Real Science-4-Kids

Level I

Rebecca W. Keller, Ph.D.

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Illustrations: Rebecca W. Keller, Ph.D.

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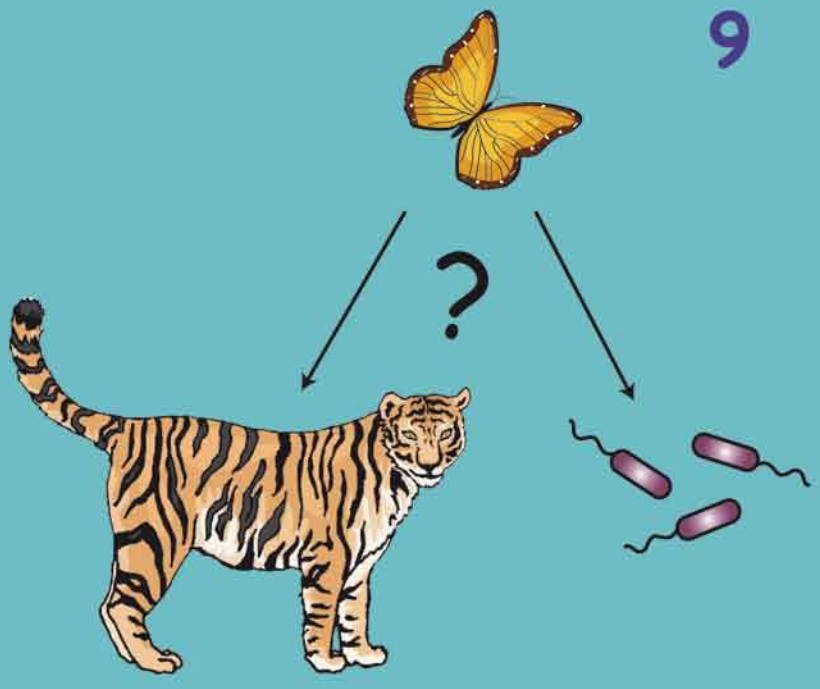
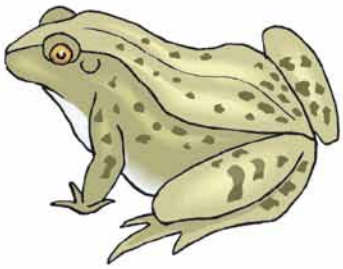


1.1 The science of life

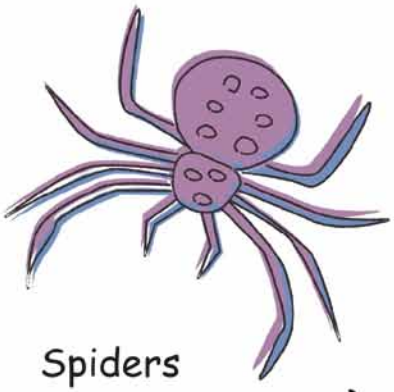
What is biology? The word biology comes from the Greek words *bios*, which means "life," and *logos*, which means "description." So biology is the field of science that "describes life." Biology is concerned with all living creatures and how they interact with one another.

Living creatures come in different sizes, shapes, and colors. Some are big and some are very small. Some are green, some are red, some are black, and some are white. Some see with two eyes, some see with eight eyes, and some have no eyes at all! Some fly, some walk, some swim, and some crawl.

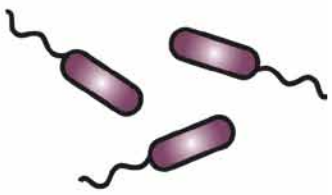
Trees



Frogs



Spiders



Bacteria

There are many different kinds of living things but they all have one thing in common. They are all alive.

Both living creatures and nonliving things are made of the same material: atoms! But living creatures differ from nonliving things, like rocks and lakes and air, because they are living.

