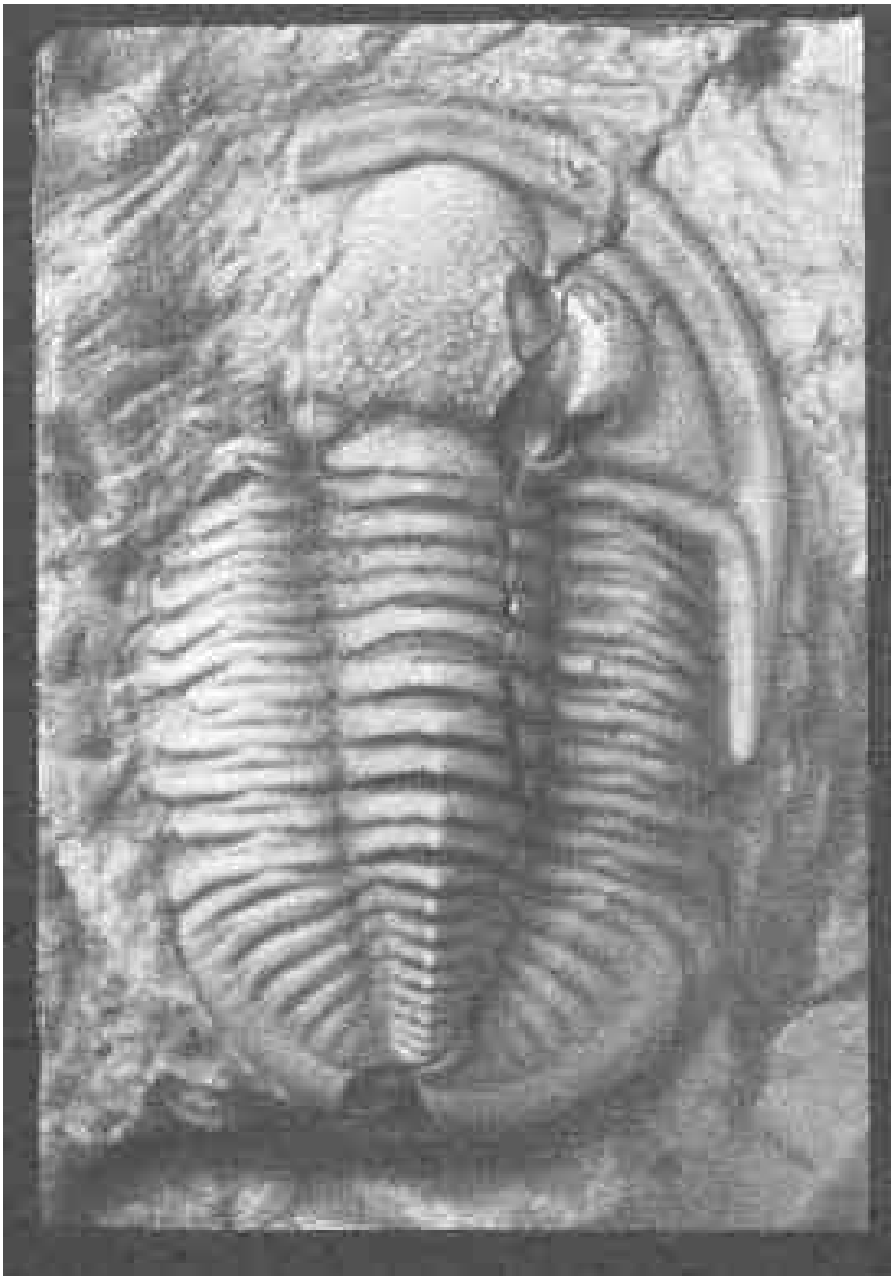
Fossil Park Field Guide

The Olander Park System



Pamela A. Haywood

AUTHOR'S NOTE

This field guide is an introduction to the geology of Fossil Park and surrounding area, as well as life in the Devonian period. While there are numerous sources of information on these topics, often people want a jumping-off point into the material, a safe haven for beginners, or the "rusty." This is what I hope with have created with the Fossil Park Field Guide.

