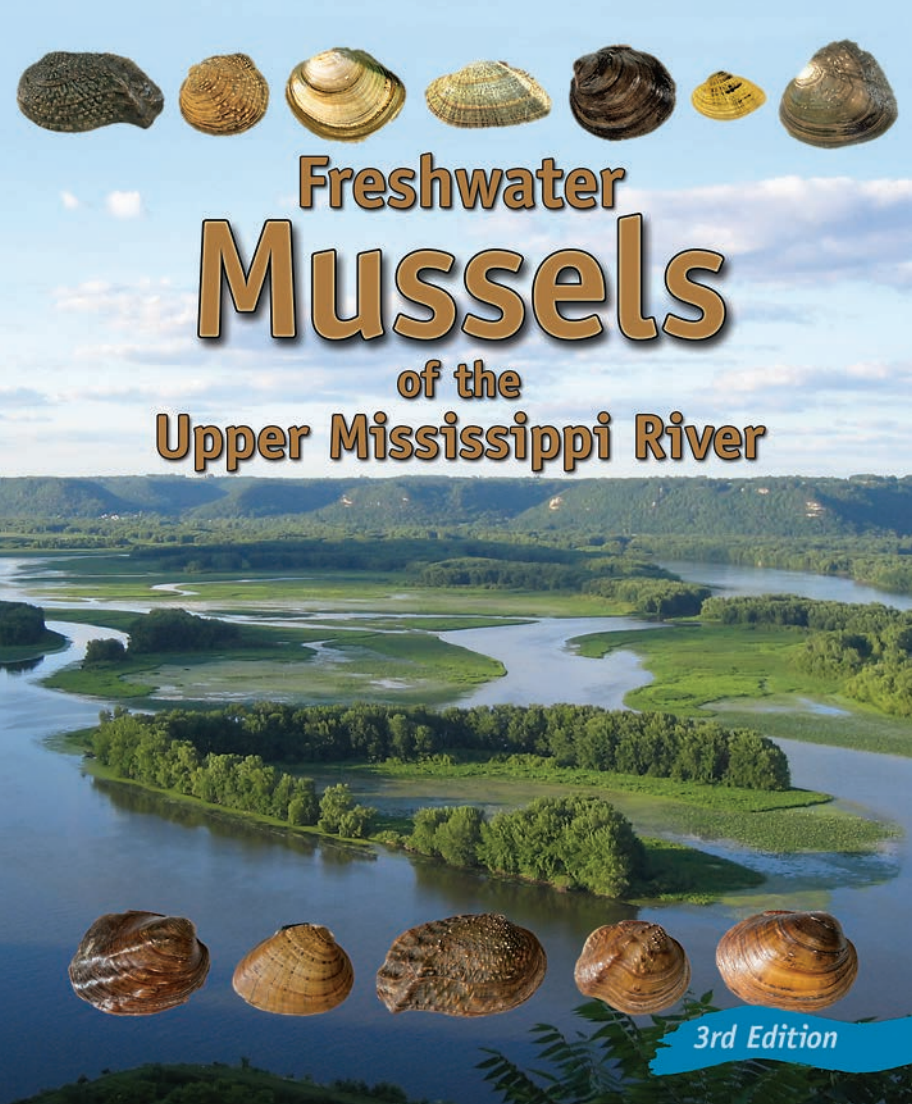
Freshwater
Mussels
of the
Upper Mississippi River
3rd Edition

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Introduction

This booklet is to help you identify freshwater mussels, including the non-native Asian clam and zebra/quagga mussels, known from the Upper Mississippi River and some of its major tributaries. All these organisms are collectively known as bivalves (mollusks with two shells). Identifying characteristics here are limited to the shell. Common and scientific names are provided for each species, and some have changed from previous versions. Newcomers to freshwater mussels will find the vocabulary difficult at first. It may help to read through the glossary, then read the descriptions of individual mussels, referring back to the glossary for any unrecognizable terms.

Handling

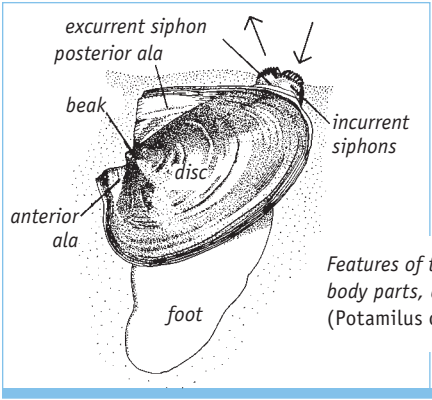
Casual observers of mussels probably won't want to invest the time, equipment or energy required to properly handle live mussels, but examining dead shells allows time for comparison and lengthy examination. Simply examining and comparing the shell features with the photographs included in this booklet can aid in identifying many species. Look for empty shells on riverbanks and sand bars and in shallow water. Rules for collecting live mussels and their shells vary among states, and a fishing license or collecting permit might be required (contact information for state and federal agencies is provided at the end of the booklet).

Keep accurate records of when and where specimens were collected and descriptions of rare species. Your state natural resources agency or the U.S. Fish and Wildlife Service should be contacted with location information about threatened and endangered mussels. If you are uncertain about the identity of a specimen, send a color photograph and detailed field notes to one of the above agencies, or to a malacologist (mussel expert) or natural science museum.

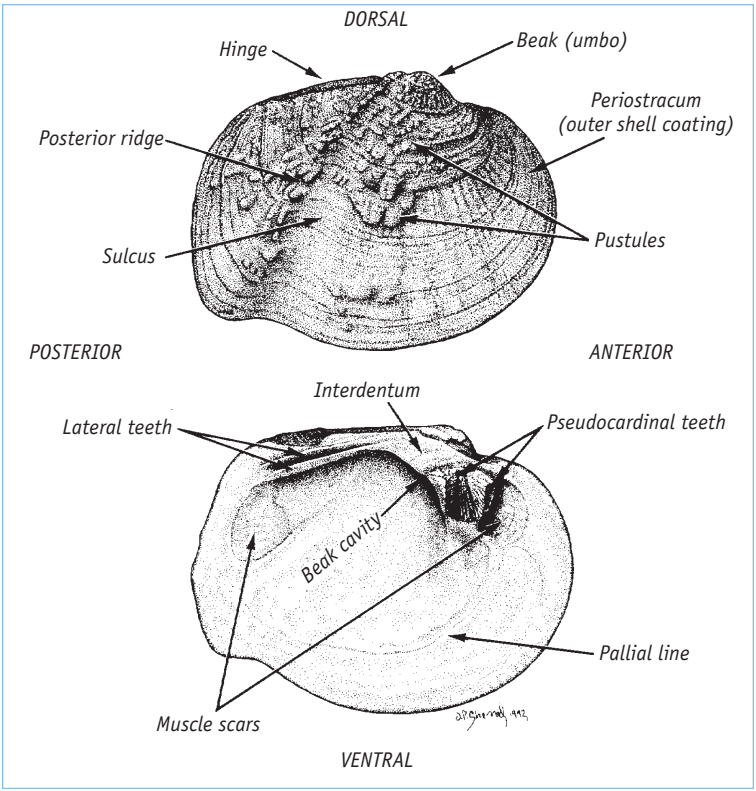
General Structure

Bivalves consist of two shells surrounding the animal's body. Shells have various shapes, colors, textures and protuberances including wings, bumps, knobs, ridges and crenulations. The two shells are held together by a hinge. The inside of the shell has a pearly nacreous material. Many mussels have interlocking "teeth" that vary greatly in size and shape among species. Pseudocardinal teeth are triangular-shaped and located near the beak (also known as umbo). Lateral teeth are elongated and positioned below the hinge. Shell growth starts at the beak (near the hinge) and progresses outward. Freshwater mussels lay down growth rings that, much like annular rings on trees, approximate the age of the mussel. In some species, shell shape varies between males and females making sex determination possible, with mature females often being more inflated and expanded on the siphon end.

Soft parts are attached to the shells by muscles and ligaments. They include a single axe-shaped foot, a pair of gills on each side, incurrent and excurrent siphons to bring in and expel water, sexual organs, internal organs and muscle tissue. Freshwater mussels also have primitive circulatory and nervous systems.



Features of the shell and typically observable soft body parts, as exemplified by the pink papershell (Potamilus ohiensis)



The major features of a freshwater mussel shell, as exemplified by the mapleleaf (Quadrula quadrula). *The drawing shows the exterior of the right valve (top) and the interior of the left valve (bottom).*

From "Field Guide to Freshwater Mussels of the Midwest" by Kevin S. Cummings and Christine A. Mayer, 1992, Illinois Natural History Survey, Manual 5. Used with permission.

Natural History

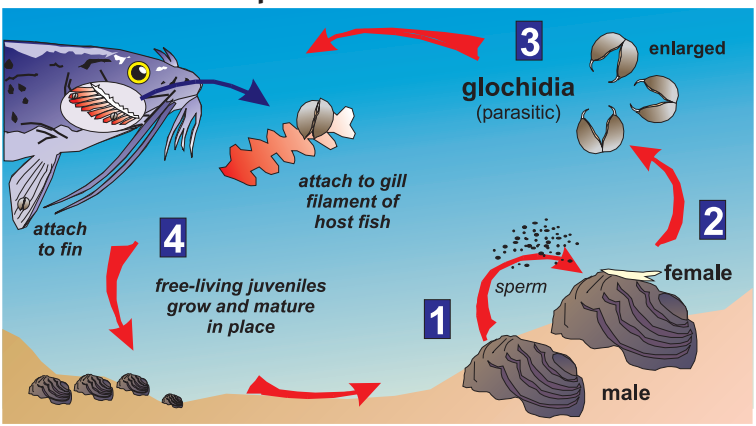
The life cycle of a freshwater mussel is unique and fascinating. The male mussel releases sperm into the water, which are drawn into the female through her incurrent siphon. Fertilized eggs develop into larvae, called glochidia, which resemble miniature mussels. Larvae are brooded inside the gills (marsupia), where they are held for a period of days to several months depending on the species. To survive, glochidia must attach to a vertebrate host, usually a fish. They attach to the fish's gills and remain as implanted, though harmless, parasites for a few weeks or months (see diagram on opposite page). Glochidia of some species also attach to fins or other exterior parts of the fish. During this time, the glochidia undergo a transformation where their organs and other internal structures develop. When transformation is complete, the juvenile mussels release from the fish and fall to the streambed. If the substrate and the currents are favorable, the young mussels survive and begin their one to eight-year maturation into adult mussels.

