

"scale tree"  
(Lepidodendron)

A Visitor's Guide to  
**Geologic Features**  
at the Saylorville Lake  
Emergency Spillway

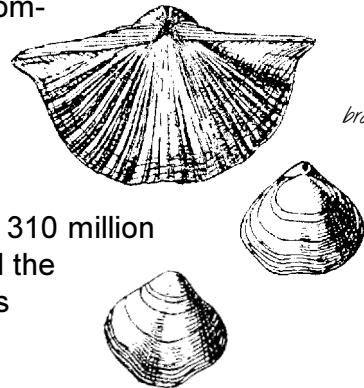
**H**istoric flooding along the Des Moines River during the summer of 1993 significantly enlarged a bedrock gorge below the Saylorville Lake emergency spillway. The gorge, first eroded in 1984 by overflow waters, has deepened to 70' and widened into a 10-acre "canyonland," with vistas of colorful, layered sequences of Pennsylvanian-age bedrock. The strata uncovered along the walls and floor of this canyon provide the best look at rocks of this age anywhere in the state.

**Layers:**  
alternating  
profile  
these  
from

The pronounced horizontal strata are sedimentary rocks, consisting of layers of sandstone, shale (and mudstone), limestone, and coal. The along and across the spillway channel is strongly influenced by contrasts in bedrock types. The stepped appearance results from differences in their resistance to erosion. The more durable sandstones and limestones form prominent ledges. Softer shales and mudstones beneath the overhangs were more easily eroded by the churning floodwaters.

**Composition:** Shales, the most common rock type, are composed of easily split layers of clay and are quite colorful, ranging from light gray to greenish to black, sometimes with red or yellow mottling. Mudstone, another gray fine-grained rock, shows no visible layering. The limestone deposits are hard, thin and gray, sometimes occurring as irregular rounded lumps ("nodules") within more shaley materials. Sandstone is more granular, like sugar, and is usually light brown. The coal is black and light-weight, composed of alternating shiny and dull layers with many vertical fractures, often filled with the minerals pyrite ("fool's gold") and calcite (calcium carbonate).

**Ancient Environments:** These various bedrock deposits formed during fluctuating sea levels across a low coastal plain 310 million years ago. At this time, the North American continent straddled the Equator. The result is a series of shales, sandstones, and coals



brachiopods

(in the lower 50') that were deposited in fresh water, along a lush, tropical river system that included delta channels and peat accumulation in backwater swamps. The mudstones, containing mud cracks and traces of plant roots, show where ancient soils developed. Alternating shales and limestones in the darker colored, upper 20' represent a sharp contrast, a deepening of the sea — the earliest widespread invasion of Pennsylvanian seas into the midcontinent. The prominent rock layer at the top of the canyon is a sandstone, whose grains were deposited in “cross-bedded” patterns, or parallel sets of straight sloping lines produced by shifting river currents. Giant ripples (east side of canyon) are seen as steep wavy surfaces on top of the sandstone, expressing prolonged current activity. The sandstone indicates a lowering of sea level and a return to river and delta building environments.

*Fossils:* Fossils help to separate the marine deposits from the fresh-water deposits. The sandstone bench along the top of the rock sequence contains plant and “scale tree” fossils (*Lepidodendron* and *Sigillaria*) and long straight marks made by logs dragged along the ancient river bottom. The marine limestones, on the other hand, contain abundant brachiopod shells, some crinoid stems, and traces of animal burrowings just beneath the sea floor.

*Flood Evidence:* Large blocky slabs of bedrock were loosened, toppled, and shoved downstream. These overlapping and tilted masses of rock demonstrate the force of the floodwaters.

*Glacial-Age Deposits:* The softer deposits seen slumping along the steep canyon sides above the bedrock include ancient river sediments, wind-blown silt, ice-deposited materials, and more recent stream deposits. Best observed south of the road crossing, these materials and the ancient soils weathered into them are seen from this distance as red, brown, and gray colors. The glacial-age deposits fill an ancestral tributary of the Des Moines Valley, and they range in age from about 10,000 to over 30,000 years old. The contact between these deposits and the bedrock beneath marks a time gap of over 300 million years in the geologic record.

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Illustrations:  
Brachiopods from "Invertebrate Fossils" by Moore, Lalicker, & Fisher (1952)  
Others by the Geological Survey Bureau