Enjoy your trip back in time!

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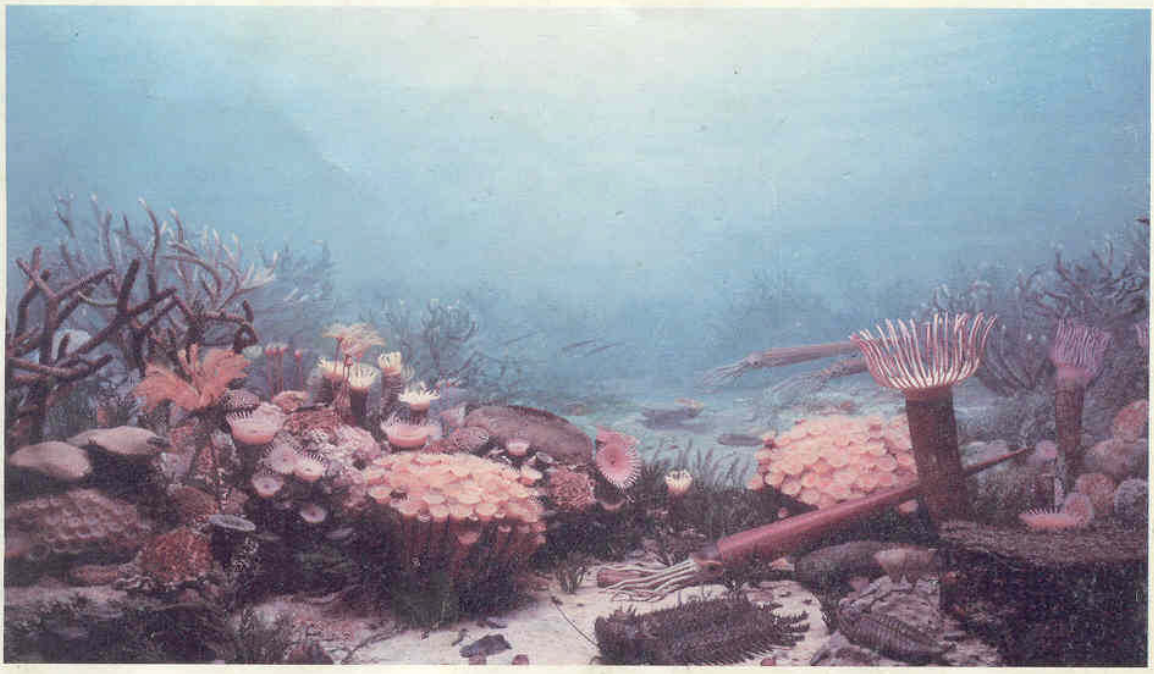
GEOLOGY

GEOLOGY is a fascinating science. It spans the history of our universe and brings to life worlds never before seen by human beings. Layers of rock become pages in a history book for us to turn back and see our past, and these pages have a texture, smell, vivid color and weight that no text book ever had! Ever wonder how paleontologist come up with dioramas in the museum or the fanciful images that fill dinosaur books? Geology is the answer. Geology allows us to discover what Ohio was like during the Devonian period, what its like to be close to a glacier and find out how Lake Erie was formed. Geology allows us to **recreate** prehistoric worlds!

This field guide will give you a glimpse into Ohio's geologic past, focusing on Northwest Ohio's world of Devonian sees and Pleistocene glaciers. A state whose rock record ranges from the history of a warm, shallow seaway, to the trials of a mastodon trudging through the snows of a massive continental glacier. (check out the geologic map of Ohio on the following page.)



