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## PLANT CLASSIFICATION

Examples of keys and classification for different plants and animals separate those organisms not only by genus and species, but also by family, class, and other taxa. A classification from kingdom to species gives us a great deal of information about an organism.

Let's find out the type of information we can gain from classifying a grass that is a favorite for summertime eating in the United States. We know this plant as corn.

Along with the information that classification gives, take note of the Latin clue endings for taxa. For plants, *-ophyta* is a division ending, *-ae* or *-eae* is a class ending, *-ales* is an order ending, and *-aceae* is the usual family ending. Notice also that all taxa names are italicized (or underlined) and that the species name also includes the genus name.



Figure 8: *Zea mays*

| Taxa            | Classification          | Information  |
|-----------------|-------------------------|--|
| <b>Kingdom</b>  | <i>Plantae</i>          | Organisms that usually have chlorophyll and cell walls. These organisms usually make their own food through the process of photosynthesis.   |
| <b>Division</b> | <i>Tracheophyta</i>     | These are vascular plants, meaning they have special foods and water-conducting tissues called <i>phloem</i> and <i>xylem</i> .  |
| <b>Class</b>    | <i>Angiospermae</i>     | Flowering plants. The seeds of these plants are enclosed or covered by the ovary of the flower.  |
| <b>Subclass</b> | <i>Monocotyledoneae</i> | The embryo plant inside the seed has one cotyledon or seed leaf for stored food. Flower parts are usually in threes. The conducting tissues are scattered in bundles through the stem. Leaves usually have parallel veins. |
| <b>Order</b>    | <i>Commelinales</i>     | These are monocots with fibrous leaves. Some flower parts may be missing; some may be fused together.  |
| <b>Family</b>   | <i>Poaceae</i>          | The grass family has only monocots with hollow stems and greenish flowers with flower parts such as petals missing. The fruit is a grain or caryopsis.   |
| <b>Genus</b>    | <i>Zea</i>              | Large grasses with separate pollen and seed flower clusters (the tassel and the ear). The grain is enclosed by leafy husks.  |
| <b>species</b>  | <i>Zea mays</i>         | Corn<br><i>Zea</i> (Greek) = grain; <i>mays</i> (Spanish) = Indian corn  |



Write the classification for each plant in the correct order from Kingdom to species. Use the endings to determine in which taxa they belong.

3.14

**corn**

- Poaceae* a. \_\_\_\_\_
- Zea* b. \_\_\_\_\_
- Tracheophyta* c. \_\_\_\_\_
- Commelinales* d. \_\_\_\_\_
- mays* e. \_\_\_\_\_
- Angiospermae* f. \_\_\_\_\_
- Plantae* g. \_\_\_\_\_

3.15 **apple**

- Tracheophyta* a. \_\_\_\_\_
- Rosaceae* b. \_\_\_\_\_
- sylvestris* c. \_\_\_\_\_
- Angiospermae* d. \_\_\_\_\_
- Rosales* e. \_\_\_\_\_
- Plantae* f. \_\_\_\_\_
- Malus* g. \_\_\_\_\_



Complete this activity.

○ 3.16

Take a field trip with your family or a group within your class. Select a location in your area which provides plant study opportunities. Ideas might include a field, meadow, or woods; a plant nursery or greenhouse; a botanical garden or arboretum; a farm; a park. Make a list and sketches or photographs of at least 15 different kinds of plants. Identify them if you can. You may need to use a plant identification book that was printed for your region. Write an essay (100 words minimum) describing God's intricate design in one of the plants. Hand in the list, pictures, and essay to your teacher.

## ANIMAL CLASSIFICATION

If we continue our classification of the leopard frog animal key we used earlier in this LightUnit, the information will tell us a great deal more about leopard frogs than their common names and genus species name.