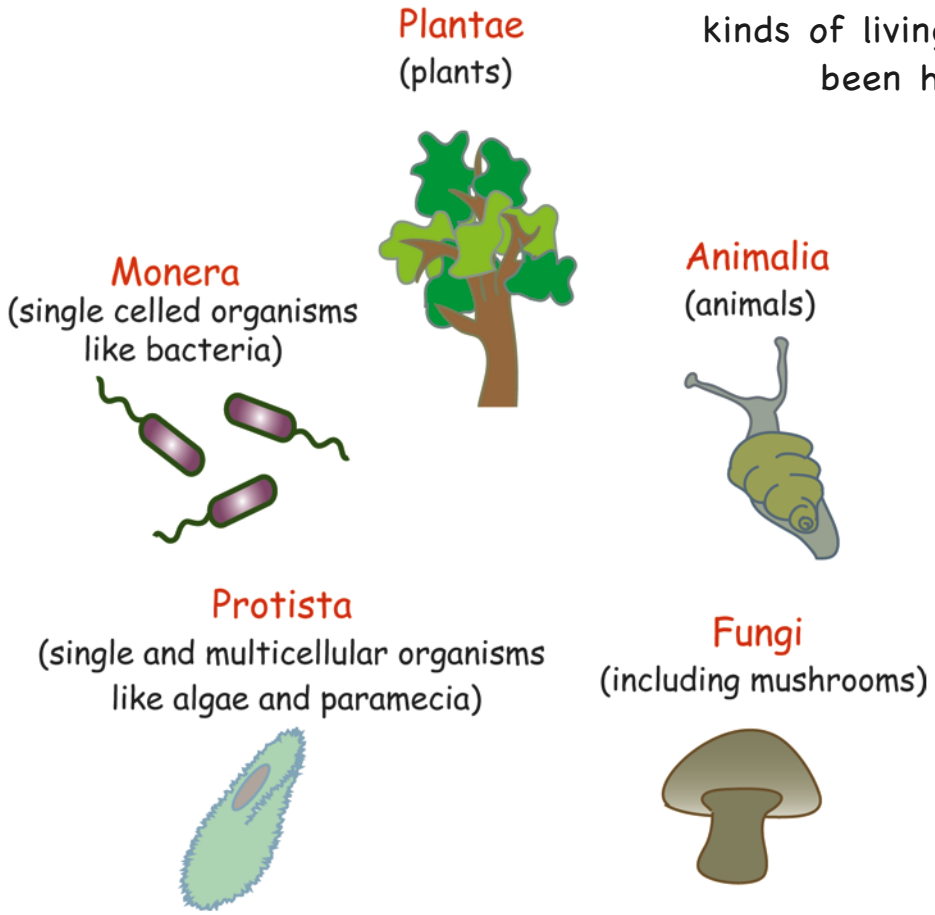
Living things require food to stay alive; they reproduce (have babies); some move freely in their environment; and eventually, all living things die. Living creatures are "alive" and nonliving things are not.

1.2 Taxonomy

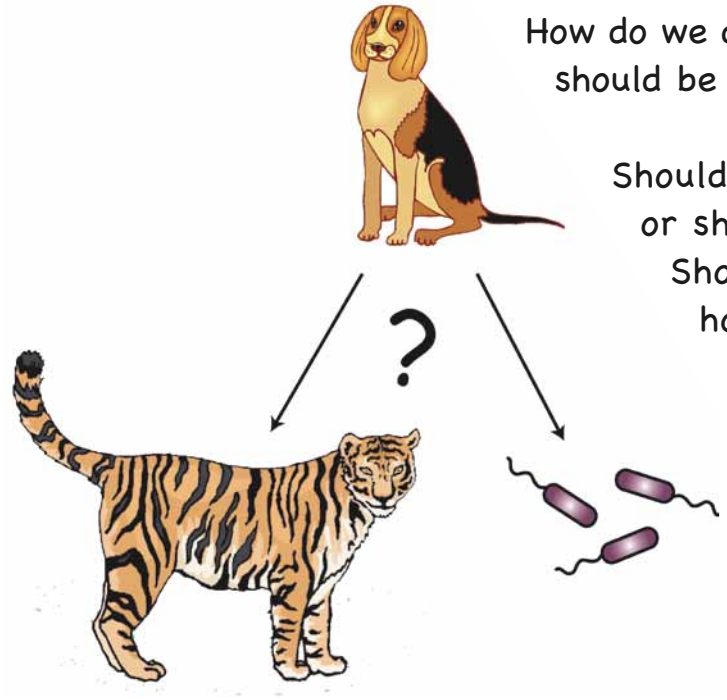
One way to understand living things is to organize or classify them. By organizing the different types of living things, scientists can better study both their similarities and their differences.

The branch of biology concerned with naming and classifying the many different types of living things is called taxonomy (tak-sä'-nə-mē). Carolus Linnaeus (li-nē'-əs) (1707-1778), a Swedish physician, was the founder of taxonomy. Linnaeus viewed science as a way to understand how the world was organized. He began to carefully study all the living things he could find. Whenever he found animals that were similar, like dogs and wolves or bees and wasps, he grouped them together. Grouping things together is what is meant by classifying. A new creature is classified in a group depending on which creatures it looks like. Sometimes it is very hard to decide which group a creature fits into.

