CLASSROOM ACTIVITY

Jellies Down Deep

Increasingly, marine researchers are finding that there are far more jellies and jellyfish in the world's oceans than previously thought. Indeed, these creatures may play an unexpectedly large role in ocean ecosystems. This Bio Bulletin, which features spectacular underwater footage, follows scientists at the Monterey Bay Aquarium Research Institute (MBARI) as they retrieve jellies from the deep.

CLASS DISCUSSION

Establish Prior Knowledge

Ask students to share what they know about the life in the deep sea. Discuss the challenges of studying this part of the planet. (For more information about ROVs (remotely operated vehicles) and other underwater research vessels, go to "MBARI: Marine Operations: Vessels and Vehicles" at http://www.mbari.org/dmo/vessels.htm). Point out that there is much that remains unknown about the deep sea, including numerous life forms still to be discovered.

The Scientific Method

Research scientists use the Scientific Method (see page three) to investigate the natural world. You can use *Jellies Down Deep* to illustrate how scientists use technology to collect information about animals in the deep sea.

Exploration

Have students watch the video and read the synopsis. Use the following questions to guide a class discussion:

- What are scientists learning about the population and diversity of jellies?
- Why is the area just off the California coast such a good site for scientific study?
- How does the ROV optimize scientific study? What does it allow scientists to do that they couldn't do before?
- What have the researchers at MBARI learned so far?
- What are the physical features of jellies, and how do these features help jellies survive in their habitats?
- What are some basic questions the researchers at MBARI are trying to answer about jellies?
- What is bioluminescence, and what function does it serve for animals living deep in the ocean's depths? (For more information about bioluminescence, go to "Milstein Hall of Ocean Life: Ecosytems: Deep Sea" at http://www.amnh.org/exhibitions/permanent/ocean/02_ecosystems/02h3_darklights.php).

Wrap-Up

Use the following question to wrap up your discussion.

- Why is the study of jellies important?

CLASSROOM ACTIVITY

Jellies Down Deep (continued)

Extend
Invite students who wish to learn more about jellies and deep sea exploration to visit these websites:

SeaWiFS: Teachers Resources
http://seawifs.gsfc.nasa.gov/SEAWIFS/TEACHERS/
Find out why and how NASA scientists study Earth's oceans from space.

JPL Earth: Ocean Motion
http://www.jpl.nasa.gov/earth/ocean_motion/ocean_motion_index.cfm
Read all about the tools and techniques that NASA scientists use to study Earth's ocean.

Hydrothermal Environments on the Ocean Floor
http://www.resa.net/nasa/ocean_hydrothermal.htm
Learn about the mysterious life forms that thrive in the sunless and barren environments of deep sea hydrothermal vents.

Scientific Process

The Scientific Method is a dynamic and open-ended process that scientists use when they investigate a question they have. It is not a series of prescribed steps that scientists follow to prove a hypothesis. Rather, it's a general plan that helps guide their investigation. And while all scientists use the Scientific Method, they might not use all the steps, or they may complete the steps in a different order. For example, a scientist might make observations and collect data about a subject that interests him or her for years before formulating a hypothesis.

DEFINING A QUESTION TO INVESTIGATE

As scientists conduct their research, they make observations and collect data. The observations and data often lead them to ask why something is the way it is. Scientists pursue answers to these questions in order to continue with their research. Once scientists have a good question to investigate, they begin to think of ways to answer it.

FORMING A HYPOTHESIS

A hypothesis is a possible answer to a question. It is based on: observations scientists make, existing theories, and information they gather from other sources. Once they have a hypothesis, scientists can begin to think about how to test it.

TESTING A HYPOTHESIS

Evidence is needed to support or disprove the hypothesis. There are several strategies for collecting evidence. Scientists can gather their data by observing the natural world, performing an experiment in a laboratory, or by running a model. Scientists decide what strategy to use, often combining strategies. Then they plan a procedure and gather their data. They make sure the procedure can be repeated, so that other scientists can evaluate their findings.

ANALYZING THE DATA

Scientists organize their data in tables, graphs, diagrams, and even photographs. If possible, they check the data by comparing it to data from other sources. They are looking for patterns that show connections between important variables in the hypothesis they are testing.

DRAWING CONCLUSIONS

Scientists must decide whether the data clearly support or do not support the hypothesis. If the results are not clear, they must rethink their procedure. If the results are clear, scientists write up their findings and results to share with others. The conclusions they draw usually present new questions for them to pursue.