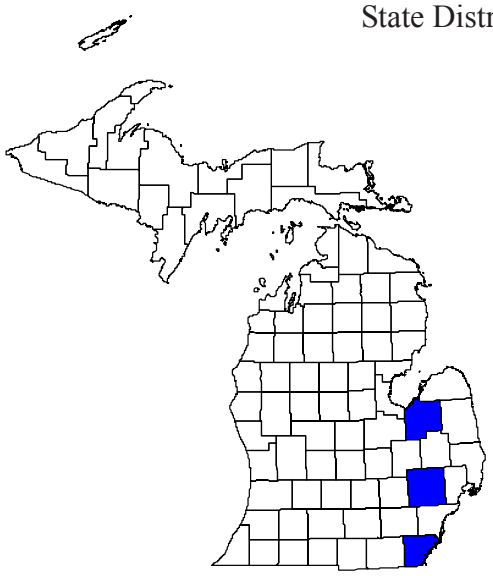
Toxolasma lividus Rafinesque — Purple Lilliput

Male (left) and female (right) shells. Photo courtesy of Kevin Cummings, Illinois Natural History Survey

State Distribution



Best Survey Period

Status: State Endangered

Global and state ranks: G2/S1

Family: Unionidae (Pearly mussels)

Synonyms: The purple lilliput was formerly known as *Carunculina lividus*. There is currently debate over the taxonomy, specifically whether *T. glans* is the same species, a subspecies, or a unique species NatureServe). Commonly, the purple lilliput has also been referred to as the little purple (Cummings and Meyer 1992).

Total range: Because of the taxonomic uncertainties, it is difficult to judge the range of the purple lilliput. Generously, it occurs from Michigan south to Alabama, and Missouri and Arkansas east to Virginia.
The purple lilliput is listed as rare in much of its range, more so at the outer edge of the range. In North Carolina, it is listed at Presumed Extirpated (SX) and in Oklahoma, Possibly Extirpated (SH). It is Critically Imperiled (S1) in most states in which it occurs, (Michigan, Illinois, Ohio, Kentucky, Tennessee, Virginia) and Imperiled (S2) in a few others (Indiana, Missouri, Alabama). In Arkansas, the purple lilliput is listed as Vulnerable (S3), but in no state is it listed as Apparently Secure (S4) or Secure (S5) (NatureServe).

State distribution: In Michigan, the purple lilliput is found in the southeastern portion of the state. While spent shells have been recovered from sites in the Cass River (Tuscola County), Macon Creek and the Raisin River (Monroe County) historically, live mussels have only been found in the Clinton River in Oakland County.

Recognition: The purple lilliput is a small mussel, growing to a little over one inch in length. The shell is inflated and relatively heavy. The anterior end is rounded, while the posterior end is pointed to rounded in males, and truncated in females. The umbo (i.e., the rounded peak near the hinge) is inflated over the hinge line, and the beak sculpture consists of three to four ridges. The shell of the purple lilliput is smooth, except for growth lines, and light to dark green or brown, becoming darker with age (Clarke 1981, Oesch 1984).

Internally, the purple lilliput has well-developed pseudocardinal teeth, two in the left valve and one in the right. Lateral teeth are also well developed, and the beak cavity is variable. The nacre is distinctly purple, giving the purple lilliput its name.

Best survey time: Surveys for the purple lilliput are best done in the summer when water levels are lowest and water clarity is high. Low water levels expose muskrat middens that often contain empty freshwater

Michigan Natural Features Inventory
P.O. Box 30444 - Lansing, MI 48909-7944
Phone: 517-373-1552

mussel shells. In rivers that are less than two feet deep, a glass-bottomed bucket is an efficient tool for finding live freshwater mussels. However, the purple lilliput mussel is often missed in surveys because of its small size.

Habitat: The purple lilliput occurs in small to medium sized streams, less often in large rivers and lakes. It is most often found in well packed sand or gravel. The purple lilliput often occurs at water depths less than one meter. Suitable habitat for fish host species must be present in order for the purple lilliput to reproduce successfully.

Biology: Little is known specifically about the biology of the purple lilliput. Reproduction requires the presence of a fish host. Sperm is released into the water, then taken in through the female's siphon for fertilization. Eggs develop into larvae within the female. The purple lilliput is thought to be a long-term (bradytictic) breeder, holding the larvae internally for about a year. However, in Michigan, the purple lilliput is reported to be a short-term brooder, producing multiple broods per year (Hoeh, cited by NatureServe).

