Earth: Its Changes and Fossil Evidence
Lesson Plan

Grade Level: 6-8	**Curriculum Focus:** History of Earth; Fossils	**Lesson Duration:** Two or three class periods

Student Objectives

- Understand how Earth changed over a long period of time.
- Understand how scientists developed a theory using fossil evidence.

Materials

- Discovery School video on *unitedstreaming*: *When Dinosaurs Ruled: Africa*
  Search for this video by using the video title (or a portion of it) as the keyword.

  Selected clips that support this lesson plan:

  - Dinosaurs Evolve over Time
    - Pangaea Breaks: New Dinosaurs Emerge in Africa during the Cretaceous Period
- Video on *unitedstreaming*: *Earth's Catastrophic Past*
  Search for this video by using the video title (or a portion of it) as the keyword.

  Selected clips that support this lesson plan:

  - Part One: Earth's Catastrophic Past
    - Earth's Tumultuous History
    - Pangaea: A Giant Supercontinent

- Computers with Internet access (optional but very helpful)
- Reference materials, including an atlas
- Large sheets of paper
- Colored pencils
- Pencils or pens
- Scissors
- Clear adhesive tape

Procedures

1. Begin the lesson by showing the class a standard physical map of the world. Tell students to look closely at the continents. Ask if they think the continents always looked as they do on the map, or if they have changed shape or location throughout Earth's history. Write their ideas on a large sheet of paper or on the board.
2. Tell students that in 1915, the German scientist Alfred Wegener developed a theory that the continents once formed a giant supercontinent that he called Pangaea. He speculated that Earth took this form about 245 million years ago, during the Triassic period of the Mesozoic era—the era in which dinosaurs lived. A few years after Wegener proposed his theory, South African geologist Alexander Du Toit further theorized that Pangaea divided into two supercontinents 205 million years ago. Du Toit called the northern supercontinent Laurasia and the southern one Gondwanaland. The scientists used many kinds of evidence to advance their theories, especially similar fossil remains of plants and animals on different present-day continents. The scientists hypothesized that the continents were once connected.
3. Tell students that they'll follow steps similar to those of Wegener and Du Toit to see if fossil evidence supports the theory that one supercontinent divided into two. Assign the Fossil Evidence in Prehistoric Landmasses activity (see last page). Tell students they will focus on Gondwanaland, the supercontinent that includes what is now South America, Antarctica, Australia, Africa, Madagascar, and India.
4. Next have students cut out the shapes of the present-day landmasses and try to piece them together on a sheet of paper as Gondwanaland. Ask them to think about how the continents fit together.
5. Have students share their versions of Gondwanaland. Are most constructions similar? Show students a picture of scientists' version of Gondwanaland. (To download a picture, visit the Web site http://www.hartrao.ac.za/geodesy/tectonics.html.)
6. Discuss where the fossil remains in the activity have been found. Does this evidence support Wegener and Du Toit's theory? Do students think it is sufficient evidence? What other information would be helpful? Conclude by telling students that over the past century, scientists have continued to find evidence that supports this theory.

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students demonstrated exemplary performance and effort in marking the landmasses, completing the chart, and constructing Gondwanaland; participated actively in the class discussion.
- **2 points:** Students demonstrated average performance and effort in marking the landmasses, completing the chart, and constructing Gondwanaland; participated somewhat actively in the class discussion..

- **1 point:** Students demonstrated unsatisfactory performance and effort in marking the landmasses, completing the chart, and constructing Gondwanaland; did not participate in the class discussion

Vocabulary

fossil

*Definition***:** The remains of an animal or plant preserved from an earlier era inside a rock or geologic deposit, often as an impression or in a petrified state

Context: Pieces of coal often contain plant fossils.

Mesozoic

*Definition***:** The geologic era including the Triassic, Jurassic, and Cretaceous periods

*Context***:** The Mesozoic era is known as the Age of Dinosaurs because these animals roamed the earth then.

Pangaea

*Definition***:** A supercontinent that existed during the Mesozoic era that included most of Earth's present-day continents

*Context***:** German scientist Alfred Wegener first coined the term Pangaea, meaning "all land."

plate tectonics

*Definition***:** A theory that explains movements of continents and changes in Earth's crust caused by internal forces within the planet

*Context***:** The process of plate tectonics is responsible for building mountains and causing earthquakes.

Academic Standards

National Academy of Sciences

The National Academy of Sciences provides guidelines for teaching science in grades K–12 to promote scientific literacy. To view the standards, visit this Web site: http://books.nap.edu/html/nses/html/overview.html#content.

This lesson plan addresses the following science standard:

- Earth Science: Earth's history

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit link: http://www.mcrel.org/compendium/browse.asp

This lesson plan addresses the following national standards:

- Science—Earth and Space Sciences: Understands Earth's composition and structure; Life Sciences: Understands biological evolution and the diversity of life

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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- http://school.discovery.com/teachingtools/teachingtools.html