DEVONIAN

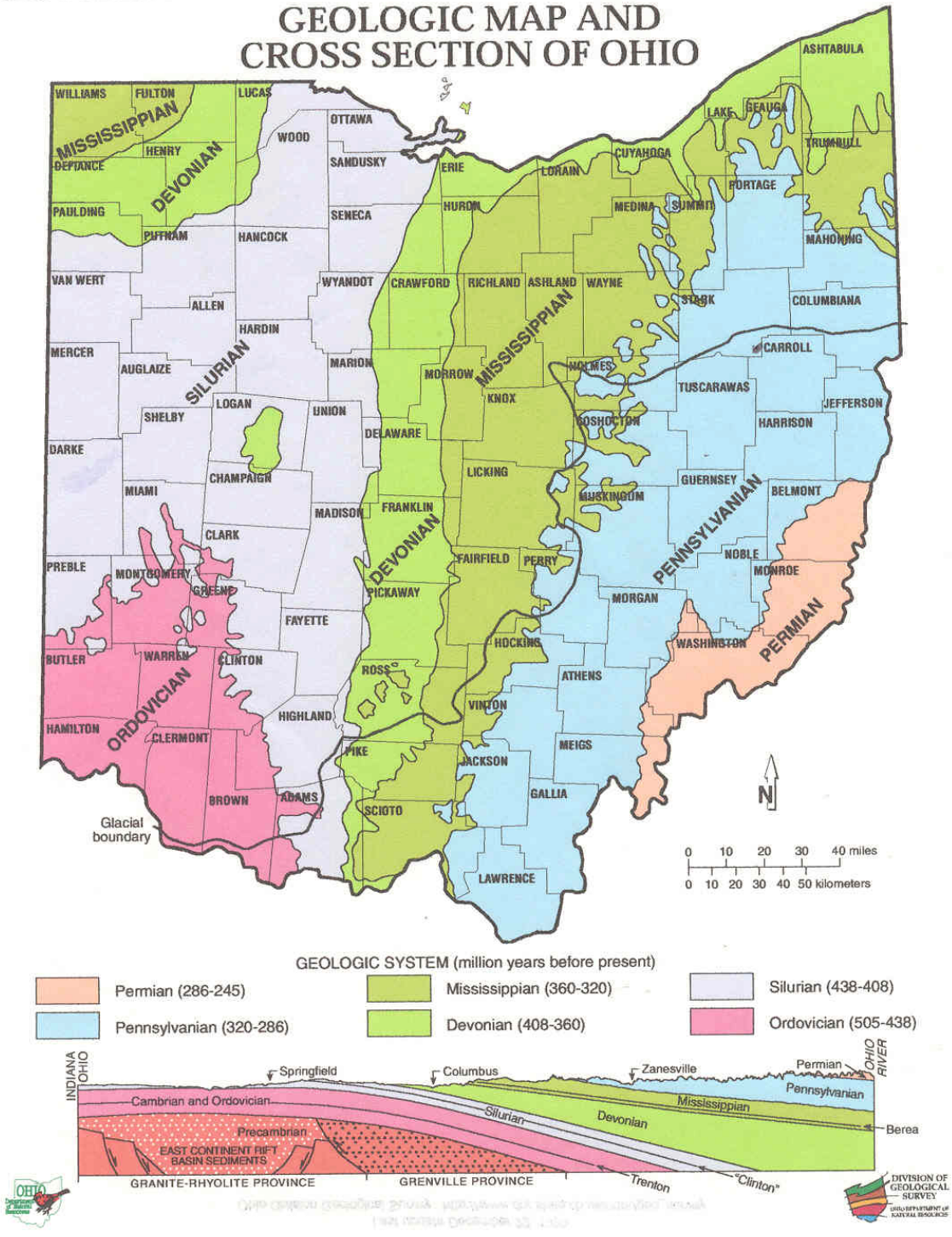
Corals, bryozoans, orthoconic cephalopods, trilobites, and crinoids typical of Middle Devonian time are shown.

