

The Falls of the Ohio State Park Educator's Handbook

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Introduction

Thank you for your interest in the Falls of the Ohio State Park. This handbook was designed as a guide to help you and your students have a safe, positive learning experience during your visit to the Falls of the Ohio.

The Interpretive Center offers a variety of programs and media through which you may experience the Falls on many levels.

The pre-visit, on-site visit, and the post-visit activities are designed to encourage visitors to “experience” the Falls with all of their senses.

We hope that each person leaves the Falls with a better understanding of both the natural and cultural history that makes the Falls of the Ohio so unique. Ideally, we hope that each person leaves with a desire to learn even more.

For additional information or to schedule an indoor, outdoors, or teacher training program call (812) 280-9970 or write to:

Falls of the Ohio State Park
201 W. Riverside Drive, Clarksville, IN 47129
Mailing address: P. O. Box 1327, Jeffersonville, IN 47131-1327

Programs and Services

Please refer to the “Educator’s Guide” for information about classroom programs, hikes, in-service, and other programs and services offered by the naturalists at the Falls of the Ohio. If you do not have a copy, please call (812) 280-9970, and we will send you one. We recommend that teachers visit the Interpretive Center for an orientation tour before bringing their group. Orientation tours are scheduled each for Thursday from 4 to 5 p.m. Please call ahead to reserve a space. We welcome inquiries about special needs from educators and are always looking for ways to help.

Weekend programs are designed to meet the needs of our visitors and local educational groups. Special cultural arts programs and other events are scheduled throughout the year. Call to find out what is happening here.

We do ask that educators please read the “Educator’s Guide” carefully before bringing groups to the Park. Following the guidelines and suggestions will make the visit a pleasant and memorable learning experience. All group visits must be reserved in advance! Naturalist-led hikes and programs are not available to groups without reserving them in advance. These programs are free with building admission.

Park naturalists can provide teacher training in the areas of geology, paleontology, biology, and environmental sciences. Call for more information.

Interpretive Center

The Falls of the Ohio Interpretive Center is a 16,000 square foot facility with over \$1 million in exhibits and displays, a 14-minute state-of-the-art movie, educational classroom/library, gift shop, vending area, restrooms, river observation room, and wildlife observation room.

Exhibit topics include geology, paleontology, flora and fauna, cultural history, human changes at the Falls, surveying and mapping, industry and commerce, and the process that led to the establishment of the Falls of the Ohio National Wildlife Conservation Area and Indiana State Park. Small temporary exhibits will be set up from time to time.

While there is no fee to enter the State Park, there is an entrance fee to the Interpretive Center: \$2 for adults and \$1 for children 2 to 12. Teachers and chaperones are admitted free of charge (please read the “Educator’s Guide” for additional important information).

We suggest that groups allow a minimum of one hour to tour the building. This would include time for the orientation theater and other video presentations in the exhibit gallery.

Groups which purchased a brick as part of the Falls of the Ohio fund raising campaign may view “their” brick by inquiring at the information desk. Brick sales will continue indefinitely; please inquire at the reception desk.

Introduction to the Falls of the Ohio

Natural History

The history of the Falls of the Ohio reaches back millions of years, leaving us with a wealth of natural wonders and resources to explore. They include 400 million-year-old Devonian fossil beds; over 265 species of birds; 125 species of fish; a variety of flora and fauna; habitats and interesting geological formations such as sculpted limestone, a natural arch, and small waterfalls.

The formation of the Falls fossil beds dates back to the middle of the Devonian Period (in the Paleozoic Era) between 408 and 360 million years ago. At that time a shallow sea cut diagonally across the eastern half of the North American continent from New York through Kentucky southwest over Texas. The Appalachians and the Great Plains were dry land.

The continental sea was teeming with a variety of marine life including fish, echinoderms, trilobites, brachiopods, bryozoans, sponges, and corals. The skeletal remains (mostly calcium carbonate) settled on the sea floor, steadily burying older layers of sediment. Over time the sedimentary rock limestone was formed, which preserved the fossils.