Word endings for animal taxa are different from those for plant taxa. The *-a* or *-ata* end-

ings are used for phylum; *-a* or *-ea* for class; *-a*, *-ea*, or *-ia* for order; and *-ae* for family. Note the wide variation of endings. Unless the classification word is used with the taxon, we may have difficulty determining the rank of classification being discussed.

| Taxa           | Classification      | Information  |
|----------------|---------------------|--|
| <b>Kingdom</b> | <i>Animalia</i>     | Organisms that are dependent on other animals or plants for food. Lack cell walls. Usually capable of locomotion or movement.  |
| <b>Phylum</b>  | <i>Chordata</i>     | Develop notochord and later vertebrae for backbone body support. Spinal cord or one nerve cord down back.  |
| <b>Class</b>   | <i>Amphibia</i>     | Organisms covered with soft, moist, glandular skin; no scales; eggs with gelatinous covering; three-chambered heart. Young usually aquatic breathing through gills; adults living on land breathing through lungs. |
| <b>Order</b>   | <i>Salientia</i>    | Head and body are fused with no obvious neck; no tail. Front legs are short, hind legs long for leaping; webs between toes. Metamorphosis obvious from tadpole to adult.   |
| <b>Family</b>  | <i>Ranidae</i>      | True frogs. Smooth skin, narrow waist, long legs; toes with webs, fingers separate. Teeth in upper jaw. Eggs in tapioca-like masses.   |
| <b>Genus</b>   | <i>Rana</i>         | Fingers and toes without end discs. Some with, others without lateral ridges. Edible frog legs.  |
| <b>species</b> | <i>Rana pipiens</i> | Leopard frog<br><i>Rana</i> (Latin) = frog; <i>pipiens</i> (Surinam) = frog  |



Place the animal classification in the proper sequence using the rules for correctly writing scientific names.

- 3.17 **leopard frog**
- Rana* a. \_\_\_\_\_
- Salientia* b. \_\_\_\_\_
- Amphibia* c. \_\_\_\_\_
- pipiens* d. \_\_\_\_\_
- Ranidae* e. \_\_\_\_\_
- Animalia* f. \_\_\_\_\_
- Chordata* g. \_\_\_\_\_

- 3.18 **lion**
- Chordata* a. \_\_\_\_\_
- Felidae* b. \_\_\_\_\_
- leo* c. \_\_\_\_\_
- Felis* d. \_\_\_\_\_
- Animalia* e. \_\_\_\_\_
- Carnivora\** f. \_\_\_\_\_
- Mammalia* g. \_\_\_\_\_

\*Hint: *Carnivora* is the order.



Complete this activity.

○ 3.19

Take a field trip with your family or a group within your class. Select a location in your area which provides animal study opportunities. Ideas might include a zoo, pet shop, pond or lake, wildlife sanctuary, farm, or park. Make a list, sketches, or photographs of at least ten different kinds of animals. Identify them if you can. You may need to use an animal, bird, or reptile identification book to help you. Hand in your list and pictures of the animals to your teacher.

## SEARCH FOR A SYSTEM

Life science classifications and systems of classification vary greatly depending on interpretations. You may find other systems in reference or science books. This variation does not mean one is right or better than another system. Some have the advantage of being more detailed but are more complicated to use. Others simplify detail, making the key more usable, but ignore important similarities and differences in characteristics. The problem today is one of too many interpretations which may look good but which are not clear or consistent. Systems have from two to five *kingdoms* depending on the taxonomist, with the five-kingdom system presently used the most frequently.

