NATURAL RESOURCES BUILDING
Geology of the Building Stone
NATURAL RESOURCES BUILDING

ARCHITECTURE

The Natural Resources Building, like many others on the University of Illinois campus at Urbana-Champaign, closely resembles a type of manor house built in Great Britain and the United States during the 17th and 18th centuries. The architectural style, generous in scale, with great refinement and considerable elaboration of detail, is loosely termed Georgian, which includes several British styles that came into prominence during the reigns of the first four Georges from 1714 through 1820.

The Natural Resources Building displays a steeply pitched slate roof with narrow eaves, a row of dormers on all sides, and several pairs of tall brick chimney stacks topped with chimney pots. The building is three and four stories and constructed of rectangular structural block and brick exterior walls. The four-story centerpiece, composed of three sections, projects slightly forward. It is flanked by a recessed, three-story pavilion and a projecting, four-story wing at each end. A band of light gray limestone in the exterior wall divides the first and second floors. The outside walls are faced with a Flemish bond pattern of red brick from the Danville area. The spacing of entries, windows, and other elements is regular and symmetrical.

Architect Joseph Button successfully adapted the architectural style of the Georgian manor house to the institutional scale of the Natural Resources Building in 1939. The original centerpiece was completed in 1942 and the wings were added in 1950. Despite its block-long, four-story dimensions and the plainness of its basic lines and shapes, the building avoids the monotonous appearance of a box or barracks. Trimmed openings divide and lighten the large roof and wall surfaces. The earthy, low-key colors of the slate, brick, and limestone trim create division and detail. The effect is one of imposing stability and balance.

BUILDING STONE

Roof A greenish gray slate covers the roof. It is an excellent roof material for two reasons. One, slate splits along parallel planes of weakness into smooth-surfaced slabs and sheets; this splitting is called slaty cleavage. Two, slate has a fine grained surface that is relatively imperious to water.

The slate was quarried from the Maine and western Vermont slate belt by the Rising and Nelson Slate Company of West Pawlett, Vermont. These slate deposits originated as sea-bottom muds during the Cambrian and Ordovician Periods (more than 450 million years ago). As the muds were deeply buried by younger sediments, they became compacted and cemented into shale, a sedimentary rock. Near the end of the Ordovician Period (438 million
years ago), the earth’s crust in this part of what is now New England was uplifted to form mountains. Heat and pressure produced by folding during the crustal uplift changed some minerals in the shale to micas and altered the shale to slate, a metamorphic rock.

**East Entrance Exterior**

**Steps and platform** The stone is a light gray, medium-grained granite composed of translucent white feldspar crystals (65–80%), light gray glassy quartz grains (15–20%), and black biotite mica crystals (5–10%). Supplied by the Cold Springs Granite Company of Cold Springs, Minnesota, the rock is probably from the Warner area, Kanabec County, in east-central Minnesota. An igneous rock, the granite formed from molten magma that cooled deep underground during the Precambrian Era, more than a billion years ago.

**Limestone balls and exterior trim** The pair of large balls on the platform (cornices, string course, lintels, sills, entry posts) consist of light gray limestone mottled with whole fossils, fossil fragments, and pellets—all cemented together by calcite, a common rock-forming mineral composed of calcium carbonate. Closer inspection of the limestone reveals sediment layering called bedding. Each layer of shelly and pelletal debris was deposited on the floor of a warm, shallow sea and often reworked by wave and tidal currents. High-energy, or fast-moving, waves deposited layers of coarse-grained fossil fragments and low-energy, or slow-moving,
waves deposited layers of finer grained fragments. As time passed, these layers were buried deeper and deeper, finally becoming compacted and cemented into limestone, a sedimentary rock. The rock unit that supplied this stone, the Salem Limestone, accumulated in seas that covered what is now the Midwest during the Mississippian Period, between about 360 and 320 million years ago.

The Salem Limestone came from a Bloomington Limestone Company quarry near Bloomington in south-central Indiana. Extensively quarried between Bloomington and Bedford, Indiana, it is marketed under the trade names Indiana Limestone and Bedford Limestone. An excellent building stone due to its durability, attractiveness, and economy, the Salem Limestone has been quarried in Indiana since at least 1827. It is standard construction material in American buildings, particularly in the Midwest.

**Exterior door trim** The light gray, faintly mottled limestone that frames the door contains whole fossils, fossil fragments, and pellets. It was originally a shell-sand deposit like the Salem Limestone. Unlike the Salem, this limestone is not visibly porous; calcite cement has filled all the spaces between grains. Consequently, it takes a polish.

This stone, called the Ozark Tavernelle Marble, and three others used inside the building, were supplied by the Carthage Marble Corporation of Carthage, southwestern Missouri. The stone industry gives the name Ozark Tavernelle Marble to limestones that take a high polish and to marbles—the white and varicolored metamorphic carbonate rocks used to make gravestones, statues, and buildings. Tavernelle is an old building stone term that means spotted or mottled.

