Investigation 4 • A

SKILL FOCUS

Performing and recording
Analyzing and interpreting
Communicating results

Creating a Dichotomous Key

If you find an insect you have never seen before, how could you discover its identity? Many field guides help you match up the characteristics of your specimen with those of similar organisms using a **dichotomous key**. This identification key uses a series of paired comparisons to sort organisms into smaller and smaller groups. In this investigation, you will learn how to make your own keys to identification.

Pre-lab Questions

- What characteristics do all insects have in common?
- Name two characteristics that scientists use to tell different insects apart.

Problem

How do you make a dichotomous key?

Prediction

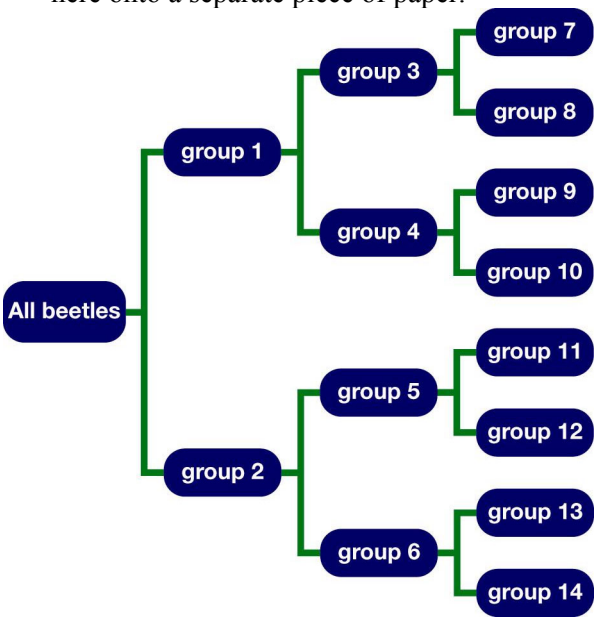
Predict which characteristics of insects will be most useful in creating an identification key.

Materials

illustration of 18 beetles
paper
sample dichotomous keys
pencil

Procedure

1. Copy the diagram of a dichotomous tree shown here onto a separate piece of paper.



2. Study the illustration of 18 beetles shown on the next page.
3. Select one characteristic and sort the beetles into two groups based on whether they have the characteristic or not.
4. List each beetle's number under either Group 1 or Group 2 on your diagram.
5. Record the characteristic that identifies each group.
6. Select another characteristic of each subgroup, and repeat steps 4 and 5 for the next level down on your diagram.
7. Continue to subdivide the groups until you have 18 groups with one beetle in each.

8. Using the characteristics shown on your diagram, construct a dichotomous key that someone could use to identify any beetle from the original large group. To do this, create a series of numbered steps with the first step showing the first characteristic you used. At each step, offer two choices for classifying the beetle based on a single characteristic. For example, you may have used the characteristic "antennae longer than front legs" as your first dividing characteristic. Your first numbered step in your key would be (1a) antennae longer than front legs or (1b) antennae not longer than front legs. Use the sample keys provided by your teacher to help you.
9. Exchange your key with a partner. Use your partner's key to classify a beetle, and record all the characteristics of the species you chose.

Post-lab Questions

1. Did your partner produce a dichotomous key identical to yours? Explain why or why not.
2. Which beetle characteristics were not useful for creating your key? Explain why not.

Conclude and Apply

3. Why does a key offer two choices at each step and not more than two?
4. Use print or electronic resources to find the two-word species name for each beetle shown below.

Exploring Further

5. Your teacher will provide you with several different "mystery" beetles. Use your dichotomous key and see if you can identify what species the beetles are. You may be unable to completely identify your beetle using your key. If this is the case, how far could you go with your key? Visit the library or the Internet and get a field guide to beetles. Use this to identify the mystery beetles. What characteristics would you have needed in your key in order to fully identify them?