During the remainder of the Paleozoic Era, this area was alternately under a sea, swamps, or intermittently exposed as dry land. During the Mesozoic Era (the “Age of Dinosaurs”), the area was dry land (with dinosaurs everywhere). The evidence of dinosaurs was not preserved, because there were no rocks formed in the area during the Mesozoic. Land was eroding away, as it is today.

Millions of years later during the Pleistocene epoch, glaciers advanced from the north. Over a period of two million years, they helped form the present day Ohio Valley. The last glacial advance (the Wisconsin glaciation) ended about 10,000 years ago. The last glaciers pushed south stopping short of the Falls before melting. This melt water, coupled with millions of tons of loose rock, filled the river valley and shaped the river we call the Ohio. Since the end of the glaciation, an estimated 100 feet of glacial outwash and 20 feet of limestone have been removed.

The Devonian limestone extends to the north beyond Indianapolis, Indiana, and southeast to the Cumberland plateau. It may be found in northern and central Ohio and swings into Canada and over to western New York. During the Devonian Period, the North American and African continental plates were not far apart. Fossils similar to those at the Falls can also be found in Morocco, in northwest Africa.

The fossil beds at the Falls are considered to be among the largest naturally occurring laterally exposed Devonian coral beds in the world. Over 300 species of fossils have been identified at the Falls, many of which are type specimens, being discovered and described from the Falls for the first time.

The fossil beds are only one natural resource at the Park. There are over 265 species of birds, including shore birds, wading birds, and songbirds. There are several endangered species that visit the Falls - the American bald eagle, the osprey, two species of night herons and the peregrine falcon. Cormorants, herons, gulls, geese, ducks, egrets, loons and kingfishers may be seen.

The Falls have been used as a fishing area for thousands of years. Some 125 species of fish have been reported. Some of the largest are catfish weighing over 100 pounds. Three of the oddest fish, the long-nose gar, the paddlefish (spoonbill catfish), and the shovelnose sturgeon, resemble prehistoric fish.

Other fauna which may be seen at the Falls include mammals like the fox, whitetail deer, beaver, eastern cottontail rabbit, gray and fox squirrels, muskrat, opossum, and raccoon. Reptiles including lizards and non-poisonous snakes may be rarely seen. Invertebrates including river mussels, snails, and a variety of aquatic and airborne insects can be observed.

Flora at the Falls includes both native and non-native species. Evening primrose, prairie mimosa, monkey flower, wood sage, bittersweet nightshade, cardinal flower, and tickseed sunflower may be seen blooming at various times. Trees include the eastern cottonwood, sycamore, black willow, honey locust, silver maple, and osage orange. Other plants include star cucumber vine, sumac, trumpet creeper, and bind weed.

The flora and fauna flourish at the Falls in a variety of habitats including river, stream, wetland, mud flat, sandbar, marsh, prairie, rock, and woodland. These diverse habitats co-exist in a concentrated area that has been altered both by man and nature.

The diversity of the natural resources at the Falls provides an unlimited opportunity for study and simple enjoyment of a natural area rich in bio-diversity.

Cultural History

The cultural history of the Falls is both rich and varied. The first human habitation of the Falls reaches back about 12,000 years ago when the Paleo-Indian people lived in the area. These early peoples were nomadic, following animal migrations and seeking raw materials such as high quality "flint." They probably hunted mammoths, mastodons, and other ice age mammals that are now extinct.

The Archaic people lived between 10,000 and 3,000 years ago. They were semi-nomadic tribes who moved seasonally to gather wild plants, to fish, and to hunt and trap animals. They produced tools such as adzes, axes, the compound spear (atl-atl), and baskets. The native figure in the lobby exhibit represents this group.

The Woodland Culture developed in the region 2,000 to 1,000 years ago. They cultivated crops, established small villages with regional variations, buried their dead ceremoniously, used bows and arrows, and developed pottery techniques. Extensive trade networks were established. Large mound and earthwork complexes were built during this period.

