Classification organizes organisms based on their physical characteristics and/or genetic relationships. Using and understanding classification helps us understand these relationships.

Essential Questions

1. How do scientists classify organisms?
2. Is it possible to classify common objects into groups using the same method as a scientist?

Georgia Performance Standards

Characteristics of Science-Habits of Mind
SSL1. Students will classify organisms into groups and relate how they determined the groups with how and why scientists use classification.

b. Demonstrate how plants are sorted into groups.

What the Student Should Know

Students will know:
♦ How to use simple classification schemes.
♦ How to organize common objects based on observable characteristics.

What the Student Should Be Able to Do

Students will:
♦ Identify and classify basic lichen partners (alga and fungal).
♦ Describe different habitats and influences of lichens on those habitats.
♦ How to construct their own dichotomous key in order to classify things.

Enduring Understandings
♦ Classification helps us understand physical and genetic relationships.

Questions to the author can be sent to the project administrator, Dr. Bob Hill at bobhill@uga.edu.
Background

Scientific classification is a method used by scientists to categorize species of organisms. Initial classification systems were based on shared physical characteristics; however, with the introduction of molecular systematics, that uses genetic information obtained from organisms, classification systems are moving towards a classification system based on genetic relationships.

The following is an excerpt about taxonomic classification from http://www.learner.org/channel/courses/essential/life/session2/closer4.html.

“A hierarchical system is used for classifying organisms to the species level. This system is called taxonomic classification. The broadest classifications are by domain and kingdom; the most specific classification is by genus and species. The hierarchical groupings in between include phylum, class, family, and order.

Species are the basic unit of classification. While there are different views on what defines a species, in sexually reproducing organisms, a species has traditionally been defined by the ability of its members to reproduce together to form fertile offspring. When identifying an organism, familiar names – like human, fruit fly, or maple tree – are most likely the names you use. However, each type of organism has a scientific name — humans are called Homo sapiens, for example. Scientific names are derived from the genus and species names in a system known as binomial nomenclature... This system allows for a common language with which biologists can both classify and compare organisms. It also provides a basis for biologists to communicate their findings with other scientists. A key aspect of taxonomy is the ability to characterize each level of description with unifying features, thus relaying information about the organism(s).”

A dichotomous key is a resource that helps identify a rock, plant, or animal species. It works “by offering two alternatives at each juncture, and the choice of one of those alternatives determines the next step” (http://en.wikipedia.org/wiki/Dichotomous_key). It is important at this grade level to emphasis the simple physical attributes that could be used to develop a dichotomous key. Many simple keys using common materials in the classroom are available on the internet. The introductory activity does not need to focus on scientific terminology.

Lichens are organisms composed of either algae or cyanobacteria living in a relationship with a fungus. Lichens may be crust-like, scaly or leafy, or shrubby in form and are classified on the basis of the fungal partner. They can be grouped based on their body types. Those resembling leaves are referred to as foliose lichens and others like crusts are crustose lichens and shrubby forms are fruticose lichens. They commonly grow on trees and rocks, but may be found growing on sandy soils and upon the sides of buildings and tombstones. Georgia lichens are an array of colors-grey, browns, green, yellow, and orange.

Lichens are important to an ecosystem. They can live in adverse conditions and in locations were plants cannot thrive. They are early colonizers after disturbances and have a role in soil formation. Lichens provide a food source to some mammals such as reindeer living in the Artic. However, more common they are used by birds as nesting material. Humans harvest lichens to make dyes, healing aids and tonics.

For more information on lichen morphology and ecology, visit
Introduction to Lichens: An Alliance between Kingdoms at http://www.ucmp.berkeley.edu/fungi/lichens/lichens.html

Lichens of North America at http://www.lichen.com

10 Things You Should Know About Lichens at http://ohioline.osu.edu/sc195/029.html

What is a Lichen? at http://www.earthlife.net/lichens/lichen.html

Lichenland: Fun with Lichens from Oregon State University at http://ocid.nacse.org/lichenland


Materials

- Computer with Internet access or reference materials

The Activity

You can collect lichen samples for this activity or you may wish for students to collect lichen samples as part of this activity. If you collect the samples, it is important for it to be a lichen species found in A Guide to Twelve Common & Conspicuous Lichens of Georgia’s Piedmont. Also, it is important to take a picture or video of the location where the lichen(s) were collected. These photographs or videos should be shown prior to this activity so the students grasp the lichen’s habitat and conditions.

NOTE: Seek qualified advice before venturing and collecting lichens in an area. Please be aware lichens cannot be collected from an area without first getting permission from the landowner and those responsible for the site. It is prohibited to collect from federal, state, and local parks without special permission.

Exercise

1. Have the students take one of the lichen samples they collected from outside (optional) or one you provide them and have them identify the species using A Guide to Twelve Common & Conspicuous Lichens of Georgia’s Piedmont.
2. Illustrate to the students (using photographs or videos) or take them to the location where the lichens were collected.
3. Using the Guide and additional resource materials, have the students identify the necessary requirements for this lichen to thrive. Also, have the students identify possible pollution (natural and human influenced) that can harm this lichen.
4. Have the student draw the lichen sample they selected and researched. Have the students write a description of it.
Wrap Up
Relate how writing a description of this lichen is what scientist does when they classify an organism based on physical attributes.

Extension
Have the students go outside and try to locate the lichen species they drew and described. Have the students document the physical attributes that made recognition easier. Ask the students, how did you determine if you retrieved the correct lichen? Have the students go back and modify their descriptions or drawings to improve accuracy.
Note: With classification of organisms, there is a method for determining accuracy of descriptions.

Performance Assessment
Students will:
♦ Create one dichotomous key for organizing any group of objects.
♦ Write about a Lichen and how it is both a plant and a fungus.