



## Deep East 2001 Exploration

# What's New?

### FOCUS

Hudson Canyon

### GRADE LEVEL

5-6

### FOCUS QUESTION

What kinds of organisms live in the habitats of the walls of Hudson Canyon?

### LEARNING OBJECTIVES

Students will learn about the biodiversity in Hudson Canyon.

Students will learn about similarities and differences between related organisms.

### ADAPTATIONS FOR DEAF STUDENTS

Vocabulary:

- Pre-teach vocabulary.
- Additional vocabulary: organisms, opportunistic, and potential.

Seating Arrangements

- Students can work in teams of two rather than four so that all can have a hands-on experience during the lesson or the entire class can work as one team.

### MATERIALS

For each pair of students:

- One live earthworm (Red wigglers work well for classroom use and can be obtained at a bait shop locally or by ordering from a science supply company.)

- 9" x 12" tray for experimenting with earthworms
- One sheet of black construction paper
- One sheet of white paper
- One square of window screen – 10 cm x 10 cm
- Paper towels
- Water for moistening a paper towel
- Magnifiers
- Metric ruler
- Flashlight
- Student Data Table

### AUDIO/VISUAL EQUIPMENT

N/A

### TEACHING TIME

Two periods of 45 minutes each

### SEATING ARRANGEMENT

Groups of four students

### MAXIMUM NUMBER OF STUDENTS

30 students

### KEY WORDS

Biodiversity  
Benthic  
Polychaete worm  
Oligochaete worm  
Continental shelf  
Continental break

### BACKGROUND INFORMATION

Hudson Submarine Canyon is an ancient extension

sion of the Hudson River Valley, through which the Hudson River flowed during the last Ice Age. It extends over 400 nautical miles seaward from the New York-New Jersey Harbor, across the continental shelf to the continental break. Due to its geology and the fact that it is a conduit for sediments, including pollutants between the land and the deep ocean, Hudson Canyon is particularly susceptible to movement of materials downcanyon and may concentrate pollutants and other materials in the Canyon. Additionally, the 106-mile Deepwater Dumpsite (DWD-106) is located adjacent to the Canyon. For many years, it received the world's largest discharge of municipal sewage sludge to the deep ocean. This was halted in 1992 after investigations using the submersible ALVIN revealed chemical increases and biological changes not expected when the dumping was originally permitted.

These investigations also revealed great biodiversity, indicating that further exploration has the potential for the discovery of unusual and previously undiscovered deep-sea creatures. One of the groups of organisms that are likely to be present in large numbers and different types are polychaete worms. These worms are members of the Phylum Annelida, also known as the segmented worms, and have characteristics in common with their terrestrial "cousins," the earthworms (Oligochaetes). There are thousands of species of polychaetes known to inhabit both shallow and deep water marine habitats. They are also known to be opportunistic colonizers, often inhabiting areas not used extensively by other organisms.

### LEARNING PROCEDURE

#### Activity 1 – Polychaetes and Oligochaetes – What's the Difference?

1. Ask the students what they know about earthworms and record their answers on the board or a flip chart.
2. Tell the students that they are going to look at some earthworms and try to learn some new things about them.

3. Give each pair of students an earthworm on a tray and a box with the other materials.
4. Ask them to observe their earthworm and draw it, including all of the characteristics that they can see. Have them use magnifiers. Have the students measure the length of their worm and record the measurement on their drawing. Remind them that earthworms are living creatures and that they should handle them carefully to prevent injuring them while using their earthworms in experiments.
5. Tell them that they are going to use their materials to learn more about their earthworms.
6. Ask the question "How can we find out if earthworms prefer light or dark?"
7. Instruct students to fold the sheet of black construction paper in half lengthwise and set it on their table to make a tent.
8. Students will stand next to the tent and hold the flashlight 15 cm from the table top so that it shines down on one end of the tent and place the earthworm in the light beam.
9. Students will observe their earthworm for 3-4 minutes.
10. Students will record their observations on the Student Data Table.
11. Students will repeat the experiment four more times.
12. Ask the question "How can we find out whether earthworms prefer rough or smooth surfaces?"
13. Instruct students to place the window screen and piece of white paper on their table, overlapping slightly, and to place the earthworm where the edges meet.
14. Students will observe their earthworm for 3-4 minutes.
15. Students will record their observations on the Student Data Table.
16. Students will repeat the experiment four more times.
17. Ask the question "How can we find out whether earthworms prefer a moist or dry environment?"
18. Instruct students to moisten one paper towel

