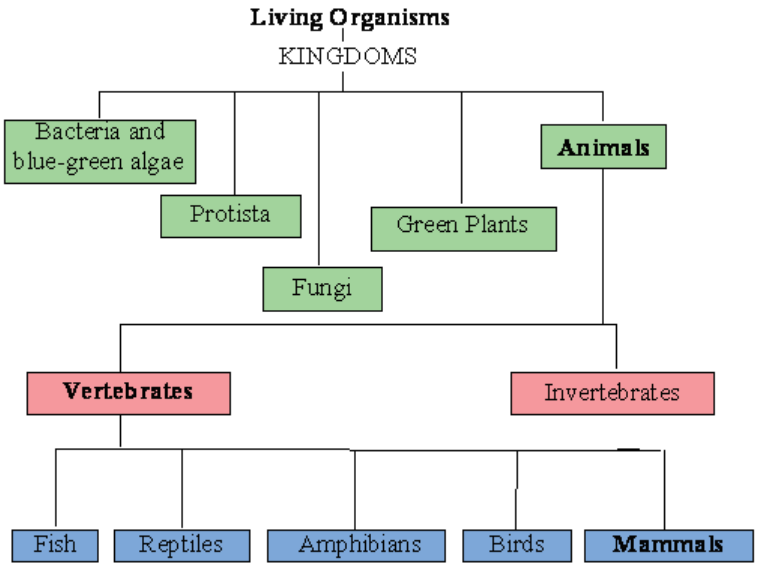


The Human Animal

Human beings show all the characteristics of living things. However, we also share special features with some other animals. Human beings are mammals like all hairy and furry creatures (and a few more besides!). Mammals give birth to live young and then suckle them — feed them with milk produced by the mother.

One group of mammals is the primates. This group is made up of the lemurs, monkeys, apes and humans. We all have the special ability to grasp things with our fingers (and toes), to be able to judge distance, and to be able to stand upright. Other animals may have these characteristics but not in combination with all the others.

Using a Key

As we have said, all living things can be put into groups, or classified, according to their particular characteristics. A way of finding out to which group something belongs, is to use a key. Keys can be constructed for non-living things as well as living organisms and are a useful way of classifying things. Here is an example of a simple key:

1. Lays Eggs .....go to 2
   Has live young .....mammal
2. Eggs in shell .....go to 3
   Eggs not in shell .....go to 4
3. Shell hard and brittle .....bird
   Shell leathery .....reptile
4. Adult can live on land.....amphibian
   Adult cannot live on land .....fish

This simple key can be used to classify a vertebrate into the group to which it belongs.

Note that a key is made up of paired statements and you have to choose which of the pair is appropriate. You are then either told which group you have reached or you are directed to another pair of statements.

ACTIVITY 3: Use the key above to classify the following:

Duck, frog, mouse, turtle, salmon, snake.

You should have arrived at the following pairings:

- Duck: bird
- Frog: amphibian
- Mouse: mammal
- Turtle: reptile
- Salmon: fish
- Snake: reptile

Maybe you knew that a snake was a reptile anyway. If so, you could work backwards through the key to find out something about a snake, for instance that it has leathery egg shells.

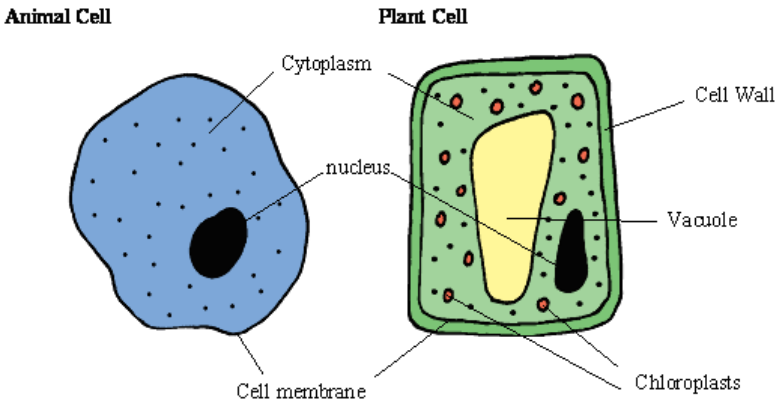
You don't need to be trying to put an organism into a group — you can use a key to identify something by its characteristics. The names at the end of the statements would then be a selection of objects or organisms.

ACTIVITY 4: Try to make up a key to distinguish between the following plants: oak tree, daffodil, pine tree, parsley.

You can find suggested ways of doing this at the end of the unit.

Cells, Tissues, Organs and Systems

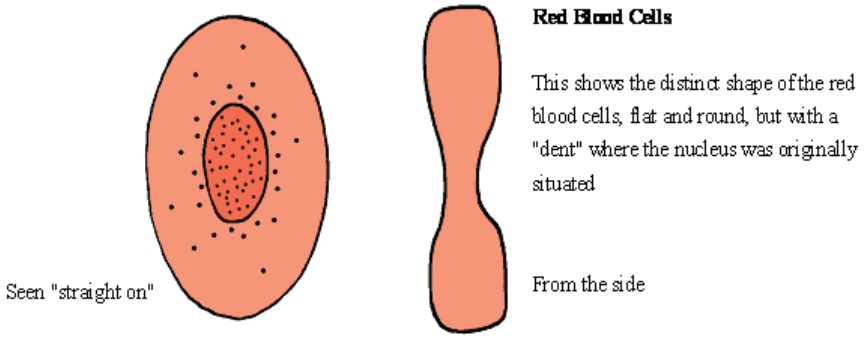
All living things are made up of very similar tiny units, called cells. Each one of these, although often adapted for a special purpose, is basically very similar. Below are diagrams of a typical animal cell (a cheek epithelial cell — one of the cells from the inside lining of a human's cheek) and a typical plant cell (a palisade cell from a leaf that uses sunlight to make sugar).