STATE OF OHIO
George V. Voinovich, Governor

DEPARTMENT OF NATURAL RESOURCES
Donald C. Anderson, Director

DIVISION OF GEOLOGICAL SURVEY
Thomas M. Berg, Chief

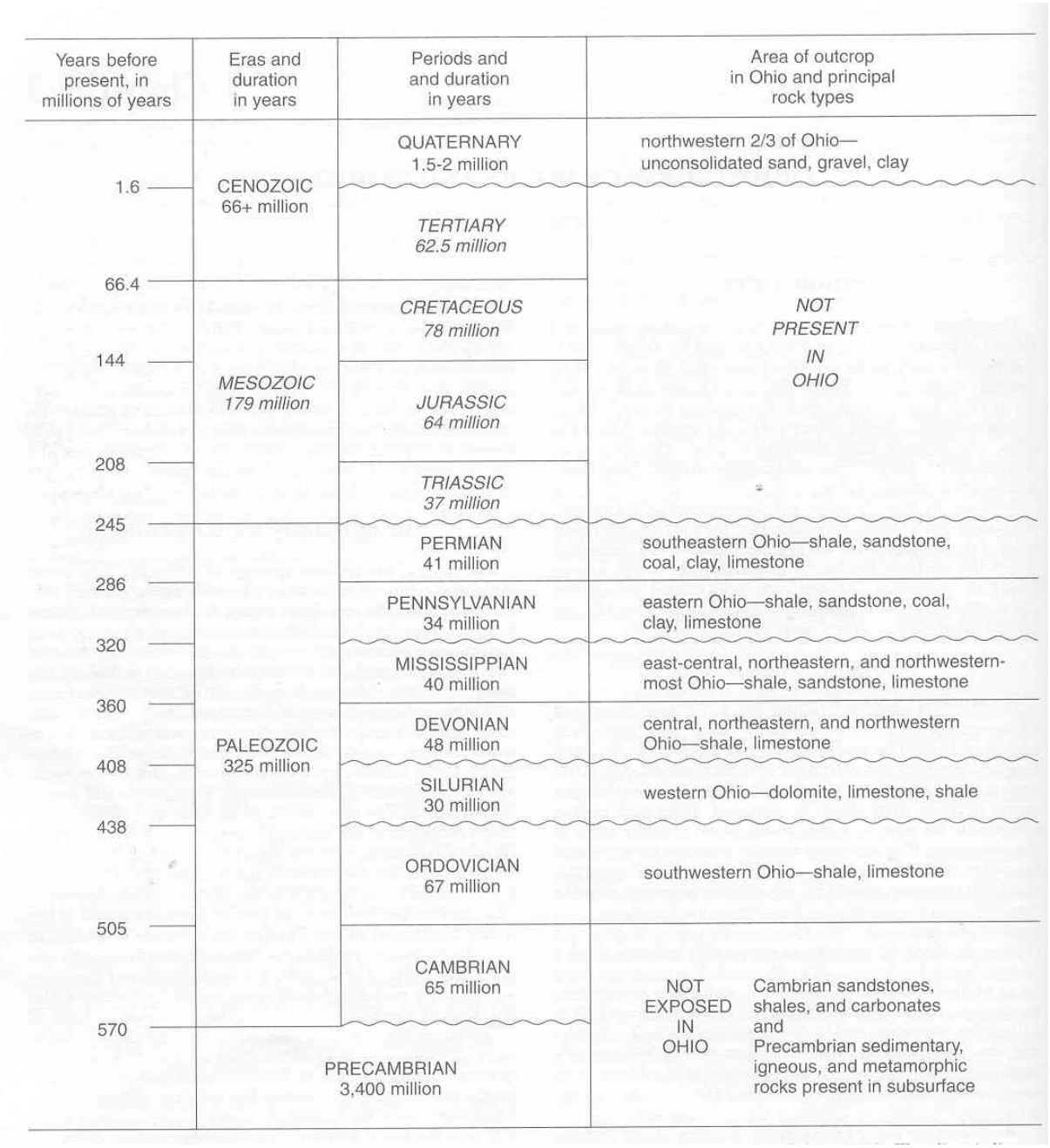
GEOLOGIC MAP AND CROSS SECTION OF OHIO



GEOLOGIC SYSTEM (million years before present)

- Permian (286-245)
- Pennsylvanian (320-286)
- Mississippian (360-320)
- Devonian (408-360)
- Silurian (438-408)
- Ordovician (505-438)

