CARVING THE LANDSCAPE

After many cycles of warping, which tilted the rocks slightly to the west and southwest, Indiana ultimately was freed of the seas, and weathering and mass wasting began sculpturing the land. Stream erosion and glaciation are the two keys to the present topography of the park. Before the spread of glaciers, the scene in southern Indiana was much the same as now except for the arrangement of drainage. The Ohio River did not exist, and major streams flowed to the north.

Glacial ice sheets twice reached approximately to the position of the present Ohio River near Madison. A thin layer of glacial deposits (till) lies on top of the Laurel in the park and records the former presence of ice. The vast mass of ice blocked northward-flowing streams, ponding water in temporary lakes against the ice edge. Outlets were quickly cut down to form a line of drainage roughly parallel to the front of the ice. Tremendous amounts of meltwater liberally laced with sand and gravel cut a bedrock channel, the newly created Ohio River, to depths below the present river level. As the ice melted back, the new pattern of drainage became integrated with the Ohio River.

Even a small stream like Big Clifty Creek has a great deal of eroding power because it drops from the uplands to the Ohio Valley in such a short distance. As the stream cut down, the soft shales and thin limestones of the Dillsboro were literally cut out from under the Saluda, thereby forming a waterfall. This falls has been cut back from the Ohio until now we see it as Clifty Falls about 2 miles from the river.

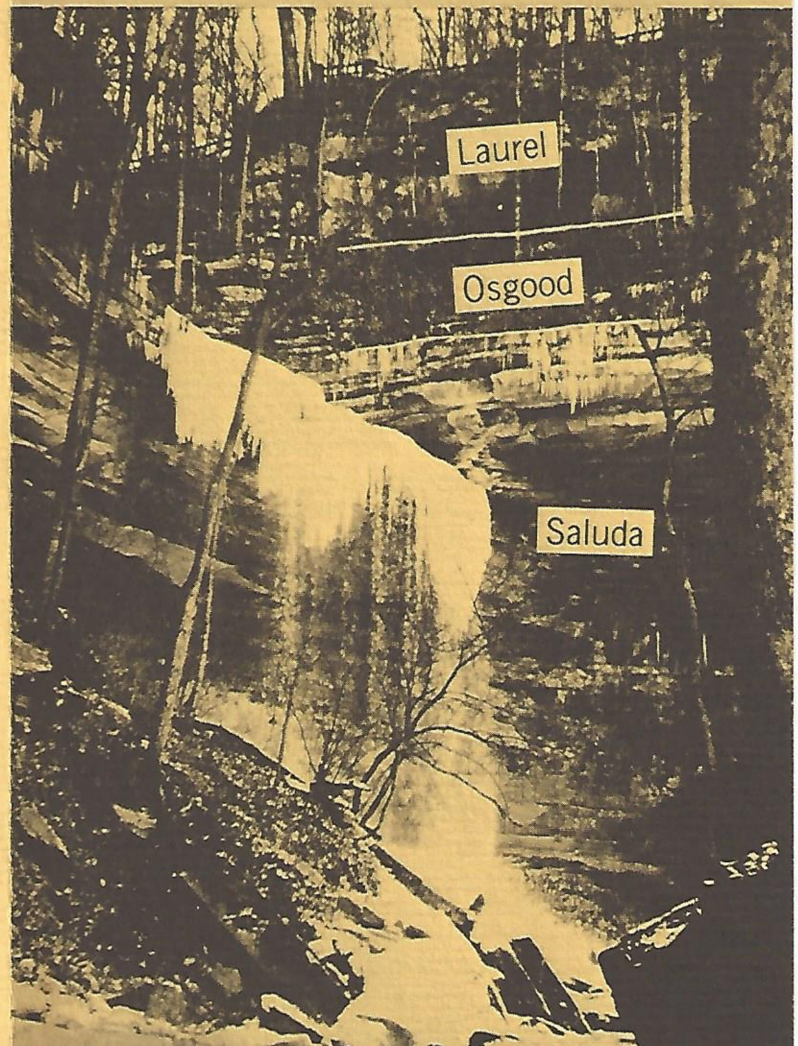
Big Clifty valley is practically a gorge right at the major falls, but it widens downstream. With the passage of time, weathering, slumping, and sliding have widened the valley by moving rock debris from the valley walls to where it can be carried away by the stream. Thus by this continuing process Clifty Falls State Park has been shaped to the rugged terrain that we see at this moment in geologic time.