The species of fish that serve as hosts varies among mussel species. Some mussels specialize on a single fish species or group of fish (such as minnows or catfishes), while others are host generalists, and can transform on a broad range of fish species. Most mussels do not simply release glochidia and leave their fate to chance encounters with the appropriate host. Instead, many species have specialized adaptations and behaviors that target suitable hosts. These adaptions frequently involve elaborate examples of food mimicry to elicit an attack by the host. Examples include mantle lures and conglutinates (packages of larvae) that resemble small fish or invertebrates (see figures on opposite page), and glochidia-laden mucous webs that entangle the host.

Mussels are important in North American river systems for various reasons. Shells provide spawning sites and habitat for various fishes and insects. As filter feeders, mussels are primary consumers of plankton and are important in the food web of large rivers. They convert and accumulate nutrients from plankton and bacteria into proteins that are directly used by

fishes and other invertebrates. Because they are quite sensitive to changes in habitat and water quality, freshwater mussels are good indicators of changing environmental conditions. Their shells also have commercial value. From about 1890-1950, they were used to make buttons for clothing. Presently they are used as nuclei for cultured pearls.

How do mussels reproduce?



Reproductive adaptations "Increasing the odds"

MN DNR

*Minnow-like mantle flap of the Plain Pocketbook (*Lampsilis cardium*) lures a possible host fish.*

Conglutinates (packages of glochidia) imitate worms and are preyed on by host fish.

Graphics by Karl Scheidegger, WDNR

Federal & State Endangered Species Acts

If you disturb a mussel you suspect is one of the seven federally endangered species in the Upper Mississippi River, a state listed species, or Species of Conservation Concern, take a photo if possible and immediately return the mussel to the water by placing it on the substrate where it was found. Note the location, species, and size of the individual, and date and submit the data and photos to your state natural resources agency (contact information for state and federal agencies is provided at the end of the book). Your report will help biologists maintain accurate records of the abundance and distribution of these endangered species.

Under the U.S. Endangered Species Act of 1973 (PL 93-205), it is illegal to possess any part of an endangered species. For example, it is illegal to possess the shells of any endangered mussel species. Penalties for a violation of the Act include maximum fines of $50,000 and a year in prison. Penalties may also affect your hunting and fishing privileges. Each state also has its own endangered species laws and penalties.

Legal Listing Status

Federally Endangered: Any federally-listed species that is in danger of extinction throughout much or all its natural range.

State Endangered: A species listed at the state level that is in danger of becoming extirpated from the state in the foreseeable future.

State Threatened: A species listed at the state level that could become endangered in the foreseeable future.

Species of Conservation Concern (= Species of Concern): A species listed at the state level that could become threatened in the foreseeable future; affords no legal protection in some states.

Healthy: Those species whose historical quantity and/or geographic range in the Upper Mississippi River might be reduced, but continue to thrive locally at least.

Extralimital: Those species for which the Upper Mississippi River is not within their usual range. These species are generally found elsewhere, such as small streams and headwaters.

Non-native (= Exotic or Introduced): Those species whose native range does not include the upper Mississippi River. These species often cause negative affects to the native fauna.

Glossary

(See shell diagram on page 3.)

ala (plural: **alae**; adjectives: **alate, bialate**): dorsal wing-like extension of the shell.

beak: oldest part of the valve; shell knob on hinged end of valve; also known as umbo.

bivalve: a mollusk with two shells.

denticals: a small, tooth-like projection.

excurrent siphon: opening through which mussel expels water, wastes, and glochidia.

extirpated: to be absent from a specific locality.

extralimital: beyond the edge of a species natural geographical range.

glochidium (plural: **glochidia**): a larval freshwater mussel that develops as an external parasite on a fish.

gravid: pregnant, as a mussel marsupium containing eggs and/or glochidia.

host generalist: a mussel species whose glochidia can transform on a variety of fish species.

incurrent siphon: the opening through which water is drawn into the mussel.

mantle: the soft tissue that lines the inner surface of a mussel shell.

mantle flap: large, often colorful, fish-like structure (host lure) on the postbasal mantle margin of *Lampsilis*.

marsupium (plural: **marsupia**; adjective, **marsupial**): the part of the gill that is structured to protect mussel eggs and incubate glochidia.

nacre: the interior layer of the shell; also known as Mother-of-Pearl.

periostracum: the outer layer or covering on the shell.

postbasal: the posterior one-third of the shell (opposite the foot end).

posterior slope: area of a valve bordered by the posterior ridge and dorsal and posterior margins.

pseudosiphons: tube-like extension of the mantle apertures of some mussels.

sulcus (adjective: **sulcate**): shallow depression on the shell.

tubercle (adjective: **tuberculate**): a pointed, rounded, or knob-like projection on the outer shell.

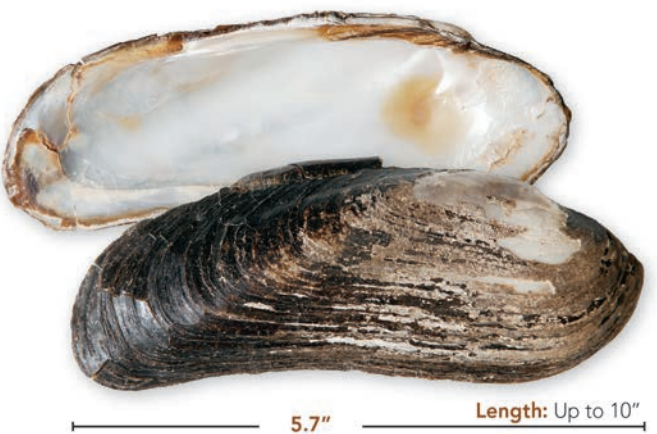
valve: one of the two halves of the shell.

Taxonomy follows Graf and Cummings [2007 - Review of the systematics and global diversity of freshwater mussel species (Bivalvia: Unionoida). Journal of Molluscan Studies 73:291-314], except for Gulf Mapleleaf, which was not recognized by the authors but has been determined to be a valid species (Williams, J.D., A.E. Bogan, and J.T. Garner. 2008. Freshwater mussels of Alabama & the Mobile Basin in Georgia, Mississippi & Tennessee. University of Alabama Press, Tuscaloosa 908 pp). Also, since Graf and Cummings (2007), the gender agreement for Lilliput has changed (Williams et al. 2008). Species accounts are ordered differently from the previous version, and are now organized alphabetically within Family groups (called Tribes), except for the type species, which is always listed first. Some generic changes from previous editions are *Cumberlandia* is now considered *Margaritifera,* some species formerly in the genus *Anodonta* are now either *Pyganodon or Utterbackia*, and *Quadrula* has been subdivided into three genera (*Quadrula, Amphinaias and Theliderma*). Host information primarily came from the Ohio State University's, Division of Molluscs, host/parasite database (http://www.biosci.ohio-state.edu/~molluscs/OSUM2/terms_hosts2.html).

Spectaclecase

Margaritifera monodonta (Say, 1829) listed as *Cumberlandia monodonta* in previous version

Shell: Brown in juveniles and black in adults, very elongate, usually curved, valves gaping slightly at the anterior end; beak sculpture 2-3 heavy bars; nacre white; teeth reduced but present; sexes alike. **Compare:** Spike, Black Sandshell, Pondmussel. **Range:** Historical records sporadic and uncommon; recent living records from the upper Mississippi River mainstem sporadic and uncommon downstream of Lock and Dam 9; also in the St. Croix River. **Habitat:** Lives beneath and among large rocks. **Host:** Unknown. **Status – Federally Endangered/ IA, IL, MN, & WI: Endangered/ MO: Species of Concern.**

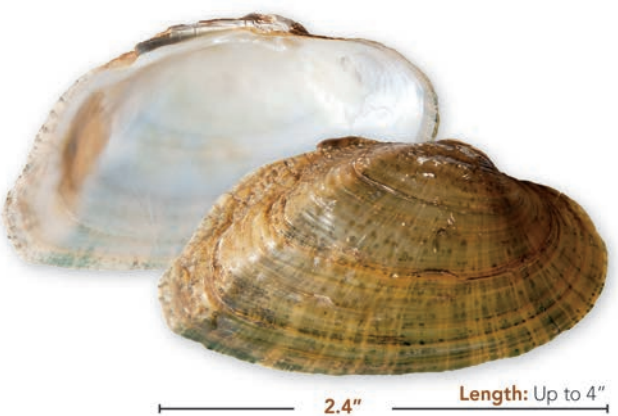


Typical adult length: 6"

Elktoe

Alasmidonta marginata Say, 1818

Shell: Elongate, subrectangular and inflated yellow or green with interrupted green rays and scattered speckles; posterior ridge sharp; beak sculpture 3-4 heavy, double-looped ridges; nacre white; reduced teeth present; foot often peach-colored; sexes alike. **Compare:** Female Snuffbox. **Range:** Historically sporadic and uncommon; recent living records from the upper Mississippi River mainstem sporadic and uncommon upstream of Lock and Dam 12, but present in some tributaries including the Cedar, St. Croix, Chippewa, Black, and Wisconsin rivers. **Habitat:** Small streams to large rivers. **Host:** Primarily suckers, but potentially a few other species including some minnows and sculpins. **Status – MN: Threatened/ MO & WI: Species of Concern.**



Typical adult length: 3"–4"

Slippershell

Alasmidonta viridis (Rafinesque, 1820)

Shell: Suboval, inflated, yellow, green or brown, sometimes with green rays; posterior ridge rounded and sloped with shallow ridges; beak sculpture is a few coarse loops; nacre white; small teeth present; sexes alike. **Compare:** Male Snuffbox and Elktoe. **Range:** Extralimital – recorded only once from the upper Mississippi River mainstem in Pool 5A. **Habitat:** Small to medium-sized streams. **Host:** Probably darters or sculpins. **Status – IA: Endangered/ IL & WI: Threatened/ MO: Species of Concern.**

