LESSON 12: PLANT CLASSIFICATION

TEACHER GUIDE

BACKGROUND INFORMATION

- There are nearly two million identified and formally described living species on Earth. Scientists believe that the true number of species in existence far exceeds this number.
- A complex method of classification has developed to organize species.
- There are seven widely recognized levels of classification of life: kingdom, phylum, class, order, family, genus and species. Kingdom is the broadest category, and species is the most specific.
- Sometimes, the classification of "domain" is used as the broadest level (even more so than kingdom). Domain is divided into three categories: Archaea, Bacteria and Eukaryota.
- The kingdom level further specifies the domains and is subdivided into six categories: Plants, Animals, Protists, Fungi, Archaebacteria and Eubacteria. Plants, Animals, Protists and Fungi fall under the domain "Eukaryota". Archaebacteria fall under the domain "Archaea". Eubacteria fall under the domain "Bacteria".
- Organisms are placed into specific categories based on a variety of distinguishing characteristics including cell type and where they get their energy from.
- Classification is especially useful when discussing and learning about organisms.
- Let's look at strawberry classification as an example of how to classify a plant
    - Strawberries are in the kingdom Plantae because they are plants.

- Strawberries are in the phylum Angiosperms because they produce flowers.
- Strawberries are in the class Magnoliopsida because in the seedling phase the strawberry plants have two leaves.
- Strawberries are in the order Rosales because of their ability to accomplish nitrogen fixation (the conversion of nitrogen into ammonia). Also, the flowers on Rosales plants have four or five petals that are either flat or cupped.
- Strawberries are in the family Rosaceae because of the pattern of their leaves, the attractive nature of their flowers, and the fact that they produce fruit.
- Strawberries are in the genus Fragaria. Fragaria means strawberry.
- Strawberries can be further classified into specific species like Woodland and Garden strawberries.

LESSON OBJECTIVES

- To introduce the vast array of species on Earth.
- To understand what classification is.
- To understand why people undertake the project of classifying life.
- To introduce the scientific method of classification.
- To practice classifying by recognizing characteristics and identifying similarities and differences.

LESSON MATERIALS

- Two sheets of paper and a writing utensil for each student.
- A copy of the "Organisms Sheet" for each group. This can be found at the end of this "teacher introduction" section. Cut out each of the pictures so the students can move them around.
- Optional: you might consider substituting some of the plant pictures with actual plants from your aquaponics system. This way the students could really examine the characteristics of the plants and get a better feel for how organisms are classified.
- Copies of the assessment.

ASSESSMENT ANSWER KEY

1) To classify means to put into groups. (C)
2) We classify organisms to more easily discuss life and learn about life.
3) The most specific classification category is species. (D)

SAMPLE ACTIVITY ANSWERS

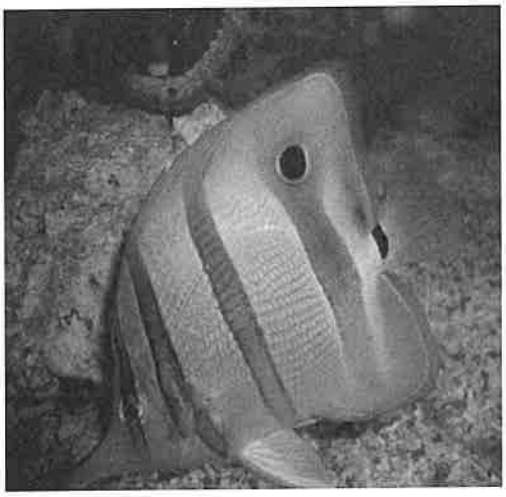
- As long as the student logically explains why they made whatever move they did, they accomplished the goal of the activity.
- All of the organisms are linked by the fact that they are alive.
- The next move might be to separate plants from animals.
- After there is a group of four plants and four animals, a student might choose to divide the organisms into four groups as follows: the leopard and the lion (both live on land), the fish and the dolphin (both live in the water), the tree and the flower (neither produce fruit) and the strawberry and pepper plants (both produce fruit).
- Finally, all of the organisms should be in groups of their own. The leopard is distinguished from the lion because it has spots. The fish is distinguished from the dolphin because it has stripes. The tree is distinguished from the flower because it has bark. The strawberry plant is distinguished from the pepper plant because the strawberry seeds are on the outside of the fruit whereas the pepper seeds are on the inside of the fruit.

ORGANISMS SHEET

Lion

Leopard

Fish



Dolphin

Flower

Strawberry Plant

Pepper Plant

STUDENT GUIDE – HOW ARE PLANTS CLASSIFIED?

VOCABULARY

Classify – to put into a category or group.

Identify – to recognize as a particular thing.

Organism – a unit of life. Plants, animals and bacteria are all types of organisms.

Fruit – the part of the plant that has the seeds.

Characteristic – a trait used to classify. Brown hair and funny are both characteristics a person might have.