Late Prehistoric Cultures flourished between 1,000 and 300 years ago. They developed maize agriculture, as part of adapting to a floodplain environment. These cultures developed into "chiefdoms" with complex political and social systems. Large "towns" were developed by building large platform mounds around a central plaza. Often stockaded walls surrounded these settlements.

Evidence of permanent settlements at the Falls of the Ohio by prehistoric peoples is considerable. Development of the modern cities around the Falls has destroyed many of these prehistoric sites. Construction of the levee following the 1937 flood heavily altered or destroyed sites near the Falls. The filling of swamps and lakes has destroyed many

prehistoric sites in the Louisville area. More recent development has destroyed more. Still, there is an abundance of evidence that people occupied and lived in the Falls Area.

The first documented European occupation of the Falls occurred in 1778 when George Rogers Clark, with a group of militia and their families, established a settlement on Corn Island near present-day Louisville. It was from here that he launched his successful military campaign in the Northwest Territories. Some have suggested, though not confirmed, that Robert LaSalle visited the Falls in the late 1600s. Daniel Boone may have passed through in 1771.

After George Rogers Clark completed his military career and settled near the Falls, the area began to develop rapidly. Clark and his men were granted land in the area and Clark surveyed the town of Clarksville, Indiana. In 1803, George Rogers Clark's younger brother, William Clark, with his partner, Meriwether Lewis and the Corps of Discovery, began their famous exploration of the Louisiana Purchase near Silver Creek below the Falls.

Several famous people visited and lived near the Falls. In the early 1800's, Henry Clay and Humphrey Marshall fought a duel at Silver Creek. John James Audubon lived at the Falls from 1807-1810 and completed many bird paintings there.

Other famous dignitaries who visited the Falls include Presidents James Monroe, William Henry Harrison, Abraham Lincoln, and Herbert Hoover (also a geologist). Literary figures including Charles Dickens, Mark Twain, and Walt Whitman made visits. Mike Fink, the legendary riverman, visited. Big Jim Porter, the "Kentucky Giant," ran a tavern on Shippingport Island (at that time a thriving community).

As navigation and commerce expanded on the Ohio River, the need for controlling the depth and flow of the river increased. To circumvent the dangerous rapids at the Falls of the Ohio, the Portland canal with locks was dug over several years and completed in 1830. Over the years, it was enlarged to handle bigger steamboats. The first dam on the Ohio River was constructed beginning in 1868. Due to frequent interruptions by high water and runaway barges, the dam was not completed until 1881.

The Ohio River Canalization Project was created to improve river navigation. A series of dams were constructed to control the river flow. The wickets consisted of 58 dams made of wood and metal that had to be raised and lowered individually by manual labor. The dam at the falls was number 41. Wicket construction began in 1885 and was completed in 1929. A decision was made to replace the wickets with a series of mechanized locks and dams. Currently, 18 locks and dams help maintain water levels throughout the entire Ohio River system. Two wicket dams, dams #52 and #53, are slated to be replaced by a new dam near the mouth of the Ohio. The McAlpine Dam at the Falls of the Ohio was completed in 1964, replacing the aging wooden wickets. The locks and dams on the Ohio are operated and maintained by the Army Corps of Engineers, who are responsible for controlling the water level in the river.

In 1982, after immense effort by groups and individuals, 1404 acres of the Falls were designated a National Wildlife Conservation Area administered by the Army Corps of Engineers. In 1990, a section of the area became the Falls of the Ohio State Park, administered by the Indiana Department of Natural Resources, Division of State Parks. The state park designation gave impetus to the construction of the Falls of the Ohio Interpretive Center, a 16,000 square feet, 4.9 million-dollar visitor exhibit complex.

Activities

We have developed a variety of activities that can be used to maximize your visit to the Falls of the Ohio. Activities have been developed for pre-visit, on-site and post-visit experiences. Activities include writing, listening, observing, visualizing, and measuring skills. Additional communication and math skills could easily be incorporated into the program. How might these activities change with the seasons?

Pre-Visit Activities

Natural History

Have students select a subject which interests them such as geology, birds, fish, plants, trees, etc. and write a short essay to predict what might be found at the Falls.

