

Discovering Alabama

Teacher's Guide

Geological History

Suggested Curriculum Areas

Science
Geography
History
Social Studies

Suggested Grade Levels

4–12

Key Concepts

Geological Change
Geological Time
Scientific Method
Biosphere

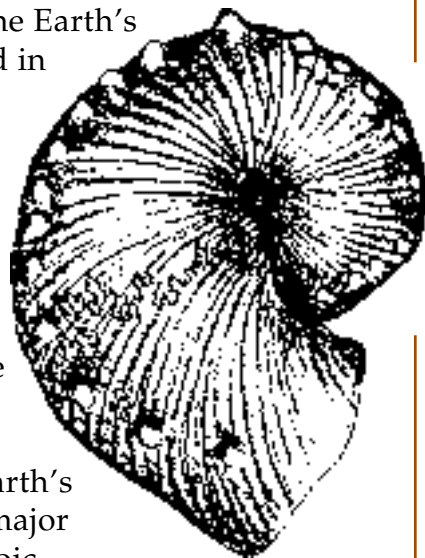
Key Skills

Map Reading
Research
Issue Analysis
Communication

Synopsis

This video highlights the geological history, landscapes, and natural resources of Alabama in the context of the geological history of the Earth.

Some of the first studies of the Earth's geological history were conducted in Alabama. As far back as the eighteenth century, geologists from other countries were attracted to Alabama by reports of the region's diverse geology. Since then, the science of geology, in Alabama and elsewhere around the world, has pieced together the history of how the landscape and life forms of earth have changed over time. This video traces the earth's changing formation through the major geological eras (Paleozoic, Mesozoic, and Cenozoic) of fossil record and concludes with the scientific question of whether industrial societies may be causing environmental changes that induce accelerated geological change.



THE UNIVERSITY OF
ALABAMA



The Linn Henley
Trust

Discovering Alabama is a production of the Alabama Museum of Natural History in cooperation with Alabama Public Television. For a complete list of titles in the *Discovering Alabama* series, as well as for information about ordering videos and accompanying Teacher's Guides, contact us at either: *Discovering Alabama*, Box 870340, Tuscaloosa AL 35487-0340; phone: 205-348-2036; fax: 205-348-4219; or email: orders@discoveringalabama.org. Also visit our website: www.discoveringalabama.org.

This program was produced with support from the following organizations:

Before Viewing

1. Have each student sketch from memory (without assistance from a map or the teacher) an outline of the state of Alabama, large enough to cover most of an 8.5" by 11" sheet of paper. Within this outline each student should place appropriate symbols to indicate the locations of Alabama's a) major mountain areas, b) major valleys, c) Fall Line, d) prairie region, e) sandy hills region, f) major rivers, bays, and wetlands, and g) coastal area. (You might make available a standard key of feature symbols so all drawings will be consistent. To feel comfortable with this activity yourself, an advance review of Alabama geography/geology might be useful.)

2. With students either in pairs or in small groups, ask that they exchange sketches, discuss briefly how the drawings differ, and work together to produce a composite map based on their joint input. When the improved maps are completed, ask them to work jointly to locate several additional features: a) the part of the state with the oldest rocks, b) the part with the youngest rocks, c) the region with the darkest fertile soils, d) the region with dinosaur age fossils, and e) the most recent major geological features in the state.

Note: These tasks may be difficult for younger students unfamiliar with such information, but encourage them to make every effort to locate features as precisely as possible, even if they have to guess. The aim at this point has less to do with the accuracy of information than with stimulating student interest for the video.

While Viewing

Have students watch for clues and information relating to the **Before Viewing** assignments.

Video Mystery Question: According to scientists, one form of life has enjoyed a relatively short period of existence on the earth but has possibly wrought the greatest range of impacts. Which form is this? (Answer: *Homo sapiens*, the one and only living species of the genus *Homo*—human beings.)

After Viewing

1. Reconvene students in pairs or small groups and have them add to their maps any new information they learned from the video.

2. Using the colorful Geological Map of Alabama, (See **Additional References and Resources**), assist students in examining the many geological regions of the state to pinpoint features discussed in the video.