LECTURE AND DISCUSSION

- There are more than one million living species, or organisms, that have been identified on Earth. Scientists suspect that there are far more species that have not yet been identified.
- Since there are so many species, we have developed a system to classify living things.
- Tell the class this story: pretend there is someone who has never heard of chocolate sauce. You decide to explain chocolate sauce to them by first saying it is a type of food. You then tell them it is a type of dessert. Then you explain that it is a liquid. You then tell them it is a thick liquid. Then you tell them it is made out of chocolate. At the end of your explanation they will probably have a pretty

good picture of what chocolate sauce is. (power point)

- This is the same idea as classification.
- When you classify something you put it into more and more specific groups until you have that thing in its own group. (power point)
- Classifying life makes it easier to talk about and learn about.
- It is easier to understand a species someone is talking about when they can describe how that species was classified, just like the chocolate sauce example.
- It is easier to find similarities and differences amongst species when they are put into groups.
- Activity Break! Consider taking a quick break to let the students try their hand at describing something using classification.
- Have each student take out a sheet of paper and a writing utensil.
- Have each student pick an object they wish to classify. This can be anything, a banana, a chair, a fan, a pizza, etcetera.
- Tell them to figure out how to describe the item to someone who has never heard of it before using at least four steps.
- The student's descriptions should start with the most general category and end with the most specific, just like the chocolate sauce example.
- Once everyone is finished, call on a few students to share their descriptions with the class.
- Scientists use this method of classification to organize all sorts of life on Earth.
- There are seven main levels used in classification: kingdom, phylum, class, order, family, genus and species. (power point)
- We will use strawberries as an example to demonstrate how a scientist would classify an organism.
- Strawberries are in the kingdom plantae. (power point)
    - Ask the class: why do you think they are in this kingdom?

- Strawberries are in this kingdom because they are plants.
- Ask the class: what else might go in this category?
  - Lettuce, trees and grass would all go in the kingdom plantae as well.

- Strawberries are in the phylum angiosperms. (power point)
  - They are in this phylum because they have flowers.
  - Ask the class: what other plants have flowers and would go in this category?
    - Tomatoes and peppers are both plants that produce flowers and would go in this category.
- Strawberries are in the class Magnoliopsida. (power point)
  - They are in this class because of the number of leaves the young plants have.
- Strawberries are in the order Rosales. (power point)
  - They are in this class because of the number and shape of the petals on the flowers.
- Strawberries are in the family Rosaceae. (power point)
  - They are in this family because of the pattern of their leaves, the type of their flowers, and because they make fruit.
- Strawberries are in the genus Fragaria. (power point)
  - Fragaria means strawberry!
- There are many different types of strawberries that we could further classify into specific species.

ACTIVITY

- Divide the class into groups of 2-4.
- Each student should have a piece of paper and a writing utensil.
- Give each group a set of eight items. There are pictures provided for this at the end of the teacher introduction segment of this lesson. The students should treat the pictures as if they were real plants and animals. It would also be fun to supplement some of the pictures with plants from the aquaponics system. This way the students could really examine the characteristics of the plants and get a better feel for how organisms are classified.
- Have the students first put all eight of their items into a group. Each student should then write a sentence describing what characteristic all items in that group have in common. For example, they might write that all of the items in their group are alive.
- The students should then divide their group of eight into two groups of four based on characteristics. They should write a sentence for each group, citing what characteristic all of the members of each group have in common and that the other group does not have. Ask the students to also record which organisms they placed in each group.
- The students should then divide each of their groups of four into groups of two. This will result in four groups of two members each. Have the students go through the same process as they did for the previous division. They should record why they made the decisions they did, along with which organisms ended up in each group.
- Finally, the students should divide their groups into eight separate groups, each consisting of only one member. The students should record what characteristic is unique to that organism, and as such, distinguishes it from all of the other organisms.

- Once everyone has finished, consider letting the groups share some of the divisions they made and why they made those divisions with the rest of the class.

CONCLUSION

- There are greater than one million species on Earth.
- Since there are so many species, scientists have developed a way of classifying them.
- We use the categories: kingdom, phylum, class, order, family, genus and species to organize life on Earth.
- The classifications are listed in order of most broad to most specific. Kingdom is the broadest category and species is the most specific.
- Ask the class: what are the benefits to classification?
    - It makes it easier to talk about organisms.
    - It makes it easier to study organisms.

EXTENSION

- Research – a fun research project would be to give each student an organism and have them research that organism's classification. The students could put together a poster on their organism and present their findings to the class.

Name_____ Date_____

ASSESSMENT 12 – PLANT CLASSIFICATION

1. What does it mean to classify? (Circle one)
    A. To divide.
    B. To write about.
    C. To put into groups.
    D. To research.

2. Why do we classify organisms? (In your own words)

3. What is the most specific classification category? (Circle one)
    A. Phylum
    B. Kingdom
    C. Class
    D. Species
    E. Order