Science Picture Explorations:
A Set of Mini Lessons for Grades Pre-K to 2

Background

The Integrated Ocean Drilling Program (IODP) is an international marine research program that explores the Earth's history and structure as recorded in seafloor sediments and rocks, and monitors sub-seafloor environments. Scientific ocean drilling revolutionized our view of Earth history and global processes through ocean basin exploration. Science outcomes from 40 years of expeditions have advanced our understanding of sea level and climate history, gas hydrates, deep biosphere and the structure of land underneath the ocean. Scientific ocean drilling expeditions have validated the theory of plate tectonics, given researchers insights into Earth's ancient climate and provided evidence of an asteroid impact that caused mass extinctions 65 million years ago.

These mini-lessons are designed to introduce young children to and encourage exploration of a variety of subjects related to the process and science of scientific ocean drilling. They can be used as a unit in any order; alternatively each lesson can stand alone.

For more background information, please go to: *http://www.deepearthacademy.org*, *http://www.iodp.org*, and *http://www.joidesresolution.org*

Summary

Children observe photographs and do simple intro-ductory activities related to oceanography and ocean science.

National Science Education Standards

Standard A: Science as Inquiry

Standard B: Physical Science

Standard C: Life Science

Standard D: Earth and Space Science

Standard E: Science and Technology

Standard G: History and Nature of Science

Ocean Literacy Essential Principles

1. The Earth has one big ocean with many features.
2. The ocean and life in the ocean shape the features of the Earth
5. The ocean supports a great diversity of life and ecosystems.
6. The ocean and humans are inextricably interconnected.
7. The ocean is largely unexplored.

Target Audience

Ages 4 to 7 or Grades Pre-K to 2

Time Required

Each lesson is approximately 30 minutes.

Contents

Lesson 1: The Ocean is Big

Lesson 2: Exploring Mud

Lesson 3: Living Deep in the Ocean

Lesson 4: Tiny, Tiny Fossils

Lesson 5: Tools, Tools, Tools!

Lesson 6: Ocean Careers

Lesson 7: Drilling Geography

Lesson 8: Blast from the Past

Lesson 9: Minerals

Lesson 10: Collections

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Science Picture Explorations
Lesson 1: The Ocean is Big!

Objectives

Students will be able to:

- State that most of Earth is covered by ocean.
- Explain that ocean drilling is one way we learn about what is under the ocean.
- Name at least two parts of the scientific ocean drilling vessel.

Materials

- an inflatable globe
- a flip chart
- markers
- poster-size photo of the *JOIDES Resolution*
- a bag of puzzle pieces of the *JR* photo for each group
- a "mystery" bag, decorated with ocean-related art

Background

The Consortium for Ocean Leadership operates the U.S. scientific ocean drilling vessel—the *JOIDES Resolution* (*JR*). This ship is a state-of-the-art research vessel. It is 143 m (470 feet) long and 21 m (70 feet) across. The ship can drill in water up to 8230 m (27,000 feet) deep and hold more than 100 crew, scientists and support staff. It can stay out at sea on an expedition for up to 75 days without returning to port. For more information about the *JR*, please see: *http://iodp.tamu.edu/publicinfo/drillship.html*, *www.joidesresolution.org*

What to do

1. Have a student reach into the mystery bag to pull out a beach ball globe. Explain that you will toss it around and every time someone catches it, he/she will call out where his thumb and pinky finger on each hand have landed – in water or on land.
2. A volunteer will record these numbers with tally marks on a board or flipchart.
3. After a few minutes of ball-tossing, stop and look at your numbers. What do the students notice? (Hopefully they will notice that there are a lot more tallies in the ocean column than the land column.)
4. Once students realize that ocean covers most of the planet, explain that this is why scientists want to study the ocean and what is underneath it—to better understand our planet. How do they do this? One way is by scientific ocean drilling.
5. Divide students into groups of 4 to 5. Hand out a set of puzzle pieces to each group. Have them spend a few minutes putting together the puzzle on their desktops.
6. Once they have assembled the picture, hold a discussion with your students. Ask students:
   a. What do you see in this picture?
   b. What colors and shapes can you identify?
   c. What parts of the ship do you see? (e.g., windows, derrick, lifeboats, weather monitoring equipment, etc.) What are each of these things for?
   d. How do you think this ship moves?
   e. Do you know anyone who has been on a ship? Have you ever been on a ship or a boat? Where do ships go?
   f. What do you think this ship does?
   g. What kind of people do you think work on a ship like this? What kinds of things do they do?
7. End by explaining that this ship drills down into the sea floor to help us learn more about Earth.

Lesson 1: The Ocean Is Big!

Science Picture Explorations
Lesson 2: Exploring Mud

Objectives

Students will be able to:

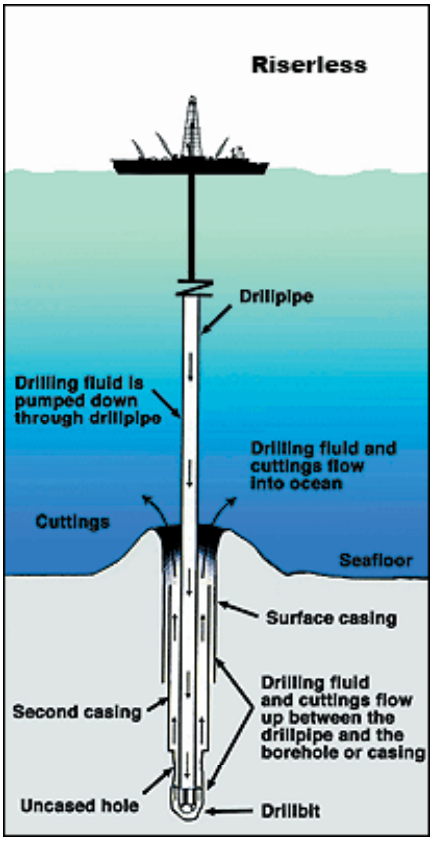
- Explain that scientists look at sediment samples to learn about the Earth's history.
- Name one thing that scientists do to study these samples.