Extensions

1. Visit the **Alabama Museum of Natural History** in Smith Hall on the University of Alabama's Tuscaloosa campus. Before your visit develop a "research" questionnaire that should include all pertinent questions and concerns you and your students might have. You might also want to organize the class into investigative teams and compete to see which team learns the most during the visit. Don't miss the geological maps on the second floor! Coordinate your visit with the Museum (call 205-348-9482) so that you can enjoy a guided tour and also arrange some exploration/research time for students.

2. For upper grade levels, this video is a good primer to

help set the stage for examining such environmental issues as the **greenhouse effect** and its implications of global warming, climate change and sea level rise. Environmental groups fear that human society is causing these problems, while others believe that current global environmental change is a result of natural causes, regardless of human influence. Thus, you might a) invite groups with differing viewpoints on this issue to speak to your class, or b) have student teams do research and report on these issues.

Philosophical Reflections

As we all know, the ongoing controversy of evolution *vs.* creationism can evoke emotional debate and is sometimes best left out of the classroom. On the other hand, questions about the origin and purpose of the world are central to the human quest for knowledge. The key is to make sure that any classroom discussion about these questions is conducted not only with respect for differing viewpoints, but also with kindness and sensitivity for the feelings of others.

If your school is compatible with examining both the **evolutionist** and the **creationist** perspectives, you might wish to begin with an observation made by the famous astronomer Carl Sagan, who said that, when searching for truth, extraordinary claims require extraordinary evidence. In this regard, many scientists and religious leaders today are working closely together. It seems there is growing agreement that, while the layers and fossils of the earth's crust are extraordinary geological evidence, another kind of extraordinary evidence is simply the wonder of creation itself. What do you think?

Nature in Art

In Act IV of *Julius Caesar*, William Shakespeare makes the assertion that “nature must obey necessity.” And indeed, as Shakespeare suggests, the design of every existing thing must, of necessity, conform to the dictates of mass, pressure, flow, and other structural constraints imposed by space. The immense variety of harmony and beauty we see in the world is largely the result of nature’s working and reworking only a few basic structural patterns. The branching of trees is essentially the same pattern as the branching of human arteries and the branching of rivers. Patterns of equilateral triangles form the same structural basis for crystals as for tortoise shells. Likewise, the spiral fossils of the ancient sea nautilus are similar in pattern to the spiral arrangement of the largest galaxies. The fact that the same functional forms are common to physics, mathematics, art, and music suggests a universal law of order over chaos. Invite students to draw, paint, or photograph examples of different things in nature that have the same patterns of design or structure.

Community Connections

1. Using the *Geological Map of Alabama*, have students locate the geological region of your county. Determine the geological era and, if possible, the geological period of the major formations and surface rocks in your part of the state. Invite a geologist to help.

Take a field trip to an exposed land surface—examples include old mining areas, roadway cuts, or rocky natural areas—to collect an array of rocks and fossils from your area. Start a classroom geology lab containing rocks and fossils that students have collected locally and from other places, see **Additional References and Resources**.

2. Organize the class into teams to research, produce and distribute a variety of public education materials about local geology and geological history. These materials might include articles for the local newspaper, slide presentations for civic groups, and informational brochures for general use. The class might want to develop other ideas, perhaps a student-led geology awareness hike for parents. With a little preparation, the school grounds could suffice for such an event.

Complementary Aids and Activities

Project Learning Tree, Activity Guide 7-12, Activity 77, “You’ve Come a Long Way, Maybe.” Available through Alabama Forestry Association, 555 Alabama St., Montgomery AL 36104.

Volunteer for Science Program. Help scientists at the U.S. Geological Service by gathering data in your state. Write to USGS, Dept. P, 601 National Center, Reston VA 22092, or call (703) 648-7440.

Earth Science Information Center, USGS, 507 GH National Center, Reston VA 22092. Phone 1-800-USA-MAPS. Write on school letterhead and specify grade level to obtain geography and map reading study guides.

Additional References and Resources

• *NatureSouth*: vol. 1, no. 3; vol. 2, no. 2; vol. 3, no. 4; vol. 5, no. 1. Contact Alabama Museum of Natural History, Box 870340, Tuscaloosa AL 35487-0340, or call (205) 348-2040.