1.3 The kingdoms

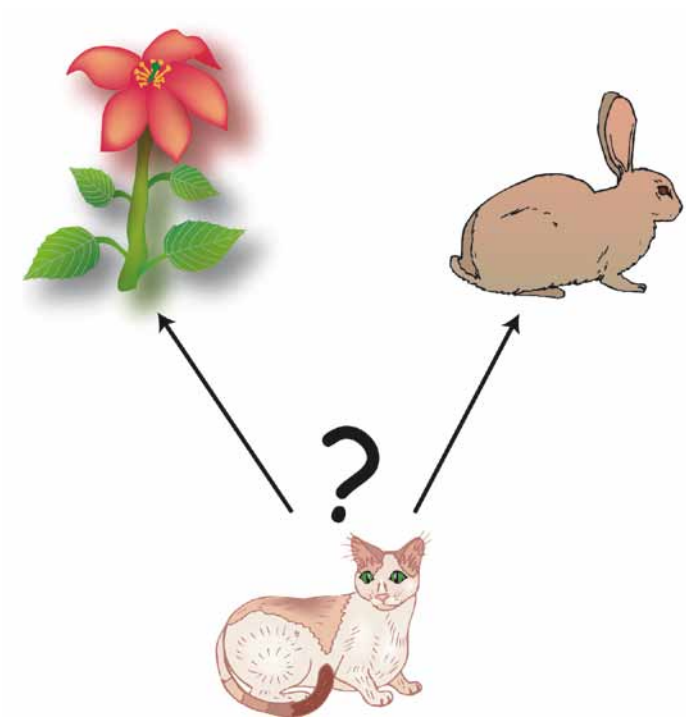


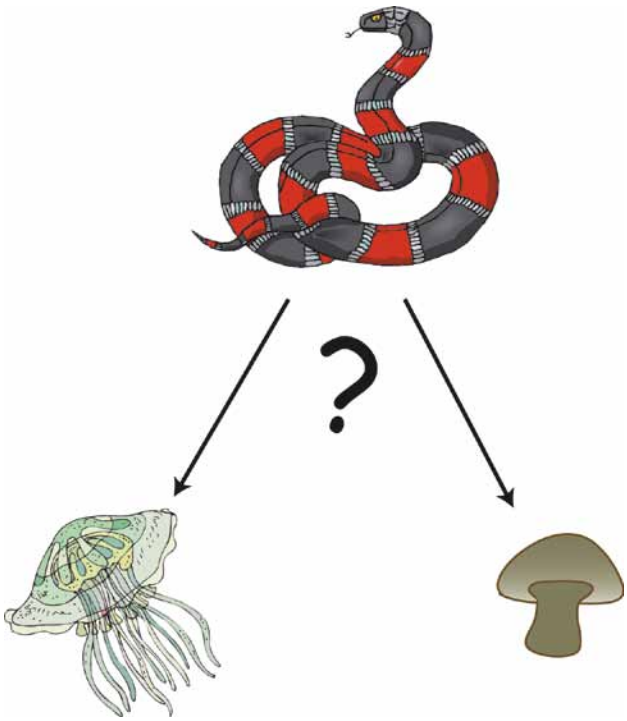
Because there are so many different kinds of living creatures, it has been hard for scientists to figure out exactly how to organize them. Several different approaches are currently in use. The most commonly used approach first divides all living things into five kingdoms. The kingdoms divide the various kinds of life into their largest groupings. The names of the kingdoms are Monera, Protista, Plantae, Fungi, and Animalia.



How do we decide which kingdom a living thing should be placed in?

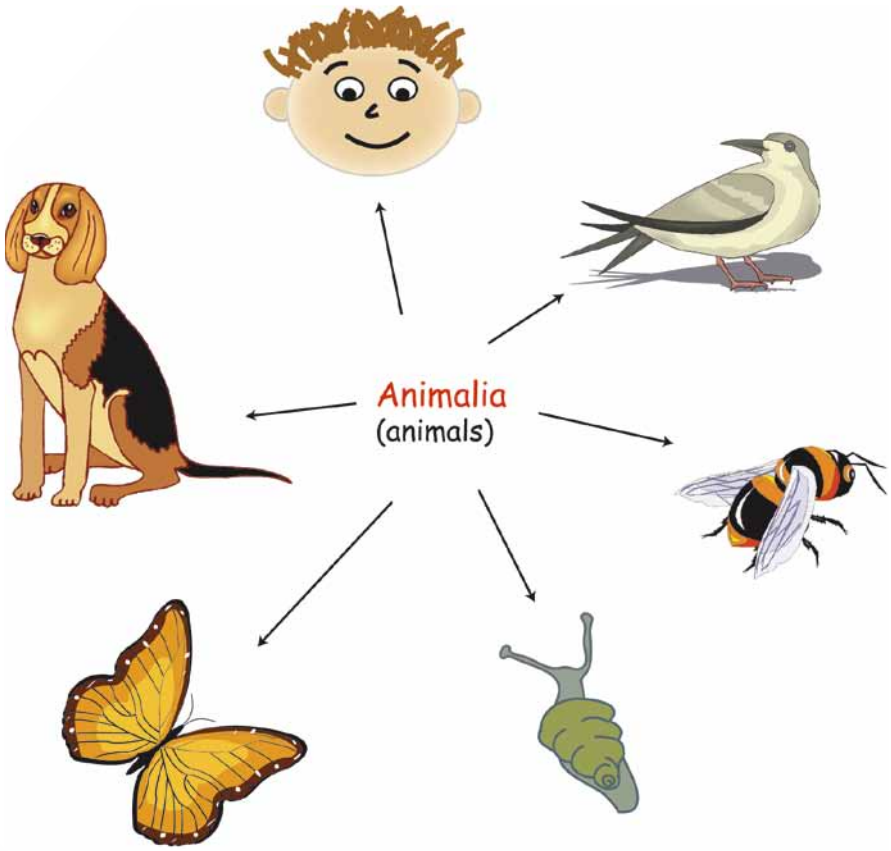
Should a dog be grouped with the tigers, or should it be placed with the bacteria? Should a house cat be grouped with the house plants or with the bunnies? What about a snake? Is it like a mushroom or like a jellyfish?