Materials

- Photo of scientists looking at sediment samples
- For mystery bag: magnifying glass, film canister of mud, safety goggles, rock, t-shirt or jacket, pencil and paper, clipboard

What to do

1. Show students the scientist photo.
2. Ask them:
   - What do you see in this picture?
   - What shapes and colors do you see?
   - What objects?
   - Why would a scientist want to study "dirt"? What do you think she can learn from it?
   - Do you like to look at soil around your house or school? What do you see when you look at it?
   - Who are the people in this photograph? What do you think they are doing?
   - Have you ever met a scientist? What do you think scientists do? How do you become a scientist?
3. End discussion by having students reach into the mystery bag and describe what they find and how these items are related to the picture. How would each one be used?



Background

Scientists on the scientific ocean drilling vessel study what are called "core samples." The drill ship brings up samples of the sea floor in cores – long tubes of material collected while drilling. Each section of core is about 9.5 meters (31 feet) long and 6 cm (2.4 inches) in diameter. Once on board the ship, technicians cut the cores into 1.5 m (5 foot) sections for study. They are labeled to show where they came from. Scientists then investigate these cores to look at the kinds of sediments, rocks, minerals and fossils in the samples. The information they gain from these samples tells us a lot about the age of the sediment and what the Earth's climate was like when that sediment first settled to the ocean floor.

For more information, please see:

http://www.joidesresolution.org/node/218

http://www.joidesresolution.org/node/777

Lesson 2: Exploring Mud

Science Picture Explorations
Lesson 3: Living Deep in the Ocean

Background

Scientists have recently discovered animals in places they never thought life could survive! Ocean drilling led to the discovery of marine deposits of gas hydrates, which are ice-like substances that form when gases such as methane combine with water at low temperatures and high pressure. Scientists also discovered dense colonies of polychaete worms, like those in this photo, living on mounds of methane hydrate at the very bottom of the ocean. They are commonly called ice worms. These worms eat bacteria that live off chemicals produced by the hydrates, so they are among the small groups of animals discovered so far that do not depend on the sun for their energy.

For more information on ice worms, please see:

http://www-ocean.tamu.edu/Quarterdeck/QD5.3/macdonald.html

Objectives

Students will be able to:

- State that animals live in the deepest parts of the ocean.
- Compare ice worms to other worms they have seen.

Materials

- Photo of ice worms
- For mystery bag: photo of earthworms, real earthworms in a jar if possible, photo of a submersible vehicle to explain how photo was taken, play dough

What to do

1. Show students the worm photo.
2. Ask them:

- What does this look like to you?
- Have you ever seen anything like it before?
- How is this animal different or similar to worms that you have seen?
- What colors do you see? What shapes?
- Where do you think this photo was taken?
- What do you think it would feel like to hold this object in your hand?
- Do you think they would have a smell? What kind?
- Do you think you could eat this animal? Why or why not?
- Do you think some other animal eats them?
- Why would we want to study animals like this?

3. When your discussion is over, have student volunteers reach into the mystery bag and bring out the photo of a submersible. Ask students what they think it is? Explain that this is how scientists take photos like this.
4. Have students reach into the mystery bag to bring out real earthworms to compare.
5. Bring out the play dough and give students time to make their own worms. Ask students to share with the class what kind of worm they made, where it would live, what it would eat, etc.

Lesson 3: Living Deep in the Ocean

Science Picture Explorations
Lesson 4: Tiny, Tiny Fossils

Objectives

Students will be able to:

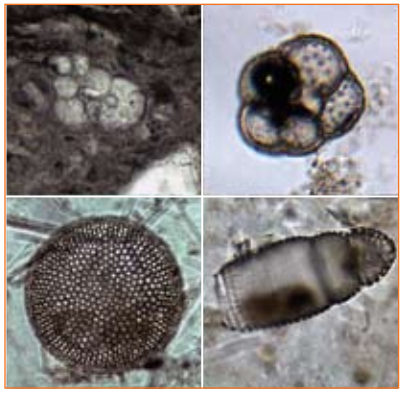
- Explain that fossils come in many different sizes.
- Describe a microfossil.

Materials

- Photo of the Day: Microfossils Poster cut up into individual squares
- Mystery Bag

What to do

1. Have students reach into the mystery bag and bring out one of the microfossil squares.
2. After each student has a square, ask them to walk around the room and find another student with a picture similar to their own.
3. When everyone is paired up, ask students:
    - What does your microfossil look like? Describe it to the rest of the class.
    - Why did you choose your partner? What is alike about your two photos? What is different about them?
    - What shapes do you have in your pictures? Does anyone have a star shape? Do any have shells with chambers (tiny spaces) in them? Does anyone have cone-shaped fossils? How about spikes?
    - What do you think your picture is? Is it a plant? An animal?
4. Have students return to their seats and explain that these photos are all of tiny, tiny creatures that lived a long time ago. In fact, they are fossils—just like dinosaur bones.
5. To help students understand relative size, explain that these fossils are about the size of a period at the end of a sentence. How big were dinosaurs? Some of the biggest were about 30 m (100 feet) long. If you take 30 kids and have them lay down feet to head, feet to head on the floor of the classroom or hallway, they will form a line about 30 m (100 feet) long.
6. Ask students to explain what they have learned about the size of fossils. How do they vary?