Typical adult length: 1.25"–1.5"

Cylindrical Papershell

Anodontoides ferussacianus (Lea, 1834)

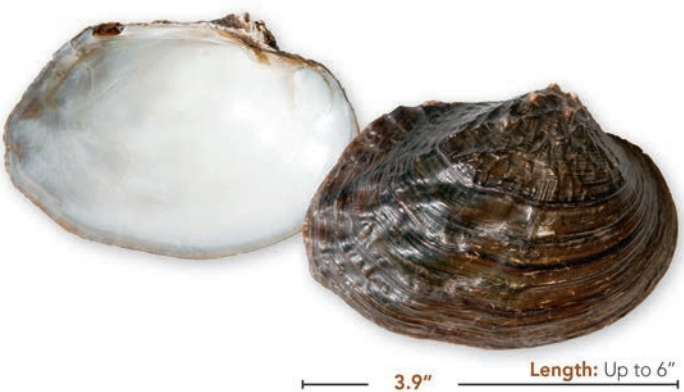
Shell: Thin, elliptical with a straight dorsal margin; periostracum yellowish brown to light green, sometimes with green rays; beak sculpture of 2-3 small curved ridges; nacre whitish; teeth virtually absent; sexes alike. **Compare:** Giant Floater, Creeper. **Range:** Extralimital – recorded only twice from the upper Mississippi River mainstem in Pools 4 and 10. **Habitat:** Only inhabits small streams. **Host:** Generalist. **Status – IA: Threatened/ MO: Species of Concern.**

Typical adult length: 2.5"–3"

Rock Pocketbook (a.k.a. Rockshell)

Arcidens confragosus (Say, 1829)

Shell: Brown or black, large, juveniles greenish; inflated, moderately heavy; prominent beaks sculptured with two diverging rows of tubercles extending onto each valve; in adults, this appears as numerous low, broad ridges; nacre white; reduced teeth present; sexes alike. **Compare:** Threeridge, Washboard. **Range:** Historically widespread and common; now less so. **Habitat:** Areas with reduced flow in mud or sand. **Host:** Generalist. **Status – MN: Endangered/ WI: Threatened/ MO: Species of Concern.**

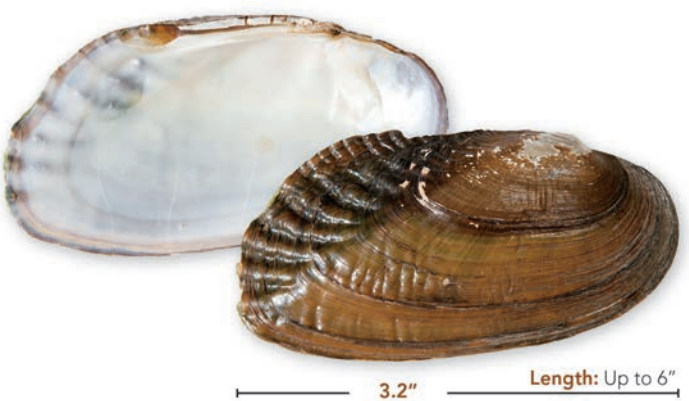


Typical adult length: 3.5"–5"

Flutedshell

Lasmigona costata (Rafinesque, 1820)

Shell: Yellow, green or brown often with green rays; elongated, subrectangular and compressed; ridges or "flutes" on posterior slope; beak sculpture three or four heavy ridges; nacre dull white or salmon; pseudocardinal teeth large not grooved; lateral teeth reduced, but interlocking; sexes alike. **Compare:** Creek Heelsplitter. **Range:** Historically widespread but uncommon; presently very rare in the upper Mississippi River mainstem (Pool 10), but present in some tributaries including the Iowa, St. Croix, Chippewa, Black, and Wisconsin rivers. **Habitat:** Small streams to large rivers. **Host:** Generalist. **Status – MN: Threatened.**

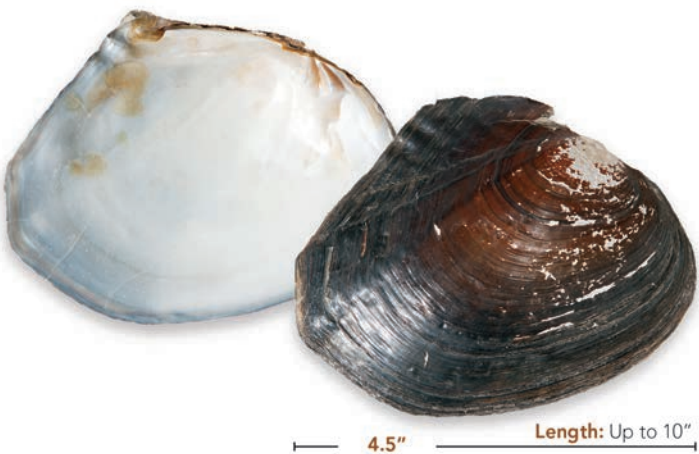


Typical adult length: 4"–6"

White Heelsplitter (a.k.a. Pancake)

Lasmigona complanata (Barnes, 1823)

Shell: Very compressed, subcircular, brown or black; large posterior wing, often with several small ridges on the wing that extend onto the shell; beak sculpture double looped; nacre white; pseudocardinal teeth large and not grooved; lateral teeth reduced; sexes alike. **Compare:** Pink Heelsplitter, Pink Papershell. **Range:** Historically widespread and common; presently still widespread but less common. **Habitat:** Areas with reduced flow. **Host:** Generalist. **Status – Healthy.**

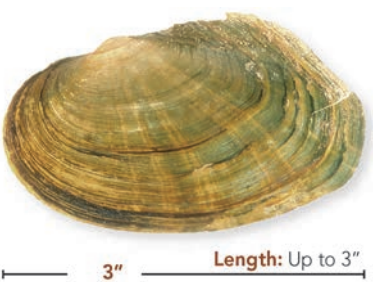


Typical adult length: 4.5–6"

Creek Heelsplitter

Lasmigona compressa (Lea, 1829)

Shell: Similar to Flutedshell but without flutes and with interlocking lateral teeth; moderately large teeth present; whitish nacre; beak sculpture several double looped ridges; sexes alike. **Compare:** Flutedshell. **Range:** Extralimital – recorded only twice from the upper Mississippi River mainstem in Pool 15. **Habitat:** Small streams. **Host:** Generalist. **Status – IA: Threatened/ MN: Species of Concern.**

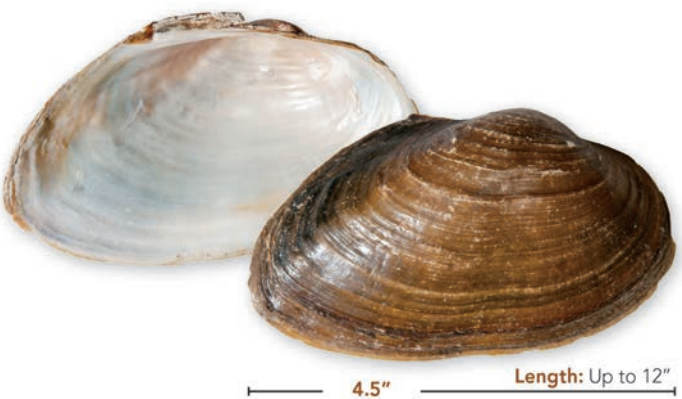


Typical adult length: 4"–5"

Giant Floater

Pyganodon grandis (Say, 1829)

Shell: Yellow, green or brown often with green rays when young; shape highly variable depending on habitat, but usually thin, large, inflated and elongate-suboval; ventral margin rounded or straight; beaks somewhat prominent and sculptured with 2-3 nodulous double-looped bars; nacre white, cream colored, or salmon; teeth absent; sexes alike. **Compare:** Flat Floater, Paper Pondshell, Creeper. **Range:** Widespread and common; exploits impoundments. **Habitat:** Areas with reduced flow. **Host:** Generalist. **Status – Healthy.**



Typical adult length: 4"–6"

Salamander Mussel

Simpsonaias ambigua (Say, 1825)

Shell: Elongate, somewhat inflated, fragile, yellow or brown, smoothly rounded beak not prominent and sculptured with a few double looped lines; nacre bluish white; small pseudocardinal tooth in each valve; lateral teeth absent; sexes alike. **Compare:** Cylindrical Papershell, Lilliput. **Range:** Recorded only twice (1930 and 1995) in Pool 10 in the upper Mississippi River mainstem; fresh-dead shell found in Pool 11 in 2008; present in the St. Croix, Black, Chippewa and Wisconsin rivers; perhaps under-sampled. **Habitat:** Lives in small colonies beneath rocks, which is habitat for its host. **Host:** Mudpuppy (a salamander). **Status – IL & MN: Endangered/ WI: Threatened/ MO: Species of Concern.**

Typical adult length: 1.5"–2"

Creeper (a.k.a. Strange Floater)

Strophitus undulatus (Say, 1817)

Shell: Brown, sometimes with green rays; elongate-suboval and smoothly rounded; beaks inflated, prominent and sculpted with a few well-defined concentric ridges; nacre bluish white or cream colored; reduced teeth present; sexes alike. **Compare:** Cylindrical Papershell, Paper Pondshell. **Range:** Historically widespread and common; now less so. **Habitat:** Small streams, but also well established in upper Mississippi River. **Host:** Generalist; glochidia known to complete transformation without a host. **Status – IA: Threatened.**

Typical adult length: 3"–4"

Paper Pondshell

Utterbackia imbecillis (Say, 1829)

Shell: Green, brown or yellow, with faint green rays; very thin and fragile; juveniles very compressed, becoming inflated; moderately elongate, subrectangular; posterior end pointed; dorsal margin straight; umbo not raised above hinge line; beak sculpture a few fine double loops; nacre bluish white; teeth absent; sexes alike. **Compare:** Flat Floater, Giant Floater, Cylindrical Papershell. **Range:** Historically widespread and uncommon (perhaps overlooked); presently widespread and common; may exploit impoundments. **Habitat:** River margins, ponds, backwaters, and silty areas. **Host:** Generalist; glochidia known to complete transformation without a host. **Status – Healthy.**

Typical adult length: 3"–4"