Ohio's bedrock is made up of sedimentary rock, formed by the hardening of deposited sediment such as mud, sand or clay. The geologic map of Ohio, on the previous page, shows the age and location of Ohio's bedrock. All of these rocks date to the Paleozoic Era, roughly 570 million years ago to 245 million years ago. This Era is divided into geologic periods, listed below in a Geologic Timescale of Ohio. In Ohio, rocks range from the late Ordovician period to the early Permian period. This field guide will focus on the Silica shale formation of the Devonian era, and its related rock unites



Limestones, shales, dolostones, and sandstones all represent a past marine environment. This portion of the field guide will focus on the geologic history of the rock units exposed in the Medusa North Quarry and the Medusa North-North Quarry (Fossil Park). These units include the Devonian age Silica shale formation, Dundee limestone, Tenmile Creek dolomite and the Pleistocene glacial deposits. See figures 3, 4, and 5 for a detailed look at Northwest Ohio's stratigraphy.

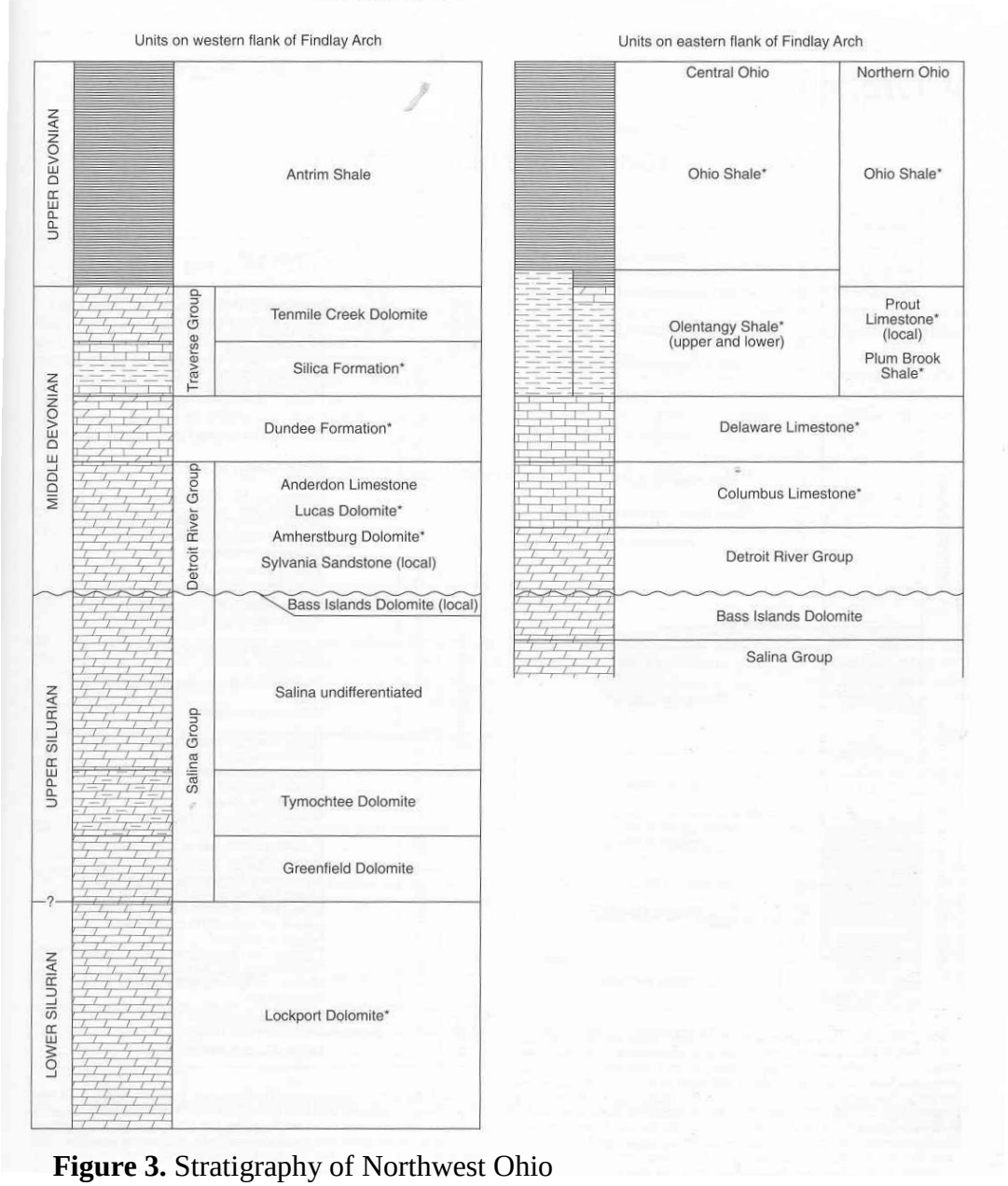


Figure 3. Stratigraphy of Northwest Ohio

Dundee Formation

This formation is composed of a dolomitic limestone. Marine in origin, it is quite hard, and fossils are difficult to free from the rock. Fossil in this formation are marine animals such as horn corals and brachiopods. The Dundee limestone makes up the walls of the Fossil Park quarry.

Silica Formation

At approximately 50 meters thick, silica shale is comprised of fossiliferous limestones and "limey" shales. Units contain small nodules of minerals pyrite, also known as fool's gold, and marcasite which is red or purplish in hue. The fossil are numerous and the relatively soft shale makes for excellent collecting (see following pages for photos!).

Tenmile Creek Dolomite

Tenmile Creek dolomite caps the Medusa North quarry's west all. Along the top of the quarry's western wall you can find glacial grooves that have been carved into the rock by the heavy ice sheet. While this unit contains fossils, it is very hard and makes for difficult collecting. Horn Coral is the most commonly found fossil in this