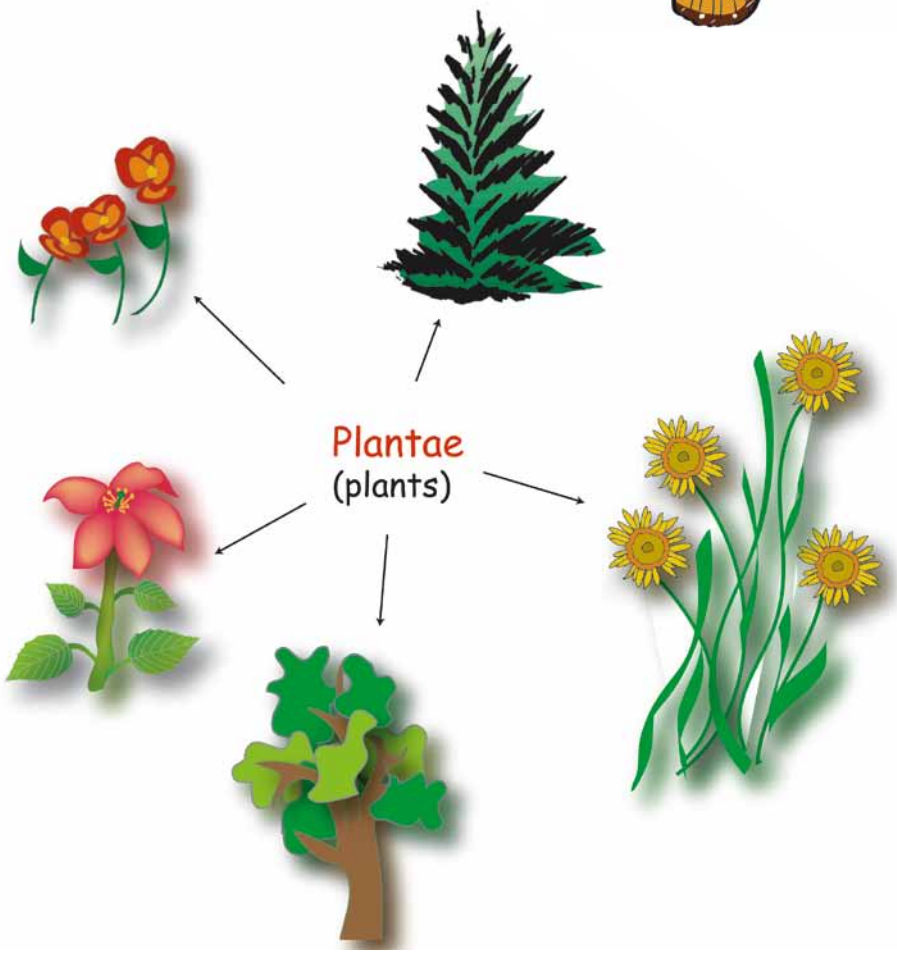




There are several things that need to be considered when placing a living thing into a particular kingdom. However, it is mostly the difference in the structure of the cells that ultimately determines the kingdom in which an organism will be placed. Cells are the basic building blocks from which all life is made. We will learn more about cells in Chapter 2. Dog cells are more like tiger cells than bacteria, so dogs are grouped with tigers. Cat cells are more like bunny cells than plant cells, so cats are grouped with bunnies. Snakes and jellyfish, although very different from each other, have similar cells, so snakes are grouped with jellyfish and not mushrooms.