Flat Floater

Utterbackia suborbiculata (Say, 1831) listed as *Anodonta suborbiculata* in previous version

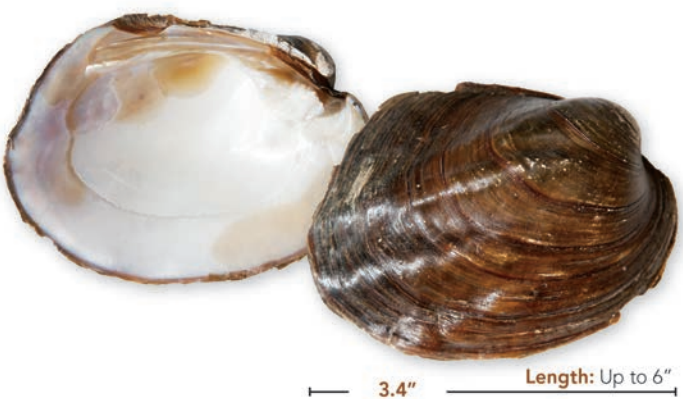
Shell: Fragile, large, flat (compressed), light brown, shiny, often with fine green rays; no teeth present; subcircular with straight dorsal margin; umbo not raised above hinge line; beaks sculptured with two diverging rows of shallow tubercles; nacre white or salmon; teeth absent; sexes alike. **Compare:** Paper Pondshell, Giant Floater. **Range:** Predominantly a southern species, historical records sporadic; might be expanding its range in the upper Mississippi River mainstem by exploiting impoundments, recently found up to Pool 4; also present in some tributaries including the Black, St. Croix, Chippewa, and Wisconsin rivers. **Habitat:** Ponds, backwaters and silty areas. **Host:** Generalist. **Status – MN, MO and WI: Species of Concern.**

Typical adult length: 4"–6"

Threeridge (a.k.a. Bluepoint)

Amblema plicata (Say, 1817)

Shell: Adults brown or black, moderately large and heavy; juveniles greenish; beak sculpture 2-3 small concentric rings; adult typically has 3-5 wide ridges, rarely without ridges; nacre white, frequently bluish along the posterior margin; large teeth present; sexes alike. **Compare:** Washboard, Rock Pocketbook. **Range:** Widespread and abundant; the most abundant mussel in the upper Mississippi River in spite of commercial harvest. **Habitat:** Medium-sized streams to large rivers, including impoundments. **Host:** Reported generalist, but catfishes seem to be important hosts. **Status – Healthy.**

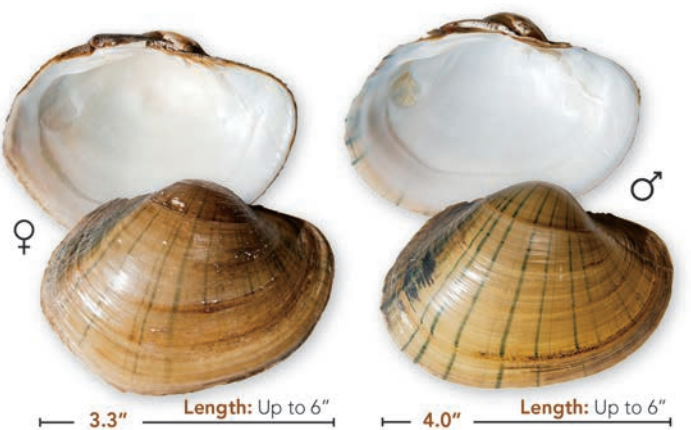


Typical adult length: 4"–5.5"

Plain Pocketbook

Lampsilis cardium Rafinesque, 1820

Shell: Yellow, brown, green, red or pink; colors often form concentric bands, especially in juveniles; green rays common; suboval, inflated with prominent beaks; female more inflated and rounded, with truncated posterior; beak sculpture two or three heavy ridges; nacre white, often salmon in umbo cavity; moderately large teeth present. **Compare:** Higgins' Eye, Fatmucket, Fat Pocketbook. **Range:** Historically widespread and very common; now more restricted in range and only moderately common. **Habitat:** Medium-sized streams to large rivers. **Host:** Reported generalist, but basses seem to be important hosts, as are Walleye and Sauger. **Status – Healthy.**

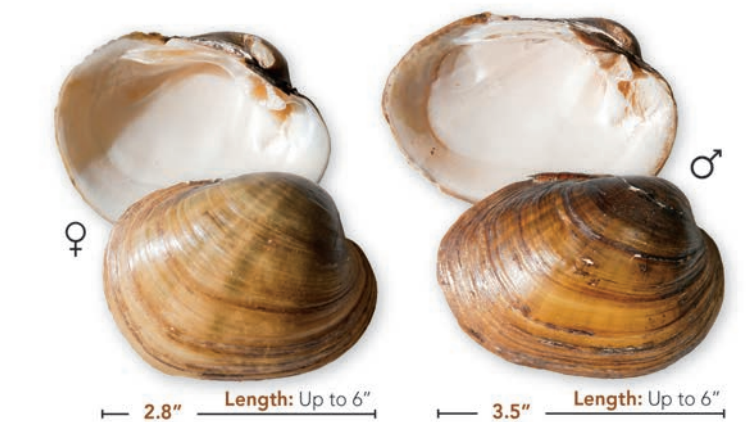


Typical adult length: 3.5"–5"

Higgins' Eye

Lampsilis higginsii (Lea, 1857)

Shell: Very heavy yellow or brown, often with green rays, especially juveniles; moderately prominent rounded umbo angled forward; male is suboval; female is postbasally rounded or truncate and inflated; nacre white; moderately large to large teeth present; mantle flap present; beak sculpture is inconspicuous fine wavy lines, but is often eroded in adults. **Compare:** Hickorynut, Mucket, Fatmucket, Plain Pocketbook. **Range:** Historically widespread and common; presently sporadic and uncommon upstream of Lock and Dam 17; also in Wapsipinicon, St. Croix, and Wisconsin rivers. **Habitat:** Large rivers. **Host:** Basses; Walleye and Sauger also might be important hosts. **Status – Federally Endangered/ IA, IL, MN, MO & WI: Endangered.**

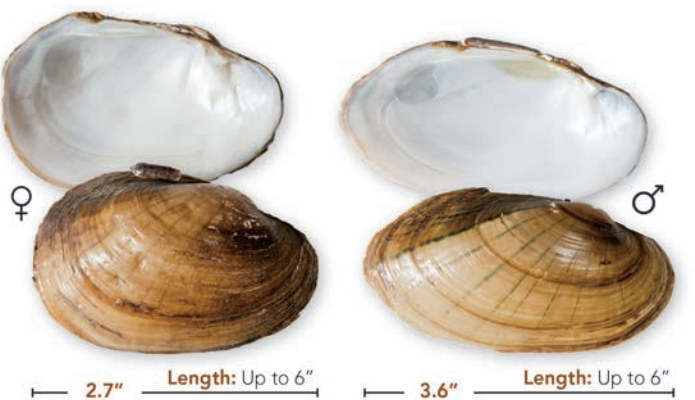


Typical adult length: 2.5"–3.25"

Fatmucket

Lampsilis siliquoidea (Barnes, 1823)

Shell: Yellow or brown, darker as adult, usually with green rays; moderately elongate, Mississippi and St. Croix river specimens heavy and very inflated, especially female; female generally more postbasally inflated and rounded; mantle flap present beak sculpture of several fine double looped ridges; nacre white; moderately large to reduced teeth present. **Compare:** Mucket, Higgins' Eye, Yellow Sandshell. **Range:** Historically widespread and abundant; less common now, especially downstream of Lock and Dam 12. **Habitat:** Shallow water near aquatic vegetation. **Host:** Reported generalist, but sunfishes and basses might be important hosts. **Status – Healthy.**



Typical adult length: 3.25"–4.5"

Yellow Sandshell

Lampsilis teres (Rafinesque, 1820)

Shell: Elongate, inflated, shiny yellow, greenish rays sometimes present; female is postbasally more rounded and inflated than male; female mantle flap is simpler than others of this genus and often with orange stripe on inner surface area; beak sculpture of several well defined double looped ridges; nacre white, occasionally cream or salmon in beak cavity; moderately large teeth present; juveniles resemble juvenile Fatmuckets. Many malacologists (mussel biologists) do not differentiate the two subspecies (Yellow Sandshell *L. t. anodontoides* and Slough Sandshell *L. t. teres*). **Compare:** Spike, Fatmucket, Black Sandshell, Pondmussel. **Range:** Historically widespread and common to abundant; now sporadic and rare; present some tributaries including the Iowa and Wisconsin rivers, but absent in the St. Croix River. **Habitat:** Clean swept sandy areas in main channel, although some can be found in muddy substrates adjacent to current. **Host:** Gars. **Status – IA, MN & WI: Endangered.**

Typical adult length: 4.5"–6"

Mucket

Actinonaias ligamentina (Lamarck, 1819)

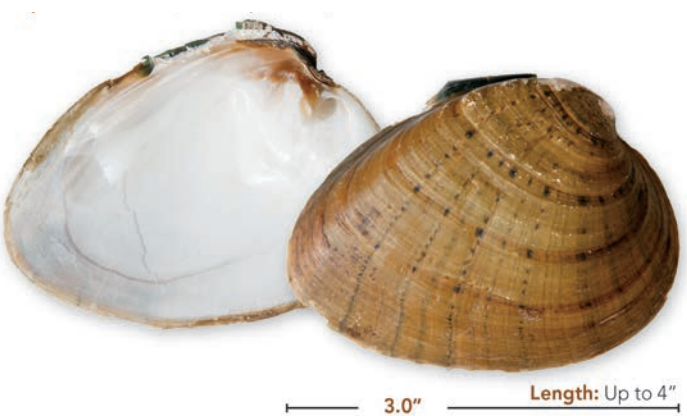
Shell: Heavy, suboval, yellow or brown with wide green rays; beak sculpture usually not visible; no mantle flap; nacre white, sometimes with dark blotches; large teeth present; sexes alike. **Compare:** Ellipse, Fatmucket, Plain Pocketbook, Higgins' Eye. **Range:** Historically widespread and abundant in several tributaries; currently very restricted (but locally common in less disturbed areas) and rare in much of the upper Mississippi River basin. **Habitat:** Medium-sized streams to large rivers with good current. **Host:** Possibly a generalist; sunfishes and basses might be important hosts. **Status – MN: Threatened.**