Have students identify the time sequence that the Devonian Period occupies within a geological time chart. Students should research the types of creatures that lived during that time in order to recognize the fossils that they might observe.

In order to make students familiar with conditions during the Devonian Period, have students study modern coral reefs. Visit the Louisville Zoo's HerpAquarium and observe the life in the aquariums. Those artistically inclined should make sketches. Others should list the type of creatures they observe. Which would be easiest to become fossils (why)? Which are not likely to be preserved (why)?

Have students identify four types of fossils found in the Devonian Period. Did they swim, float or remain fixed on the sea floor? (Why?)

Have students look for them in the diorama in the exhibit gallery.

Take students outdoors. Have them close their eyes and listen to the sounds of their environment. Students would then write what they hear. When they visit the Falls, have them do the same thing. Compare and note differences and similarities.

Have students study the arctic environment. What factors are present above the Arctic Circle that were not present in the Louisville area during the ice age? (Also see post-visit activities 4 & 5)

Have students observe leaves of the following plants: cottonwood, oak, ginkgo, cattail, pine, and horsetail (scouring rush). Use illustrations of those plants for On-Site Activity 6. Studying the origin of words helps us understand why organisms are given specific names.

In the following Devonian plants, what do the underlined prefixes mean? Pseudobornia, Archaeopteris, Protocalamites.

(Answers: Pseudo - false, Archaeo - ancient, Proto - first or early)

Describe the differences between wading birds (like a heron) and a swimming waterfowl (like a mallard). How do these differences help the birds survive?

Study three fishing birds associated with the Falls: Cormorant, osprey, and heron.

Describe differences in their fishing techniques. Try to observe them at the Falls with binoculars or a telescope.

Cultural History

Can students imagine what the Falls of the Ohio may have looked like before Europeans settled? Have students write an essay on “shooting the rapids” in a canoe.

Have students, as a group, act out an excursion through the Falls on a flatboat in the early 1800s.

Have students research the Lewis and Clark expedition of 1803. Did it begin in St. Louis, as some believe? Did it begin at the Falls?

Have students write an essay on a historical figure associated with the Falls such as George Rogers Clark, Aaron Burr, John James Audubon, the legend of Prince Madoc, or the various Native American cultures that hunted and fished there.

Using handout #1, have students match the persons, events, and things in the left column with the numbers 1-12 to learn the time sequence of historical events at the Falls. What did the native people at the Falls do? Children? Women? Men? Create a play and act out the roles.

On-Site Activities

Natural History

Have students study textures. Make rubbings of trees, leaves, and fossils. Compare and look for symmetry of the patterns. Instruct the students not to write on the surfaces. Please be sure students do not make rubbings on brick walls or concrete walkways.

Have students collect water samples from the Ohio River. Examine the water for microscopic life. Run pH and other tests to check water quality. Compare water from the main channel to water in potholes. Note: Students should wash their hands in the Interpretive Center or with alcohol wipes after taking samples.

Have students do a sketch of a natural object (i.e. fossil, rock, tree, flower, falls, river, etc.).

Look at the sea floor diorama in the exhibit gallery. Each panel represents a different aspect of sea floor life (left: Silurian; center: Devonian life at the Falls; right: Devonian life represented at rocks at the west edge of the Park). Compare it to the aquariums at the Zoo’s HerpAquarium. List similarities and differences.

Observe the undersea diorama as if it were an aquarium to answer the questions:

- A) Which animals had backbones?
- B) Which types of animals were mobile? Stationary?
- C) Which were scavengers? Filter feeders? Carnivores?
- D) Make a checklist of the different organisms in the diorama. Note their colors.

Observe the trees in the diorama depicting the Devonian swamp.

- A) Use the leaf identification sheet described in Pre-visit Activity 7.
- B) Look at the Callixylon-Archaeopteris leaves.
What living plant leaves do they most closely resemble?
- C) Look at the Pseudobornia and Protocalamites leaves. What living plant leaves do they resemble?

Have groups of students work in teams to study different habitats at the Falls. The most accessible are marsh, rock (flat ground and rock cliffs), willow, and woodland habitats. Do not collect samples!