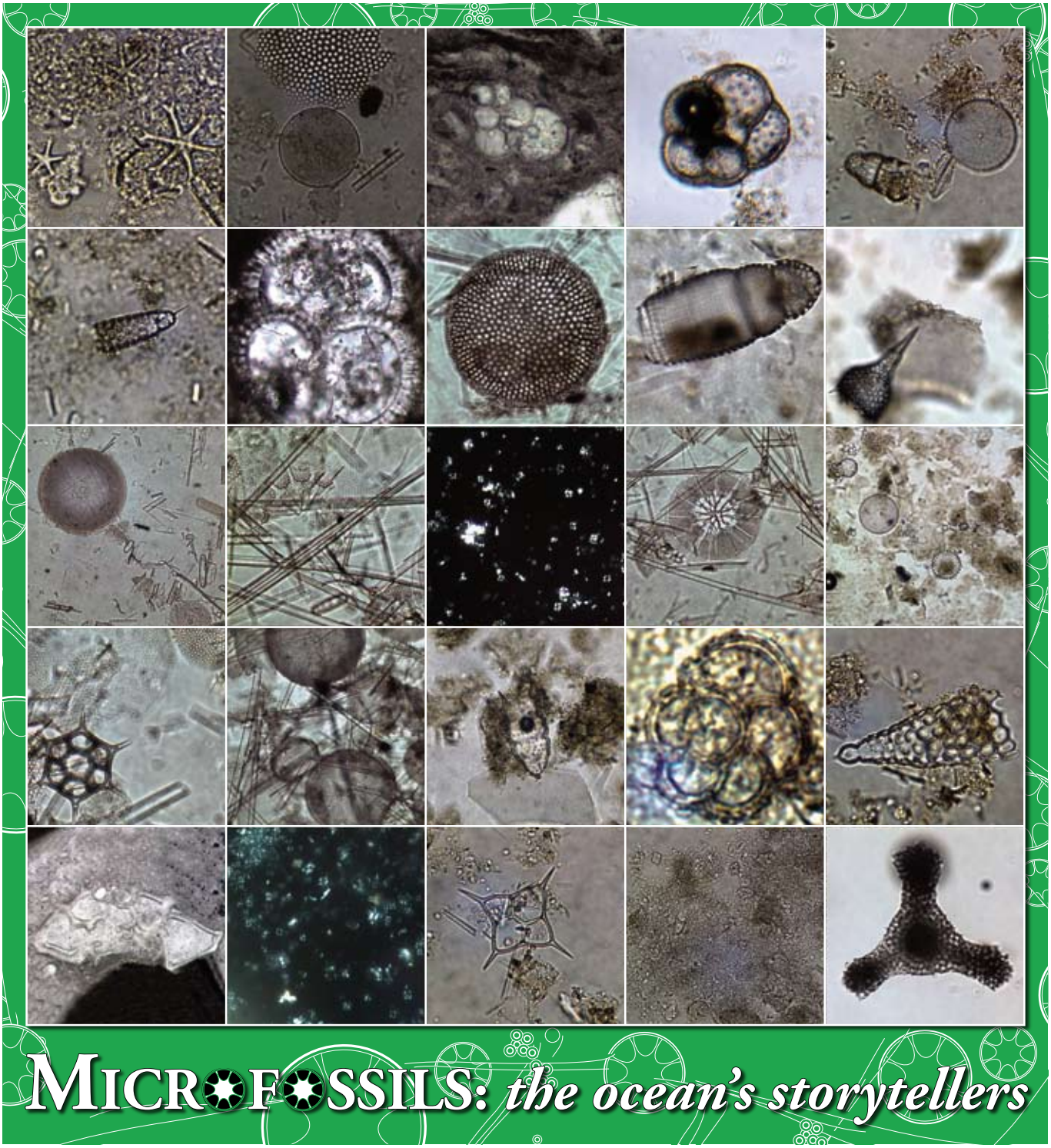
Background

Students often think of fossils as huge dinosaur bones displayed in museums. But, in fact, microfossils—or tiny fossils—are far more common. Microfossils are microscopic single-celled organisms that belong to the Kingdom Protista. Many are floating organisms that live in the sunlit surface waters of the ocean. The tiny shells of microfossils are the sediments that cover vast areas of the seafloor.

The poster in this activity shows several different images of microfossils, taken through microscopes. The microfossils were found in cores recovered by the scientific ocean drilling vessel, *JOIDES Resolution*. When a core is brought up on deck, scientists look at pictures like these to identify the microfossils found in cores and determine the age of the sediment, as well as other fascinating information about Earth's past climate.

For more information, please see:

http://www.oceanleadership.org/education/deep-earth-academy/resources/posters-pencils-and-more/dea-poster-microfossils/


MICROFOSSILS: the ocean's storytellers

Science Picture Explorations
Lesson 5: Tools, Tools, Tools!

Background

Engineers on board the scientific ocean drilling vessel need to solve challenges all the time. Drilling into the ocean floor is a big challenge – it's a little bit like hanging a string of spaghetti from the Empire State Building to a spot on the sidewalk – blindfolded! But over time, they have created and refined numerous tools to do this fascinating work. One of the most important tools is the drill itself, and the bits that core into the sediment or rock below the seafloor. One of these is pictured in this activity.

For more information, see: *http://www.smm.org/buzz/museum/ocean_drilling/drill_bit*

Objectives

Students will be able to:

- State that tools are objects that help us do things.
- Explain what an ocean drill helps us do.
- Draw an ocean drilling drill bit.

Materials

- Photo of the Day: ocean drilling drill bits
- Mystery bag: small tools such as screwdrivers, staplers, hammers, etc.
- A blindfold

What to do

1. Blindfold a student volunteer. Ask him or her to reach into the mystery bag and pull out an object and hold it up where the class can see it. By feeling it, have the blindfolded volunteer guess what it is. If she can't, she can ask the other members of the class yes or no questions until she figures out what it is.
2. Once they figure out what it is, ask students what this particular tool is used for. How does it help its user?
3. Repeat this activity with several other student volunteers until you have used up your mystery bag tools.
4. Ask students what all of these objects have in common. More or less, students should realize that they are all tools that help us with particular tasks.
5. Ask students to imagine what tools they would need to drill on the ocean floor.
6. If time allows, have students draw a picture of what their deep ocean drill would look like.
7. Share the photo of the drill bit and have a discussion about how this drill does its job—reaching to the ocean floor and bringing up core samples from the rock and mud below the seafloor.

Lesson 5: Tools, Tools, Tools

Science Picture Explorations
Lesson 6: Ocean Careers

Objectives

Students will be able to:

- Name several careers required to run a large ship

Materials

- Photos of the Day: several photos of people working on board the *JOIDES Resolution*
- For mystery bag: a tongue depressor or thermometer, a chef's hat, a screwdriver, a hard hat, a ruler, other career-related tools depending on careers you choose.

Background

The scientific research drilling community is made up of dynamic individuals with a huge variety of backgrounds and interests. From scientists, engineers, and editors to computer programmers, graphic artists, and accountants, drilling requires a group of dedicated individuals with the common goal of advancing earth science and sharing scientific results with the public. The careers pictured here are those of individuals who work on the *JOIDES Resolution* (*JR*) research vessel through the Integrated Ocean Drilling Program (IODP). You would also find many of these careers at earth science departments on university campuses, oceanographic or geologic research vessels, petroleum exploration companies, scientific book publishers, and even in your own schools. For more information, please go to *http://www.oceanleadership.org/education/deep-earth-academy/students/careers/*

What to do

1. Ask students to name several jobs they think are needed to run a large ship like the ocean drilling ship. Write their answers on a board or flip chart.
2. Show students the photos and ask them to try to identify what each person is doing.
3. Choose a person in your photos and ask what kind of things they think that person would need to know to do his job.
4. Now ask students to think about all the things they would need on board a ship for several weeks (e.g., food, laundry, helping the ship steer and move, doing experiments, talking to the shore and home, looking at the weather, etc.) Explain that there are people who do each of these functions as their jobs. Help students to list several of them.
5. Ask students what kinds of jobs their parents do and what kinds of things they think they might like to do when they get older.
6. Open the mystery bag and have student volunteers pull a tool out of the bag. For each tool, ask the class what kind of career would use that tool. Can they think of other tools that person would need? (e.g., for a thermometer, the students might name a doctor and other tools a doctor might need, including a stethoscope, a tongue depressor, a light, a bandage, crutches, an x-ray machine, etc.)
7. Wrap up by having students draw a picture of their favorite ship-based career.