slightly and to place it and a dry paper towel next to each other on their table, overlapping slightly.

19. Students will place their earthworm where the two paper towels meet.
20. Students will observe their earthworm for 3-4 minutes.
21. Students will record their observations on the Student Data Table.
22. Students will repeat the experiment four more times.
23. Have the students write a paragraph about the three experiments and their results.
24. Explain earthworm taxonomy to the students. Tell them that we are now going to learn about some related segmented worms, the polychaetes, that live in the deep ocean in the area being explored by the ALVIN on the Deep East Voyage of Discovery.

### Activity 2 – Polychaetes From the Deep!

1. Have students go to the Deep East Web site.  
[www.oceanexplorer.noaa.gov/explorations/deepeast01/deepeast01.html](http://www.oceanexplorer.noaa.gov/explorations/deepeast01/deepeast01.html)
2. Have students print out copies of photos that have been posted from the dives accomplished on that day or prior.
3. As a group, discuss what is seen in the pictures. (Scientists are expecting to find lots of polychaete worm tubes and worms!) Discuss the fact that polychaetes are the ocean "cousins" of the terrestrial earthworms. You should be able to see the segments as well as the hairs and bristles on each one. These hairs and bristles give them their nickname, "bristleworms."
4. Have students use various resources, such as encyclopedias, marine science books, and the Internet, to learn more about these amazing creatures.
5. Have students prepare a one-page report with an illustration about polychaetes.

Click on 5th or 6th grade. Go to Ocean Planet: Interdisciplinary Marine Science Activities and choose Ocean Planet from the list.

### THE "ME" CONNECTION

[www.vims.edu/bridge/elementary.html](http://www.vims.edu/bridge/elementary.html)

Click on 5th or 6th grade. Go to Ocean Planet: Interdisciplinary Marine Science Activities and choose Ocean Planet from the list. Once there, choose Ocean Market. This is a good activity and has links to others. Exploration and discovery of new species yields much information of use to mankind. This includes things such as new medicines, information about how organisms change over time, both in the ocean and on land, and the potential for discovering new ways that organisms process food for energy.

### CONNECTIONS TO OTHER SUBJECTS

Mathematics, Language Arts

### EVALUATION

1. Evaluate student drawings and written reports about earthworms.
2. Have students construct a Venn diagram to identify similarities and differences between earthworms (oligochaetes) and polychaetes. Use characteristics such as segments, bristles, and shape. Either of the designs below could be used, depending upon the knowledge and level of thinking skills possessed by students. There are also many other combinations of these characteristics that could be used.
3. Evaluate student reports about polychaetes.
4. Evaluate accuracy of worm measurements.

### EXTENSIONS

**Science** - Learn more about the man who is so interested in these deep sea organisms, Dr. Fred Grassle, using the Ocean Explorer web site.

**Language Arts** - Have students write a paragraph about why they would or would not like to be a scientist who studies worms or other creatures that live in the deep ocean.