Cultural History

Have students note all of the man-made changes to the Falls. Which are the most significant? Why? What changes might be made in the future?

Have students locate and guess the purpose of the old iron rods sticking out of the rock at the lower end of the fossil beds near “Big Eddy.” (They were used to anchor boats.)

Have students list all the man-made objects (i.e. brick, metal, glass, and trash) which they observe at the Falls. Speculate as to who might have discarded the item and why. Compare the items to the trash left over after eating lunch.

Post-Visit Activities

Natural History

Let students compare the water samples that they collected with water samples from streams around the county. Visit the local water company to see how water is purified. How was water purified 50 or 150 years ago?

Students can write an essay on their experience at the Falls including the sounds, smells, textures, and sights.

Have students create a story on the object that they sketched at the Falls.

Some thought-provoking questions about the Ice Age and glaciers:

- A) What was the climate while the glaciers were in the area?
- B) Which animals co-existed then that don't today? Why?
- C) Were different plants in the area? Where are they found today?
- D) Where did the ice go?

Have students research the appearance of the Ohio River before the glaciers changed it to what we see today.

Cultural History

In small groups, have students make a collage of the Falls using photographs taken on their excursion.

Have students construct a model of a flatboat.

Have students visit Locust Grove and learn more about George Rogers Clark.

Visit the McAlpine Locks and Dam.

Visit the Portland Museum.

Visit the Howard Steamboat Museum in Jeffersonville.

Activity 1

Falls Time Line

Match the persons, events, and things in the left column in the correct time sequence from the oldest (number 12) to the most recent (number 1).

Devonian coral patch reef	_____
Daniel Boone's Wilderness Road ends at the Falls	_____
Paleo-Natives	_____
Glaciers cover most of Indiana	_____
Wickets, moveable wooden dams	_____
Portland Canal constructed	_____
Dinosaurs were living	_____
Falls of the Ohio becomes a State Park	_____
Louisville founded	_____
John James Audubon at the Falls	_____
ConnRail railroad bridge built	_____
First steamboats on the Ohio River	_____

Answers: 12, 8, 9, 10, 2, 4, 11, 1, 7, 6, 3, and 5.

Devonian coral patch reef	___12__
Daniel Boone's Wilderness Road ends at the Falls	___8__
Paleo-Natives	___9__
Glaciers cover most of Indiana	___10__
Wickets, moveable wooden dams	___2__
Portland Canal constructed	___4__
Dinosaurs were living	___11__
Falls of the Ohio becomes a State Park	___1__
Louisville founded	___7__
John James Audubon at the Falls	___6__
ConnRail railroad bridge built	___3__
First steamboats on the Ohio River	___5__

Activity 2

Match the bird to the food.

The following birds are found at the Falls. What food do they eat?

- | | |
|------------------------------------|----------------------------------|
| 1. Cardinal | A. Jabs fish, frogs, insects |
| 2. Cormorant | B. “Dive bombs” for fish |
| 3. Heron | C. “Dabbles” for insects, plants |
| 4. Hummingbird (Ruby-Throated) | D. Dives in head first for fish |
| 5. Kingfisher (Belted) | E. Small birds |
| 6. Mallard Duck | F. Flower nectar |
| 7. Osprey | G. “Flies” underwater for fish |
| 8. Peregrine Falcon | H. Grubs |
| 9. Woodpecker (Downy, Hairy, etc.) | I. Seeds |

Answers: 1-I, 2-G, 3-A, 4-F, 5-D, 6-C, 7-B, 8-E, 9-H

Activity 3

Glaciers

Definition: Glaciers are large bodies of moving ice which act as bulldozers upon the landscape.

Thought question 1: What happens to trees, soil and rocks as glaciers advance?

Thought question 2: What happens to the earth's surface with the weight of hundreds or thousands of feet of ice above it?

To demonstrate the answers to Thought questions 1 & 2, you will need a box filled with several inches of sand or uncompressed soil. A cardboard box (sealed to prevent leaking sand) or a cat litter tray will work well. It should be a minimum of 12" wide, 24" long and shallow, (less than 6" above the sand). A brick or cinder block is needed to demonstrate the effects of a glacier.