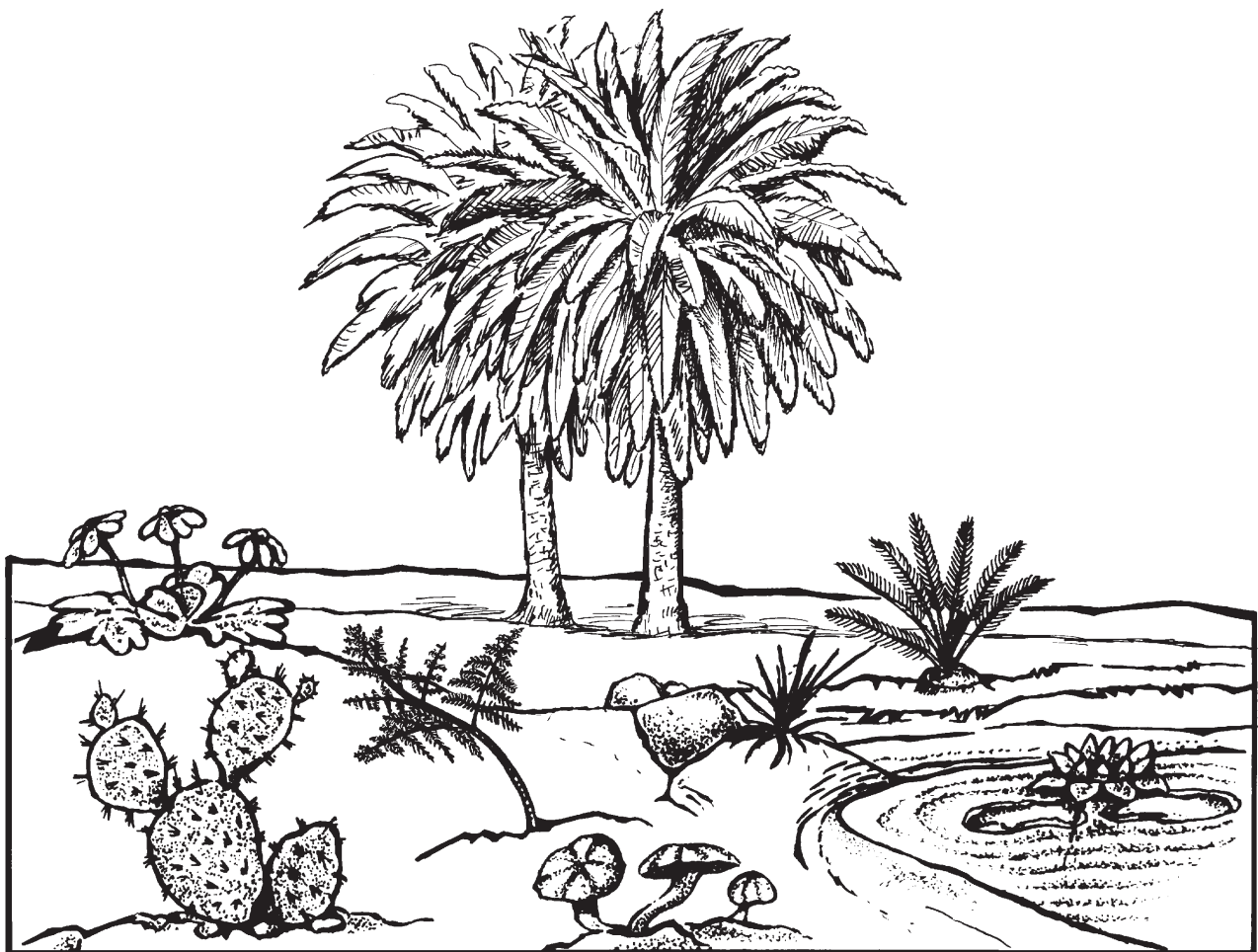
In the two-kingdom system, all living organisms are classified as either plants or animals. As you will study in LightUnit 1003, however, *Euglena* (a protozoan) makes its own food like a plant, yet is mobile like an animal. So where can we put it? Mushrooms

and all forms of bacteria are also difficult to classify. Creatures like these are a potential problem in the two-kingdom system. In the five-kingdom system, the three additional kingdoms are used to account for these types of organisms. In addition to the plant and animal kingdoms, the five-kingdom system has groups labeled Monera, Protista, and Fungi. Bacteria would be classed as Monera, *Euglena* as Protista, and mushrooms as Fungi.

In this LightUnit we will be using the classification system which has proven to be the simplest to use, yet which communicates basic information for the understanding of the life sciences. The basic two-kingdom model for taxonomy is still one of the best tools in teaching classification because of its simplicity and clarity. For this LightUnit series we will use the Plant and Animal Kingdom classifications as they appear in the charts on the following pages.

