

## #51 INTRODUCTION TO AND USE OF DICHOTOMOUS KEYS

### CONTENTS

- 5 Sets containing 8 “specimen” cards
- 30 Dichotomous Key Charts - Indented and Non-Indented Versions
- 30 Student Worksheets and Guides
- 1 Teacher’s Guide

Classification keys are many and varied in complexity. Taxonomic keys (also known as dichotomous keys) are used by scientists and naturalists to identify living organisms as well as non-living objects in the laboratory and in the wild. The main value of a classification system is that it provides an organized study of these living and non-living things. There are many aids available that may help us in identification of specimens. Field guides are books which contain elaborate information about a group of things found in nature. These may include elaborate illustrations and descriptions. A taxonomic key is a guide based on certain distinguishing characteristics. Characteristics so specific that one can readily follow each trait given and eventually identify and name the specimen.

Keys are developed by using similarities and differences in characteristics or traits. Characteristics named in keys may be physical, behavioral, and even biochemical. These characteristics are given in pairs of opposing statements. Only one statement in each pair can be true for the given specimen. The term dichotomous comes from dichotomy meaning “two opposites or categories”. After reading these two opposite statements, the observer must make a choice as to which most accurately describes the specimen. The statement chosen directs the observer to another pair of statements in which another choice must be made. Each succeeding pair of statements is more specific in describing the specimen. Choices are continued until the specimen is identified and named. Generally, taxonomic keys call attention to small details of the things to be identified. For this reason it is especially important for students to familiarize themselves with terminology given in Figure 1. For obvious reasons, the keys used in this lab activity will focus on simply the physical attributes of the contrived specimens.

The purpose of this activity is to introduce students to the use of dichotomous keys to identify unknown specimens. Contrived specimens are used so that students will have no prior information that may help them identify the organisms. We have named these organisms Quozes which means “strange or ridiculous things”.

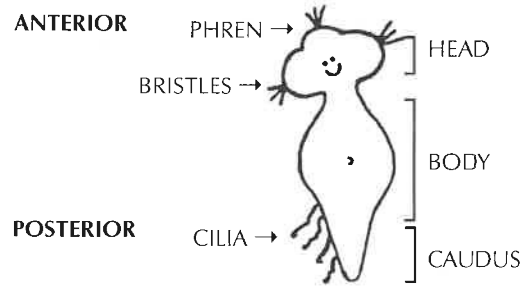
Students are introduced to two formats of dichotomous keys frequently encountered in the sciences (because they are used for large samples). They will evaluate which key is easiest to read or follow. The first dichotomous key is an indented format which uses letters for choices. Students progress alphabetically and read both A and AA, B and BB, etc. before making a choice. They must record each letter of the key that applies to the specimen (e.g. Specimen IX—A,B,DD,EE.....) until they reach a scientific name and variety (if applicable). The second dichotomous key is a non-indented format which uses numbers for choices. Two choices are given for each number. Students are to choose the best statement, record the number and number it says to go to (e.g. Specimen IX—1,2,3,12... Choices are continued until a scientific name and or variety is revealed.

### PROCEDURE

1. Have your students familiarize themselves with Figure 1 on their worksheets which describes the physical structures on this contrived organism. Review

the following terms below Figure 1 with your students.

FIGURE 1



TERMS

- asymmetrical** - each side of an imaginary line dividing parts that are not the same
- bristles** - three straight hairlike projections on anterior and sides of head
- caudus** - tail-like projection
- caudii** - (plural) - more than one tail-like projection
- cilia** - short, hairlike outgrowths
- ciliated** - with cilia
- dichotomous** - division into two parts or opposite categories
- lineated** - with lines or stripes
- phren** - bump on the head portion
- split head** - no phrens; two sections as illustrated below
- symmetrical** - similar form or arrangement on either side of a dividing line or plane

FIGURE 2



2. Using Figures 1 and 2, students should be able to identify parts on particular specimens in the sample. They should note that each specimen has a Roman numeral designation. There are five sets of 8 different specimens providing a total of 40 cards. Each student should receive one card and may start identification of the specimen with either key. They should stay with a particular key until all 8 specimens are identified. They do not have to start with Specimen I and so on.
3. Students should record the letters or numbers as they are read in the appropriate charts on the student guide and worksheet. Specimen card can be exchanged by the teacher or designated partner for another specimen until both keys have been completed.

4. Summary questions will test the student's ability to read the keys and identify the specimens. They will also determine related traits as well as draw specimens not included in the eight specimen sample, but described in the keys.

ANSWERS

DICHOTOMOUS KEY OF QUOZES-INDENTED VERSION (A)

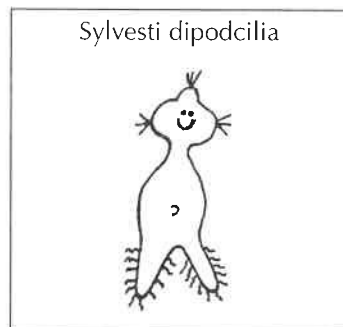
Specimen number	Letters used	Scientific name
I	A,BB,CC,D,EE,FF,G	Multiphren lineus var. symmetricus
II	A,B,C,DD,EE,F	Sylvestris spoticus
III	A,B,CC,DD,E,F	Sylvesti multipodus
IV	A,BB,CC,DD,E	Multiphren lostus
V	AA,B,C	Schizolobus ordinarius
VI	A,B,CC,D,E	Sylvesti dipodnoncilia
VII	AA,BB,C	Schizolobus hairilimbi
VIII	AA,B,CC,DD,EE	Schizolobus dandi var. spoticus

DICHOTOMOUS KEY OF QUOZES-NON-INDENTED VERSION (B)

Specimen number	Numbers used	Scientific name
I	1,2,5,6,7,8	Multiphren lineus var. symmetricus
II	1,2,3,4,5,6	Sylvestris spoticus
III	1,2,3,12,14,15	Sylvesti multipodus
IV	1,2,5,14,16	Multiphren lostus
V	1,19,20	Schizolobus ordinarius
VI	1,2,3,12,13	Sylvesti dipodnoncilia
VII	1,19,23	Schizolobus hairilimbi
VIII	1,19,20,21,22	Schizolobus dandi var. spoticus

## SUMMARY QUESTIONS

1. What are the physical characteristics that all specimens have in common? 2 eyes, mouth, belly button, 3 bristles at top and opposite sides of head, have head and abdomen sections.
2. Which key was easiest to read and follow? (Opinion) Answers will vary.
3. What are the advantages of using a classification key when identifying organisms? Sometimes there are only minor differences in two specimens that look similar. The key helps to focus on specific characteristics that may be missed. It is a useful guide to observation of the specimen.
4. What characteristics of these specimens were most useful for keying them? cilia, spots, lines present or absent from specimen, type of head, caudus or caudii.
5. Do you think it would be easier to identify actual specimens, rather than these illustrated specimens, by using a dichotomous key? Answers may vary, but may include: Actual specimens might be easier to identify than these illustrated ones because traits other than physical could be used, e.g. behavioral, biochemical, color.
6. What are the limitations of keys and taxonomic systems? Not all specimens will fit in a key and thus the key needs constant revision.
7. Draw below what you think the following specimens would look like based on information found in the keys.



The LAB-AIDS® #50 Concepts of Classification kit is a good follow-up activity illustrating the method of devising a classification key. Students identify characteristics used to group and regroup a set of given objects.

8. Which specimens are included in the Non-indented version of the dichotomous keys, but not found in the Indented version? Sylvestis wavirus, Plenticaudii undulata, Plenticaudii blotcho.