Typical adult length: 4"–6"

Butterfly

Ellipsaria lineolata (Rafinesque, 1820)

Shell: Yellow or brown with interrupted greenish rays comprised of V-shaped marks; very sharp posterior ridge, and narrow posterior slope; male compressed; female more inflated; nacre white; large teeth present. **Compare:** Wabash Pigtoe, Deertoe. **Range:** Historically widespread but uncommon; recent living records from the upper Mississippi River mainstem sporadic and uncommon; also in the St. Croix and Wisconsin rivers. **Habitat:** Large rivers with good current in sand or gravel. **Host:** Freshwater Drum. **Status – WI: Endangered/ IA, IL & MN: Threatened.**

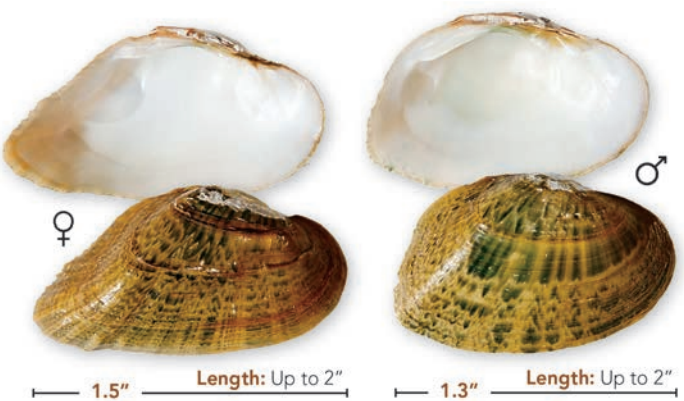


Typical adult length: 2.5"–3"

Snuffbox

Epioblasma triquetra (Rafinesque, 1820)

Shell: Yellow, green or brown with interrupted green rays; female inflated and elongated, with sharp denticles along posterior margin; male box-like; posterior ridge sharp; pronounced ridges on posterior slope and posterior part of female shell; beak sculpture a few double looped lines; nacre white; teeth present. **Compare:** Elktoe, Fawnsfoot, Deertoe. **Range:** Historical records show sporadic and rare distribution; extirpated from the upper Mississippi River mainstream, but present in the St. Croix River. **Habitat:** riffles. **Host:** Logperch, Blackside Darter, sculpins. **Status – Federally Endangered/IL, MN, MO & WI: Endangered.**



Typical adult length: 1.5"–2"

Fragile Papershell

Leptodea fragilis (Rafinesque, 1820)

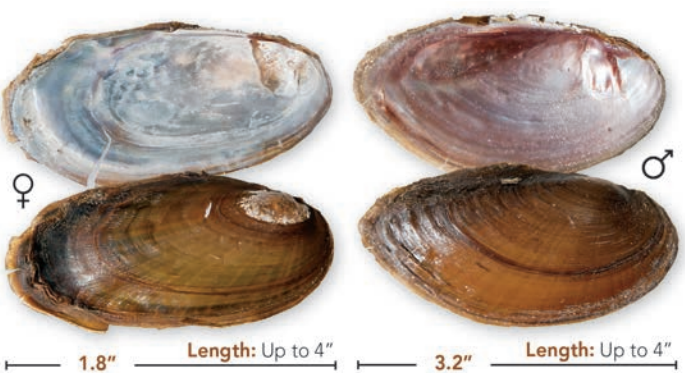
Shell: Thin, yellow or greenish, shiny or dull, usually with green rays; shell has two alae with very small anterior ala; posterior slope and wing frequently dark; beak sculpture absent or barely evident; nacre usually pinkish and white; reduced teeth present. **Compare:** Pink Papershell, Scaleshell. **Range:** Historically and currently widespread and common to abundant; tolerant of environmental alteration. **Habitat:** Medium-sized streams to large rivers; adjusts well to impoundments, perhaps exploits them. **Host:** Freshwater Drum. **Status – Healthy.**

Typical adult length: 4"–5"

Scaleshell

Leptodea leptodon (Rafinesque, 1820)

Shell: Yellowish with green rays; lacks beak sculpture; elongate, thin and compressed; shell has two small alae; in males, the posterior end is bluntly pointed; in females, the periostracum extends beyond the nacreous portion of the shell forming a fluted extension; pinkish or light purple and iridescent nacre; reduced teeth present. **Compare:** Fragile Papershell, Paper Pondshell. **Range:** Nearly extirpated; historical records from Minnesota River, Pools 10 and 13; no live records in the Mississippi River in over half a century; one individual collected in Illinois River in 2013. **Habitat:** Riffles, in gravel/sand substrate. **Host:** Freshwater Drum. **Status – Federally Endangered/ IL & MO Endangered/ MN & WI: Extirpated.**

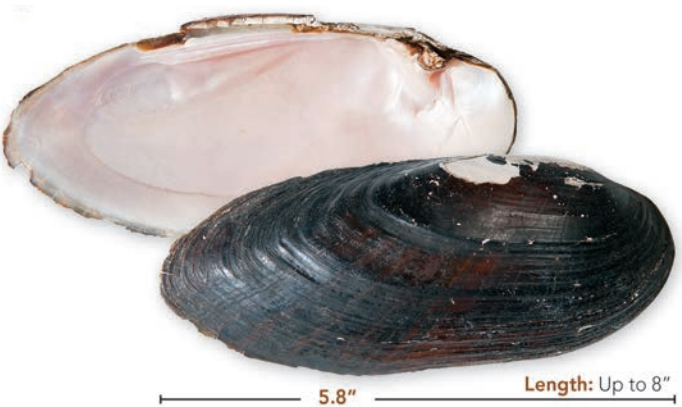


Typical adult length: 3"–4"

Black Sandshell

Ligumia recta (Lamarck, 1819)

Shell: Elongate, moderately inflated brown, black, or dark green, shiny, sometimes with green rays; female is postbasally rounded, male is tapered; beak sculpture fine double looped lines, usually not visible; nacre variable, from white to purple; moderate to reduced teeth present. **Compare:** Spectaclecase, Spike, Pondmussel. **Range:** Historically widespread and abundant; currently much more restricted and not as abundant. **Habitat:** Medium-sized streams to large rivers with good current. **Host:** Walleye and Sauger; sunfishes and basses also might be important hosts. **Status – IL: Threatened/ MN & MO: Species of Concern.**

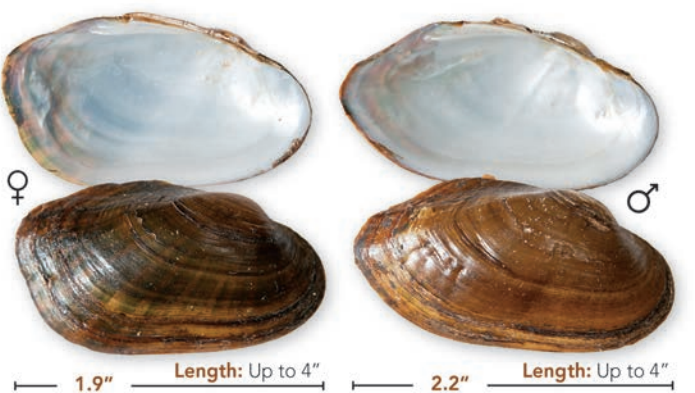


Typical adult length: 5"–7"

Pondmussel

Ligumia subrostrata (Say, 1831)

Shell: Brown or black with green rays; elongate and moderately inflated; female shell is postbasally rounded; male is suboval, tapered and posteriorly pointed; beak sculpture of several well defined wavy lines; nacre white; reduced teeth present. **Compare:** Spectaclecase, Spike, Black Sandshell, Yellow Sandshell. **Range:** Extralimital – recorded only twice from the upper Mississippi River mainstem in Pools 5 and 6. **Habitat:** Ponds, small streams, and channel borders. **Host:** Sunfishes and basses. **Status – MN: Threatened.**



Typical adult length: 2.5"–3"

Threehorn Wartyback

Obliquaria reflexa Rafinesque, 1820

Shell: Yellow, green or brown; each valve has a medial row of several (usually three) large rounded tubercles or knobs that alternate with those on the opposite valve; nacre white; large teeth present; sexes alike. **Compare:** Sheepnose, Wartyback. **Range:** Widespread and common; increasing in some areas, not plentiful but persistent in other areas. **Habitat:** Medium-sized streams to large rivers; tolerates impoundment and unstable streambeds. **Host:** Unknown; report of minnows is not well accepted and has not been repeated. **Status – Healthy.**

Typical adult length: 2"–3"

Hickorynut (a.k.a. Eggshell)

Obovaria olivaria (Rafinesque, 1820)

Shell: Moderate to very heavy; yellow or brown with green or brown rays; smooth, rounded to suboval, somewhat inflated; beaks pointed anteriorly; beak sculpture is inconspicuous fine wavy lines; nacre white, shallow beak cavity; moderately large teeth present; sexes alike. **Compare:** Higgins' Eye, Round Pigtoe. **Range:** Historically widespread and abundant; present range is more restricted but still moderately common. **Habitat:** Medium to large rivers in sand or mixed sand and gravel. **Host:** Sturgeons. **Status – MO: Species of Concern.**

Typical adult length: 2.5"–4"

Pink Heelsplitter

Potamilus alatus (Say, 1817)

Shell: Compressed brown or black; juvenile is sometimes green; female truncated and slightly more inflated; highly developed posterior ala, without sculpture; beak sculpture absent or barely evident; nacre purple; reduced teeth present. **Compare:** White Heelsplitter, Pink Papershell, Fragile Papershell. **Range:** Historically widespread and common; presently sporadic but locally common. **Habitat:** Medium-sized streams to large rivers. **Host:** Freshwater Drum. **Status – Healthy**.

