sculpin (*Cottus carolinae*), and Ozark sculpin (*C. hypselurus*). Most experts agree that the logperch is probably the most suitable host for the snuffbox. Species that may be confused with the snuffbox include the deertoe, fawnsfoot and elktoe.

The snuffbox lives in small to medium-sized creeks, large rivers and some lakes with gravel

or gravel sand substrates. It requires clean flowing water or sufficient wave action in lakes to survive. The snuffbox is widely distributed across the eastern United States but in recent years has shown marked declines in population size and distribution. In Arkansas, it has been recorded from the Spring, Strawberry, Kings, and White rivers, with recent finds of live specimens in the Spring River.



Snuffbox habitat on the Spring River, Arkansas.

Like most mussels in the Family Unionidae, snuffbox glochidia must attach to a fish to complete transformation from larvae to juveniles. Many mussel species have unique strategies to attract and attach glochidium to the fish host. Most strategies include displays that resemble a food item consumed by a particular host species. For more information on these unique strategies, see "Life in the Rocks" 4.01 (January-February 2001) or visit <http://unionid.missouristate.edu/>.

The snuffbox takes advantage of host fish's habits to increase the chances of encountering the proper host species. One of the known (and probably best) host species for snuffbox is the logperch. Logperch have the peculiar habit of rolling rocks in search of prey, such as mayfly, stonefly or caddisfly larvae. For the snuffbox, this habit is critical for successful reproduction.

The logperch is a darter with a large head and elongate snout. It is the largest (4-7 inches) darter found in Arkansas. Although, it does not come close to the size of a mature walleye or sauger, the largest members of the Family Percidae.



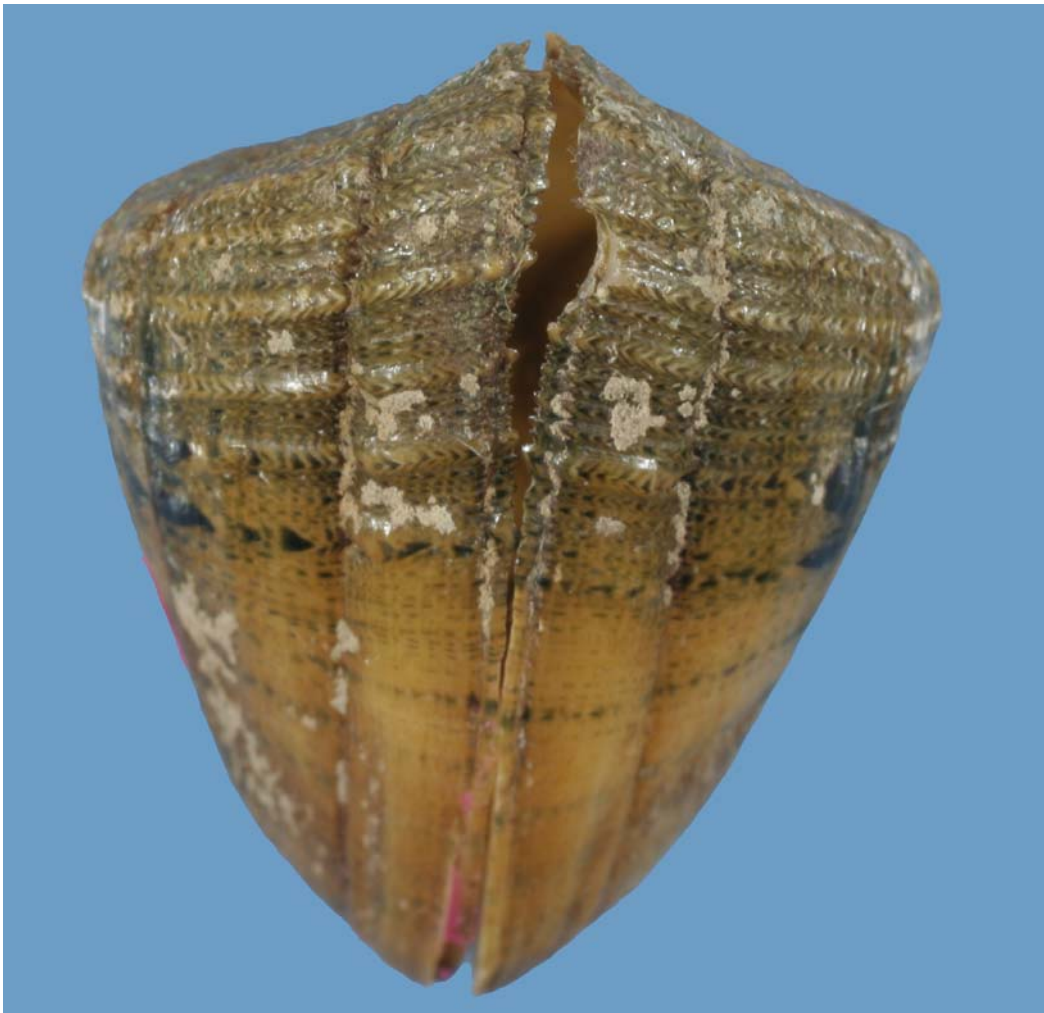
Logperch (*Percina caprodes*). Photo by Brian Wagner.

