

Capitol Fossils

In the limelight, so to speak

by Patrick Mulvany
photographs by Scott Myers



(Inset) This fossil reveals information about the relations and interactions between two living organisms. This Bryozoan encrusted a living crinoid column and radiated outward.

Note the sediment-filled, star-shaped, central opening of the crinoid column.

Countless fossils are on permanent display inside the Missouri State Capitol. The impressive assortment of fossils is embedded in the marble-like limestone throughout the building. The word “fossil,” comes from the Latin word “fossilis,” which means “dug up.” Fossils that call the Capitol home represent a variety of extinct marine invertebrate life forms, including brachiopods, bryozoans, clams, corals, crinoids, nautiloids and snails. Hunting for them provides a chal-

lenge that is entertaining and educational. It’s good exercise, too.

“The stone used in the Capitol provides an excellent glimpse into the abundant marine life that once covered Missouri. Fossil treasures can be found in the Missouri limestone throughout the Capitol in the walls, floors, rotunda and even in the treads of the stairways,” said Carey Bridges, who serves as the Geological Survey Program director of the Missouri Department of Natural Resources in Rolla.

(Right) Limestone at the Phenix quarry, near Ash Grove. Stone from this quarry was used in the construction of the Missouri State Capitol. The production of limestone contributes about \$1 billion annually to Missouri's economy.

(Bottom right) Nautiloids are among the group of animals known as cephalopods, an advanced class of mollusks. They have a straight or coiled shell, divided internally into a series of chambers of increasing size connected by a central tube.

Capitol Was Built With Missouri Limestone

The current Missouri State Capitol was constructed between 1913 and 1917. The exterior and interior of the building were built from limestone that was quarried, shaped and dressed in southwestern Missouri at Carthage, in central Jasper County, and at Phenix, near Ash Grove, in northwestern Greene County.

For more than a century, Missouri's robust limestone industry has mined the rock and processed it into a variety of useful products, including building stone, for Missouri, the nation and the world. Limestone is the state's most abundant commercial mineral. The limestone in the Capitol's interior is polished to a glossy, reflective finish. It was during the construction of the interior that the polished Missouri limestone gained the distinction of being called "marble."

What is Marble?

Marble is calcium carbonate (CaCO_3) rock that takes a polish and can be used as architectural and decorative stone. Two kinds of rock qualify for use as marble – limestone and true marble. Limestone is a sedimentary rock that usually contains fossils. True marble is a metamorphic rock that forms when limestone is subjected to elevated temperatures and pressures in Earth's crust. True marble typically contains no fossils because the metamorphic process obliterates them from the rock. The marble-like rock in the Missouri State Capitol was cut

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- 1 Rugose corals are so named because their exteriors have a wrinkled appearance. The overall shape of some species is that of a single horn. The shape of others is that of a stack of horns inserted into one another. Therefore, both types are informally referred to as “horn corals.” Rugose corals have septae radiating from the center (like bicycle spokes) when observed in cross-section. This horn coral (oblique cut) contains crinoid pieces.
- 2 Brachiopods are small marine animals that have two hard valves. They often have an extended hinge line that is so wide they look winged. The stone mason’s blade cut right through both valves of the shell of this Spiriferid brachiopod.
- 3 Gastropods are invertebrate animals that include snails and slugs. This snail fossil is accompanied by many broken pieces of crinoids.
- 4 Brachiopods such as these once dominated the seafloor. Note the broken pieces of windowed bryozoan fronds that accompany the two fossils.
- 5 Attached to and branching outward from the crinoid column is a tabulate aulopodid coral named *Cladochonus*. Note the sediment-filled, star-shaped, central opening of the crinoid column. This fossil also reveals information about the relations and interactions between the living organisms.
- 6 Bryozoans like this corkscrew-shaped, windowed or lacy (fenestrate) bryozoan named *Archimedes* can be found throughout the Capitol. Funnel-shaped, fenestrate fronds coil spirally around the central screw axis.
- 7 This rugose coral (transverse cut) contains crinoid pieces and other small pieces of fossil debris. Note the septae (spokes). Large single-horn rugose coral fossils were referred to as “petrified buffalo horns” by settlers, due to their shape.



(Right) Geologists with the Missouri Geological Survey, Pat Mulvany, Ph.D., and David Bridges, Ph.D., investigate and identify fossils in the limestone walls, floors and stairways of the Missouri State Capitol.



The top of the Capitol dome towers 262 feet above the basement floor. The building, which covers three acres and has 500,000 square feet of floor space, is literally a museum of public art, remarkable not only for its quality and abundance, but as a faithful reflection of the themes, events, people and some of the ancient animals of Missouri.