Typical adult length: 4.5"–6"

Fat Pocketbook

Potamilus capax (Green, 1832)

Shell: Smokey, yellow, gray, tan and shiny without rays; very inflated with beaks high, swollen and turned inward; beak sculpture inconspicuous; nacre white; reduced teeth present, lateral and pseudocardinal teeth forming an S-shaped pattern; sexes alike. **Compare:** Plain Pocketbook. **Range:** Historically sporadic but locally common; may now be extirpated from the upper Mississippi River. **Habitat:** Muddy areas and sloughs. **Host:** Freshwater Drum. **Status – Federally Endangered/ IL & MO: Endangered. MN & WI: Extirpated.**

Typical adult length: 4"–5"

Pink Papershell

Potamilus ohiensis (Rafinesque, 1820)

Shell: Pink, yellow, green, brown or gray; concentric bands of several of these colors are common; thin; rounded to suboval, compressed, usually smooth and shiny; shell has a pronounced posterior ala and smaller anterior ala; beak sculpture absent or barely evident; nacre light purple; sexes alike. **Compare:** Pink Heelsplitter, Fragile Papershell. **Range:** Historically and currently widespread and common to abundant. **Habitat:** Medium-sized streams to large rivers; very tolerant of environmental alteration, including impoundments and unstable substrates, especially sand. **Host:** Freshwater Drum. **Status – Healthy.**

Typical adult length: 3.5"–5"

Bleufer (a.k.a. Purple Pocketbook)

Potamilus purpuratus (Lamarck, 1819)

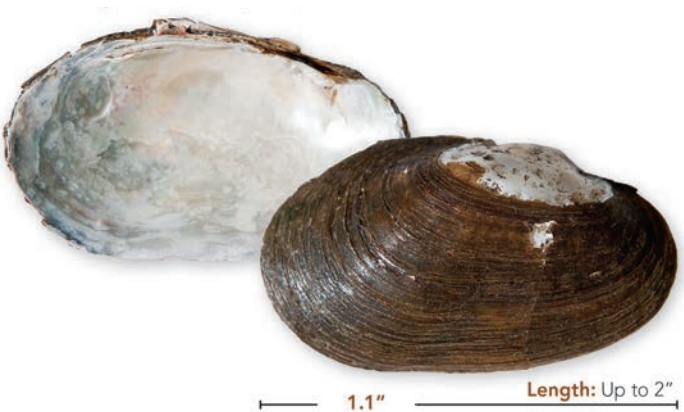
Shell: Brown or black; juvenile sometimes green with faint darker rays; very similar to pink heelsplitter but more inflated or swollen (male less so); reduced teeth present. **Compare:** Pink Heelsplitter. **Range:** Extralimital – recorded only once from the upper Mississippi River mainstem upstream in Pool 27. **Host:** Freshwater Drum.
Status – Unknown.

Typical adult length: 4"–6"

Lilliput

Toxolasma parvum (Barnes, 1823)

Shell: Very small brown, black or green; suboval; beak sculpture of several parallel ridges sloping away from the dorsal margin; caruncles (elongate structures that function as a host lure) are unique to this species among upper Mississippi River mussels; the lilliput is hermaphroditic (has both male and female gonads in a single animal); nacre whitish; reduced teeth present. **Compare:** May be mistaken for young of other species; Salamander Mussel. **Range:** Historically widespread; currently widespread and abundant. **Habitat:** Soft substrate of backwaters, sometimes common along shorelines; juveniles locally abundant in submerged vegetation or navigation channel. **Host:** Sunfishes. **Status – Healthy.**

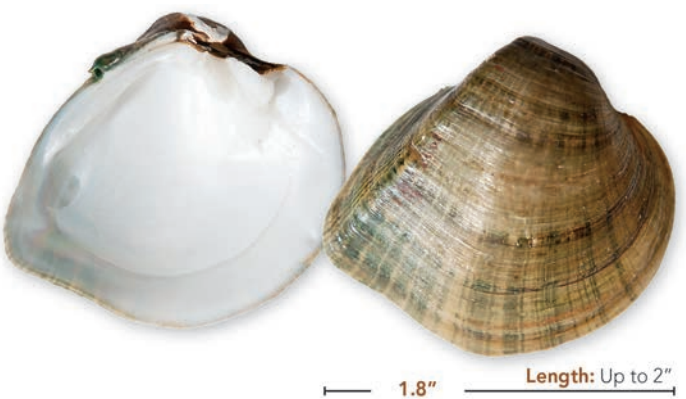


Typical adult length: 0.75"–1"

Deertoe

Truncilla truncata Rafinesque, 1820

Shell: Subtriangular, highly variable color with interrupted rays of green or brown V-shaped or zigzag marks; sharply pointed postbasal margin; occasionally sulcate; rounded ventral margin; sharp posterior ridge; nacre white or pink; well developed teeth present; sexes alike. **Compare:** Wabash Pigtoe, Fawnsfoot, Snuffbox. **Range:** Historically and currently widespread and common; not nearly as common in the lower portion of the upper Mississippi River mainsteam. **Habitat:** Medium-sized streams to large rivers. **Host:** Freshwater Drum. **Status – Healthy.**



Typical adult length: 1.5"–2"

Fawnsfoot

Truncilla donaciformis (Lea, 1828)

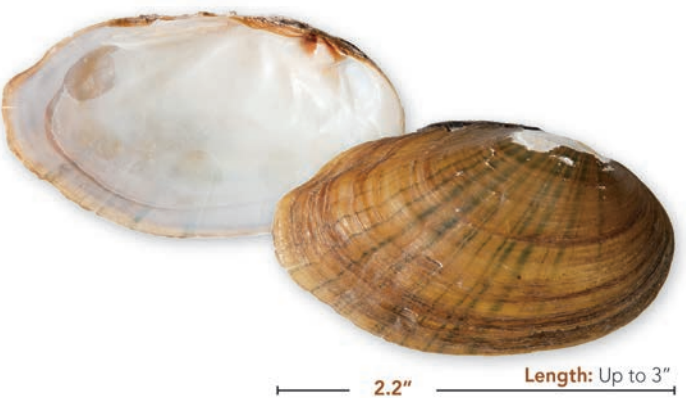
Shell: Suboval, roundly pointed postbasally; color yellow or greenish with green rays and V-shaped or zigzag lines; rounded ventral margin and posterior ridge; nacre white; reduced teeth present; sexes alike. **Compare:** Deertoe. **Range:** Historically widespread and very abundant; presently sporadic as some populations in the upper Mississippi River and a few tributaries have declined in recent years; it is often overlooked due to its small size. **Habitat:** Medium-sized streams to large rivers. **Host:** Freshwater Drum. **Status – MN: Threatened/ WI: Endangered.**

Typical adult length: 1.25"–1.75"

Ellipse

Venustaconcha ellipsiformis (Conrad, 1836)

Shell: Elongate-oval yellow or brown with fine, wavy green rays; relatively small and stout; nacre white; large teeth present; sexes alike. **Compare:** Mucket. **Range:** Extralimital in upper Mississippi River mainstem. **Habitat:** Small to medium-sized streams. **Host:** Darters and perhaps sculpins. **Status – IA, MN & WI: Threatened.**



Typical adult length: 2"- 3"

Round Pigtoe

Pleurobema sintoxia (Rafinesque, 1820)

Shell: Heavy, brown or black; triangular or rounded, beaks forward; valves slightly sulcate; rounded ventral margin; postbasal margin and posterior ridge rounded; nacre white or pink; moderately large teeth present, beak cavity relatively shallow; sexes alike. **Compare:** Wabash Pigtoe, Ebonyshell, Hickorynut. **Range:** Historically widespread but uncommon; presently sporadic and uncommon throughout the upper Mississippi River basin. **Habitat:** Medium-sized streams to large rivers. **Host:** Minnows. **Status – IA: Endangered/ MN: Species of Concern.**

Typical adult length: 2.75"–4"

Purple Wartyback (a.k.a. Purple Pimpleback)

Cyclonaias tuberculata (Rafinesque, 1820)

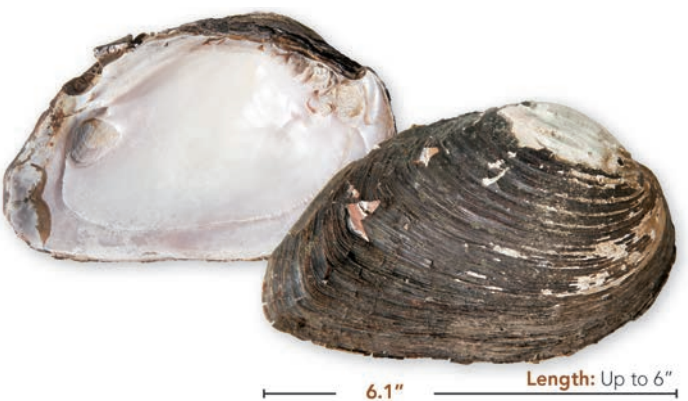
Shell: Brown or chestnut; heavy; subcircular; scattered tubercles cover most of the shell; beak sculpture numerous fine wavy ridges; nacre deep purple; large teeth with broad space between pseudocardinal and lateral teeth, beak cavity very deep; sexes alike. **Compare:** Pimpleback, Winged Mapleleaf, Wartyback. **Range:** Historically widespread; nearly extirpated from the upper Mississippi River mainstem, recent living records only from Pools 3 and 4; also present in some tributaries including the St. Croix and Chippewa rivers. **Habitat:** Rocky areas, riffles and fast water. **Host:** Catfishes. **Status – MN & WI: Endangered/ IA & IL: Threatened.**

Typical adult length: 3"–5.5"

Elephantear

Elliptio crassidens (Lamarck, 1819)

Shell: Moderately compressed, very heavy, brown or black; triangular; sharp posterior ridge; nacre white or purple; large teeth present; sexes alike. **Compare:** Spike. **Range:** Historically widespread but nearly extirpated; recent living records from the upper Mississippi River mainstem sporadic and sparse; also in the St. Croix River. **Habitat:** Large rivers in mud, sand, or fine gravel. **Host:** Potentially the Skipjack Herring, a migratory species restricted from the Upper Mississippi River since the completion of the Keokuk (Iowa) Dam in 1913. **Status – MN, MO & WI: Endangered/ IL: Threatened.**