Lesson 6: Ocean Careers

Science Picture Explorations
Lesson 7: Drilling Geography

Background

Scientific ocean drilling is dedicated to advancing understanding of Earth processes by sampling and observing environments below the seafloor. Today scientists are expanding deep-sea research by using multiple ships to explore the program's principal themes: life under the seafloor, environmental change, and solid earth cycles. In this lesson, students will look at the range of the program, exploring geography to examine the many sites where the program has operated. For more information and maps, please see: *http://iodp.tamu.edu/scienceops/maps.html*

Objectives

Students will be able to:

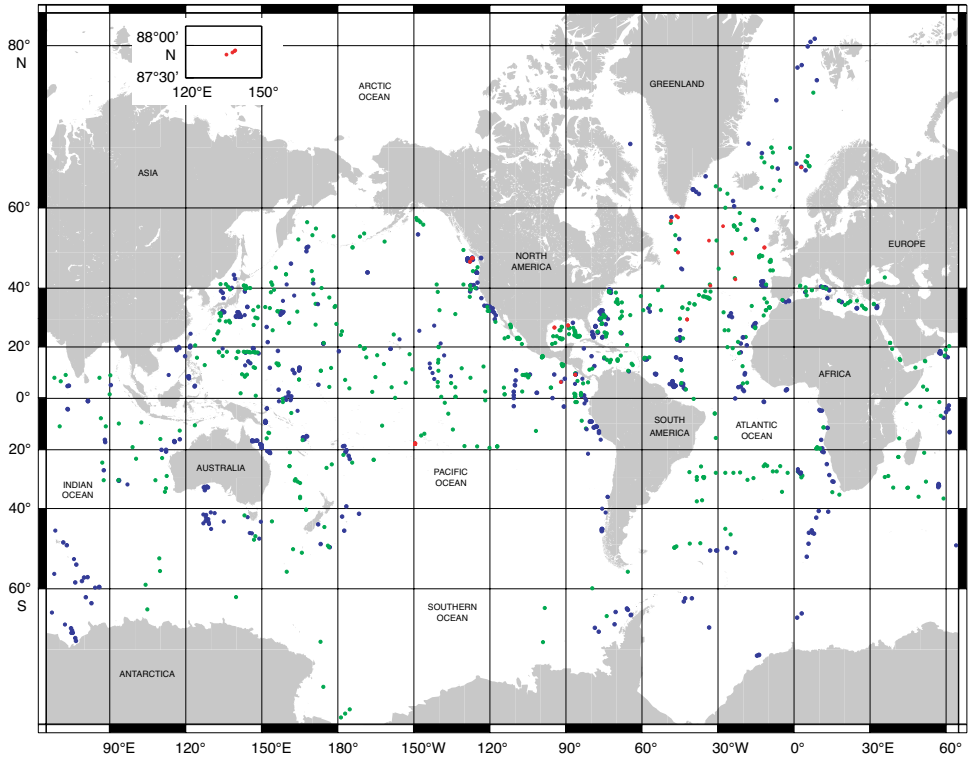
- State that ocean drilling vessels have drilled at sites around the world.

Materials

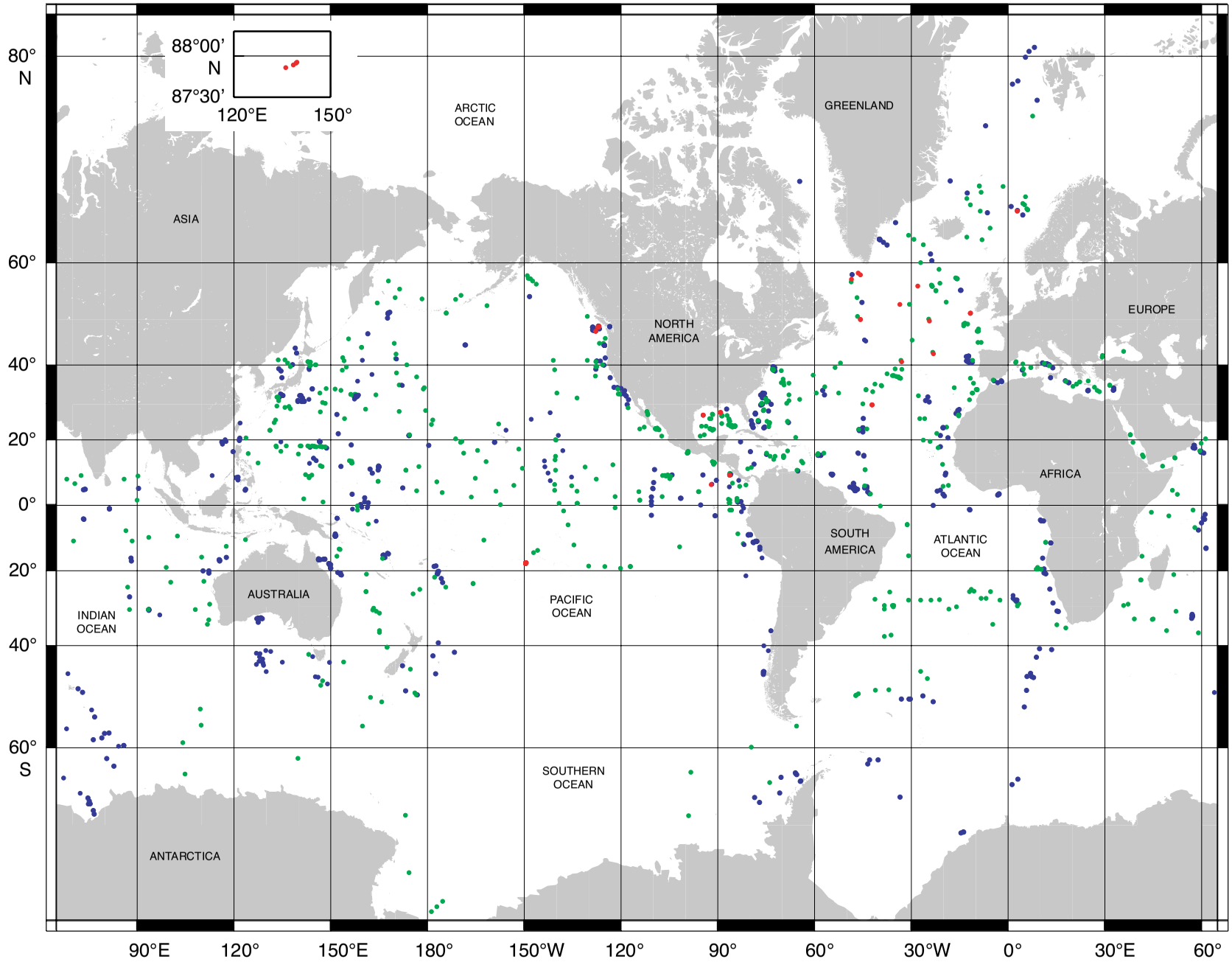
- Map of the world with drill sites noted
- Large world map