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from fossiliferous limestone. True marble is not known to occur in Missouri.

Parts of a Crinoid – Missouri's Official State Fossil

Crinoids often appear as tiny discs of stone that may have a hole (often star-shaped) in their center. Loose pieces of stem often can be strung like beads. The fossil also is preserved as sections of stems with distinctive segmentation marks. Occasionally, it is possible to find the "cup" or "calyx," which protected the animal's soft body with a symmetrical "petal pattern" of calcium-rich plates atop the stem. The bottom of the stem of a crinoid was equipped with a fingered holdfast that was used to attach the animal to some-



Crinoid graphic is superimposed on the left to aid in interpretation of the text.

thing on the seafloor, including rocks, firm sediment, coral colonies and bryozoan colonies. Today, hundreds of different species of crinoids exist in the warm, clear waters of the Pacific and Indian oceans and the Caribbean Sea.

Capitol "Marble" Formed in Ancient Sea

The Phenix stone came from the Burlington-Keokuk Limestone sedimentary rock unit. The Carthage stone came from the Warsaw Formation sedimentary rock unit. Geologic formations typically are named for the geographic area in which they were first described. Burlington-Keokuk gets its name from Iowa cities and the Warsaw for the city of Warsaw, located in Benton County, Mo. The Warsaw Formation immediately overlies the Burlington-Keokuk. Both were formed in a warm, shallow, equatorial sea that covered Missouri during what geologists identify as the Mississippian Subperiod of geologic time, about 335 million years ago. Fine particles of calcium carbonate constantly precipitated from the seawater and eventually accumulated on the seafloor as lime mud.

The sea teemed with invertebrate life forms, including corals, bryozoans, brachiopods, snails, clams and crinoids. The hard parts of dead organisms also accumulated on the seafloor and mixed with the lime mud. Over time, this layer of sediment measured 50 feet thick, or greater. Further burial beneath hundreds of feet of sediment caused the lime mud to compact and turn into a limestone that contains many fossils.

Missouri Geological Survey



The Buehler Building, which is home to the department's Geological Survey and the Edward L. Clark Museum of Missouri Geology, is faced with limestone quarried from Carthage. It, too, contains a variety of fossils. Visitors to the museum can see corals, bryozoans, crinoids, trilobites, a mastodon tusk, rocks, minerals and other exhibits related to Missouri geology. The museum is located at 111 Fairgrounds Road, Rolla, and is open for self-guided tours from 8 a.m. to 5 p.m. weekdays, and is closed holidays. For more information visit dnr.mo.gov/geology/edclarkmuseum.htm.

What You Will Find and Where to Start

Numerous fossils may be found on each of the four levels of the Capitol. The first floor of the Capitol is home to the Missouri State Museum. Missouri State Parks, a division of the Missouri Department of Natural Resources, operates the museum. Visitors are encouraged to stop by the tour desk to pick up a Fossil Tour Map to help locate some of the impressive fossils. Keep in mind that what you see on the flat marble-like surfaces are two-dimensional cross sections of the fossils, so you need to use your imagination to visualize them in three dimensions. A flashlight comes in handy on the second floor.

Missouri State Museum

Plan to spend time enjoying for the fossils in the Missouri State Museum and throughout the Capitol. The Missouri State Museum is where visitors go to immerse themselves in the captivating history of the Show-Me State.

"The Missouri State Museum provides a great opportunity for visitors of all ages to experience the history of our state," said Bill Bryan, director of Missouri State Parks. "From exhibits honoring Missourians who have served their country to displays outlining the many natural resources that our state has to offer, the museum tells the story of

our state's past, present and future."

Don't miss the museum's impressive collection of exhibits that portray Missouri's natural and cultural history in its two main exhibit halls – the Resources Hall and the History Hall. More than 30,000 artifacts and objects from all aspects of Missouri's cultural and natural history have been collected since the museum was established in 1919. Its collections include more than 130 Civil War flags and a large collection of World War I flags.

There also are exhibits with rotating artifacts about state government and the Missouri State Capitol in the Missouri Veterans Gallery and the Foundations Gallery.

A series of traveling exhibits can be used as educational tools by schools, civic and other groups. Interpretive staff members at the museum offer various educational programs on aspects of Missouri's natural and cultural history.

The Missouri State Museum, which is part of the Missouri state park system, is located on the first floor of the Missouri State Capitol. For more information, contact the museum at 573-751-2854. For information on state parks and historic sites, visit mostateparks.com. 

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