Carl B. Rexroad
Paleontologist

Take nothing but pictures.
Leave nothing but footprints.
Kill nothing but time.

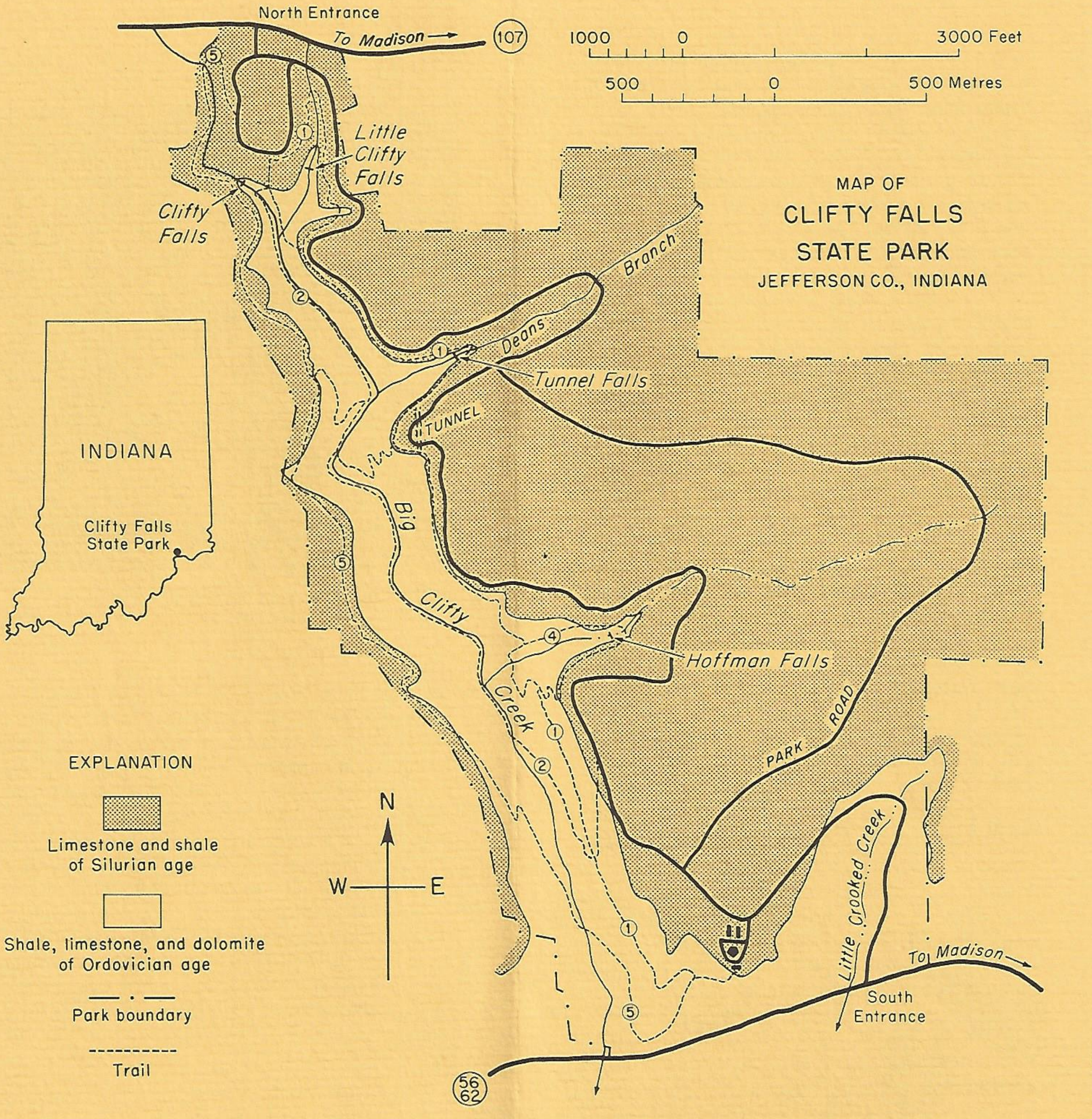
1975
State Park Guide 2

GEOLOGIC STORY OF CLIFTY FALLS STATE PARK



STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY
611 NORTH WALNUT GROVE AVENUE-BLOOMINGTON, INDIANA 47401

PRICE 10¢

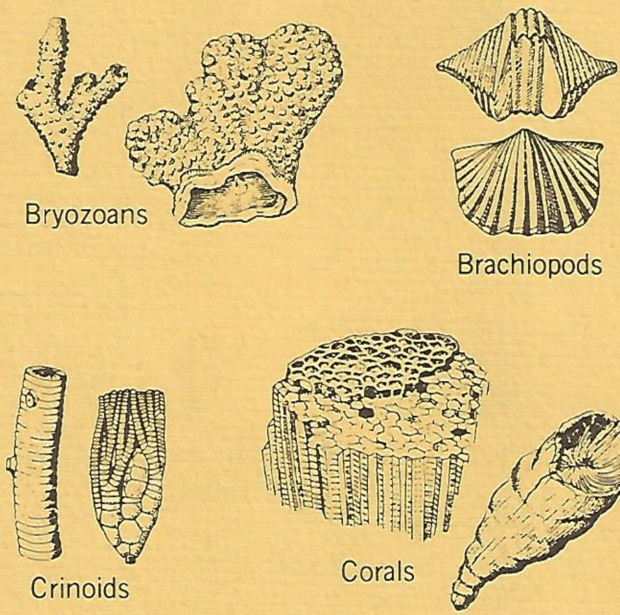

MAP OF
CLIFTY FALLS
STATE PARK
JEFFERSON CO., INDIANA
North Entrance
To Madison
107
1000 0 3000 Feet
500 0 500 Metres
Little Clifty Falls
Clifty Falls
Deans Branch
Tunnel Falls
TUNNEL
INDIANA
Clifty Falls State Park
Big Clifty Creek
Hoffman Falls
PARK ROAD
Little Crooked Creek
To Madison
South Entrance
56 62
N
W E
EXPLANATION
Limestone and shale of Silurian age
Shale, limestone, and dolomite of Ordovician age
Park boundary
Trail

INTRODUCTION

The name Clifty Falls State Park leads to expectations of a rugged, cliff-lined gorge and leaping waterfalls, and these features are indeed the primary attraction of the park, both scenic and scientific. How did the streams, canyons, and falls come into existence? Why so many different kinds of rock? What is the meaning of fossils? These questions come to mind as you stand at the overlook of Clifty Falls or of any of the numerous lesser falls in the park. A few insights into the geologic story of the park will enhance the enjoyment of a visit to Clifty Falls State Park.

Because the rock layers now exposed at the falls and in the cliffs of the park had to be formed layer by layer before they could be sculptured into the rugged terrain that makes the park so fascinating, let's start the story with a chronicle of how the rocks were created and then turn to the forces acting to expose and slice away those layers.

First, the whole record must be put into a geologic time perspective of many millions of years. Only in these terms can you picture this midwestern area—now high on the bluffs of the Ohio River—as being beneath the sea. Yet such was its beginning in seas that covered much of the interior of our continent several hundred million years ago.