What to do

1. Show students the map with all the drill site dots on it. Ask them: what do they think these dots represent?
2. Ask students to name countries they know of. As each student names a country, look to see if there are dots near that country.
3. As a class, look at a map of the world with the ocean basins labeled. Have a student volunteer point to each basin and then compare to the drill site map to see if there are drill sites in that basin.
4. Hand out copies of the drill site map and ask students to try to count the number of drill sites they see.
5. After a few minutes, ask students to tell you how many they counted. Write the numbers on a board or flip chart. What kind of numbers do they get? Is that a high number?
6. Ask students why they think we would want to drill in so many places.
7. Ask student volunteers to come up to the map and point their finger at a place they would want to drill next, where no drill site currently exists. Why would they choose that site?



DSDP Legs 1–96 (●), ODP Legs 100–210 (●), IODP Expeditions 301–312 (●)



DSDP Legs 1–96 (●), ODP Legs 100–210 (●), IODP Expeditions 301–312 (●)

Science Picture Explorations
Lesson 8: Blast from the Past

Objectives

Students will be able to:

- State that ocean cores give us evidence about past events
- Explain that something happened 65 million years ago that made many animals go extinct.

Materials

- *Blast from the Past* poster printout
- Mystery bag: modeling clay or play dough

Background

One bad day, 65 million years ago, an asteroid nearly 10 km (6 miles) wide slammed into what is now Mexico's Yucatan Peninsula and blasted debris into the atmosphere. When the dust cloud settled, a 177 km (110 mile)-wide-crater scarred the Earth. A large number of marine and terrestrial creatures—including most of the dinosaurs—became extinct. How do we know this? The evidence comes from sediment cores collected by the scientific ocean drilling vessel, *JOIDES Resolution*. By looking carefully at a photograph of one of these cores, students will be able to explore the story this core tells about our planet's past. For more information, please see: *http://www.oceanleadership.org/education/deep-earth-academy/resources/posters-pencils-and-more/dea-poster-blast-from-the-past/l* and/or *http://paleobiology.si.edu/blastPast/index.html*

What to do

1. Ask students if they know what scientists think caused the dinosaurs to go extinct. (Explain extinct if needed.)
2. Write down students' answers to the question above on a board or flipchart.
3. Show students the top of the *Blast from the Past*, showing the asteroid streaming towards Earth. Ask students what they think would happen if something that big (10 km across, that's like 100 football fields) hit the earth. What would happen to the animals? The plants? The oceans? The land?
4. Explain that we know that dinosaurs went extinct because we have found many, many of their fossils on land. But through ocean science, we have also discovered that many ocean critters also went extinct at the same time. How do we know this? By looking at samples of mud from the ocean floor and finding their fossils.
5. Show students the bottom part of the *Blast from the Past* poster. Explain that this photo shows a sample of sediment from the time of these large extinctions.
6. Ask students to tell you what they observe in the photo. Do they see changes from the top to the bottom? What kinds of differences? What colors or textures? Point out the foram photos that show the tiny animals found in the sediments above and below the gray section.
7. Ask students to focus on the gray section in the middle of the core photo. What do they think that is? What happens when you burn something? What is left behind? Explain that debris thrown into the air, and soot and ash from the burning were deposited into this sediment.
8. So what does this core sample show us? It is a story about the history of the Earth—preserved in mud!
9. Tell students that they too can tell stories in mud (or clay). Have students reach into the mystery box to pull out chunks of clay. By flattening out the clay into a pancake and using their fingers, have them create pathways or shapes that tell an imaginary story about what happened there. (e.g., these are my footprints going to the store and returning.)
10. When students are done, ask them to share their stories with each other.

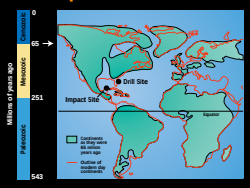
Blast from the Past

Ocean Drilling Program science at the Smithsonianís National Museum of Natural History

One bad day, 65 million years ago...

An asteroid nearly 10 km (6 mi) wide slammed into what is now Mexicoís Yucatan Peninsula and blasted debris into the atmosphere. When the dust cloud settled, a 177 km (110 mi) wide crater scarred the Earth. A large number of marine and terrestrial creatures became extinct.

The impact: where and when



The drillship, *JOIDES Resolution*, recovered a sediment core from the seafloor 563 km (350 mi) east of modern day Florida at a water depth of 2,658 m (8,860 ft). This core was recovered 2,011 km (1,250 mi) from the now-buried impact crater. It contains a detailed history of the asteroid impact and its effects on the Earth. The map above shows the shape and location of the continents as they were 65 million years ago when the impact occurred.

The Ocean Drilling Program

The Ocean Drilling Program (ODP) is an international partnership of scientists and research institutions organized to explore the evolution and structure of the Earth. The programís research vessel, *JOIDES Resolution*, has traversed the worldís oceans since 1985 collecting cylindrical cores of sediment and rock from the seafloor. By studying the cores and lowering instruments into the drill holes to study the surrounding seafloor, ODP scientists gain a better understanding of Earthís past, present, and future. ODP is sponsored by the U.S. National Science Foundation and ODP international members.

