Lesson Plan: Plant and Animal Classification

Provided by the Art Institute of Chicago Department of Museum Education

Suggested Grade Level: 9–10
Estimated Time: Two to three class periods

Introduction

In the first half of the 18th century, a natural historian known as Carolus Linnaeus (born Carl von Linné, 1707–1778) developed a taxonomy for naming and classifying plants and animals. Like natural historians before him, Linneaus knew that all organisms could be grouped into genera based on observable, shared characteristics. Unlike other natural historians, Linnaeus also realized that organisms could be placed into higher, or more general, taxa within a ranking system. Thus began our modern system of classifying plants and animals from the broad to the specific–by kingdom, class, order, family, genus, and species. Linnaeus also instituted the shorthand method of identifying organisms with a binomial, consisting of the genus name and the species name. In his system, for example, the human being is identified by the Latin terms Homo (genus) sapiens (species).

The scientific advances of the 18th century were an outgrowth of the social, artistic, and economic interests of the previous century. Many artists of the 17th-century Baroque period were as curious about the natural world as Linnaeus. The painter Frans Snyders, for example, collected specimens of preserved and stuffed animals—local and imported from other countries—and used this collection as models for still lifes, such as Still Life with *Dead Game, Fruits, and Vegetables in a Market* (http://www.artic.edu/aic/collections/artwork/62042). In paintings like this, art was connected to the science of observing, describing, and cataloging nature.

Since Linneaus's system of taxonomy was not developed until 100 years after this painting was created, Snyders could not have known the current scientific names for the plants and animals in his still life. He rendered his models so precisely, however, that they may be identified according to the modern system. In this activity, students examine Snyders's painting to determine what species are included in the painting. This is a Web-based exercise, requiring students to accumulate and integrate information from several different online sources.

Lesson Objectives

- Identify species of animals in Snyders's painting
- Research the organisms identified to determine their characteristics and define their kingdom, class, order, family, genus, and species
- Investigate links between species
- Practice using the Internet as a tool for gathering and synthesizing complex data

Key Terms:

- kingdom
- phylum
- class
- order
- family
- genus
- species
- taxonomy
- binomial
- evolution
- hybridization
- Baroque
- still life
- symbol

Instructional Materials

- Printouts (preferably color) of Snyders's Still Life with Dead Game, Fruits, and Vegetables in a Market for each student

- Field guides for European plants and animals, such as:

    o Knightly, Chris, Steve Madge, and Dave Nurney. *Pocket Guide to the Birds of Britain and North-West Europe*. New Haven: Yale University Press, 1998

    o Hanák, Dr. Vladimir and Dr. Vratislav Mazák. *The Illustrated Encyclopedia of Mammals*. New Jersey: Chartwell Books, Inc., 1993.

    o Harrison, S.G., G.B. Mansfield, and Michael Wallis. *The Oxford Book of Flowering Plants*. Oxford: Oxford University Press, 1973.

    o Peterson, Lee Allen. *Edible Wild Plants of Eastern/Central North America*. Boston: Houghton Mifflin, 1977.

- Web sites (included below) for identifying and researching organisms

Procedures

Discussion

Read more about Carolus Linnaeus and his classification system and ask students the following questions:

- What were the first organisms Linnaeus began to name and classify according to his new system? (Plants)

- What was his main criterion for classifying these organisms? (Sexual traits)

- Why do you think he began with plants rather than animals? (Plants show their sexual traits on the outside while animals' sexual traits, particularly reproductive organs, are internal and require dissection to view.)

- How were naturalists classifying organisms before Linnaeus developed his system? (By their own, individual systems)

- Why was this a problem? (Because one organism might have more than one scientific name, given by different scientists; there was no consistent naming process, which made it difficult to compare organisms within a single system)

- How did Linnaeus change this system?

- Discuss the purpose of classifying organisms and the structure of taxonomy used commonly today. Introduce and define related terms: taxonomy, kingdom, phylum, class, order, family, genus, and species. Ask students:

    - How is Linnaeus's taxonomy different from the taxonomy currently in use? (there are intermediary steps between Linnaeus's original ranks.)

    - What other differences are there between Linnaeus's system and modern taxonomy? (Linnaeus believed that species were fixed; he did not believe in the evolutionary model. He recognized that hybridization might create new species but believed that the number of permutations of organisms was fixed.)

Activity

- Have students locate Flanders on a map. Determine the modern name for the country in which Flanders is located and discuss the environmental features of the area so that students may narrow their species research by region and habitat, and then discover which species are exotic to that region.

- Pass out printouts of Snyders's painting or allow students to examine the painting on the Web. Ask students to list all of the living or dead organisms in the painting. Students should write down as many observable characteristics about the organisms as possible, e.g. the deer has a reddish-brown coat, a white underbelly, two antlers.

- Ask students to use guidebooks for plants and animals or the following Web sources to identify each of the species represented by Snyders and provide the complete scientific name.

- For scientific names and habitat information:
    - http://www.search.eb.com (for all species; a good place to start)
    - http://www.nmnh.si.edu/msw/ (for mammals)
    - http://www.sp2000.org/AnnualChecklist.html (for plants and birds)

- For rank characteristics:
    - http://animaldiversity.ummz.umich.edu/animalia.html (for most species of mammals and birds)
    - http://www.perspective.com/nature/plantae/index.html (for plants)

- As students to determine the defining characteristics of each rank to which the species belong (for example, what are the defining features of primates, what are the defining features of artiodactyls)?

- Have students try to discover the original habitat of each species and where it has been introduced. Ask students to determine which scientist first identified and named the species in the painting. Ask further:
    - Which species in the painting are most closely related?
    - Which species are native to Snyders's region? Which are not?

Evaluation

Have students look at Ambrosius Bosschaert the Elder's *Bouquet of Flowers in a Glass Vase* (http://www.nga.gov/feature/artnation/still_life/bosschaert_1.htm), 1621. Ask students to identify the flowers represented in Bosschaert's image using a botany guidebook or Web site they locate on the Internet.

Have students write down the scientific name for the flowers and some of the basic characteristics of the species. Then ask students to figure out if this bouquet could have existed in the 17th-century and to explain why or why not (exploring the above Web site will reveal the answer).

Base students' evaluation on their ability to locate and use information on the Web; their in-class discussion of Linnaeus and his taxonomy; their ability to identify the species in the painting; and their capacity to research and integrate information about the various species.

Illinois Learning Standards

Science: 12, 13