Place the brick or cinder block in the box on top of the sand/soil. Remove it and measure the amount of compaction that has taken place. Do it again, but leave the brick for an hour or more.

To simulate glacial movement in the box, have students make a model of a landscape, so that the brick will represent a thickness of about 500 feet. You can use match stems for trees and dig in the sand to make hills and valleys. Place the brick or cinder block on its side (horizontal) on the sand or soil. Slowly push the brick across the "landscape."

What happens as the brick is being pushed?

What has changed when the brick stops? Remove the brick carefully and examine the landscape again.

Do you have a terminal moraine (a pile of sediment where the glacier stopped moving forward)? Do you have any lateral moraines (sediment piled along the flank of the glacier)?

Compare your model to the map of Indiana showing glacial sediments (a wall map is available from the park's gift shop for \$3.50). Do you see moraines?

Thought question 3: How might melting glaciers have affected the directions in which rivers flow?

Additional activities for students

Activity 4 - Your Favorite Fossil

1. Divide your students into teams of two.
2. Have each pair of students walk on the fossil beds until they find a fossil they want to study.
3. What type of organism was fossilized?
4. What feature caught your attention to this fossil?
5. Study the physical characteristics of fossil. Measure its length and width (and if possible, its height). Note its shape, color and any associated patterns (growth, etc.).
6. Sketch, trace or make a rubbing of the fossil.

Activity 5 - Fossil Rubbing

Place a piece of typing paper or wax paper over a fossil that is embedded in rock. Fossils that protrude slightly from the rock are best. Using a crayon or soft pencil, slowly mark over the paper until the fossil imprint is clearly visible. Be careful to hold the paper very still to get the sharpest image possible.

Activity 6 - Analysis of Water Sample

Utilizing the data sheet, choose three factors (i.e. pH, oxygen) to test for. After obtaining the test results, what inferences can you make about: (1) types of pollution (2) sources of pollution, and (3) impacts on aquatic life.

Activity 7 - Falls Collage

In groups of 6-8, make a collage of man-made objects (aluminum cans, for example) and changes (i.e. the McAlpine Dam) which you observed at the Falls. You may use real objects (not collected at the Falls) or pictures and drawings to represent the objects and changes.

After completing the collage, have a group discussion on what you found, how it may have impacted the environment at the Falls, and your feelings about these changes.

Activity 8 - Geologic Column

Use a roll of paper. If 1 million years = 1 cm, the Devonian life at the Falls would be on one end 400 cm (4 meters) from today. The most recent glacial period would be within the last millimeter. The founding of the River Cities would be less than the width of a hair from the end of the paper.

Question: How long would the paper be if 1 cm = 1 million years, and your chart included the origin of the earth 4.8 billion years ago?

Additional activities for students

Activity 9 - Making Cast and Mold Fossils

Objective: Students will be able to describe how fossils are formed and will distinguish between a cast and mold fossil.

Materials: Plaster of Paris, water, plastic container for mixing plaster, modeling clay, paper cups, various seashells,

Procedure:

1. Distribute a ball of clay (about the size of golf ball), a cup with the bottom cut out, and a seashell to each student.
2. Direct the students to make a flattened pancake- shaped piece of the modeling clay which is slightly larger in diameter than the bottom of the paper cup and about 1/4 to 3/8 in. thick.
3. Press a shell into the center of the clay pancake deep enough to make a good impression.
3. Explain to students that the impression left in the clay after the shell is gently removed is a mold of the shell and in real life a shell leaves an impression in the sand or silt in which it is buried.
4. Press the rim of the bottomless cup into the clay pancake with the shell mold in the center to form a dam around the mold in which plaster can be poured.
5. Mix a batch of plaster of Paris to the consistency of thin pudding and help the students pour this into the dam. The cup only needs to be filled 1/3 of the way.
6. Set the students' clay and cup combinations gently aside and let them set up for a day or two.
7. Have the students retrieve their cups after the plaster sets. They should be able to gently peel away the clay from the bottom and carefully tear off the paper cup. This will leave a piece of plaster containing a cast of the original shell.
8. Explain to students that in real life, the impression or mold of the original animal's hard parts, such as bone or shell, would often become filled with minerals which would form a cast type fossil much like the ones they made from Plaster of Paris.
9. To further help the students remember the cast and mold concept, you can ask them to think of a Jell-O mold into which the Jell-O is poured. When students are out on the fossil beds, have them tell the difference between actual cast and mold fossils they see. They can also take modeling clay with them and press it onto (or into) fossils to form casts or molds of the original fossils.