For more information

Visit these web sites: www.nmnh.si.edu/paleo/blast and www.oceandrilling.org. Or contact: Ocean Drilling Program, Joint Oceanographic Institutions, 1755 Massachusetts Avenue, NW, Suite 800, Washington, DC 20036-2102, USA; (202) 232-3900; joi@brook.edu.

Deep-sea core shows impact

This sediment core recovered by the Ocean Drilling Program records the cataclysmic event that changed life on Earth 65 million years ago.

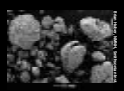
AFTER THE IMPACT: Only tiny, less ornate foraminifera microfossils are found in this layer; a few new species have evolved. Notice the tremendous difference in size between the foraminifera microfossils shown here compared to those from before the impact.

FIREBALL LAYER: Contains dust and ash fallout from the asteroid impact.

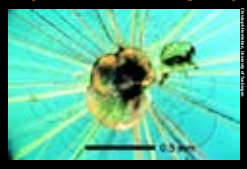
EFFECTS OF THE IMPACT: Ejecta including tektites ñ glassy spherules condensed from the hot vapor cloud produced by the asteroid impact ñ are found in this layer of the core. Debris thrown into the atmosphere by the impact rained down on the Earth for days to months after the event. The impact and ensuing global climatic changes devastated life. In the ocean, 95 percent of the free-floating foraminifera died out.

MOMENT OF IMPACT: K/T (Cretaceous/Tertiary) Boundary

BEFORE THE IMPACT: This layer contains microfossils of the large and ornate foraminifera that flourished in the oceans during the time of the dinosaurs.



Tiny creatures tell a big story



Foraminifera are single-celled organisms that have inhabited the oceans for over 500 million years. They come in many shapes and sizes. This living, free-floating foraminifera from the Caribbean has just captured its next meal. When the organism dies, its spiny shell will be preserved on the seafloor as a microfossil. Their abundance, wide distribution, and sensitivity to environmental variations make the foraminifera indicators of past climate change. By studying foraminifera microfossils scientists can better understand ancient organisms, environmental conditions, and dramatic events in Earthís history.

What happened on land?

How do we know that the extinction in the ocean also occurred on land? Scientists have recovered continental cores containing iridium, shocked quartz, and soot from global wildfires that coincide with the mass extinction at sea. This evidence allows scientists to visualize what conditions must have been like on land. After the asteroid impact, a searing vapor cloud sped northward. Within minutes, the North American continent was in flames. The rain of burning debris from the impact caused wildfires and turned most of the land into a ìglobal broiler.î Super hurricane-force winds scoured the Earth. Ash, soot, and debris darkened the skies causing sub-freezing temperatures over most of the land surface for weeks to months after the impact. Many species were extinguished by the blast from the past, including *Triceratops*. Small mammals like the ones in the foreground survived. This pivotal event changed the course of evolution.

Science Picture Explorations
Lesson 9: Minerals

Objectives

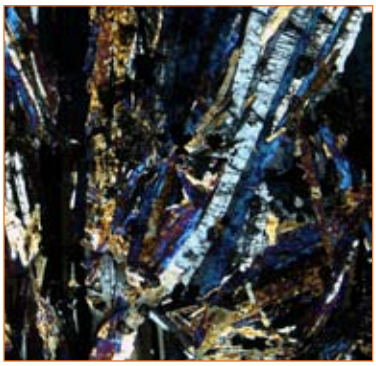
Students will be able to:

- Explain what a mineral is
- State where they might find minerals

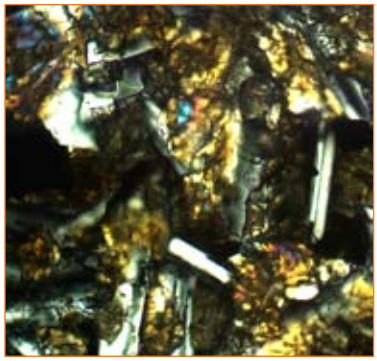
Materials

- Photomicrographs of minerals
- Mystery bag: a collection of different kinds of rocks

Background

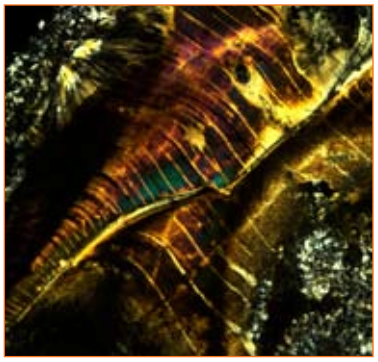


A mineral is a solid, inorganic (non-living) natural material that occurs in nature. Many minerals are made up of two or more elements, like sapphire—which is composed of aluminum and oxygen. Gold, silver and copper are minerals that are made from a single element. Minerals are the building blocks of rocks; most rocks are made up of combinations of many minerals. To learn more about the rocks they find in the seafloor and what minerals they are made of, scientists take very thin slices of rocks and look at them under a microscope. In this activity, students will look at colorful "photomicrographs," photos of these views.

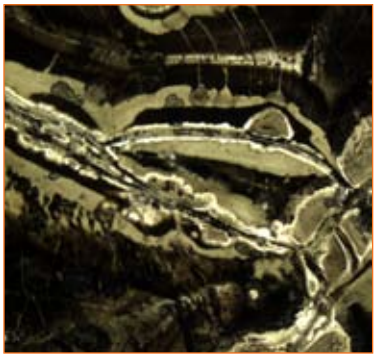


To see some more examples of photos like these, please see: *http://iodp.tamu.edu/publications/PR/305PR/prel31.html*

