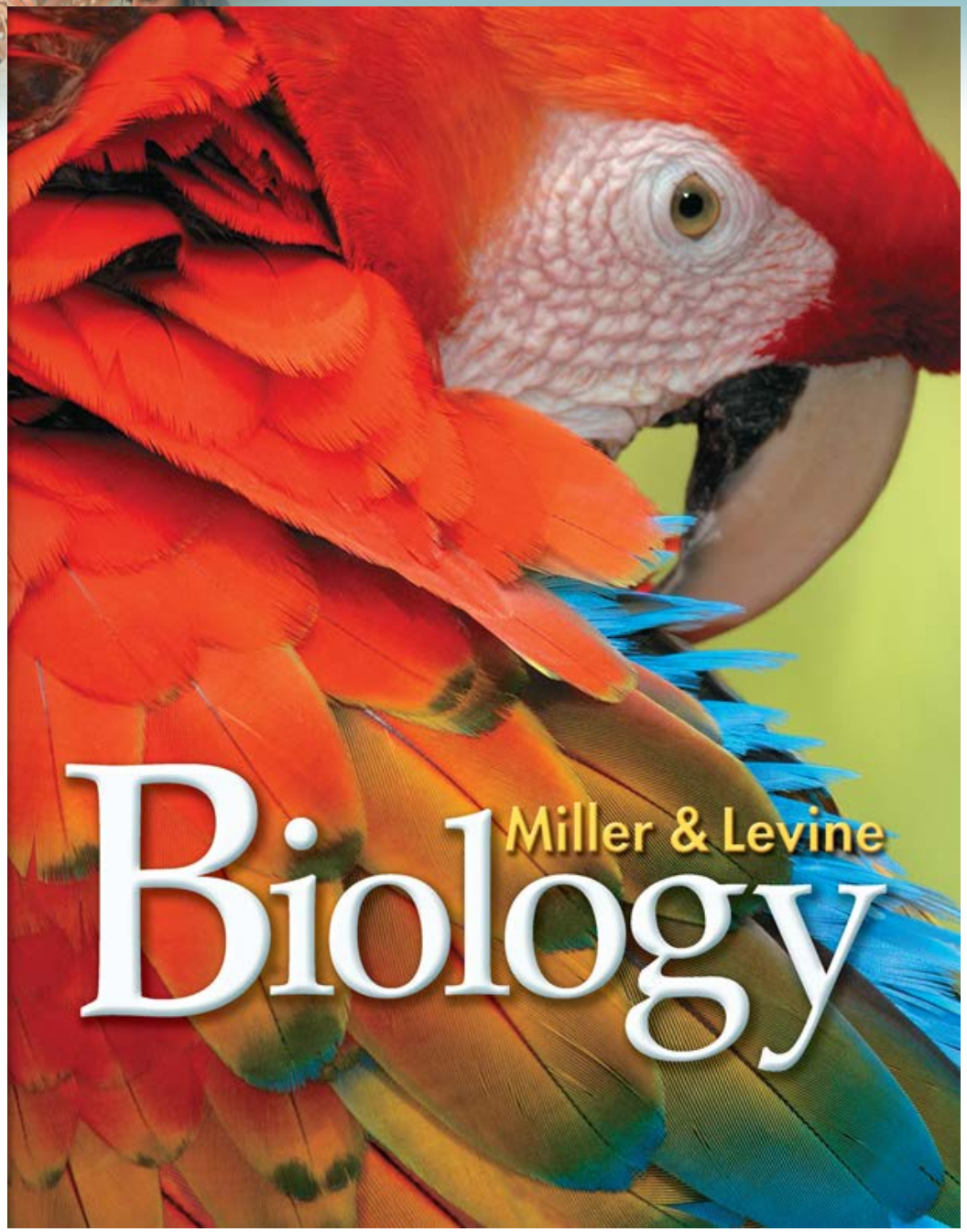


18.1 Finding order in diversity

Binomial Nomenclature

In the 1730s, Swedish botanist Carolus Linnaeus developed a two-word naming system called binomial nomenclature. In deciding how to place organisms into larger groups, Linnaeus grouped species according to anatomical similarities and differences.

The scientific name usually is Latin. It is written in italics. The first word begins with a capital letter, and the second word is lowercased.

Binomial Nomenclature

The polar bear, for example, is called *Ursus maritimus.*

The first part of the name—*Ursus*—is the genus to which the organism belongs. A **genus** is a group of similar species. The genus *Ursus* contains five other species of bears, including *Ursus arctos,* the brown bear or grizzly bear.