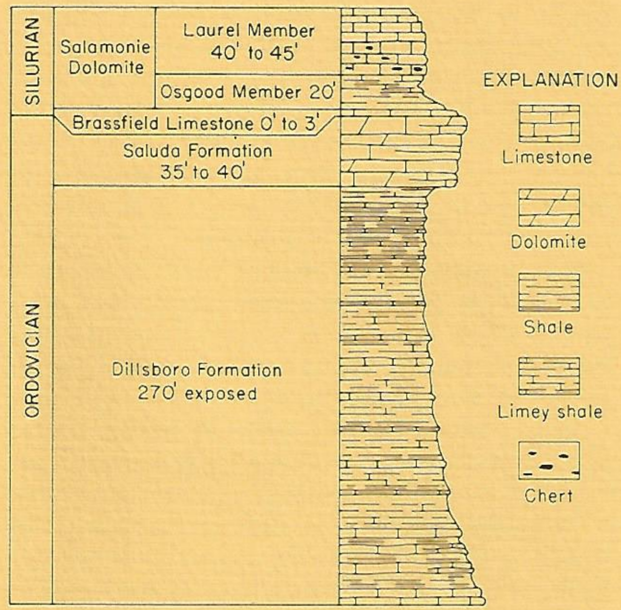


Diagram of Clifty's rock formations

ORIGIN OF THE ROCKS

Rocks at Madison represent the Ordovician (older) and Silurian Periods. The distribution of these rocks in the park is shown on the geologic map on the back of the folder. All rocks in the area were formed in seas that spread over the land more than four hundred million years ago. This is shown by the types of rocks and their enclosed fossils that are closely similar to animals of today found only in the oceans.

Into these former inland seas currents spread mud in pulses into southern Indiana, where the mud is now seen as shale. Interlayered in the shale are beds of fossiliferous limestone that formed when the seas cleared at times and animal life flourished on the limy bottom. The sequence of shale and limestone now found in the lowest areas of the park is called the Dillsboro Formation. See the diagram showing the formations exposed in the park, their thicknesses, and general rock types.

Overlying the Dillsboro is the Saluda Formation, also of late Ordovician age. The Saluda is composed dominantly of fine calcitic dolomite, and this upward change in rock type along with ripple marks and mud cracks shows a change in conditions. The rock sequence indicates that most of the Saluda sediments were deposited in a very shallow sea before the seas again deepened. The Saluda forms the lip and prominent overhang of Clifty Falls, Little Clifty Falls, Tunnel Falls, and Hoffman Falls. It also forms the lower set of cliffs in the park.

After the Ordovician rocks were deposited, the youngest were removed by weathering and erosion in the park area before the region settled beneath a great new inland sea in Silurian time. If you come through the south entrance of the park and compare the rocks along the side of the road with the figured diagram, you will find the Brassfield Limestone about halfway up the hill from the bridge over Little Crooked Creek. At Clifty Falls at the other end of the park, however, the Brassfield is absent. The park is on the edge of an area that was warped above the sea in early Silurian time.

Again the seas swept over southern Indiana, bringing more clay and limy muds to build more rocks, the Osgood Member. Gradually the amount of clay decreased, so that the rocks changed upward from shale to limestone, the Laurel Member of the Salamonie Dolomite. Before specific geographic place names were given to rock units, the Laurel was called the Cliff Limestone. It is easy to understand the name.

The soft easily eroded Osgood makes both the falls on the Saluda and the cliffs of the Laurel more prominent. Not only is it more easily eroded, it is easier to dig. Thus the tunnel shown on the geologic map was cut through the Osgood during construction of the Madison and Indianapolis Railroad in 1852 to avoid the steep climb of the open cut straight up the bluff from Madison. The tunnel was never completed, however, because the M & I went broke from the high construction costs.

Clifty Falls from Lookout Point

FOSSILS

All rocks in the park contain fossils, but they are by far the most abundant in the Dillsboro. Do your collecting in exposures outside the park, though, not inside where everything is protected. Fossils represent life of the geologic past, either plant or animal life, preserved in many different ways. Because life was constantly changing, different rock units contain different fossils. These changes with time give us a way of measuring the relative ages of rocks. Fossils also tell us about the environment in which the animals or plants lived, whether on land or in the sea, in deep water or shallow, in a warm climate or a cold one. In the park the most abundant fossils include bryozoans, corals, brachiopods, and crinoids. Trilobites, snails, clams, cephalopods, and stromatoporoids are also present.