Inaugural Paleontological Building Stone Tour of Michigan Avenue

NATIONAL FOSSIL DAY
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Chicago, Illinois

Your guide:
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Blocks of Chicago’s own Silurian dolomite along the River Walk

Fossils from four continents in blocks embedded in the Tribune Tower

Trilobites, corals, bryozoans, snails, brachiopods, and worms in the Mississippian Salem Limestone making up the rest of the Tower

Mississippian Salem Limestone makes up all four bridgehouses

Cretaceous rudist reef limestone around the Macy’s entrance from within the mall at Water Tower Place

Beautiful Mississippian Salem Limestone face with sedimentary structures visible

Fossils, corals, brachiopods, and worms in the Mississippian Salem Limestone making up the rest of the Tower

Mystery Mesozoic fossils around the entrance of the InterContinental

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How do we select our building stones? Why granite and not pumice? Why flagstone for walks but not for walls? Naturally, there’s a science and an art to it all, and hopefully today you’ll pick up a bit of both.

And what about fossils? Well, natural rock walls often happen to cut through fossil-rich beds and thereby host visible fossils (see below left). As soon as humans began making their own walls, we were including fossils as structural & artistic elements (see below middle). And today, with our walls constructed of industrially sawed bedrock, fossils naturally occurring in that bedrock remain an essential decorative element of many facing & building stones (see below right).

When you think “building stone,” you might think “granite,” or maybe “marble.” But the reason you know those names is from countertop catalogs; they’re for the most part decorative stone. At least around here, that is - granite and marble are absent from the surface of much of the midwest, where hundreds of millions of years of calm sediment deposition has left those deep, hard rocks blanketed with thousands of feet of sandstone, shale, and limestone. And since much of building stones’ cost is in their transportation, we have seen throughout history a tendency to rely on what is most local. Thus, Midwestern cities’ buildings are largely constructed of sedimentary rock, notably limestone.

Whereas sandstone is made of sand grains deposited by mouths of rivers, and shale is composed of mud grains deposited further out, limestone is unique in that it is often made of grains grown in place or nearby, rather than carried in. Grown! Its calcite grains are the shells of creatures, the microcrystals of stalactites, the tests of algae. Limestone is grown. What this means for us, of course, is that many limestone building stones are *made of fossils.* We will not have to look hard in such rocks to be overwhelmed with a rich paleontological experience.
The biosphere did not always look as it does today. For most of earth history, there were no plants and no animals, only bacteria. For much of the remaining history, there were no land plants or animals; the land was a barren wasteland even as life teemed in the sea.

Reefs have been around for a long time, but who makes them has changed time and time again. Corals have been around all along but seem to have from time to time “forgotten” how to make a reef.

Until about 200 million years ago, predation wasn’t even a major evolutionary force - if you had a shell you were all set.

Until just a few million years ago there was no such thing as grass.

And at many times in earth history, seasonality was globally damped, and there were no deserts or icecaps, with the poles nearly as warm as the tropics, and winter nearly as warm as summer.

Things are not as they always were.

The four arrows at right point to moments in earth’s history that you’ll get to witness today as sediments laid down at those times and later turned to stone, quarried, and shaped into buildings. Be mindful, if you can, of the vastly different world that each rock represents. Imagine swimming in a sea lily garden. Imagine.
Chicago, it turns out, is a city built on limestone - literally. 400 million years ago, what is now Chicago was a hundred feet underwater, hosting one of the great barrier reefs of its day. Thanks to its tropical climate (North America had not yet drifted to its present cold latitudes), this reef supported an astounding variety of life, much of which is preserved in the rocks right under our feet. You can see these rocks for yourself at Stearns Quarry, now a park in Chicago’s Bridgeport neighborhood (see historical photo at right).

Unfortunately, reef limestones have a tendency to transform into dolomite, with an attendant loss of many fossils and sedimentary structures. This is why Chicago limestones are not so good for finding fossils (though we will see some). As a building stone, Chicago limestones are also a poor choice both cosmetically and structurally: they are flaggy in texture, meaning they tend to fracture and peel layer by layer, looking worse and worse as they age. Many railroad embankments in Chicago are held up by Chicago limestone, but few buildings are.
Chicago 400 million years ago: a thriving tropical reef.
Chicago's limestone legacy:
A great barrier reef and its debris, including its inhabitants.
Indiana's limestone legacy:
Used for monuments and buildings in all fifty states, including 35 of our 50 state Capitol buildings.

Indiana 330 million years ago:
A vast underwater garden of animals called crinoids and blastoids, or “sea lilies.”
MISSISSIPPIAN ENCRINITINE FAUNA:
Animals called Crinoids and Blastoids ("sea lilies")

Indiana's limestones are composed largely of crinoid stem ossicles, which look like discs or "Cheerios." So are limestones of similar age stretching all the way to The Grand Canyon. We deduce that the whole region must have been a vast crinoid "garden" the likes of which was never seen again.
MISSISSIPPIAN ENCRINITITE FAUNA:

Bryozoans (“moss animals”)

The other major constituent of Indiana’s limestones is bryozoans. Their beautiful and varied textures are easy to spot. How many different bryozoan textures can you pick out in the rocks you see?

Indiana 330 million years ago.

Bryozoans are tiny colonial animals that generally build stony skeletons of calcium carbonate, superficially similar to coral.

More delicate structure than the similar looking Northern Staghorn Bryozoan. Delicate’s branches are spindly and the tips are pene.

DELICATE STAGHORN BRYozoAN
Heteropora alaskensis

A modern-day bryozoan
MISSISSIPPIAN ENCRINITE FAUNA

The animals that lived in and around Indiana’s underwater crinoid gardens 330 million years ago.
**Eocene Nummulitid Limestone**

Egypt 30 million years ago: an ocean dominated by the single-celled protozoan *Nummulites*.

*Nummulites* was a single-celled organism that grew to huge sizes (centimeters!) and proliferated to such an extent that its skeletons compose most of the limestone laid down during the Eocene epoch. This happens to be the age during which Egypt was underwater, so Egypt’s limestones are largely *Nummulites*. Therefore most of Egypt’s monuments are *Nummulites* too.

See *Nummulites* when you visit the chunk of the Great Pyramid embedded in the Tribune Building.
Rudists were aberrant oysters that took over reefbuilding in the mid-Cretaceous when corals gave it up. These were the reefbuilders of *Tyrannosaurus’*s day. See them at Macy’s inside Water Tower Place.
National Fossil Day is a celebration organized by the National Park Service to promote public awareness and stewardship of fossils, as well as to foster a greater appreciation of their scientific value and educational value.

http://nature.nps.gov/geology/nationalfossilday/index.cfm

National Fossil Day events, resources and initiatives will:

· Celebrate the wonderful diversity of fossils as clues for understanding the history of life, past climates, and ancient landscapes;
· Promote the understanding that fossils are non-renewable resources and the importance of preserving fossils for future generations;
· Highlight the science-based management of fossils on public lands;
· Encourage paleontologists to participate in outreach activities at local schools, parks, museums and similar settings throughout the United States;
· Establish partnerships between professional organizations, government agencies and other groups to promote the scientific value and educational value of fossils;
· Develop a media strategy for consistent and positive messaging which promotes the objectives of National Fossil Day;
· Promote awareness of the paleontological resources, programs, services, and expertise of the National Park Service.

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