What to do

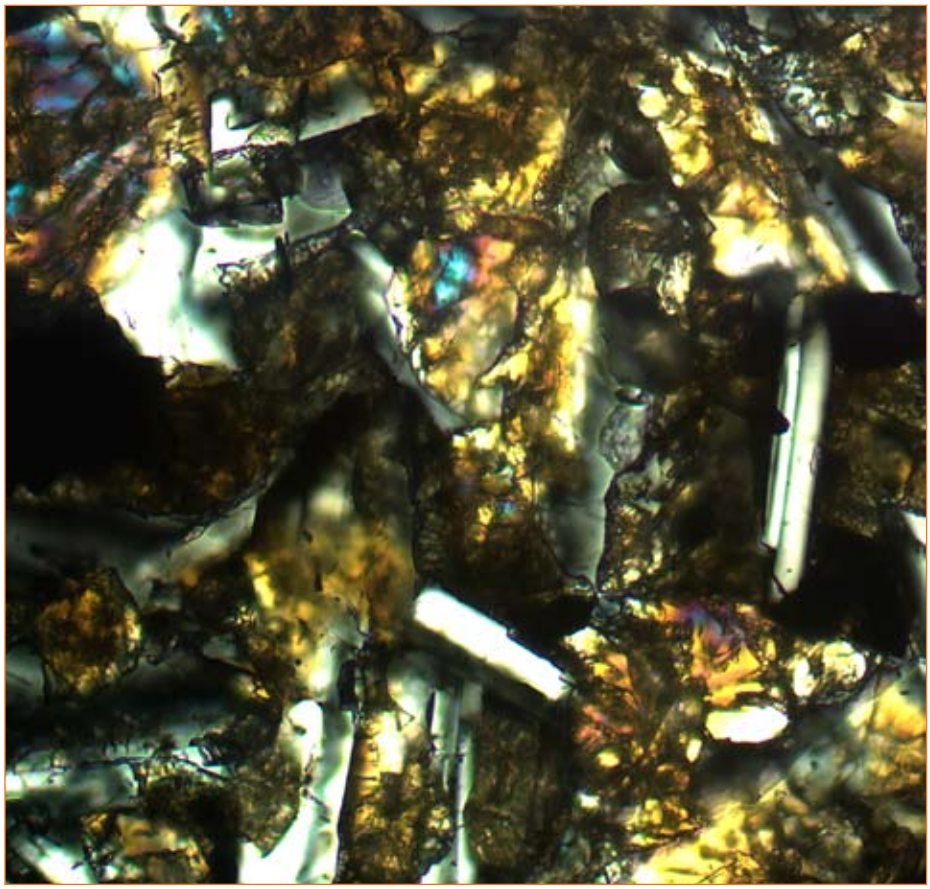


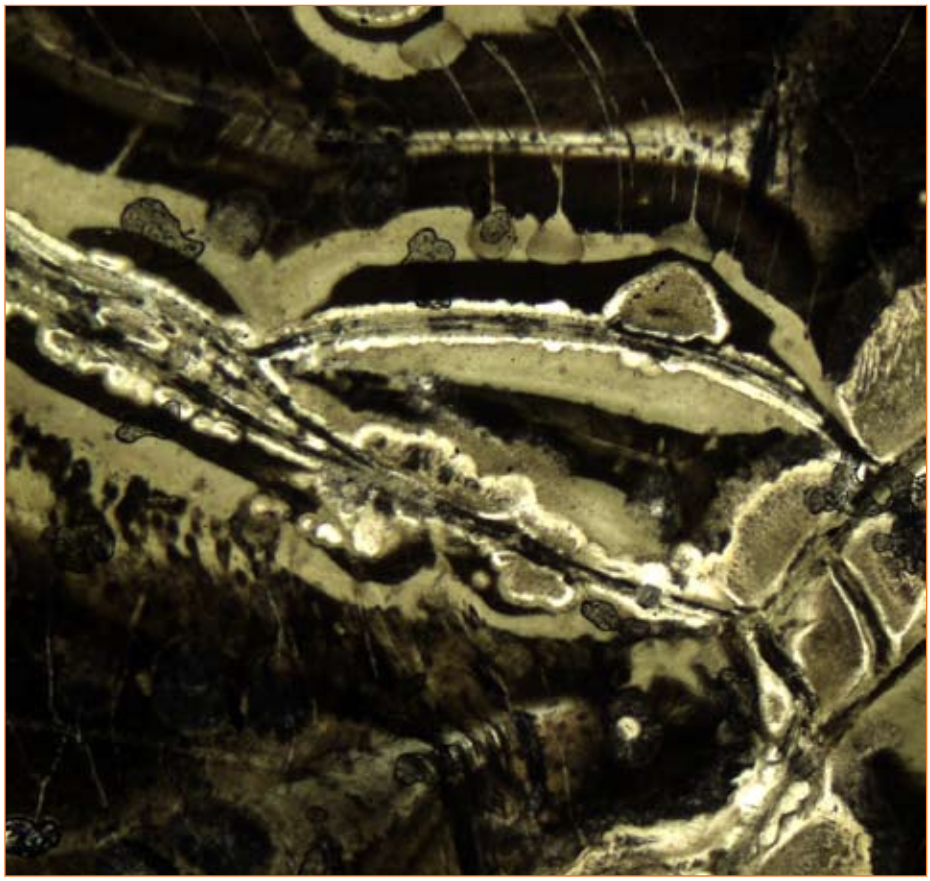
1. Have students take turns pulling a rock out of the mystery bag.
2. Give students a couple of minutes to examine their rock. What do they notice about it? Encourage them to feel it, look at it closely and use their senses to explore it.
3. After a few minutes, have student volunteers raise their hands and take turns describing their rock.
4. Explain to students that some of the colors and textures they observe are from the individual minerals that make up rocks. A mineral is something that occurs in nature that is neither an animal nor a plant. Ask students to name some minerals they can think of (e.g., gold, silver, coal, quartz, sand, limestone).

