

SCOPE, SEQUENCE, and COORDINATION

A National Curriculum Project for High School Science Education

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Student Materials

Learning Sequence Item:

1001

Organizing Principles of Plants and Animals

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Adapted by: Tom Hinojosa

Contents

Lab Activities

1. The Shape of My Kingdom
2. The Spice of Life
3. Microville
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Readings

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Science as Inquiry

The Shape of My Kingdom**What characteristics would you use for purposes of classification?****Overview:**

If you were to classify a group of objects, you would likely group together those objects which have certain characteristics in common. Living things are classified, or grouped, in much the same way. This activity is a game of grouping or classifying fairly simple objects. Living things are much more diverse, so that makes classifying living organisms a bit more complex. This activity will help you understand the process of classifying living things. See how the system you come up with compares to others in your class!

Procedure:

Carefully cut out the shapes drawn on the paper(s). Then, group the various shapes, first into two kingdoms. Then, further divide the members of each kingdom into smaller groups called phylums. Finally, divide the members of each phylum into distinctive classes. One or more shapes may end up in a category by themselves.

Assign descriptive names to the two kingdoms. Assign names to each separate phylum. Finally, give a “scientific” name to each member in each group.

Questions:

1. What is the criteria for separating members of the two kingdoms?
2. What are the characteristics of each phylum?
3. What characteristic(s) of the various shapes did you use to classify them?
4. If these objects actually existed in three dimensions, what other characteristics might you use to classify each one?
5. How does this exercise compare to the classification of living things?

Science as Inquiry

The Spice of Life**How can we organize the major divisions of plants and animals?****Overview:**

Sometimes life can seem pretty boring, the same routines and not much variety. On the other hand, most people have never really noticed the huge variety of living things right around them where they live! In this activity you and your class will help point out this fact by creating a “virtual” bio-exhibit. Try to be the class with the best and most diverse virtual collection of living things just by working together and being observant!

Procedure:

Create with your class a list of living things including plants and insects, that you have commonly observed. Add to your list as new ideas come up. Group them and carefully develop a detailed description for each category that would help someone know which organisms should be classified in each category. Write the common name for each organism followed by the binomial scientific name in parentheses. If the correct scientific name cannot be determined, name the organism yourself using the scientific format.

You may wish to draw illustrations to show how or why each living organism was classified the way it was. Check to see how similar your classification system is to others in the class.

Questions:

1. Which organisms seem to be closely related?
2. How do you determine how closely related two different living things really are?
3. How many major categories are needed in order to classify all living things?

Science as Inquiry

Microville**Are common microbes unique forms of life?****Overview:**

By now you've noticed a fairly wide variety of living things around you. You also probably know there are some common microscopic life forms around you (even inside you!) that are not commonly observed. What are these tiny life forms like and how do they compare to other life forms? How are they related to much larger living things like plants and animals?

Procedure:

Obtain four or five 2-cm slices of peeled potato. Sterilize the potato slices in boiling water. Then place individual slices in petri dishes. Use cotton swabs to inoculate separate potato slices with dust, and the inside of your cheek. Once the potatoes are cool, rub a finger on another slice. Establish a control dish. Cover each dish immediately and leave them to sit for at least 3 days.

Observe the prepared slide(s) of bacteria under the microscope. Draw and record your observations in as much detail as possible. Observe the potato slices and record your observations in a data table.

Add these living organisms to your list of living things from Activity 2 and classify them in a suitable group (like you did for the other life forms). Modify your classification system if necessary.

Questions:

1. Each potato slice (or media) contains a unique culture. Describe the differences in each one.
2. How can you tell different species of bacteria by their colonies?
3. Why did you boil the potato slices to start?
4. How can you explain why some slices may not show any results?
5. How many major categories are needed in order to classify all living things?

History and Nature of Science

A Jungle Beneath Your Nose**Will a simple classification system work for all living things?****Overview:**

In this activity you will gather data and make observations of a wide variety of living things, some you may have seen before and others you may never have known existed! In science, we are interested in classifying living things in order to establish similarities to better understand the nature of life. How do these living things compare to life forms you are more familiar with? What relationships exist and what is the basis of these relationships?

Procedure:

Mark each of 8 bowls (provided by your teacher) for your lab group for easy identification. Prepare these bowls ahead of time (at least five days). The bowls contain the following items:

Bowl 1. Fruit, cut to fit the bowl.

Bowl 2. Water from a pond or river, containing bottom materials.

Bowl 3. Enough hay to cover the bottom of the bowl and 200 mL tap water.

Bowl 4. Dried beans and tap water.

Bowl 5. Cream cheese, spread over the bottom of the bowl about 1 cm deep.

Bowl 6. Stale bread, moistened (not soaked!) with water. Expose to air for 24 hours, then cover

Bowl 7. Place a piece of filter paper on the bottom of the bowl. Mix 5 g cornstarch with 95 g rich garden soil. While mixing soil and starch, add enough water to give the mixture a dough like consistency. Spread the mixture smoothly on the filter paper. Keep the soil mixture moist throughout the investigation.

Bowl 8. Peppercorns infused in tap water.

Divide up the work of making observations of the 8 specimens among your lab partners (otherwise, the process of observing and recording observations will be too time consuming). Make microscopic observations of the various cultures, concentrating on your respective assigned bowl(s), then share information/observations with your partners. Make detailed notes and drawings of living things you observe from the various cultures. As newly observed living organisms are found, add these to your previous list of living things from Activity 2. Classify these newly observed organisms as you did the others previous organisms—with modifications being made to the classification system as needed. Group them and carefully develop a detailed description for each category that would help someone know which organisms should be classified in each category.

Assign a scientific name to each new organism listed. If the correct scientific name cannot be determined, the student who “discovered” it names the organism—using the scientific format. (As is the practice among scientists, the person who first identifies the organism rightfully gets to name it!)

Questions:

1. Which organisms seem to be closely related?
2. How do you determine how closely related two different living things really are?
3. How many major categories are needed in order to classify all living things?