Vocabulary List

Archaic Culture - Semi-nomadic people who lived between 8,000 and 1,000 BC They moved seasonally to hunt, trap, fish, and forage. The people used tools (adzes, axes, etc.) and developed regional variations in their culture.

Archeologist - A person who studies remains of past cultures, both prehistoric and historic.

Avian - Relating to birds.

Brachiopod - A marine invertebrate animal with a soft body and two shells that are symmetrical from left to right, not top to bottom. They were fixed by a pedicle muscle and could not move. Brachiopods are abundant in the fossil record, but are uncommon in the ocean today.

Brevispirifer gregarius - A species of Devonian brachiopod so common at the Falls, it forms a layer and one of the zones of the fossil beds.

Bryozoa - A phylum of colonial animal that builds an exoskeleton. Some bryozoa build colonies that superficially resemble corals. Individual members of the colony are microscopic.

Calcium Carbonate - The chemical compound that makes the minerals calcite and aragonite. Calcite forms chalk, limestone, and marble. Aragonite forms the exoskeletons of most modern shell-forming organisms.

Chert - A sedimentary rock composed of quartz (silicon dioxide). It occurs in various colors. Prehistoric peoples used chert to make projectile points, scrapers, drills and other tools. Its origin is unknown.

Colonial Coral - A growth habit of coral where individual animals live in adjacent tubular chambers.

Corals - A marine invertebrate, usually a colonial organism. The coral animal or “polyp” builds a hard rock-like skeleton around its body. Numerous tentacles stick out from the top of the body for feeding. When the animal dies the soft body decays leaving the hard exoskeleton which is the part preserved in fossils.

Coral zone - A layer of rock at the Falls containing abundant corals.

Crinoid - A member of the echinoderm class Crinoidea, which usually have a stalk composed of circular plates (the column), a “head” consisting of a cup and arms with small tentacles, and a holdfast or grapple to anchor it to the sea floor.

Devonian - The period of geologic time between 408 - 360 million years ago, marked by the dominance of fishes and the first amphibians. The limestone layers at the Falls of the Ohio were deposited during the middle of the Devonian Period.

Dunkleosteus - A Devonian fish that reached 10 meters in length characterized by exterior bony plates and sharp cutting jaws that lacked teeth. A member of extinct fish called arthrodires.

Ecology - A branch of biology which looks at the interrelationships between organisms and their environments.

Epoch - A subdivision in geologic time. Pleistocene is an epoch of the Quaternary Period.

Era - A subdivision of geological time consisting of the divisions: Precambrian, Paleozoic, Mesozoic, and Cenozoic. The Devonian Period falls within the Paleozoic Era.

Exoskeleton - The hard outer covering, or shell, protecting the soft organs of an organism.

Extinct - No longer existing in living form.

Falls - A drop in a river or stream creating cascading water.

Fauna - Animal life occupying a particular area.

Finger coral - A slang name for small, finger-like corals, particularly in the coral zone at the Falls.

Flatboat - A steerable raft made of wood with sides and sometimes a shelter in the center. Families and traders used flatboats for river travel.

Flora - Plant life occupying a particular area.

Fossil - Any evidence of pre-existing plant or animal life preserved in rock, generally older than 10,000 years.

Geological time - The total time the earth has existed, estimated to be 4.5 billion years. It is subdivided into eons, eras, periods, epochs, ages and smaller units.

Glacial boulder - A large rock transported by ice some distance from its source, and deposited in an area of melting ice.