## THE PLANT KINGDOM

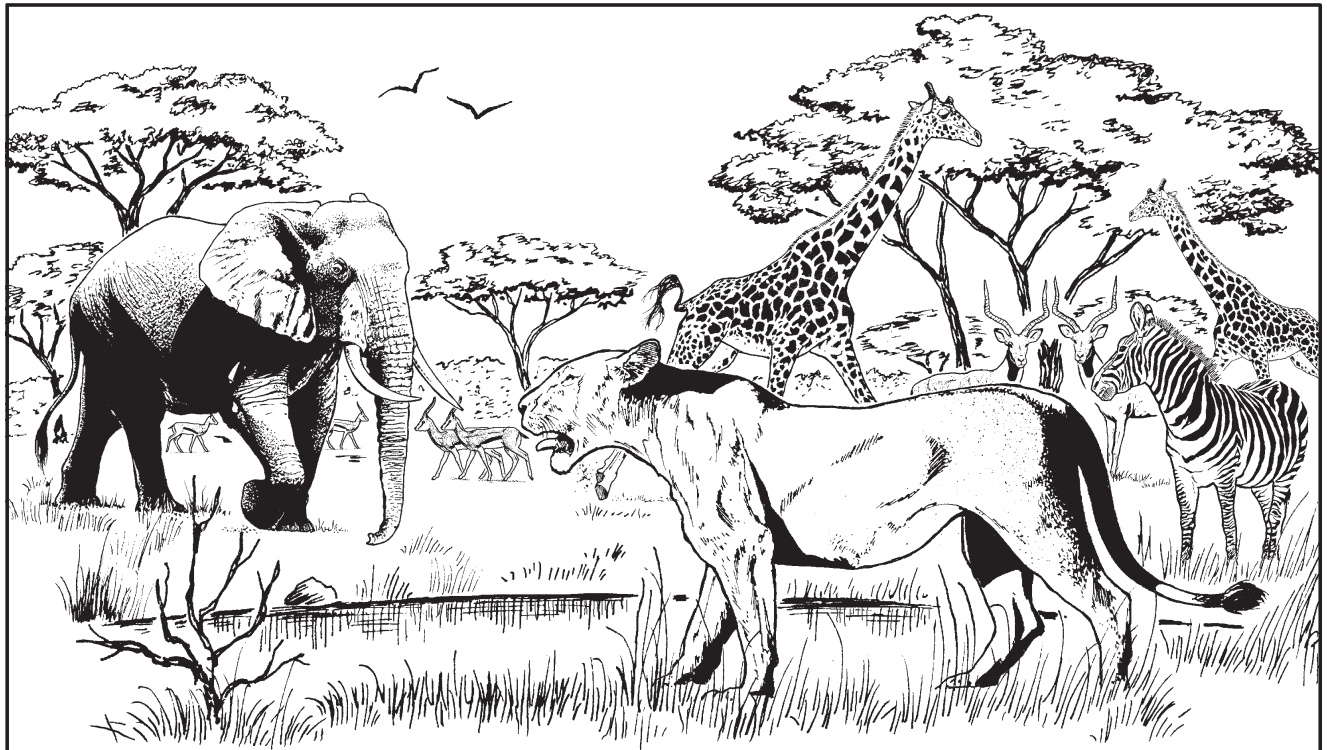
| Division | Name                 | Information   |
|----------|----------------------|---|
| 1        | <i>Chlorophyta</i>   | green algae. Approximately 7,000 species.   |
| 2        | <i>Cyanophyta</i>    | blue-green algae. About 1,500 species.  |
| 3        | <i>Euglenophyta</i>  | euglenoids. About 800 species.  |
| 4        | <i>Chrysophyta</i>   | golden-brown and yellow-green algae, diatoms. More than 10,000 species.   |
| 5        | <i>Pyrrhophyta</i>   | dinoflagellates. About 1,000 species.   |
| 6        | <i>Phaeophyta</i>    | brown algae and kelp. About 1,500 species.  |
| 7        | <i>Rhodophyta</i>    | red algae. About 4,000 species.   |
| 8        | <i>Schizophyta</i>   | fission plants and bacteria. More than 1,600 species.   |
| 9        | <i>Myxomycophyta</i> | slime molds. About 450 species.   |
| 10       | <i>Eumycophyta</i>   | true fungi. Approximately 38,000 species.   |
| 11       | <i>Bryophyta</i>     | liverworts, hornworts, and mosses. About 24,000 species.  |
| 12       | <i>Tracheophyta</i>  | vascular plants such as club mosses, horsetails, ferns, cycada, conifers, and flowering plants. More than 250,000 species of flowering plants; others approximately 13,000 species. |