When a female snuffbox is ready to expel glochidia, it will migrate to the surface of the substrate where it is either partially anchored or lying on its side on the substrate. The female will open the shell wide then wait for a fish to stick its head into the gaping shell. For logperch, this is a natural action. Video evidence shows that logperch will roll these mussels around on the substrate and the mussel will continue to gape during the activity. However, once the head of a fish touches the mantle (fleshy envelope surrounding the mussel), the mussel closes the valves in less than a second. Once closed, the serrations along the posterior edge assist in holding the fish in position while the mantle acts as a bellows, forcing glochidia into the mouth of the fish. The glochidia are released through pores at the ends of the many marsupia (pouches for brooding glochidia) and forced into the gills.

Once the glochidia are released into the mouth of the fish, the mussel relaxes its grip and the

fish swims away. However, darters of the genus *Etheostoma* usually do not survive such encounters, because they lack a skull stout enough to withstand the closing force exerted by the mussel. Fish that survive leave with numerous glochidia attached to their gills (over 200 have been recorded from one gill of a logperch). The glochidia will remain on the fish for two to six weeks, before transforming into a juvenile and dropping off to begin life as a free-living individual. If the juvenile does not land on suitable substrate, it will probably die.

The genus *Epioblasma* contains 20 species and 5 subspecies, and is the 4th most specious genus of North American mussels. However, more than half of these species are extinct and many others are listed as federally endangered species. Since many of these mussels were inhabitants of riffles and shoals of large rivers, it is believed that alterations to big river systems, primarily due to dams, has led to the decline of this genus. Many of these species have not been found alive in over 20 years and some may have gone extinct over 50 years ago.



Female snuffbox showing serrations or "teeth" along the shell margin. *Photo by Bill Posey.*

The Woodland Salamanders: Overlooked Forest Denizens

By Kelly Irwin



Female Western Slimy Salamander with eggs. Photo by Stan Trauth.

The forests, prairies, swamps, rivers, and streams of Arkansas are home to 29 species of salamanders. One group, the “woodland salamanders,” members of the genus *Plethodon* (pronounced “pleth-o-don”) are unique among Arkansas’ salamanders, because they lack the aquatic larval stage in their life cycle. This group currently contains nine (9) recognized species in Arkansas. Woodland salamanders deposit their grape-like cluster of eggs in cool, moist sites under rocks, logs, or in rock crevices or caves. The female remains with the eggs to guard against predation, as the eggs take up to two months to undergo direct development. When the eggs hatch the young are fully formed miniatures of the adult and are ready to begin life on their own. The woodland salamanders are part of a larger group of

salamanders, the “lungless salamanders,” which contains the brook salamanders, genus *Eurycea*, dusky salamanders, genus *Desmognathus*, and the monotypic Four-toed Salamander, *Hemidactylium scutatum*. The lungless salamanders are unique because, as the name implies, they all lack lungs, and respiration is accomplished by absorption of oxygen through the skin and lining of the mouth.



Southern Redback Salamander. Photo by Stan Trauth.

Woodland salamanders feed on a variety of invertebrates and are probably active year-round. During the hot dry months of summer and coldest months of winter, these salamanders retreat deep into underground burrows, root tunnels, rock crevices, and rocky talus slopes to avoid the desiccating effects of heat and freezing temperatures. They become active near the surface in the spring and fall where they can be found under rocks and logs. Woodland salamanders can be observed on the surface of the forest floor on warm, very humid or rainy nights, often in great numbers.



Fourche Mountain Salamander. Photo by Suzanne Collins.

The greatest diversity of salamander species in the world are found in the heavily forested and dissected Appalachian Mountains of the eastern United States, where many species of the genus *Plethodon* have evolved as isolated populations on specific mountaintops. However, *Plethodon* populations in Arkansas have also undergone speciation events on the ancient, isolated ridges and peaks in the Ouachita Mountains, of western Arkansas and eastern Oklahoma. As a result, Arkansas is home to several endemic species named for their montane origins, these are the Rich Mountain Salamander *Plethodon ouachitae*; Fourche Mountain Salamander *Plethodon fourchensis*; and the Caddo Mountain Salamander *Plethodon caddoensis*. The other Arkansas plethodontids are either endemic to the Ouachita Mountains, Kiamichi Slimy Salamander *Plethodon kiamichi*; Sequoyah Slimy Salamander *Plethodon sequoyah*; and Southern Redback Salamander *Plethodon serratus*; the Gulf Coastal plain, Louisiana Slimy Salamander *Plethodon kisatchie*; the Ozark Plateau, Ozark Zigzag Salamander *Plethodon angusticlavius*; or are widespread throughout the region Western Slimy Salamander *Plethodon albagula*.