### THE BRIDGE CONNECTION

[www.vims.edu/bridge/elementary.html](http://www.vims.edu/bridge/elementary.html)

## RESOURCES

[www.oceanexplorer.noaa.gov](http://www.oceanexplorer.noaa.gov)  
[www.nrm.se/ev/research/oligo.html.en](http://www.nrm.se/ev/research/oligo.html.en)  
[www.inhs.uiuc.edu/cbd/main/geninfo/oligo.html](http://www.inhs.uiuc.edu/cbd/main/geninfo/oligo.html)  
[www.kwic.com/~pagodavista/schoolhouse/species/insects/worms.htm](http://www.kwic.com/~pagodavista/schoolhouse/species/insects/worms.htm)  
[www.ocean.udel.edu/deepsea/level1/creature/creature.html](http://www.ocean.udel.edu/deepsea/level1/creature/creature.html)

## NATIONAL SCIENCE EDUCATION STANDARDS

### Content Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

### Content Standard C: Life Science

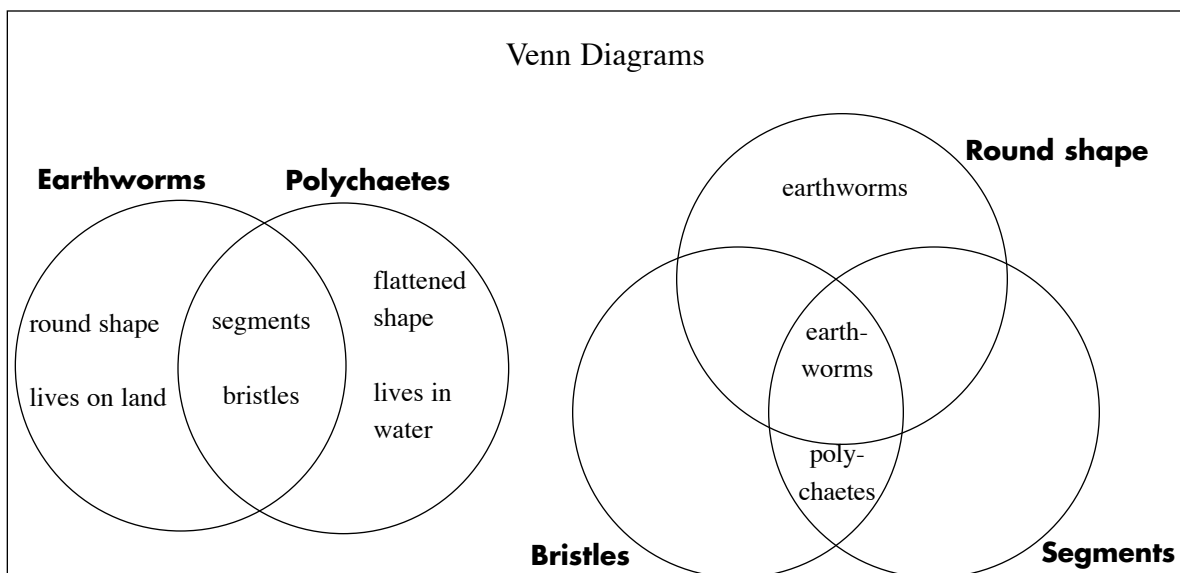
- Diversity and adaptations of organisms

## FOR MORE INFORMATION

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<http://oceanexplorer.noaa.gov>



## Student Handout

Student Data Table  
(Use with Activity #1)

### Polychaetes and Oligochaetes – What's the Difference?

<b>Light or Dark???</b>	<b>Trial #1</b>	<b>Trial #2</b>	<b>Trial #3</b>	<b>Trial #4</b>	<b>Trial #5</b>
Prefers light					
Prefers dark					
<b>Rough or Smooth???</b>	<b>Trial #1</b>	<b>Trial #2</b>	<b>Trial #3</b>	<b>Trial #4</b>	<b>Trial #5</b>
Prefers rough					
Prefers smooth					
<b>Moist or Dry???</b>	<b>Trial #1</b>	<b>Trial #2</b>	<b>Trial #3</b>	<b>Trial #4</b>	<b>Trial #5</b>
Prefers moist					
Prefers dry					