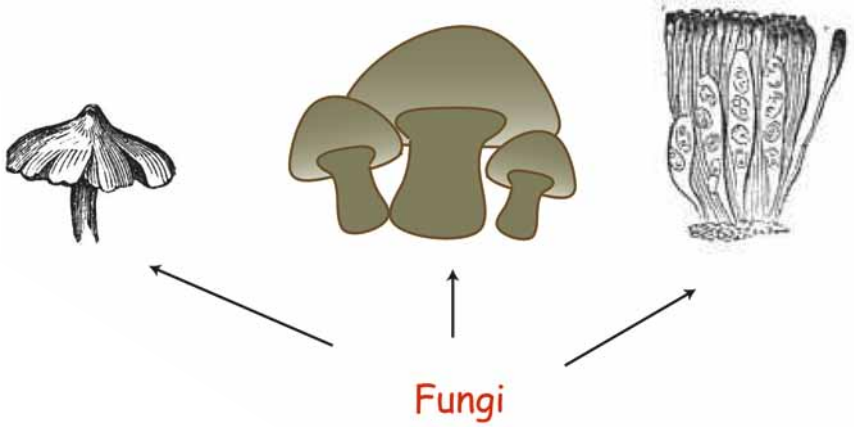
The animal kingdom, Animalia (ä-nə-māl'-yə), includes ALL of the animals: dogs, cats, frogs, sea urchins, bees, birds, snakes, jellyfish, bunnies, and even us! The animal kingdom has a wide variety of living creatures in it. Some are similar to each other, like dogs and wolves, and some are not so similar, like bees and snails, but ALL animals have animal cells. (See Chapter 2.) This distinguishes them from other living things.



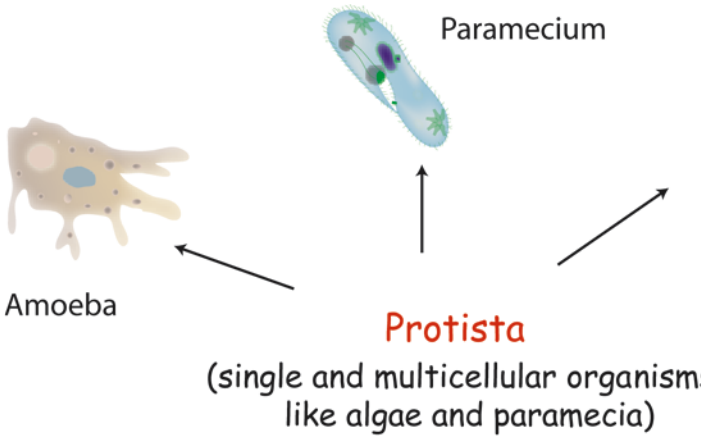


The plant kingdom, Plantae, (plan'-tī) includes all plants: trees, grass, flowers, ferns, dandelions, seaweed, and even asparagus! Again, some plants are similar to each other and some plants are very, very different from each other, but ALL plants have plant cells. (See Chapter 2.)

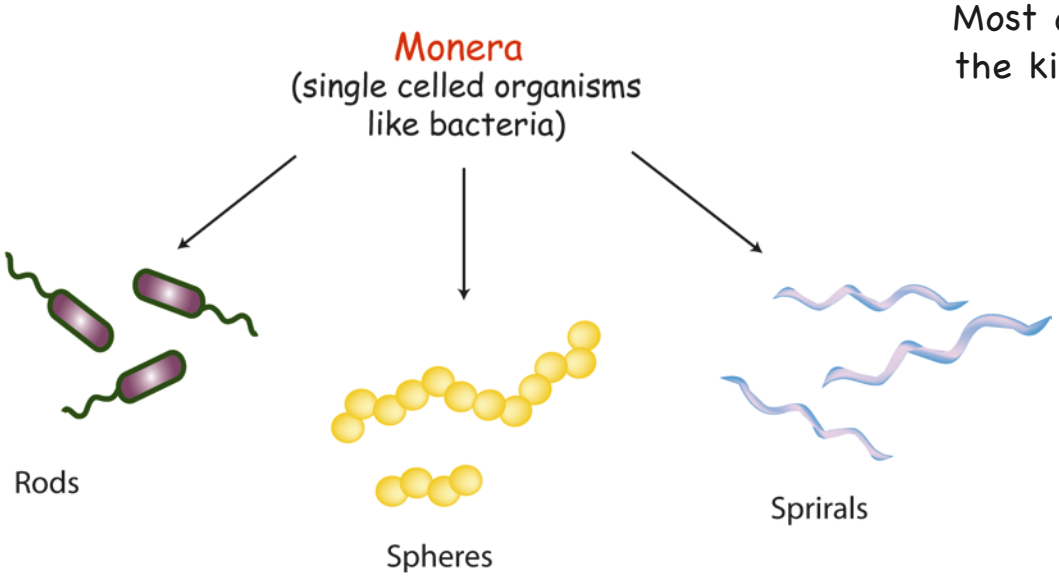
The fungus kingdom, Fungi (fun'-jī) includes mushrooms, toadstools, truffles, and even athlete's foot! The fungi were once grouped as plants, but they have many unique features and are now placed in a kingdom of their own.