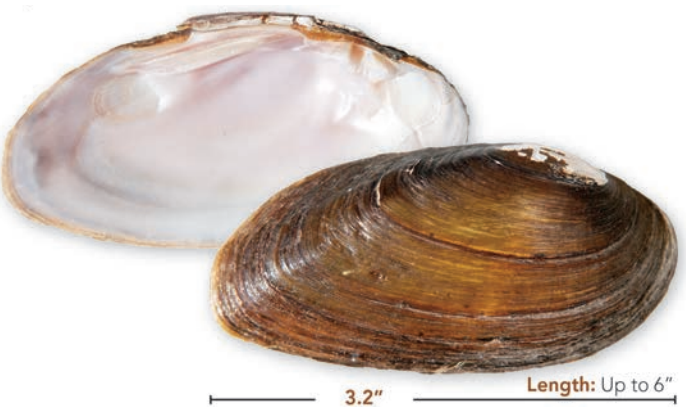


Typical adult length: 3.5"–4.5"

Spike (a.k.a. Ladyfinger)

Elliptio dilatata (Rafinesque, 1820)

Shell: Moderately heavy, brown, dark green or black; inflated and elongate; posterior end pointed, sometimes bowed; posterior ridge usually rounded; nacre white, salmon or purple; well developed teeth present; sexes alike. **Compare:** Spectaclecase, Elephantear, Black Sandshell, Pondmussel. **Range:** Historically widespread but uncommon; recent live records sporadic, but appears to be absent downstream of Lock and Dam 11. **Habitat:** Sloughs and main channel borders. **Host:** Darters and perches; basses and sunfishes also might be important hosts. **Status – IL & MN: Threatened.**

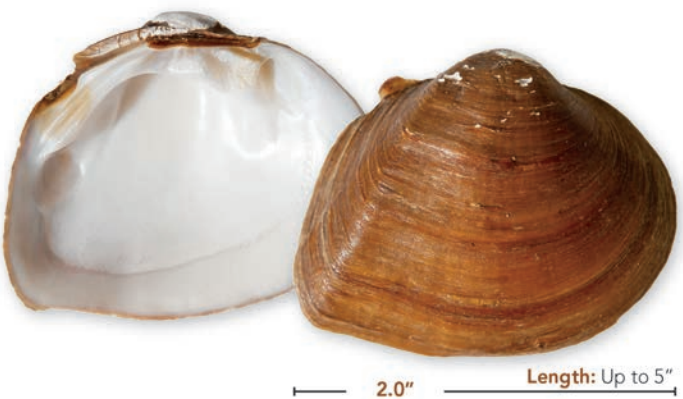


Typical adult length: 4"–5"

Wabash Pigtoe

Fusconaia flava (Rafinesque, 1820)

Shell: Reddish, yellow or brown, occasionally with fine rays; subtriangular; postbasal margin pointed; shell with a sulcus; ventral margin concave; posterior ridge sharp; nacre white or light salmon; moderately large teeth present, beak cavity deep; sexes alike. **Compare:** Ebonyshell, Round Pigtoe, Deertoe. **Range:** Historically and presently widespread and common. **Habitat:** Medium-sized streams to large rivers. **Host:** Minnows. **Status – Healthy.**



Typical adult length: 2"–3.5"

Ebonyshell (a.k.a. Black Shell)

Fusconaia ebena (Lea, 1831)

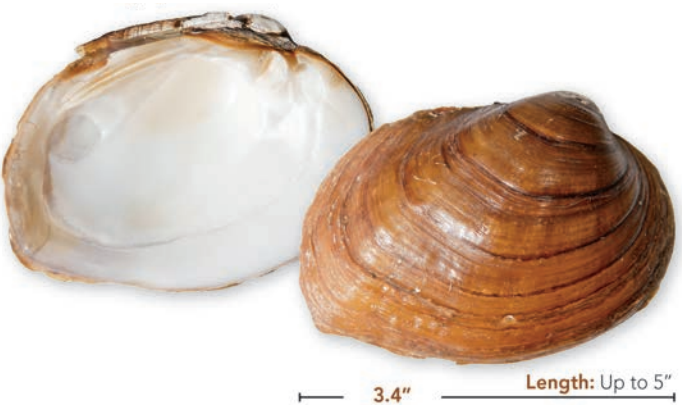
Shell: Brown or black, round, very heavy; beaks prominent and curved toward the anterior margin; valves bulge outward; posterior ridge rounded; nacre white; large teeth present, beak cavity very deep; sexes alike. **Compare:** Round Pigtoe, Hickorynut. **Range:** Historically very widespread and abundant; recent living records from the upper Mississippi River mainstem sporadic and sparse; also present in some tributaries including the St. Croix and Illinois rivers. **Habitat:** Large rivers in sand and gravel. **Host:** Skipjack Herring, a migratory species restricted from the Upper Mississippi River since the completion of the Keokuk (Iowa) Dam in 1913. **Status – MN, MO & WI: Endangered/ IL: Threatened.**

Typical adult length: 3"–4"

Sheepnose (a.k.a. Bullhead)

Plethobasus cyphyus (Rafinesque, 1820)

Shell: Heavy, brown or yellow; rounded or triangular, with several low radial knobs (running down the center) on each valve; knobs might not be pronounced and may resemble Higgins' Eye; beak sculpture two heavy, widely spaced ridges; nacre white; moderately large teeth present; sexes alike. **Compare:** Threehorn Wartyback, Hickorynut, Higgins' Eye, Round Pigtoe. **Range:** Historically widespread but uncommon; presently sporadic and very rare; also present in some tributaries including the Chippewa and Wisconsin rivers. **Habitat:** Medium-sized streams to large rivers with good current and mixed sand and gravel. **Host:** Minnows. **Status – Federally Endangered/ IA, IL, MN, MO & WI: Endangered.**



Typical adult length: 3"–4"

Mapleleaf

Quadrula quadrula (Rafinesque, 1820)

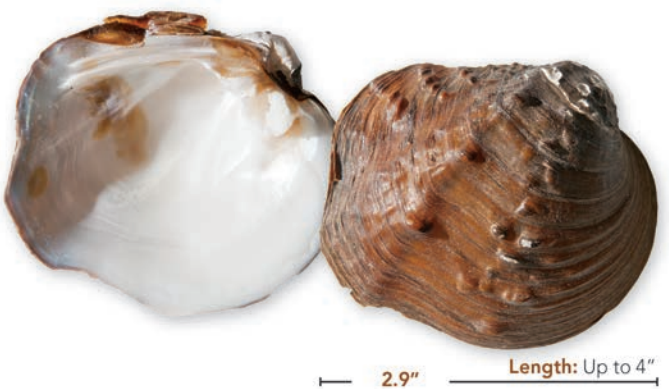
Shell: Adults brownish, juveniles greenish or yellowish, sometimes with green rays; quadrate, moderately large teeth present; a V-shaped pattern of tubercles begins at the beak and radiates in two rows down each valve separated by a sulcus (shallow depression); nacre white; moderately large teeth present; sexes alike. **Compare:** Winged Mapleleaf, Gulf Mapleleaf, Wartyback, Pimpleback. **Range:** Widespread and common to abundant. **Habitat:** Medium-sized streams to large rivers; adjusts well to impoundments, perhaps exploits them. **Host:** Catfishes. **Status – Healthy.**

Typical adult length: 2.5"–3.5"

Winged Mapleleaf

Quadrula fragosa (Conrad, 1836)

Shell: Adults brownish or chestnut, quadrate, with wide, broken green rays on dorsal two-thirds of shell; tubercles arranged in roughly two rows radiating down from beak on each valve; narrow ridges sloping to the hingeline often present; shell separated by a sulcus shallower than mapleleaf; alae more prominent than mapleleaf, especially in older individuals, frequently with well developed flutes; nacre white; moderately large teeth present; mantle margin fringed with black; sexes alike. **Compare:** Purple Wartyback, Mapleleaf, Gulf Mapleleaf. **Range:** Historically widespread but rare; currently found only in a portion of the St. Croix River within the Upper Mississippi River basin. **Habitat:** Riffles. **Host:** Catfishes; primarily Channel Catfish and Blue Catfish. **Status – Federally Endangered/ MN, MO & WI: Endangered / IL: Extirpated.**

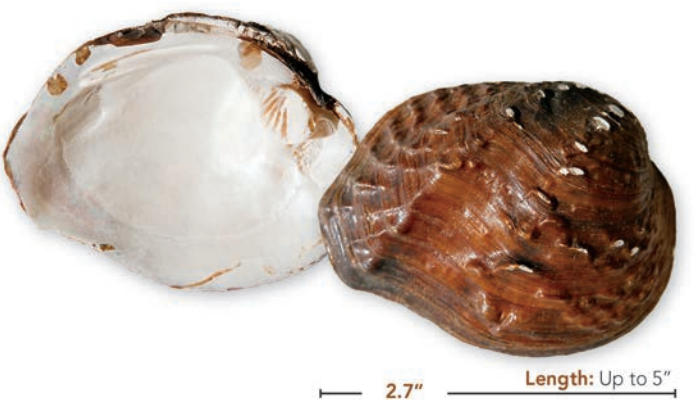


Typical adult length: 2.5"–3.5"

Gulf Mapleleaf

Quadrula nobilis (Conrad, 1854)

Shell: Usually brown or chestnut, without rays; trapezoidal to quadrate; posterior margin sloping, forming a squared or rounded point, often becoming elongate posteriorly in older individuals; two rows of prominent, shelf-like pustules extending from the umbo along the margins of the sulcus; pustules usually scattered on anterior disk, including adults, and sometimes within the sulcus; frequently with well developed flutes or rows of pustules on the posterior slope; nacre white; moderately large teeth present; sexes presumably alike. **Compare:** Mapleleaf, Winged Mapleleaf, Pistolgrip. **Range:** Historically widespread but apparently rare. **Host:** Catfishes. **Status – Unknown / undetermined.**



Typical adult length: 3.0"–5.0"

Wartyback

Amphinaias nodulata (Rafinesque, 1820) listed as *Quadrula nodulata* in previous version