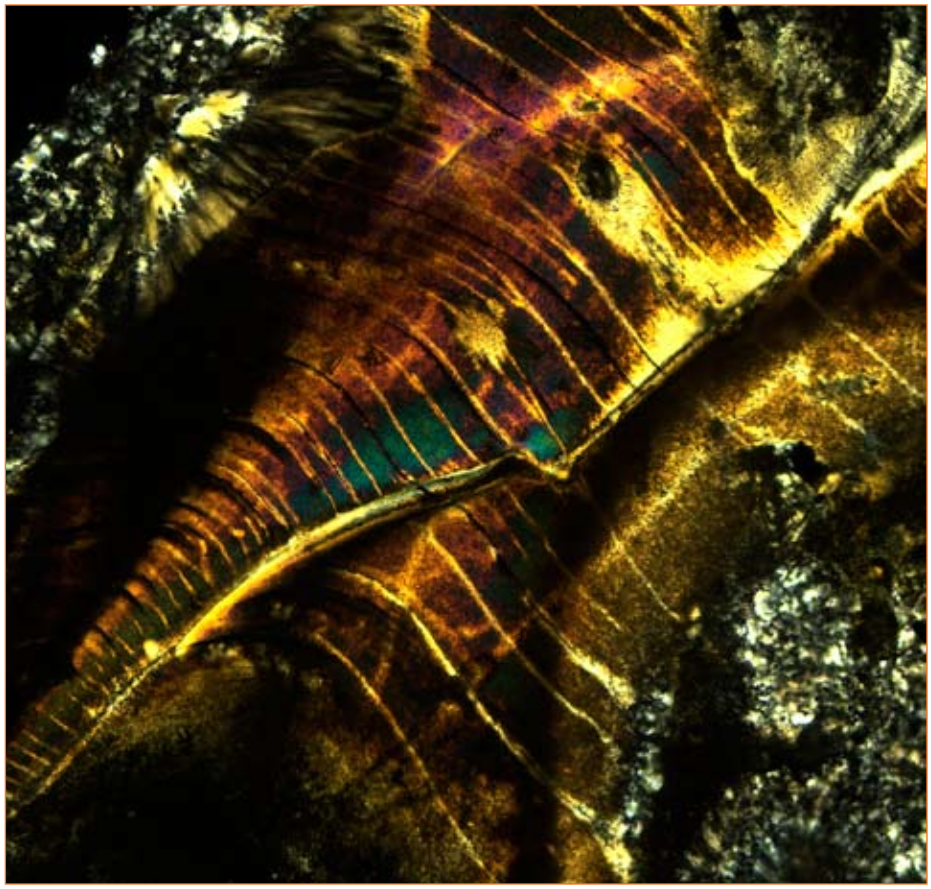


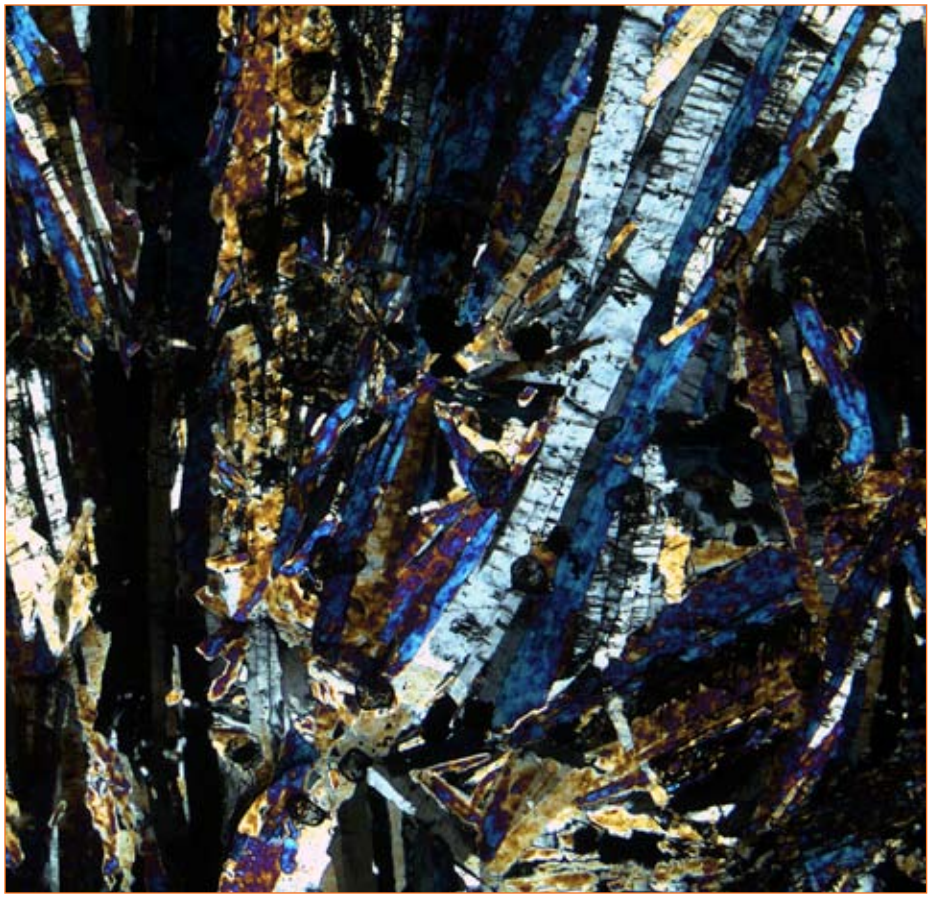
5. Show students the photomicrographs and explain that these are pictures of minerals taken with a microscope.
6. Ask students to describe some of the colors and shapes they see in the photos. Ask students what they think the different colors and shapes might mean.

Lesson 9: Minerals









Science Picture Explorations
Lesson 10: Collections

Objectives

Students will be able to:

- Explain what a collection is.
- Describe a collection of their own.

Materials

- Photographs of the repository with thousands of cores stacked up
- For mystery bag: a collection of different coins, a group of shells, a bag of jellybeans or M&M's, a box of crayons, a deck of cards, a bag of assorted marbles, etc.

What to do

1. Ask students what a collection is. Do they have any collections? Record student answers on the board.
2. Ask students what they do with their collections. Discuss the different things they do with their collections.
3. Ask students to think about this: How would they collect and store thousands of core samples?
4. Show students the photo of the repository and explain that this is the "collection" of ocean core samples. This is where scientists keep cores so they can study them later.
5. Explain to students that they will now study several collections. Divide students into 5 or 6 groups of 3 to 4 students and have a student from each group pull a collection out of the mystery bag.
6. Give students several minutes to play with their collection. Ask them to sort their collection in any way they would like, that they agree upon within their team.
7. When all the groups are done, have them share with the class the ways they sorted their collections. After each explanation, ask the class if they can think of other ways that collection could have been sorted.

Background

When scientists collect cores from the seafloor, they examine them quickly at sea. But there are often many more scientists who want to look at them, and many more experiments to do with these cores once they return to land. So scientists store the cores (more than 55,000 of them!) in repositories in various locations throughout the country and the world. Scientists can then request to look at them when they need a particular core. In this activity, students will have the opportunity to explore the idea of collections—why we have them, what we do with them, and how we keep them.

To learn more about how you can request samples from these cores to explore in your classroom, please see: *http://www.oceanleadership.org/education/deep-earth-academy/educators*

Lesson 10: Collections