Glacial outwash - A usually unstratified assortment of sand, pebbles, cobbles, and boulders that remain as melting glaciers recede from an area.

Glacier - A large moving mass of ice, forming on land surfaces.

Horn Coral - A common name for solitary corals of the Order Rugosa. Characterized by a radial septal pattern internally. Some are shaped like a cow's horn or cornucopia.

Historic time - Time usually measured from the time of recorded history or when Europeans first had contact with native people.

Igneous rock - Rock formed from molten magma or lava. Occurs at the Falls in glacial outwash.

Invertebrate - An animal without a backbone.

Joint - A linear fracture in rocks without lateral or vertical movement formed from stresses in the earth's crust. It may be filled with minerals like calcite. The Falls fossil beds contain many joints that run for 10 - 200 feet. Some are aligned in a north-south direction.

Limestone - A sedimentary rock composed of calcium carbonate which is formed from the exoskeletons of marine invertebrates or chemical precipitation in sea water.

A lock - A man-made "water elevator" built on a canal and used to raise and lower boats to different levels. The McAlpine Lock on the Portland Canal at Louisville is one of 18 locks in the Ohio River system.

Long hunter - A person who hunted and trapped in the wilderness, exploring and surveying areas while trading with the natives.

Mammoth - An ancestral elephant, with long curved tusks, which lived during the Pleistocene epoch. Preferred open woodlands and meadows where it grazed on grasses and other plants. Replica skeleton in the Interpretive Center lobby.

Mastodon - An ancestral elephant similar to the mammoth, with shorter and straighter tusks. Preferred woods where it would browse on trees.

Mineral - A natural, solid, inorganic chemical or compound. Rocks are mixtures of minerals.

Metamorphic rock - Rock which has been altered from heat and pressure (i.e. granite to gneiss, limestone to marble). Found at the Falls in glacial outwash.

Mississippian culture - (AD 1000-1650) - A native culture that lived throughout the mid-Mississippi valley and most of the Southeast. This culture lived in large villages, built houses, developed an economy based on agriculture, practiced religion, and created high levels of art.

Mollusks - A group of invertebrates that include snails, clams, squid, and slugs.

Oil shale - A type of shale rich in carbon. With treatment, small amounts of the carbon can be released as oil.

Organism - Any living, individual plant or animal.

Paleoindians - (10,000?-8000 BC) - A culture thought to have entered America via the Bering Strait land bridge between the last two Ice Ages. They were nomadic tribes that foraged and hunted for survival. Local sites date back to 10,000 BC

Paleontology - The study of prehistoric life in its geological context.

Plate Tectonics - The geological theory, with solid a proof of evidence, that the earth's crust is composed of movable plates above the mantle that slide along, over or under one another.

Portage - To carry boats and cargo over land between navigable waterways.

Prehistoric - Before the time of recorded history.

Rock - A mixture of two or more minerals, or an aggregate of a single mineral.

Sandstone - A type of sedimentary rock formed from sand-size particles cemented together by calcium carbonate or other minerals.

Sediment - Loose rock particles of any size.

Sedimentary rock - Rock formed from sediments deposited by water, wind, or ice. Examples include limestone, sandstone, and shale.

Shale - A sedimentary rock formed clay-sized particles cemented together.

Strata - (Singular - stratum) Layers of rock or sediment, usually laid down horizontally.

Stratification - The arrangement of rocks in distinct layers due to the action of water or wind.

Trilobite - A group of extinct arthropods related to crabs, spiders, and insects. Trilobites had segmented exoskeletons divided into three lobes.

Tectonics - Relating to the forces that cause earthquakes, mountain building, ocean trenches, and volcanoes.

Wicket - A gate (usually wooden) built into a dam that regulates water flow. The McAlpine dam at the Falls replaced the old wicket dam #41 in 1964.

Woodland Culture - (750 BC - AD 1,000) - A culture which began settling into villages and increasing its dependence on agriculture. They developed complex social systems, used the bow and arrow to hunt game, stored food in ceramic vessels, and built mound and earthwork complexes.

References and Suggested Reading

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