## THE ANIMAL KINGDOM

| Phylum                 | Characteristics  |
|------------------------|--|
| <i>Protozoa</i>        | microscopic one-celled animals. More than 30,000 species.  |
| <i>Mesozoa</i>         | tissue animals. Approximately 50 species.  |
| <i>Porifera</i>        | sponges. About 3,000 species.  |
| <i>Coelenterata</i>    | jellyfishes, corals. About 9,000 species.  |
| <i>Ctenophora</i>      | comb jellies. Approximately 100 species.   |
| <i>Platyhelminthes</i> | flatworms, flukes, tapeworms. About 6,000 species.   |
| <i>Nemertinea</i>      | ribbon worms. About 500 species.   |
| <i>Aschelminthes</i>   | rotifers, nematodes. More than 13,000 species.   |
| <i>Bryozoa</i>         | moss animals. About 1,200 species.   |
| <i>Brachiopoda</i>     | lamp shells. About 300 species.  |
| <i>Echinodermata</i>   | sea lilies, starfishes, sea urchins, sea cucumbers. Approximately 5,000 species.   |
| <i>Chaetognatha</i>    | arrow worms. About 30 species.   |
| <i>Mollusca</i>        | chitons, tooth shells, univalves, bivalves, squids. About 71,000 species.  |
| <i>Annelida</i>        | segmented worms, sandworms, earthworms, leeches. More than 8,000 species.  |
| <i>Arthropoda</i>      | joint-footed animals: spiders, mites, crabs, water fleas, barnacles, insects, centipedes, millipedes, water bears. More than 900,000 species (700,000 of which are insects). |
| <i>Chordata</i>        | tunicates, fishes, amphibians, reptiles, birds, mammals. Approximately 70,000 species.   |



Taxonomy helps to bring order to an immense diversity of life. The listing is monumental. Taxonomists catalogue this listing for reference, use, research, and posterity. It is also useful for personal understanding and management of the millions of kinds of living

things God intended us to share the earth with—living things that range in size from microns to metres. For these reasons, taxonomy may be referred to as the “mother science,” for biology, zoology, and botany would not be the sciences they are without it.



**Complete these statements.**

- 3.20 The two advantages of the two-kingdom model are (a) \_\_\_\_\_ and (b) \_\_\_\_\_.
- 3.21 An effective system of taxonomy should be \_\_\_\_\_.
- 3.22 The smallest plant division is \_\_\_\_\_.
- 3.23 The largest plant division is \_\_\_\_\_.
- 3.24 The total number of plant species is about \_\_\_\_\_.
- 3.25 The smallest animal phylum is \_\_\_\_\_.
- 3.26 The largest animal phylum is \_\_\_\_\_.
- 3.27 The total number of animal species is about \_\_\_\_\_.
- 3.28 There are \_\_\_\_\_ (more/fewer) animal species than plant species.



**Complete this activity.**

○ 3.29 Choose a plant and an animal (what are your favorites?) and practice classifying them from kingdom on down to species. You will need to do some research! A *World Book* encyclopedia under “animal” or “plant classification” may be able to help you determine the division, phylum, and class (you may not be able to find them all). If you can work with a classmate, classify several plants and animals.

- |  |  |
|--|--|
| <p>a. <b>Plant:</b> _____<br/>         _____ (Plant Kingdom)<br/>         _____ (Division)<br/>         _____ (Class)<br/>         _____ (Order)<br/>         _____ (Family)<br/>         _____ (Genus)<br/>         _____ (species)</p> | <p>b. <b>Animal:</b> _____<br/>         _____ (Animal Kingdom)<br/>         _____ (Phylum)<br/>         _____ (Class)<br/>         _____ (Order)<br/>         _____ (Family)<br/>         _____ (Genus)<br/>         _____ (species)</p> |
|--|--|

**CLASSIFICATION OF MAN**

Perhaps the thought has entered your mind: What is man? He does not have chlorophyll, so he certainly is not a plant! He does possess the ability to move about, but is he an

animal? His manner of reproduction and growth is similar to the mammals, as well as his respiration and ability to move. And yet something is different about man.