Ozark Tavernelle, cut from a 2- to 3-foot thick bed in Carthage Quarry, is the lowest of the three beds that supplied cut stone for the Natural Resources Building. All three beds are part of the Warsaw Formation of Mississippian Age.

**East Entrance Interior**

**Floor and stairs** The brown to dark brown limestone that contains very light brown speckles is Nerobi Marble. It came from a bed in the Warsaw Formation at Carthage Quarry. Nerobi Marble occurs above the Ozark Tavernelle and Ozark Veined beds. The speckles in the rock are round, donut-shaped crinoid columnals, the skeletal parts of animals related to starfish and ancestors of the present-day crinoids. Like other limestones used in the Natural Resources Building, the Nerobi Marble formed in a warm, shallow sea. It was originally calcium carbonate sand largely composed of animal plates and columnals, and it was deposited by sea currents strong enough to sort the grains by size and wash away most of the fine grained chalky muds that were present.

**Lower wall veneer, pillar, and baseboard** The dark grayish brown stone with the streaks of light grayish brown mottles is Dark Plattin Marble. This Ordovician-age stone, supplied by Carthage Marble Company, was probably
extracted from a quarry near Batesville in north-central Arkansas. The
geologic name of the stone is the Plattin Limestone. It is about 455 to 460
million years old.

The rock was originally deposited in layers consisting mostly of very fine
grained calcite mud and a little bit of clay. It was deposited in a shallow sea,
or possibly in a tidal estuary where marine animals thrived and some soil
was washed into the ocean from the land. The stone shows cross sections
of thin wafer-like brachiopods and a few coral colonies—animals that lived in
soft mud. Many of the light brown mottles appear to be sections of mud-filled
animal burrows.

This limestone was cut at right angles to the bedding to show the
various bedding colors and accentuate the mottled effect. The burrows
and other large pores were filled with mud from the bottom upward,
and where the top of a pore was not filled, glassy gray calcite crystals
grew in the space. These calcite fillings ("birds-eyes") indicate which
way was "up" when the sediments were originally deposited.

**Hall, walls, door frames** The blocks of mottled, light yellowish
gray stone are cut from dolomite, a
rock native to Illinois. It was quarried and finished in Joliet by the
Adam Groth Stone Company. In that area the dolomite was called Joliet
Marble. A few miles north, near
Lemont,
which
was once
known as
Athens,
the same
dolomite
was called

Athens Marble. The stone comes from the Sugar Run
Formation of Silurian age (438 to 408 million years old).

Beds of the Sugar Run Formation in the Joliet-
Lemont region have furnished more building stone
than any other rock unit in the state. Dolomite was a
very popular stone in the late 19th century to the early
20th century. The stone was generally used to face exterior walls because weathering turns it a distinctive pale yellow. It is found in older public and private buildings throughout the state but particularly in the northeast. Chicago's Water Tower is among the best known examples.

This dolomite is a sedimentary rock that was originally deposited as a fine grained calcite mud. From time to time, a little mud (clay and silt) from the land was added to the sediment. The mud forms the darker gray streaks and mottles in the stone. At some point, probably not long after deposition, water carried magnesium into the calcium carbonate (calcite) mud and changed it to calcium-magnesium carbonate (dolomite) by replacing some of the calcium with magnesium.

Because the crystal structure of dolomite is more compact than that of calcite, the process of replacing calcite with dolomite causes a decrease in volume and a corresponding increase in porosity in the dolomite. The process frequently obliterates the distinctive shapes and internal structure of fossils. Consequently, few, if any, animal skeletons or hard parts are visible in the dolomite, although there are traces of burrowing animals. The streaks of sooty black, rust-spotted pyrite (an iron sulfide mineral) probably formed in fecal matter. Rusty specks of pyrite are very noticeable on the east pillar of the east entrance. Burrowing animals probably disturbed what were originally continuous bedding surfaces and produced the wavy, broken surfaces visible on the ends of some blocks.

The stone has a honed finish; it has been ground smooth but not polished. The gray marbling is produced by cutting the exposed face parallel to the plane of the rock's bedding so that the gray mud films, or laminae, are intersected.

Rest room partitions and wall veneer  These polished limestone panels are Ozark Veined Marble from the Carthage Marble Corporation Quarry in Missouri. The light gray and light olive gray limestone contains wispy, dark gray figures. It comes from the same quarry ledge as the Ozark Tavernelle stone. The veined rock comprises about the upper three-fourths of the ledge and the Tavernelle the lower one-fourth. The veins in the stone are stylolites. These limestone panels are cut parallel to the bedding and perpendicular to the stylolite seams. The dark gray, wispy figures occur where the cut intersects the top of the stylolites. Stylolites can also be seen in the lower wall veneer, pillars, and baseboard in the east entrance foyer.

The limestone is part of the Warsaw Formation of Mississippian age. Patches of horn corals and brachiopods are visible in the panels as dark gray skeletal sections. These fossils are the remains of animal communities that lived on the bottom of a Mississippian sea that existed from 360 to 320 million years ago.
SOURCES


Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
Natural Resources Building
615 East Peabody Drive
Champaign, IL 61820-6964
(217) 344-4747