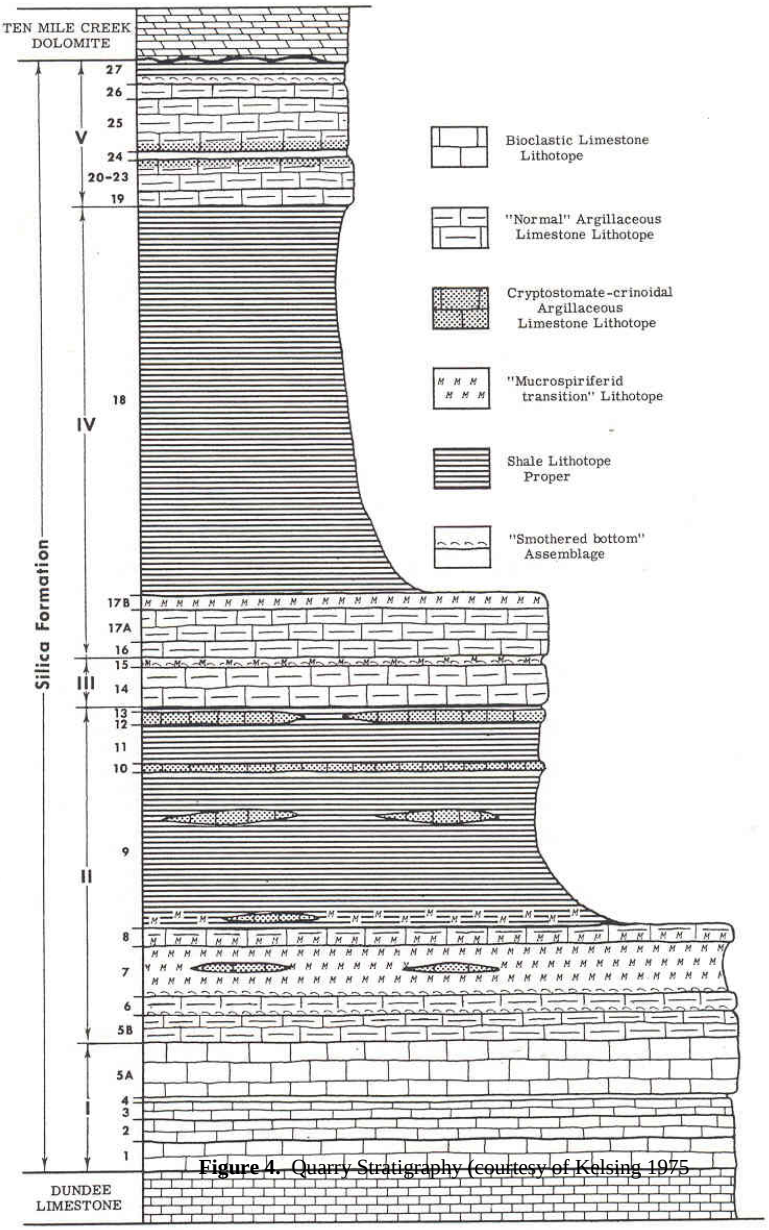
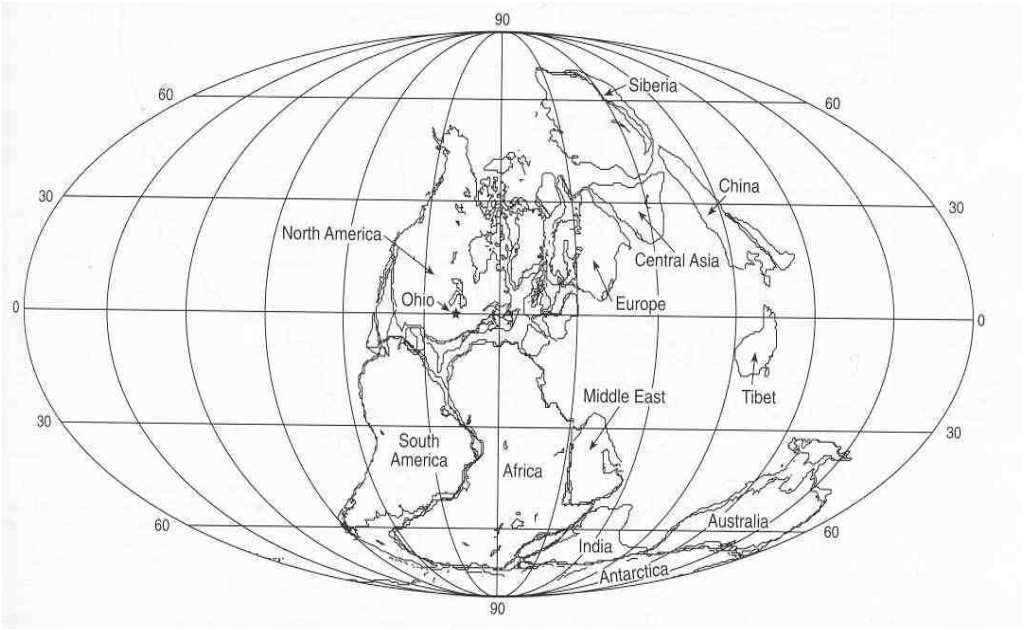


Figure 4. Quarry Stratigraphy (courtesy of Kelsing 1975

Stratigraphic sequence of biotopes of the Silica Formation.

Geologic Environment

The plates that make up the Earth's crust shift constantly at imperceptible speeds, driven by its own internal heat. During the Devonian, there were three major continental masses: North America and Europe sat together near the equator, much of their current land underneath seas. To the north lay a portion of modern Siberia. A composite continent of South America, Africa, Antarctica, India, and Australia dominated the southern hemisphere. North America was rotated 90 degrees, so that "California would have been in the north and Ohio was located at the equator



Covered with water, Ohio during the Devonian period would have been similar in habitat and climate to the coral reefs of the Gulf of Mexico. The Devonian was also witnessed and orogenic or mountain building event: the birth of the Appalachian Mountains as a result of the collision of the African and North American "coastlines." Silty, muddy deposits from this event and subsequent erosion of rock material uplifted during the collision settled into the seaway. This sediment is responsible for forming the Silica Shale. Structurally Fossil Park sits on the lip of a geologic basin, known as the Michigan Basin, in which the youngest rocks are located in the center and the rocks dip inward, creating a bowl shape. The Michigan Basin started forming during the Silurian periods and continued to warp into a "basin" into the Pennsylvanian period. The north wall of the Medusa North Quarry is a great place to see this. The rock layers in the wall obviously dip to the west.