The second part of a scientific name—*maritimus* for polar bears—is unique to each species and is often a description of the organism's habitat or of an important trait. The Latin word maritimus refers to the sea: polar bears often live on pack ice that floats in the sea.

Binomial Nomenclature

The scientific name of the red maple is *Acer rubrum.*

The genus *Acer* consists of all maple trees.

The species *rubrum* describes the red maple's color.

Classifying Species into Larger Groups

In addition to naming organisms, biologists try to organize, or classify, living and fossil species into larger groups that have biological meaning. Biologists often refer to these groups as taxa (singular: **taxon).**

The science of naming and grouping organisms is called **systematics or taxonomy.**

Seven Levels

Linnaeus identified just four levels in his original classification system.

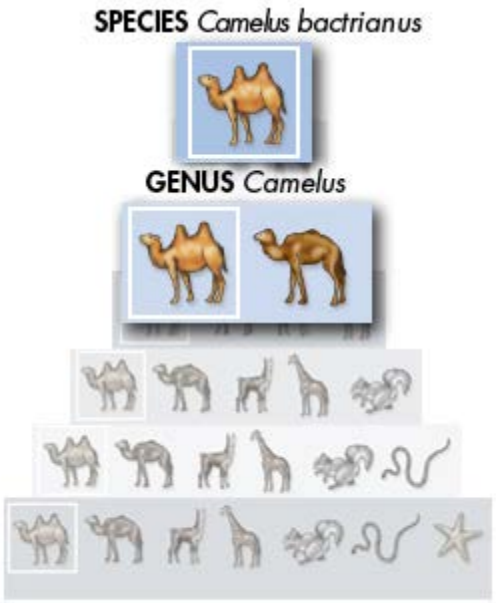
Over time, Linnaeus's original classification system would expand to include seven taxa: species, genus, family, order, class, phylum, and kingdom.

Seven Levels

The scientific name of a camel with two humps is *Camelus bactrianus.*

This illustration shows how a Bactrian camel, *Camelus bactrianus*, is grouped within each Linnaean category.

The genus *Camelus* contains another species, *Camelus dromedarius,* the dromedary, with only one hump.

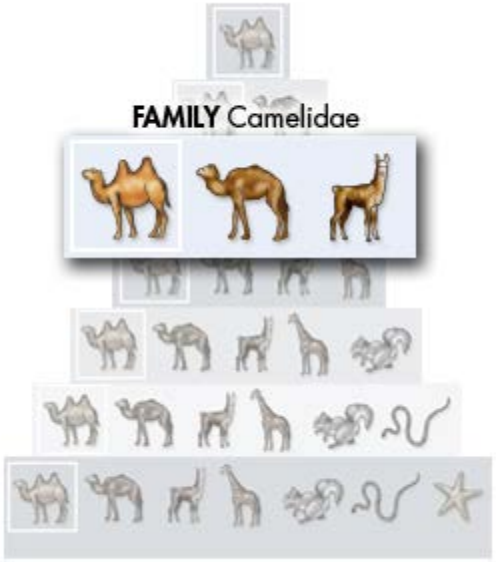


Family

The South American llama bears some resemblance to Bactrian camels and dromedaries. But the llama is more closely related to other South American species than it is to European and Asian camels.

Therefore, llamas are placed in a different genus, *Lama*; their species name is *Lama glama.*

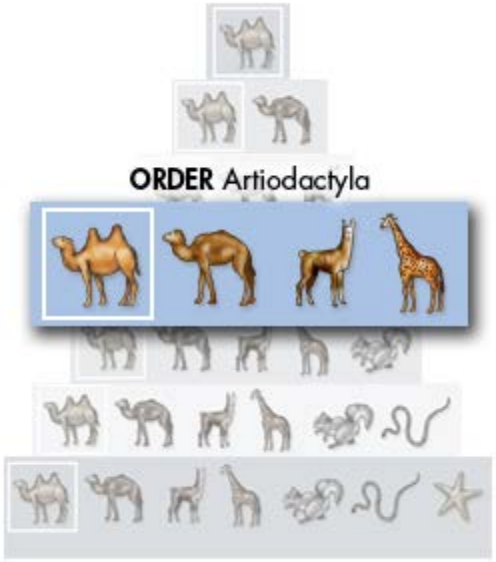
Genera that share many similarities *are* grouped into a larger category, the **family**—in this case, Camelidae.



