

Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their "Everything We Know About..." list. Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised, before viewing the program.

Raising a thought-provoking question is a good way to assess the overall depth of student understanding. A couple of suggestions are listed below:

- Why do we want to learn about the Earth's past? What can it tell us?
- What are some ways that scientists learn about the Earth's history?

Follow-up Activities

- Students can create their own version of the Earth's history by running a clothesline down the length of a school corridor. Students can illustrate important specific events in Earth's history, placing their illustrations all along the time line at the correct spots. (A suggested scale: given 75 feet of line, each inch would represent 5 million years.) Showing the entire human era, with all of its inventions and history, as being represented in less than 1/2 of an inch could be very memorable!
- The representation of the history of the Earth as a 4,500-page book (scale: one million years per page) is an interesting way to picture the passage of time. With your guidance, have students create their own "history book," with an appropriate scale to represent the amount of time from their birth until today (scale: one year per page). This book can be created using dates, photos, paragraphs, numbers and illustrations.
- One way to learn about the history of the Earth is to examine rocks. Encourage children to bring in rocks from their local communities. Help children to identify the rocks that they've discovered by using rock and mineral guides for resources. What can these rocks tell you about the geologic history of your area? Do any of these rocks contain fossils? Invite a local geologist to visit with your class to extend students' knowledge of the development of the geology in your surrounding community.

Suggested Internet Resources

Periodically, Internet Resources are updated on our web site at www.LibraryVideo.com

- www.childrensmuseum.org/geomysteries/timeline.html
The Children's Museum of Indianapolis sponsors the "Geo Mysteries" Web site that includes an excellent geologic time line. Artifacts from eras and periods in the Earth's past are also featured.
- www.sdnhm.org/kids/dinosaur/index.html
Sponsored by the San Diego Natural History Museum, this Web site shares information about the dinosaurs that once roamed the Earth. Provides dinosaur facts, puzzles and fossil hunting tips for children.

Suggested Print Resources

- Hiscock, Bruce. *The Big Rock*. Aladdin Paperbacks, New York, NY; 1999.
- Hooper, Meredith. *The Pebble in My Pocket: A History of Our Earth*. Viking, New York, NY; 1996.
- Peacock, Graham and Jill Jesson. *Geology*. Thomson Learning, New York, NY; 1995.

TEACHER'S GUIDE CONSULTANT

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Earth Science for Children™



All About Earth's History

Grades K-4

This guide is a supplement, designed for educators to use when presenting this program in an instructional setting.

Before Viewing: Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create an "Everything We Know About..." list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they put on their list were scientifically accurate.

After Viewing: After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts they put on their "Everything We Know About..." list. Discuss what else they learned and use the followup questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



Program Summary

Scientists believe that the Earth started as a giant cloud of gases and dust in space, around 4.6 billion years ago. As the dust and gases came together under great pressure, they formed a red-hot ball. The surface of this ball took about 500 million years to begin to harden and cool. As the surface cooled into a crust over millions of years, volcanoes erupted regularly and rain fell constantly, covering most of the planet with water. The first spark of life appeared in the form of single-celled bacteria, and eventually blue-green algae filled the oceans. Over time, bony fish and sharks appeared in the waters, and millions of years later, plants began to form on the land. With plants as food, insects evolved and moved onto land. Amphibians formed and fed on the insects. At this time, all of the Earth's land formed one huge continent called Pangaea.

The Earth's crust broke into large plates that started drifting apart, forming today's separate continents. Many mountains were also created through earthquakes and volcanic action. Earth's giant reptiles, the dinosaurs, ruled the Earth from about 200 million years ago until about 65 million years ago. Ancient birds and many other kinds of animals — some of which are still around today — evolved at this time as well. Some scientists believe that about 65 million years ago, a huge meteorite smashed into the Earth, raising a blanket of dust that blocked out the sunlight for an extended period of time and turned the climate very cold. Dinosaurs and most other forms of life could not adapt to these sudden changes and became extinct at this time.

After the extinction of the dinosaurs came the Age of Mammals. More and more animals started populating the Earth, but it was not until around 2 million years ago that early forms of humans appeared. Modern humans evolved around 10,000 years ago, and many of the inventions and developments of our modern world have only taken place in the last 100 years!

Throughout Earth's history, the Earth itself has been continually changing and moving. That change continues even today. The layers of the Earth are responsible for much of this change. The crust, or hard surface that we live on, is relatively thin, resting on a very deep layer of molten rock called the mantle. The crust actually floats on this moving mantle, accounting for the continuous movement of the plates, the rising of mountains and the formation of deep trenches. Over time, layers of rock on the surface of the Earth have been built up and then worn away by the Earth's natural forces. Worn-away rock pieces, as well as shells and bones, form new layers of rock. Scientists who study these layers can tell how long ago they were formed and what was happening on Earth when they were deposited. One thing is certain: the Earth will continue to change.

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

crust — The outer layer of the Earth that is made of hard rock.

volcanoes — Mountains built by melted rock and other materials that erupt or flow out of the Earth.

single-celled — A term that describes organisms that are made of just one cell. Bacteria are single-celled, but humans are made of millions and millions of cells.

bacteria — Simple, single-celled organisms that were the first living things on Earth.

insects — Small animals with hard outer shells, three body parts, six legs, two antennae and usually two pairs of wings.

amphibians — Cold-blooded animals with backbones and smooth, moist skin that spend part of their lives in water and part of their lives on land.

reptiles — Cold-blooded animals with backbones and scales that breathe air and lay leathery eggs.

evolve — To change slowly over a very long period of time.

Pangaea — A giant continent that is thought to have existed about 300 million years ago and consisted of all of the present-day continents.

continent — A large, extensive landmass on the Earth's surface. There are seven continents on Earth.

dinosaurs — Land-dwelling reptiles that appeared on the Earth over 200 million years ago.

plates — Large pieces of rock that make up the Earth's crust. These plates float on the mantle layer.

earthquakes — The shaking of the Earth's crust, resulting from stresses that cause the sudden movement of rocks deep underground.

meteorite — A small piece of rock or metal that speeds through space and crashes into the Earth's surface.

extinct — To die out completely. Dinosaurs became extinct about 65 million years ago.

mantle — The layer of the Earth surrounding the core that is made of very hot, melted rock.

core — The solid center of the Earth made of very hot, solid metal.

fossils — Evidence or clues from the remains of living things that once lived on Earth.

Pre-viewing Discussion

Before students generate their list of "Everything We Know About..." this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- How old is the Earth?
- Has the Earth always looked like it does today? How do you think it has changed?

After the class has completed their "Everything We Know About..." list, and before watching the show, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

Focus Questions

You may wish to ask your class the following questions to assess their comprehension of key points presented in the program:

1. When was the Earth formed?
2. What was the Earth like when it first formed?
3. What happened to the surface of the Earth as it cooled?
4. What was the first life form on Earth like?
5. What does it mean to evolve?
6. What is Pangaea?
7. How did Pangaea change over time?
8. Describe what happened during the Age of the Reptiles.
9. How did volcanoes and earthquakes change the Earth?
10. What do scientists believe happened to the dinosaurs 65 million years ago?
11. Why is the Age of the Mammals called that?
12. Describe the early people on the Earth.
13. What are the three main layers of the Earth?
14. How is it possible for huge continents to actually move?
15. What is a core sample?
16. How are fossils helpful to scientists who want to learn about the Earth's history?