Lesson 3
Classification of Insects

Timeframe

1 Fifty minute class period

Target Audience

Middle School (6-8) Life Science but easily adapted to Grades 4-12

Materials

- Petri Dishes
- Magnifying Lenses
- Forceps (Tweezers)
- Insect collection data sheet

Contact:
SMILE Program
smileprogram@oregonstate.edu
http://smile.oregonstate.edu/

Description

In this activity students will grapple with the challenges of classification by trying to group and name the organisms that they collected in with their traps. Students will share findings from each habitat with the other groups and then come up with shared organism names. After agreeing to a common set of names for the organisms they have found, students will discuss how the diversity of life they observed differed among the various habitats they surveyed.

Objectives

- Experience the challenge(s) of classifying living, variable things.
- Notice that there is variation (i.e., diversity) even between individuals of the same "type", which makes classification difficult, interesting, and useful.
- Reflect on the need for/ uses of classification.

Guiding Question

- How does classifying information help you better understand living things?

Teacher Background

There is an incredible amount of biodiversity, or variety of life, on Earth. Scientists have already discovered and named over 1.75 million species and estimate there may be as many as four to ten times this number undiscovered. For centuries, scientists have been attempting to organize and classify this incredible diversity of life using a classification system called taxonomy.

Scientists use a taxonomic hierarchy as a way to organize and classify organisms based on their ancestral descendent relationships (inferred on the basis of their observable characteristics and/or their genetic overlap). At the root of the taxonomic hierarchy, organisms belong to one of the three basic domains of life: Archaea (primitive bacteria), Bacteria, and Eukarya (all other organisms). Next, the Eukarya domain is separated into many kingdoms of life, including Plantae, Animalia, Fungi, Protista, and Chromista. Within each kingdom, organisms are separated further into the following hierarchies: Phylum, Class, Order, Family, Genus, and Species, with numerous sub-levels in between.

Taxonomists, or biologists specializing in biological classification, are constantly discovering new information that becomes part of this dynamic taxonomic system. Being able to identify a species and give it a name, be it descriptive or just agreed-upon, is foundational to virtually all of the biological sciences. Just imagine how hard it would be to communicate with your friends if you couldn't even agree on what to call the objects you're talking about!

Activity Introduction

Tell students that scientists collect, study, and observe specimens. They record every detail they can think of and then compare their observations to existing records. New species are discovered (or recognized) based on their differences to other known species, but classified according to their similarities to known species. New species are then given a unique scientific name based on their relationship to other, known species and (often) some aspect of their unique characteristics. These names are continuously revised as the relationships between different species become clearer, and as previously-described species are subsequently shown to in fact be the same as the "new" species.

Activity

1. Have students get back into their habitat sampling teams with their specimen containers and provide them with petri dishes. Tell students that they are going to closely examine their organisms and use the data sheet provided to record and draw species information. They might find that they need

Next Generation Science Standards

DISCIPLINARY CORE IDEAS:

LS2.A: Interdependent Relationships in Ecosystems

PERFORMANCE EXPECTATIONS:

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

PRACTICES:

Practice 1: Asking questions and defining problems

Practice 2: Developing and using models

Practice 8: Obtaining, evaluating, and communicating information.

CROSSCUTTING CONCEPTS:

- Patterns
- Systems and systems models

to regroup organisms after looking at them more closely. Some characteristics that students will want to consider when grouping organisms is: number of legs, eyes, body segments, antennae, color, texture, pattern, size, etc.

2. Tell students that biodiversity is more than just the number and distribution of species, but also the diversity of variation within species. Have students use magnifying lenses or microscopes to look closely at individual species to try to find and record variations (this could be anything including variation in size, differently shaped wings or legs, differently positioned hairs, etc.)

3. Explain to students that scientists create names for species based on a diagnostic or notable characteristics, where it was found, or sometimes the whim of the person who found it. To Introduce genus and species have students think about their own names. Last names are like the genus (used to group a species with close relatives), but the species name is unique (used to separate it from other members of the family). This way you can use the same 'species' name in different genera just like "Bill Smith" is not the same as "Bill Williams".

4. Have students brainstorm a suitably informative and useful name for each unique organism that they found. Emphasize that students do not need to know or use the "scientifically correct" name, rather the goal is to work together to come up with usefully descriptive identifiers that will ensure that they all know what organism is being referred to when it is being discussed. Have students record the exact time that they named each unique specimen in order to make it like real taxonomy, this will help with agreeing on a shared name later.

5. After each group has completed a data sheet for their sampled habitat, tell them that they are going to a "American Entomological Society's Annual Pacific Northwest Insect Conference" to share their discoveries about their new organisms with other scientists. Have students set up their data sheets and organisms on desks around the classroom, and give them time to look at and discuss each other's specimens. Are there any organisms that multiple groups observed? If yes, students can compare the time that specimens were named and everyone has to use the name that the first group to name a particular species came up with. If any organisms were named at the same time, then students might vote as a class to decide on a shared name.

6. Once the students are done classifying and sharing their organisms they should pick one or more

of the "best" specimens to submit to Oregon State University. If you need organism boxes you can contact smileprogram@oregonstate.edu

ATTN: CHRIS MARSHALL
OREGON STATE ARTHROPOD COLLECTION
3029 CORDLEY HALL
CORVALLIS, OR 97331

Remind students that specimen containers and/or envelopes should ALWAYS contain a label that includes:

- **Location** of collection
- **Date** specimen was collected
- **Name** of the collectors

Discuss

- What was difficult about classifying and naming organisms?
- Why do you think that scientists use scientific names for organisms?
- Did you find any variations (differences) within a single species? Why do these variations exist?

Resources

http://nationalgeographic.org/activity/classifying-information/

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Insect Collection Datasheet

Sample Location (forest, field, classroom, etc.):

# Found	**Collection Method** (pan, ground, light, etc.)	**Distinguishing Characteristics** (what makes this organism a unique species?)	**Sketch of Organism** (make sure to include specimen details)	**Name of Organism** (Based on characteristics of organism)	**Time Named** (Exact Time)