ACTIVITY 5: Write down all the similarities between the two cells. What are the two main differences between them?

Can you draw any conclusions from this about the main differences between animals and green plants?

You should have noted that both cells have a nucleus, cytoplasm and a cell membrane. These are common to all cells with few exceptions. One exception is a red blood cell. To be efficient, a red blood cell needs to have a big surface area and yet still have a small compact flexible shape. It has consequently developed a biconcave shape (see diagram) and has no nucleus so that the inside can be packed as full as possible with haemoglobin which carries oxygen. (There will be more about this in Unit Six.)



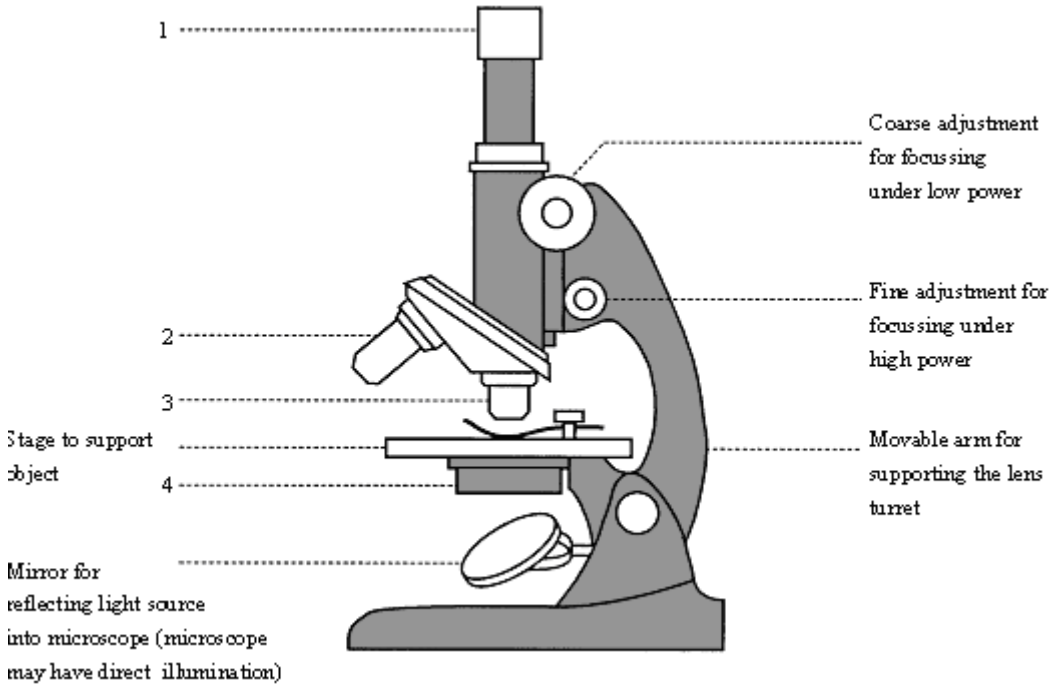
Similar cells group together to form tissues. Bone, blood, muscle, and glands are all examples of tissues.

These tissues then combine with others to form a group of cells which, together, carry out a particular job. Examples include the eye, liver, stomach, testis, uterus, kidney. These are called organs. The name given to a group of organs and tissues working together is a system, thus the digestive system includes the mouth, stomach, and intestines.

Now go back and make a list of the differences between a typical animal cell and a typical plant cell. Use the previous diagrams to help you. Write down how a nerve cell is specially adapted to its function. Now make some notes about tissues, organs and systems.

Using a Microscope

Examine in detail the diagram of a microscope below.



Both the eye piece lens and the objective lens magnify the object you are looking at — the specimen. The eye piece alone usually has a magnification ´10; it makes things look ten times bigger. There are usually two or three objective lenses, often ´5, ´10 and ´40. The high power lens (´40) together with the eye piece lens (´10) will make the specimen look 400 times bigger!

Most specimens need to be looked at in a drop of water in order to see them clearly. A thin piece of glass called a coverslip is used to keep the specimen in place and to stop the objective lens from getting wet if you move it down too far!

Measuring Very Small Objects

You will be expected to be familiar with the units used to measure very small objects. You will already be familiar with those that we use to measure larger ones.

The units that we measure length in are all derived from the metre, which we abbreviate to m. You will already have encountered:

- the kilometre, or km. This is 1000m.
- the millimetre, or mm. This is $\frac{1}{1000}$ m.
- the centimetre, or cm. This is $\frac{1}{100}$ m, or 10mm.

However, you may not yet have encountered two units which we use for measuring tiny sizes and distances. These are:

- the micrometre, written µm. This is $\frac{1}{1000}$ mm. You could not see anything this small with the human eye, but with a light microscope, objects only a few micrometres across are visible;
- even smaller, there is the nanometre, written nm. This is $\frac{1}{1000}$ µm, and is used for measuring very tiny things indeed!