The last two kingdoms, Protista (prō-tē'-stə) and Monera (mə-nē'-rə), include most of the microscopic organisms like bacteria and amoebas. These organisms cannot be seen with the unaided eye and were completely unknown before microscopes were invented.



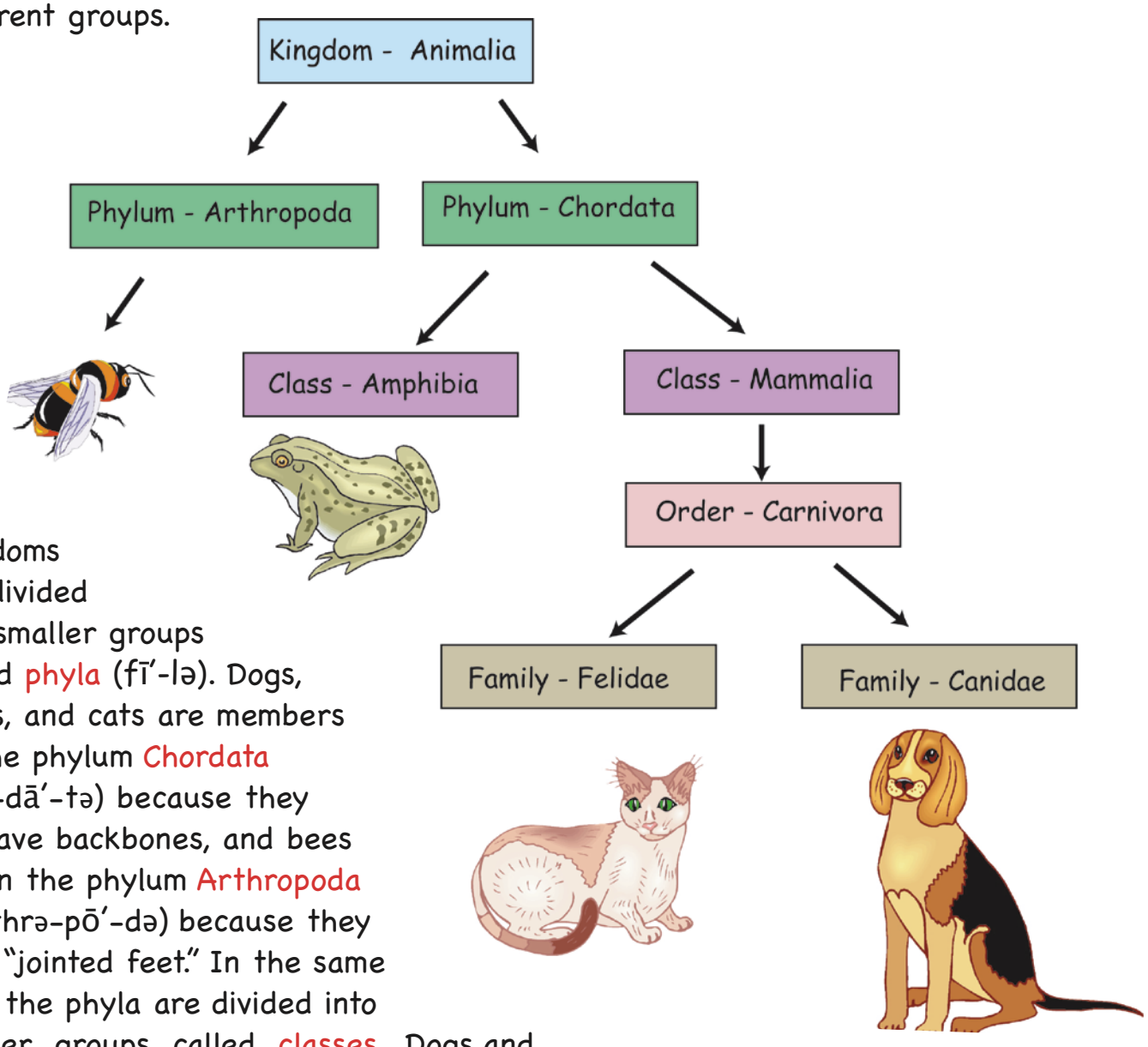
In the kingdom Protista, there are creatures that have both plant-like and animal-like features. Some, like euglena, are green and can use the sun's energy to make food like plants. Others, like amoebas, catch and eat prey like animals do.



Most of the organisms in the kingdom Monera are unicellular: that is, they have only one cell. These creatures have a variety of shapes. The three most common shapes are spheres, rods and spirals.

