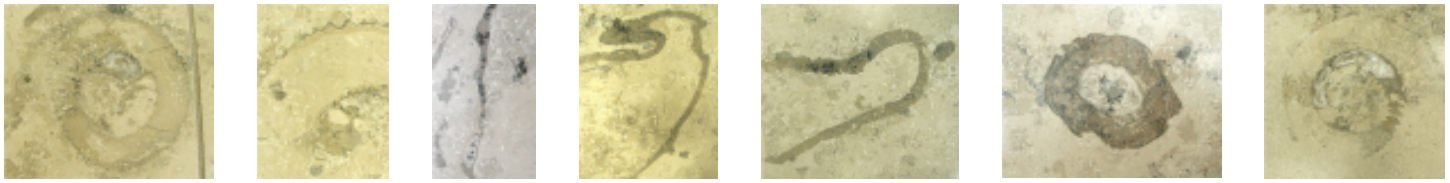
Kentucky Geological Survey
University of Kentucky, Lexington

Fossils at the William T. Young Library

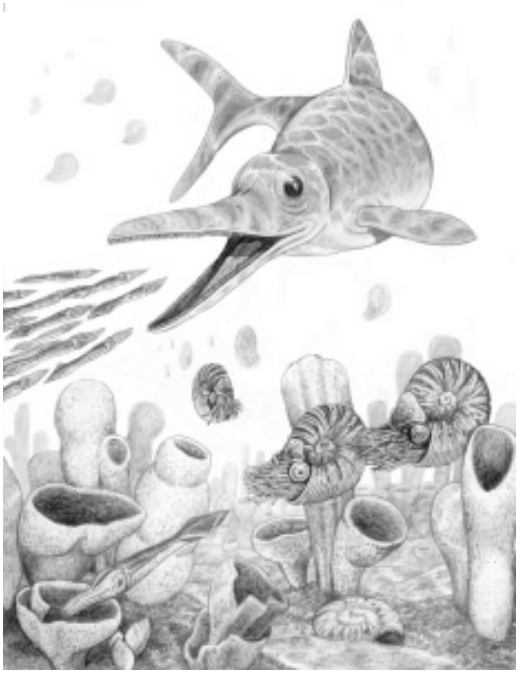
July 2004 Fact Sheet No. 11

Are there fossils in UK's W.T. Young Library? The ornamental stone on the floor of the entry halls, stairs, walls, and pillars in the William T. Young Library at the University of Kentucky, Lexington, contains many fossils. The tan-mottled stone was imported from southern Germany. It is called the Treuchtlingen (TROYKT-ling-in) Marble, although it is actually the sedimentary rock limestones. True marbles are metamorphic rocks formed from the alteration of limestone by intense heat and pressure. Fossils are usually destroyed during metamorphism. The library stone would not contain so many fossils if it were truly marble.



Do the different shapes represent different kinds of fossils? There are several types of fossils in the limestone. But not all of the different shapes represent different types of fossils. When limestone (and other rocks) is cut for decorative purposes it is often cut at angles to original bedding. Different slices through a fossil can make the same type of fossil look different. A fossil identification key is provided on the back of this fact sheet to help you identify the library fossils.

How did the fossils form? The limestone was deposited in a shallow sea that covered parts of Europe during the Late Jurassic Period (Kimmeridgian stage) of the Mesozoic Era, approximately 155 million years ago. This was during the age of dinosaurs, but dinosaurs lived on land. The limestone was deposited from lime and clay in a shallow sea. The most common fossils are sponges. Brachiopods (seashells), algae, and tiny protozoan animals called foraminifera lived among the sponges. Coiled-shelled squids called ammonites hunted smaller prey amongst the sponges and smaller cigar-shaped squids called belemnites hunted smaller prey amongst the sponges. Larger marine reptiles, such as the ichthyosaurs ("fish-lizards") also swam in these seas.



When the sea creatures died, the soft parts of their bodies were eaten by other sea creatures, or rotted away, leaving their hard parts. These were buried in the lime and clay mud, which hardened into limestone. During burial, minerals in groundwater filled pore spaces and replaced the original minerals of the buried hard parts. White fossils are composed of the minerals quartz and calcite; black to gold-reflecting fossils (or parts of fossils) are composed of pyrite ("fools gold"). It is the combination of fossils and minerals in the limestone that make this a popular ornamental stone.

What was Kentucky like during the Mesozoic Era? No Jurassic rocks were deposited in Kentucky. During the Jurassic, Kentucky was apparently an area of net erosion during much of the Mesozoic Era (of which the Jurassic Period was part). Herds of dinosaurs may have crossed Kentucky when the Treuchtlingen Marble was being deposited in the shallow seas of Germany, but any evidence of that was eroded long ago. Limestone is common in Kentucky, but our limestone is much older than the library stone. The limestone bedrock beneath the library was deposited during the Ordovician Period of the Paleozoic Era, approximately 470 million years ago—230 million years before the oldest dinosaurs and 320 million years before the Treuchtlingen Marble!