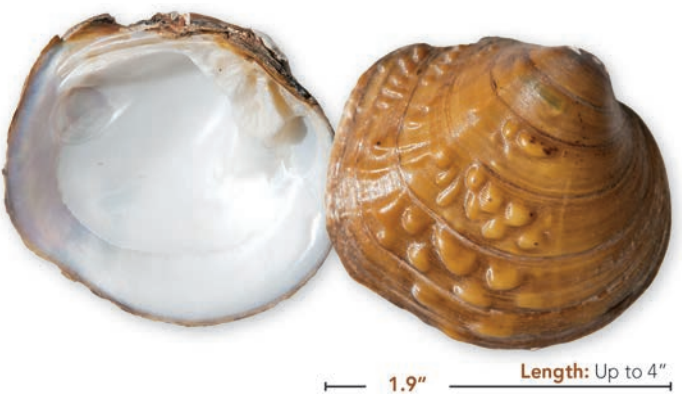
Shell: Brown or yellow; outline subcircular; posterior truncate; beak sculpture includes a few very small tubercles that extend onto each valve, becoming two diverging rows of evenly spaced pustules with no sulcus (depression) in between; nacre white; moderately large teeth present; sexes alike. **Compare:** Mapleleaf, Pimpleback, Threehorn Wartyback, Winged Mapleleaf. **Range:** Widespread and common to abundant in most pools but rare or absent between Lock and Dam 8 and 3; present some tributaries including the Minnesota, Wisconsin, Rock, and Illinois rivers. **Habitat:** Exploits impoundments but also found in riverine reaches. **Host:** Catfishes. **Status – MN & WI: Threatened/ MO: Species of Concern.**

Typical adult length: 2.5"–3"

Pimpleback

Amphinaias pustulosa (Lea, 1831) listed as *Quadrula pustulosa* in previous version

Shell: Brown or yellow with one or more broad, green rays on each beak; heavy, subcircular; posterior truncate; juvenile lacks sculpture; adult has few to many rounded tubercles in no predictable pattern; nacre white; moderately large teeth present; sexes alike. **Compare:** Wartyback, Purple Wartyback. **Range:** Widespread; common to abundant. **Habitat:** Medium-sized streams to large rivers; adjusts well to impoundments, perhaps exploits them. **Host:** Catfishes.
Status – Healthy.



Typical adult length: 2.5"–3"

Washboard

Megalonaias nervosa (Rafinesque, 1820)

Shell: Black or brown, subrectangular, heavy and very large; beak sculpture extends onto valves as chevron-patterned (V-shaped) tubercles, which develop into numerous wide ridges on adults; nacre white, sometimes with dark blotches; large teeth present; sexes alike. **Compare:** Pistolgrip, Threeridge, Rock Pocketbook. **Range:** Historically widespread and abundant; presently rare upstream of Lock and Dam 8, widespread downstream but still recovering from effects of commercial overharvest; also present in some tributaries including the St. Croix and Illinois rivers. **Habitat:** Medium-sized streams to large rivers with good current. **Host:** Reported generalist, but catfishes seem to be important hosts. **Status – MN: Endangered.**

Typical adult length: 4"–8"

Monkeyface

Theliderma metanevra (Rafinesque, 1820) listed as *Quadrula metanevra* in previous version

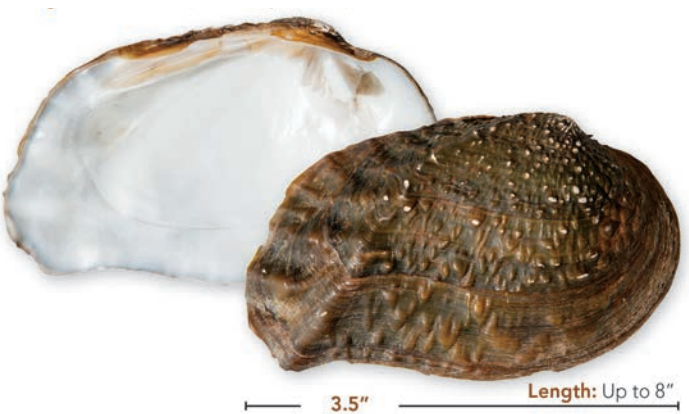
Shell: Brown, green, or yellowish, usually with numerous green chevrons (especially young mussels); heavy; anterior rounded, posterior quadrate; large posterior ridge with multiple large knobs; indentation on the posterior margin; nacre white; large teeth present; sexes alike. **Compare:** Wartyback, Pimpleback, Pistolgrip. **Range:** Historically widespread; presently sporadic and uncommon; also rare in some tributaries including the Wisconsin and Rock rivers. **Habitat:** Medium-sized streams to large rivers; found in fast waters. **Host:** Various minnows except for those in the genus *Notropis*. **Status – MN & WI: Threatened.**

Typical adult length: 3"–4"

Pistolgrip (a.k.a. Buckhorn)

Tritogonia verrucosa (Rafinesque, 1820)

Shell: Brown or black; moderately large and heavy; elongate; entire shell tuberculate; female elongate and compressed posteriorly; males are shorter and more truncate posteriorly; nacre white; large teeth present. **Compare:** Washboard; Gulf Mapleleaf. **Range:** Historically widespread and common; recent living records from the upper Mississippi River mainstem sporadic and rare; not as rare in some tributaries including Iowa, St. Croix, and Wisconsin rivers. **Habitat:** Medium-sized streams to large rivers. **Host:** Catfishes, primarily Flathead Catfish. **Status – IA & MN: Endangered/ WI: Threatened.**



Typical adult length: 4"–6"

Zebra Mussel and Quagga Mussel

Dreissena polymorpha (Pallas, 1771) and *Dreissena bugensis* (Andrusov, 1897)

Shell: Relatively small, triangular, and elongate with alternating cream and brown or black bands on the surface; nacre white and somewhat polished; no pseudocardinal or lateral teeth, a small septum present at the anterior end forming a moderately deep beak cavity; sexes alike. **Compare:** None. **Range:** Introduced into the Great Lakes from eastern Europe and rapidly spreading across North America, including throughout the upper Mississippi River basin. **Habitat:** Small to large rivers and lakes of all sizes; attaches to rocks, freshwater mussels, or almost any hard surface by gluelike fibers called byssal threads. **Host:** None needed. **Status – Non-native.**

Typical adult length: 0.5"–1.5"

Asian Clam

Corbicula fluminea (Müller, 1774)

Shell: Rounded to slightly triangular and inflated; anterior and posterior margins rounded; umbos high, centrally located, and elevated above the hinge line; relatively small, yellowish brown to black shell with numerous, evenly spaced, concentric, elevated ridges on the surface; beak cavity deep; nacre white or purple and highly polished; three cardinal teeth in each valve located below the umbo, paired lateral teeth in each valve, two on each side of the umbo in the right valve, one on each side in the left; sexes alike. **Compare:** fingernail clams. **Range:** Native to Asia and the Mediterranean, this species has spread across North America, including throughout the upper Mississippi River basin. **Habitat:** Small to large rivers and lakes of all sizes in silt, mud, sand, or gravel. **Host:** None needed. **Status – Non-native.**

Typical adult length: 0.5"–1.5"

Fingernail Clams
(a.k.a. Pea Clams or Pill Clams)

Multiple species in the Family *Sphaeriidae*

Shell: Small, rounded, thin; outer surface smooth, usually with very fine, closely-spaced concentric lines; nacre whitish; teeth small and often obscure. **Compare:** Asian Clam. **Range:** Historically widespread. **Habitat:** Small to large rivers and lakes of all sizes in silt, mud, sand, or gravel. **Host:** None needed. **Status – Unknown.**

Typical adult length: 0.25"–0.75"

Useful Mussel Resources

U. S. Army Corps of Engineers – St. Paul District: http://www.mvp.usace.army.mil/

U. S. Fish and Wildlife Service Freshwater Mussels of the Upper Mississippi River System: http://www.fws.gov/midwest/mussel/

U. S. National Park Service:
http://www.nps.gov/miss/naturescience/mussindex.htm

Illinois Department of Natural Resources:
http://www.dnr.illinois.gov/

Illinois Natural History Survey:
http:// http://wwx.inhs.illinois.edu/collections/mollusk

Iowa Department of Natural Resources:
http://www.iowadnr.gov/

Minnesota Department of Natural Resources: http://www.dnr.state.mn.us/mussels/

Missouri Department of Conservation:
http://www.mdc.mo.gov/

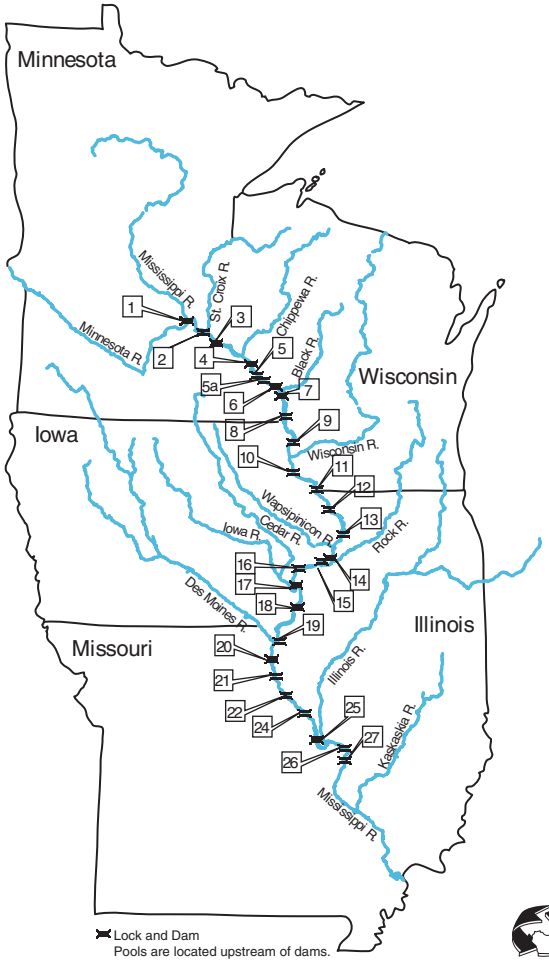
Wisconsin Department of Natural Resources:
http://dnr.wi.gov/

Freshwater Mollusk Conservation Society:
http://molluskconservation.org

Upper Mississippi River Conservation Committee:
http://www.umrcc.org

Cummings, K. S. and C. A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey, Manual 5. 194 pp. http:// http://wwx.inhs.illinois.edu/collections/mollusk/publications/guide/

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. 94 pp.



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