1.4 Further classification

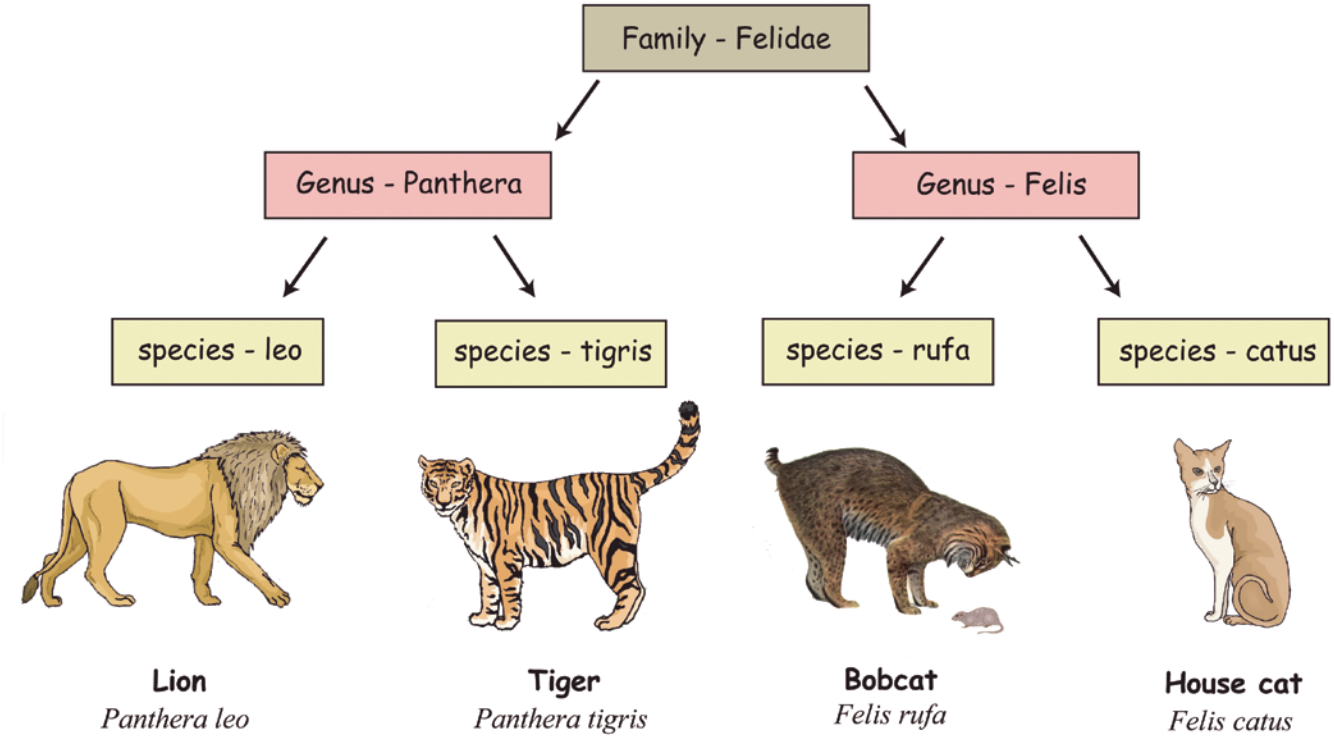
Once a living thing has been placed into a kingdom, the classification continues. Living things are further organized by being placed in additional categories that depend on a variety of criteria, like whether or not they have a backbone or whether or not they lay eggs. For example, although all animals are in the kingdom Animalia, it seems obvious that dogs and bees and snakes should be in different groups.



Kingdoms are divided into smaller groups called phyla (fī'-lə). Dogs, frogs, and cats are members of the phylum Chordata (kȯr-dā'-tə) because they all have backbones, and bees are in the phylum Arthropoda (är-thrə-pō'-də) because they have "jointed feet." In the same way, the phyla are divided into smaller groups called classes. Dogs and cats are all in the class Mammalia (mə-māl'-yə) because they nurse their young, and frogs are in the class Amphibia (am-fi'-bē-ə) because they live both in water and on land. Classes are further divided into orders. Both cats and dogs are in the order Carnivora (kär-ni'-və-rə) because they eat meat. Orders are further divided into families. Cats are in the family Felidae (fē'-lə-dī), and dogs are in the family Canidae (kan'-ə-dī).

1.5 Naming living things

Finally, families are further divided into the genus (jē'-nəs), and the genus is divided into the species (spē'-shēz). The genus is the last group in which a living creature is placed, and the species identifies each creature placed in the genus, so each different living thing has a unique genus and species name. For example both a bobcat and a house cat are in the genus *Felis* (fē'-lis). A bobcat has the species name *rufa* (roo'-fə) and a house cat has the species name *catus* (ca'-tus). So a house cat is a *Felis catus* and a bobcat is a *Felis rufa*.