Order

Closely related families are grouped into the next larger rank—an **order.**

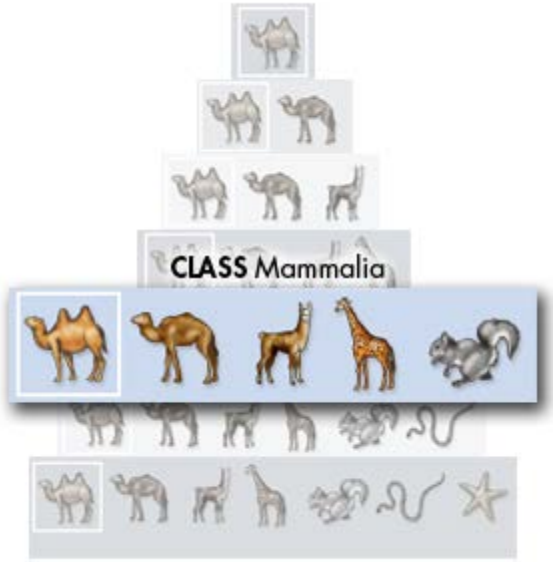
Camels and llamas (family Camelidae) are grouped with several other animal families, including deer (family Cervidae) and cattle (family Bovidae), into the order Artiodactyla, hoofed animals with an even number of toes.



Class

Closely related orders are grouped into the next larger rank, a **class.**

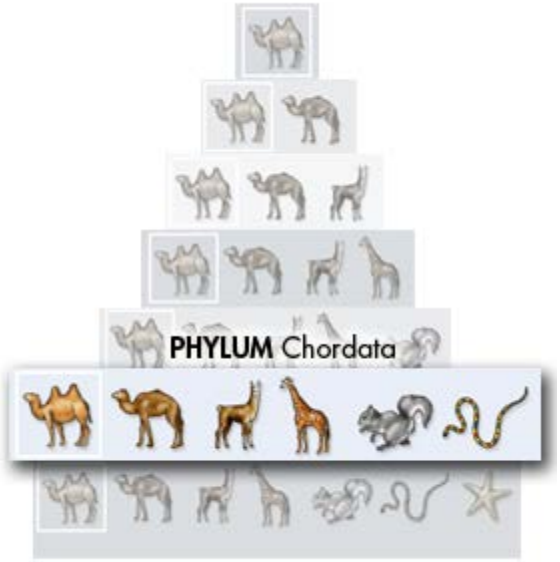
The order Artiodactyla is placed in the class Mammalia, which includes all animals that are warm-blooded, have body hair, and produce milk for their young.



Phylum

Classes are grouped into a **phylum.** A phylum includes organisms that are different but that share important characteristics.

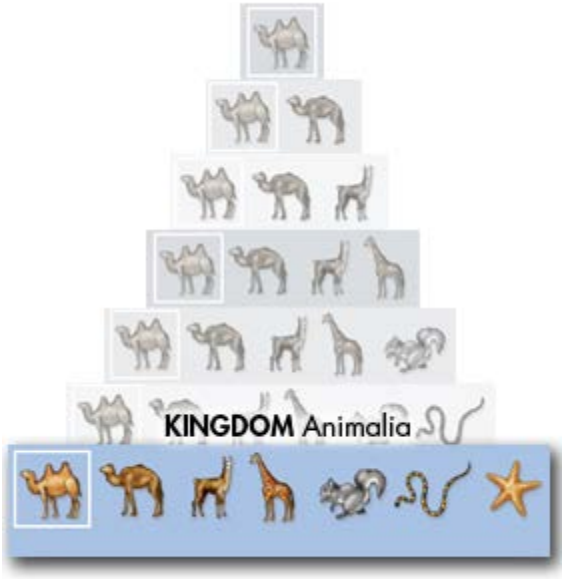
The class Mammalia is grouped with birds (class Aves), reptiles (class Reptilia), amphibians (class Amphibia), and all classes of fish into the phylum Chordata. These organisms share important body-plan features, among them a nerve cord along the back.



Kingdom

The largest and most inclusive of Linnaeus's taxonomic categories is the **kingdom.**

All multicellular animals are placed in the kingdom Animalia.



Problems With Traditional Classification

In a way, members of a species determine which organisms belong to that species by deciding with whom they mate and produce fertile offspring.

Ranks above the level of species, however, are determined by researchers who decide how to define and describe genera, families, orders, classes, phyla, and kingdoms.

Linnaeus grouped organisms into larger taxa according to overall similarities and differences. But which similarities and differences are the most important?

Problems With Traditional Classification

For example, adult barnacles and limpets live attached to rocks and have similar-looking shells.

Adult crabs don’t look anything like barnacles and limpets.

Based on these features, one would likely classify limpets and barnacles together and crabs in a different group. However, that would be wrong.

Modern classification schemes look beyond overall similarities and differences and group organisms based on evolutionary relationships.