• *Museum Ephemera*: #67 “Basic Rocks and Minerals in Alabama” and #85 “List of 20 Common Central Alabama Rocks & Minerals” by John C. Hall, Alabama Museum of Natural History, Box 870340, Tuscaloosa AL 35487-0340; (205) 348-9473.

• Geologic Inquiry Group, U.S. Geological Survey, 907 National Center, Reston VA 22092; (703) 648-4383. They will answer your questions about geology.

• Geological Survey of Alabama, “Geological Map of Alabama,” 1:500,000 topographical map, 1989; U.S. Geological Survey, “State of Alabama,” 1:500,000 topographic map, 1966. Contact: P.O. Box 869999, University of Alabama, Tuscaloosa AL 35486-9999; (205) 349-2852

• *Eyewitness Book* series, Alfred A. Knopf Publishers. Useful titles include *Crystal and Gem*, *Rock and Mineral*, *Dinosaur*, and *Fossil*.

Parting Thoughts

“In the beginning God created the heaven and the earth. And God saw everything that He had made, and behold, it was very good—especially Alabama. Alabama is great!” Thus were the concluding words of the morning sermon delivered one Sunday at a little country church in a remote part of the state. Imagine the surprised expressions on the faces of the congregation, many of whom must have wondered from what Divine Book the good preacher was quoting. Whatever his source of inspiration, this minister was possibly among the first to smoothly merge the religious tenet of an Almighty Creator with the scientific revelation that Alabama is one of the most geologically diverse regions on earth. Amen and hallelujah!

Oh yeah, I almost forgot. Destruction or vandalism of important geological and fossil areas is a serious no-no. Be sure students understand this before embarking on any class field trips.



Happy outings,

D. Deeg



Discovering Alabama

Activity/Information Sheet

Geological History

Simplified Physiographic Provinces of Alabama

Geology is expressed on the land's surface; each major change in the landscape reflects a phase of the state's geologic past. Examine a good map of Alabama or look closely at the landscape. Notice that the topography of the state is divided into distinct regions, each with a characteristic appearance. The five major regions are called **physiographic provinces**. For example, the region from Birmingham to beyond Fort Payne comprises long mountain ridges that run strongly northeast-southwest. This region is called the Valley and Ridge. This and the four other physiographic regions in Alabama are:

1. Highland Rim (the Tennessee River Valley area)
2. Cumberland Plateau (the Alabama "Coal Measures")
3. Valley and Ridge (Red, Lookout, and Chandler Mountains)
4. Piedmont (east Alabama with many minerals, gold, tin)
5. Coastal Plain (a broad, rolling plain with many rivers and lines of low hills)

From *Museum Ephemera*, #76 "Simplified Physiographic Provinces of Alabama" (1986) and #40 "Physiographic Provinces of Alabama" (1995) by John C. Hall, Alabama Museum of Natural History.



HIGHLAND RIM Mostly limestone rocks of early Coal Age (Mississippian) times, landscape broad and open, rising slowly northward

CUMBERLAND PLATEAU Of middle Coal Age (Pennsylvanian), sandstones and shales, with much coal, especially in Warrior Basin in west Alabama, landscapes with ridges and deep valleys

VALLEY & RIDGE Rocks very old, bent and upturned, wrinkled by some long ago collision with Africa that built the Piedmont

PIEDMONT Rocks very old, broken and changed, eroded roots of the ancient Appalachian Mountains, built before the dinosaurs, rough, hilly landscape

FALL LINE Water flowing off old, hard rocks to the north onto soft, younger rocks of the Coastal Plain forms falls at this point on most major streams

COASTAL PLAIN Rolling plains and lines of low hills, made of sediments that have eroded from the Appalachians to the north. **Upper:** Mesozoic age with all rocks of upper Cretaceous age. **Lower:** Tertiary age, world famous geological sections, becomes more recent north towards south

ALABAMA COAST Newest part (Pleistocene) of the Coastal Plain, formed during the Ice Ages, and still being modified by Gulf waves and currents