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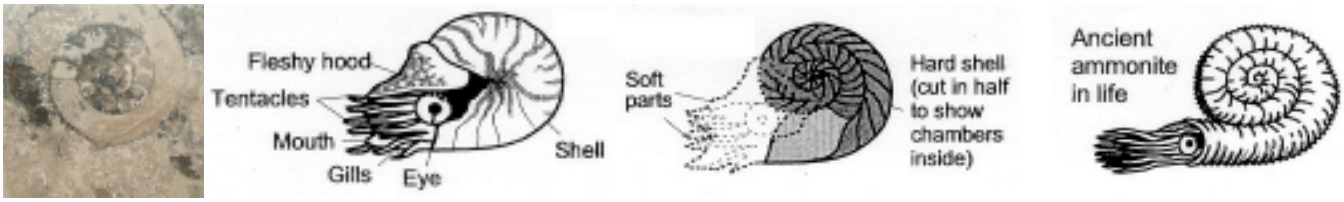
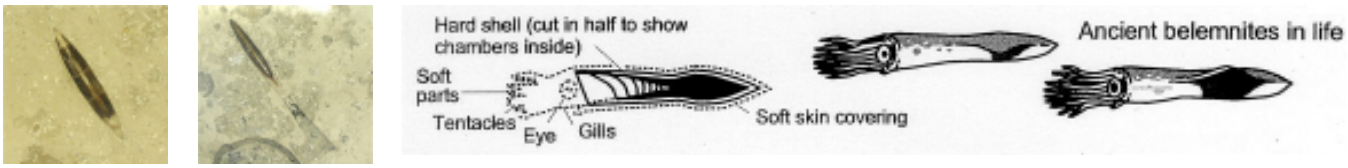
Fossil Identification Key

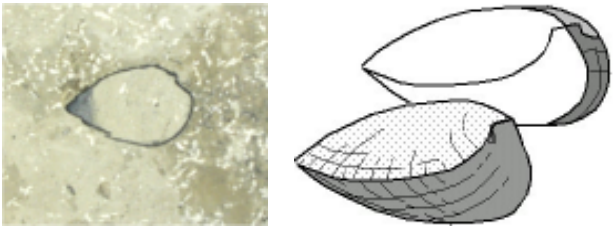
Sponges: There are abundant, circular, C-, U-, V-, and straight-, and irregular-shaped in the limestone at the library. Different shapes represent different slices through the same type of fossil: a sponge. Circular and C-shaped slices represent slices across tubular to vase-shaped sponges; smaller shapes represent slices closer to the bases of the sponges, and larger shapes represent slices closer to the tops. U-, V-, irregular, and straight shapes mostly represent slices vertically down through the sponge, either across both sides of the sponge or at angles to one side or the other of the sponge body.



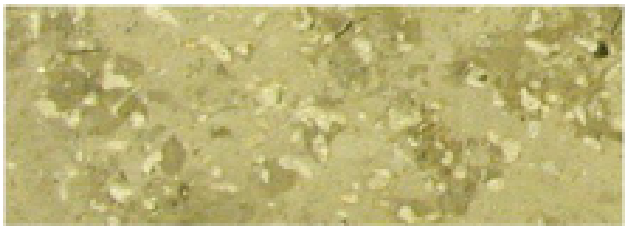
Ammonoids (squids with coiled shells): Another common fossil at the library has a spiral shape. The spiral shells are filled with chambers, similar to interior of a modern *Nautilus* shell. *Nautilus* belongs to the phylum Mollusca, class Cephalopoda, which includes the octopus and squid. When a *Nautilus* dies, the fleshy squid-like animal is eaten or rots, leaving only the hard shell behind. If you cut a *Nautilus* shell in half you can see the chambers inside the shell. Because details of the modern *Nautilus* shells are similar to these fossil shells, the fossils are inferred to be the remains of ancient cephalopods, even though the squid-like body was not preserved. The fossil cephalopods are called ammonites.



Bellemnites (squids with straight shells): Less common fossils at the library are shiny, dark brown, and cigar-shaped. These are shells of fossil belemnites. Belemnites are another type of ancient cephalopod. These straight-shelled squids shared similarities with the modern cuttlefish, which are a type of squid with a cylindrical body. The ancient squids had an internal cylindrical shell that was used for buoyancy. When cut at an angle, these long, tubular shells may appear as small brown circles or ovals.



Brachiopods (seashells): Brachiopods are small, shelled sea animals. Brachiopods are biologically different from clams but also consist of a soft-bodied organism in a hard shell. They were common in the Paleozoic seas of Kentucky, but decreased in abundance in the Mesozoic Era. Only a few species remain today.



Foraminifera: If you look closely at the limestone or use a magnifying glass, you will see tiny, white shapes. These are shells of protozoan (unicellular) sea creatures called milliolid foraminifera. The forams may have lived in a symbiotic (mutually beneficial) relationship with algae on the sea floor.

Other fossil evidence: Some of the mottled, dark gray, dark brown and black patches in the limestone are the remains of algae, which formed in mounds called stromatolites and thrombalites. Some of the patchy color in the limestone also is caused by the movement of invertebrate animals (marine worms and snails) through the original sediment. When worms travel through sediment they leave small tunnels that can be filled by sediment of slightly different texture or color. Likewise, snails and other invertebrate (lacking a backbone) animals may leave trails in mud on the sea floor, which can be preserved as patterns of slightly different texture or color from the surrounding rock.

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