LIFE IN THE DEVONIAN

PALEONTOLOGY is the study of ancient life. Whey you collect fossils at Fossil Park, you are doing the work of a paleontologist; you are stepping back in time to study life 380 million years ago (MYA). The Silica Shale at Fossil Park represents a time when a shallow seaway covered Ohio. The warm shallow waters teamed with early ocean life such as trilobites, brachiopods, coral, cephalopods, bryozoans, armored fish, and early sharks, who make this see their home.

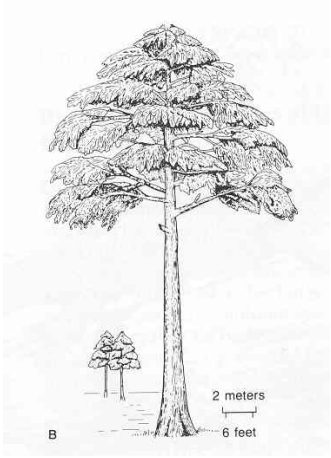
On land, life was heading in other fascinating directions. Prior to this period there were few plants and the terrain would have been covered by barren rock. During the Devonian landscape was beginning to be carpeted with vegetation and becoming home for a growing variety of animals. Amphibians developing quickly and relatives of today's ray-finned fish were starting to populate bodies of freshwater.

The Devonian Seas of Fossil Park

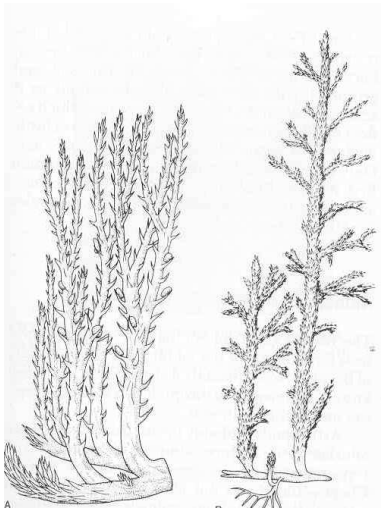
During the Devonian era coral reefs were beginning to look as colorful and lively as the reefs of today. Mounds of colonial corals, horn coral crinoids, brachiopods, and bryozoans began to pile up on the sub tidal floor, creating the classic piles of "live rock" that we see in modern reefs. Trilobites were one of the many extinct organisms that called the reef home. These delicate-looking "bugs" are actually related animals like the modern horseshoe crabs, and died out toward the end of the Devonian. Trilobites scavenged the sea floor in search of food or good place to hide, having the advantage of highly developed eyes, and rolling up into a ball to protect themselves from predators. Many types of fish, both jawed (acanthodians) and jawless (ostracoderms), developed during this era, and ammonoids, coiled invertebrates that were excellent swimmers and predators themselves, had a profound effect on the predator/prey relationship in the Devonian seas.

Devonian Plant Life

Plant fossils are not found at Fossil Park. We can look at plant fossils from other regions for a better picture. Vascular plants with parts for moving fluids up and down the plant developed in the beginning of the era previous. These plants developed more slowly because it was harder for them to reproduce. The Devonian saw and adaptive radiation of plants. Club mosses grew to the size of trees, and another innovation allowed plants to spread widely over land—seeds! The ability to produce seeds allows a plant to wait until conditions are favorable to begin sprouting, and therefore increase the likelihood of survival into adulthood. The Devonian also witnessed the first true trees and as a result the first true forests.



Devonian Tree, C.R. Beck 1970



Primitive Devonian Lycopods.
Stanley, 1993

Ichthyostega and lobe-finned fish. Drawing by Gregory S. Paul.
Stanley, 1993

Land Animals of the Devonian

Arthropods such as scorpions and insects invaded land long before other species. New to the landscape during the Devonian were amphibians. These early vertebrates fit chronologically between lobe-finned fishes and modern amphibians. The bones that make up the "lobe fin" look like the shoulder/arm bones of the amphibians. Additionally, the complicated teeth of the lobe-finned fish resemble the teeth of early amphibians. These characteristics, among others, indicate that these vertebrates are intermediate forms, commonly from the genus Ichthyostega.

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