Rich Mountain Salamander. Photo by Stan Trauth.

Pebbles...

(Quick notes on what we've been up to...)

- All Nongame Aquatic Program biologists attended a meeting to discuss changes to the Comprehensive Wildlife Conservation Strategy.
- Bill conducted a Media Outing for both television and newspaper reporters on the Black River.
- Brian and Mark, with the help of AGFC Streams Biologist Jeff Quinn, attempted to collect Arkansas saddled darters from several streams to help with a genetics study being conducted by the Missouri Department of Conservation.
- Kelly took a much-needed vacation in July to the Appalachian Mountains in southwestern Virginia and eastern Tennessee, where he worked on a forthcoming fossil fish paper with his coauthor at Henry & Emory College, caught hellbenders in the mountain streams, and dug for fossils at the Gray Fossil Site. He topped off his vacation with a visit to his family back in northeastern Kansas.
- Brian, Kelly, Mark, and AGFC Fisheries Biologist Sam Henry helped Dr. Chris Taylor of the Illinois Natural History Survey collect crayfish samples from the Eleven Point River.
- Bill assisted a Missouri State University in collecting gravid rabbitsfoot mussels in the Little River (Little River County) to determine the host specificity for the mussel across its geographic range.
- Aquatic Nongame Program personnel and Stream Team personnel assisted the Project Wild Coordinator (Pat Knighten) in a workshop where educators from Arkansas, Oklahoma, Kansas and Missouri were in attendance.
- Bill surveyed the St. Charles boat ramp on the White River to determine if a ramp extension would have any impacts to endangered mussel species.
- Brian and Mark spent a week in the field with Casey Dillman, a researcher from Saint Louis University. Brian and Casey are collaborating on a study of the genetics of several species of north Arkansas stream crayfishes.
- Bill participated in an episode of “Talkin Outdoors at the Corner Café” hosted by Steve “Wildman” Wilson.
- Kelly made two trips to survey for hellbenders on the Eleven Point River in late July and early August before a mechanical failure in his air compressor forced termination of further survey work.
- Brian, Mark, and Sam Henry conducted crayfish samples on numerous streams in the Eleven Point and Strawberry River basins.
- Bill and other Fisheries Division personnel met with commercial fishers to discuss proposed commercial fishing regulations.
- Brian met with Dr. Henry Robison and Dr. Tom Buchanan to plan the next steps in revision of the book, Fishes of Arkansas.

Pebbles...

(Continued...)

- In August Kelly assisted Bill Posey, Malacologist, with mussel surveys on the lower Eleven Point River and lower Spring River, and assisted in Bill with the collection of specimens and conducting of a “Talking Outdoors at the Corner Café” taping on mussels in Arkansas.
- Bill and other fishery staff met with Tennessee Wildlife Resource Agency personnel to discuss the reciprocal agreement between Tennessee and Arkansas concerning management of the Mississippi River.
- Brian and Mark joined biologists from Arkansas Tech University and the Missouri Department of Conservation to trawl for small fishes on the Current River.
- Kelly gave a presentation on Cretaceous fossils found on Rick Evans Grandview Prairie WMA to the Spring River Gem and Mineral Club in Cherokee Village.
- Bill and Brian, along with Rhea Riley (U.S. Forest Service) conducted a brief survey of the Mulberry River to determine the best location to conduct a “Stream Team Day”.
- Brian and Kelly conducted a crayfish survey on the Eleven Point River.
- Bill and Kelly Winningham attended a Hazard Analysis and Critical Control Point workshop held at the University of Memphis.
- Kelly wrapped up this quarter during the last week of September by providing oversight on the removal of 800 Alligator Snapping Turtles from the Joe Hogan Fish Hatchery. These turtles were being held at the hatchery since they were seized in April from a breeder who had violated AGFC regulations.
- Brian, Kelly, and Mark Oliver collected crayfish from the cold waters of the White River at 2 sites by snorkeling.
- Bill inspected a houseboat that was to be launched into Lake Ouachita while encrusted with zebra mussels.
- Bill and USFWS personnel conducted a survey of the South Fork Saline River near Benton.

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The Bayou Bodcau crayfish, and Arkansas endemic, is our smallest crayfish – adults are only 1 inch long! *Photo by Brian Wagner.*



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