

Ocean Creature Classification

Summary

In this activity, students will learn about the scientific classification of organisms and compare their own classification of a group of organisms to the scientifically accepted one.

Objectives

At the conclusion of the lesson, students will be able to:

- use observed similarities and differences to develop their own system for classifying a group of objects or organisms
- understand the process of scientific classification, and explain how marine organisms are classified by scientists

Time

2 periods

Background

The oceans surrounding Eleuthera are rich with life. In particular, the coral reefs and mangrove forests are home to an astounding array of animals, plants, and other organisms. In order to help identify these organisms and understand their evolutionary relationships, scientists have developed a system for classifying organisms with similar characteristics. When scientists classify an organism, they look closely at the structure of its body. They also examine the way that it develops as an embryo and, more recently, its DNA. All these factors provide clues about the relationships of different organisms. On the broadest level, animals (Kingdom Animalia) are classified by scientists as either vertebrates (with backbones) or invertebrates (without backbones). All vertebrates belong to the same phylum (Chordata), but invertebrates belong to several different phyla. Members of a particular phylum are further subdivided by class, order, family, genus, and, finally, species. In general, the greater the number of classification levels that two organisms have in common, the more characteristics they share.

Scientists employ taxonomic keys to identify and help classify organisms. Organisms are classified by identifying differences in a series of steps. At each step, the remaining organisms must be split into two and only two possibilities. For example, if the first characteristic chosen is color, “red” and “not red” would be acceptable choices, but “red” and “blue” would not be since there are additional colors that are not included in the latter groups.



Once classified, scientists give each animal or species a unique scientific name that consists of two Latin words: the first is the animal's genus name, the second is its species name. For example, the scientific name of the spiny lobster is *Panulirus argus*. Scientific names of organisms can be found in any field guide. An organism's common name may vary from country to country or even within the same country, but its scientific name is universally recognized by scientists around the globe, preventing confusion.

Since students are likely to be most familiar with vertebrates, this activity focuses on the classification of marine invertebrates. The table below shows invertebrate organisms commonly found in the coral reefs surrounding Eleuthera.

Phylum	Invertebrate Organisms
Porifera	encrusting sponge, barrel sponge, finger sponge, glassy sponge, white slipper sponge, brown sponge, orange sponge, vase sponge
Cnidaria	pale anemone, pink-tipped anemone, zoanthid, sea fan (soft coral), cannonball jellyfish, Portuguese man-o'-war, hard coral
Echinodermata	pencil urchin, long-spined sea urchin, sea star, sea cucumber, brittle star, sand dollar, feather star
Mollusca	queen conch, magpie shell, clam, oyster, mussel, scallop, sea snail, sea hare, cuttlefish, octopus
Arthropoda	green reef crab, spiny lobster, cleaner shrimp, mantis shrimp
Annelida	feather duster worm, purple fan worm, Christmas tree worm

Teacher's Notes

The example used in Steps 1 and 2 of the following procedure is students' shoes, but any group of readily available objects that share some but not all characteristics would work as well. For Step 3, photographs or drawings of various invertebrates are available in field guides or on the web (see the Resources section at the end of this guide for possible sources). You may also wish to consider classifying local organisms of interest in place of tropical marine invertebrates.

Elementary: Steps 1 and 2 are appropriate. If used, Step 3-4 should be simplified somewhat by reducing the number of organisms and including only the most obvious examples.

Middle School and High School: Students should be able to complete all steps. Without the key, students are unlikely to exactly match the scientific taxonomy by simply examining drawings or photographs, as scientists have additional information not evident from the drawings. Stress that the process that the students are using is the same as that used by scientists as they attempt to classify a group of organisms. As a clue to students, you may wish to tell them how many organisms from each phylum are included in their sample.

Vocabulary

Ecology, invertebrate, taxonomic key

Materials

Steps 1 and 2: overhead projector, transparency, set of similar but not identical common objects (e.g., shoes, shells); **Step 3:** copies of invertebrate drawings or photographs (unlabeled), taken from a coral reef field guide and/or the web, *Ocean Invertebrates Taxonomic Key* (provided)

Procedure

1. Introduce students to the process of scientific classification by having them develop their own taxonomic key for classifying a group of common objects—shoes. Have the class gather in a circle and have each student donate one of the shoes that they are wearing to a pile at the center of the circle. Tell students that the class as a whole will be developing a method for classifying shoes and that the method you will be using is the same as that used by scientists to classify and/or identify organisms.
2. Next, ask students to suggest different ways that the pile of shoes could be “classified.” Some likely answers include: left/right; black/not black; has laces/no laces; sneaker/not sneaker; shiny/dull; and so forth. Have students vote on which characteristic to select first. Have them divide the pile of shoes into two piles, according to whether each shoe does or doesn’t have that characteristic. Next, have students choose a second characteristic, and divide each of the two piles of shoes into two piles, according to whether each shoe has that second characteristic (thus making a total of four piles). Keep on in this manner until each shoe is eventually placed in its own unique pile. Then, reconstruct the exercise using a diagram on an overhead transparency, showing each chosen characteristic on the diagram. You have now created a taxonomic key for shoes.
3. Have students work in small groups to practice scientific classification while becoming familiar with some of the common types of organisms that inhabit a typical coral reef. Provide each group with photographs or drawings of between 12-15 marine invertebrates, being sure to include at least 1 from each of the following phyla: Porifera, Cnidaria, Echinodermata, Mollusca, Annelida, and Arthropoda. Consult the table in the Background section for sample organisms. After students have sorted the various organisms using their own criteria, review their results in a whole class discussion, asking each group to explain their reasoning.
4. Have students repeat Step 3, this time using the provided *Ocean Invertebrates Taxonomic Key* that illustrates the scientifically accepted classification for such organisms according to phyla. Have students compare their results from Step 3 with their results using the key, noting any differences.

Extend the Experience

Choose an ecosystem in your local region, such as a pond, field, or woodland. Through library, online and/or outdoor research, try to find the common and scientific names of at least five plant and animal species that are commonly found in that ecosystem.