The larvae, called glochidea, then are released into the water and must attach to a suitable fish host in order to survive. The fish hosts for the purple lilliput include the green sunfish (*Elepomis cyanellus*) and the longear sunfish (*Lepomis megalotis*) (Watters 1995). Glochidea remain on the fish host for a couple of weeks to several months depending on mussel species and other factors. During this time the mussel transforms into the adult form then drops off its host. The mussel then spends the remainder of its life in the substrate. The life span of the purple lilliput is not known.

Like all freshwater mussels, the purple lilliput is a filter feeder, gathering nutrition by filtering out particles, such as algae, zooplankton and debris, from the water.

Conservation/Management: Like most mussels, the purple lilliput requires clean water for survival. Therefore, any practices that lead to increased siltation and poor water quality will decrease the quality of the habitat of the purple lilliput. Pollution from agricultural runoff and alteration to waterways, including drain clean-outs and the construction of impoundments, increase siltation and alter the natural flow of the river. Conservation of the purple lilliput, as with other unionids, requires an approach that recognizes the interdependence of the different communities and habitats within its ecosystem. The purple lilliput cannot reproduce without the presence of its fish hosts. Conservation efforts should aim to maintain the composition of associated fish communities, including fish habitat and food resources such as aquatic insects.

The zebra mussel (*Dreissena polymorpha*) and the Asian clam (*Corbicula fluminea*) are exotics from Eurasia that have spread quickly throughout the eastern U.S. While the Asian clam has few documented harmful effects on native mussels, the zebra mussel has had a dramatic effect on native mussel communities in habitats where it has been introduced. Zebra mussels require stable, hard substrates to attach to and survive. Often the only hard substrates available are native mussels. Native mussels are sometimes covered with zebra mussels to the extent that they cannot reproduce or feed normally, eventually killing the native mussel. Zebra mussels are also filter feeders and thus compete with native mussels for food resources. The continued range expansion of the zebra mussel into purple lilliput habitat remains a serious threat.

Research needs: The current distribution of the purple lilliput in Michigan needs to be confirmed and then protected. This will include visits to historical sites of the purple lilliput, as well as targeted surveys at sites with potential habitat. The preferred habitat of the purple lilliput needs to be better defined to facilitate more efficient conservation and protection. Additionally, life history characteristics, such as lifespan, breeding season, and any additional fish hosts, need to be described. Finally, methods of preventing or minimizing the spread of zebra mussels into purple lilliput habitat are needed.

Related abstracts: White catspaw (*Epioblasma obliquata perobliqua*), Northern riffleshell (*Epioblasma torulosa rangiana*), Snuffbox (*Epioblasma triquetra*), Rayed bean (*Villosa fabalis*), Wavy-rayed lampmussel (*Lampsilis fasciola*), Round hickorynut (*Obovaria subrotunda*), Clubshell (*Pleurobema clava*).

Selected references:

Clarke, A.H. 1981. The freshwater mollusks of Canada. National Museum of Natural Sciences. Ottawa. 439 pp.

Cummings, K.S. and C.A. Mayer. 1992. Field guide to freshwater mussels of the Midwest. Illinois Natural History Survey. Manual 5. 194 pp.

NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.6 . Arlington, Virginia, USA: NatureServe. Available: http://www.natureserve.org/explorer. (Accessed: March 20, 2002).

Oesch, R.D. 1984. Missouri naiads: a guide to the mussels of Missouri. Conservation Commission of the State of Missouri. 270 pp.

Watters, G.T. 1995. A guide to the freshwater mussels of Ohio, 3rd Ed., Ohio Department of Natural Resources, Division of Wildlife. 122pp.

Abstract Citation: Carman, Stephanie M. 2002. Special Animal Abstract for *Toxolasma lividus* (Purple lilliput). Michigan Natural Features Inventory. Lansing, MI. 3 pp.

Funding for this abstract provided by Michigan Department of Natural Resources - Forest, Mineral, and Fire Management Division.

Michigan Natural Features Inventory
P.O. Box 30444 - Lansing, MI 48909-7944
Phone: 517-373-1552