

Scientists often debate how to classify organisms as new evidence about them is discovered.

In the 1960s living things were often divided into five **kingdoms: plants, animals, bacteria, fungi and protocists**. As new techniques have been developed for looking at organisms (such as what is inside their cells and what the DNA inside their nuclei is like) so scientists have developed new ways of classifying organisms. In the 1970s scientists split the bacteria into two new kingdoms based on what was inside their cells. These kingdoms were called **archaeobacteria** and **eubacteria**. Then scientists decided that they should collect kingdoms into larger groups – **empires**. The two empires were called **prokaryota** (animals without nuclei in their cells) and **eukaryota** (animals with nuclei in their cells).

In 1990 American scientist Carl Woese (b. 1928) developed the **three-domain system**. He published his new system as a paper in a scientific journal for other scientists to read and think about. His system consists of three **domains** called **archaea** (containing the archaeobacteria kingdom), **bacteria** (containing the eubacteria) and **eukaryota** (the other four kingdoms). This system is now widely used but some scientists still prefer to stick to having five kingdoms.

Each kingdom in the eukaryota domain is split into more groups called **phyla** (singular = **phylum**). The animal kingdom contains seven phyla. Humans are in the **vertebrate phylum**, which contains animals that have backbones. The animals in the other six phyla do not have backbones and are called **invertebrates**.

The vertebrate phylum is divided into five **classes** (including mammals and fish). The classes are divided into more groups – **order**, then **family**, then **genus** and then **species**.

Lions belong to the genus *Panthera*, a group containing only roaring cats. The species that lions belong to is called *leo*. Only lions are in the species *leo*. Scientists give lions a name in Latin, *Panthera leo*. This name is the same all over the world, whereas the word 'lion' is different in different languages. The Latin name avoids confusion.

Naming organisms using two Latin words (the **binomial system**) was originally developed in 1735 by **Carl Linnaeus** (1707–1778). He used Latin because all the scientists of his day wrote in Latin! His way of naming things also greatly simplified some of the scientific names for organisms. For instance, the scientific name for redcurrants in the early 1700s was '*Grossularia, multiplici acino: seu non spinosa hortensis rubra, seu Ribes officinarium*'. Linnaeus called it *Ribes rubrum*!

- 1 a** Draw a diagram to show how organisms are classified using Carl Woese's system.
b How did other scientists find out about Woese's new system for classification?
- 2** Humans are: family – hominids, order – primates, genus – *Homo*, species – *sapiens*.
a Draw out the full classification of humans, starting with the domain.
b Suggest another animal that might be found in the primate order.
c Find out what the words '*Homo*' and '*sapiens*' mean.
- 3** List the classes that make up the vertebrate phylum.
- 4** Tigers are *Panthera tigris*.
a What genus do they belong to?
b Why do you think they are in this genus?
c What do you notice about the way that the genus and species names are written in the text above? (*Hint*: there is more than one thing that you should notice!)
- 5 a** Name the four kingdoms in the eukaryota domain.
b What do all the members of this domain have in common?
c How many kingdoms are there in total in the three-domain system?

I CAN...

- explain why scientific ideas change
- describe how scientists work together
- state that there are other systems of classification.