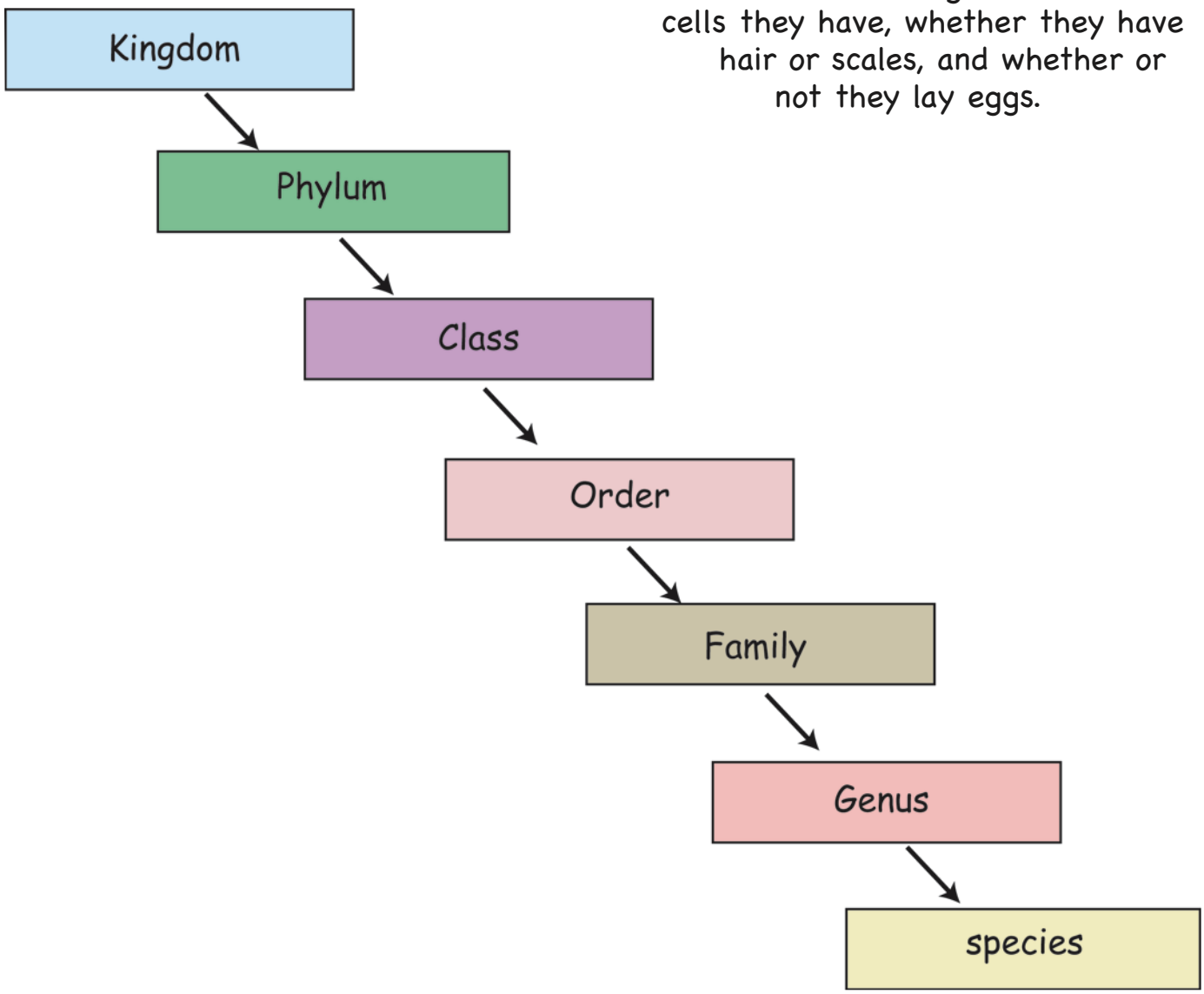
A tiger is a kind of cat, but it is different from both bobcats and house cats. It is in the genus *Panthera* (pan-thē'-rə) and has a species name *tigris* (tī'-gris). So, a tiger is called a *Panthera tigris*. A lion is like a tiger and is also in the genus *Panthera*, but it has a species name *leo* (lē'-ō), so it is a *Panthera leo*.

All living things have a particular genus and species name. The name for household dogs is *Canis familiaris* (ka'-nis fə-mil-ē-ā'-ris), and for humans it is *Homo sapiens* (hō'-mō sā'-pē-enz), which means "man wise."

1.6 Summary

Here are the main points to remember from this chapter:

- Biology is the study of living things. Taxonomy is a branch of biology that classifies living things.
- All living things are classified into different groups. The largest group is the kingdom. The five kingdoms are divided into phylum, then class, order, family, genus and species. Living things are placed in a group depending on many characteristics, including what kind of cells they have, whether they have hair or scales, and whether or not they lay eggs.



- Living things are grouped into these categories so that scientists can learn more about how they are the same and how they are different. Also, if a new creature is discovered, say from the deep ocean floor, it can be placed into a group that will help scientists identify it and better understand how it lives.