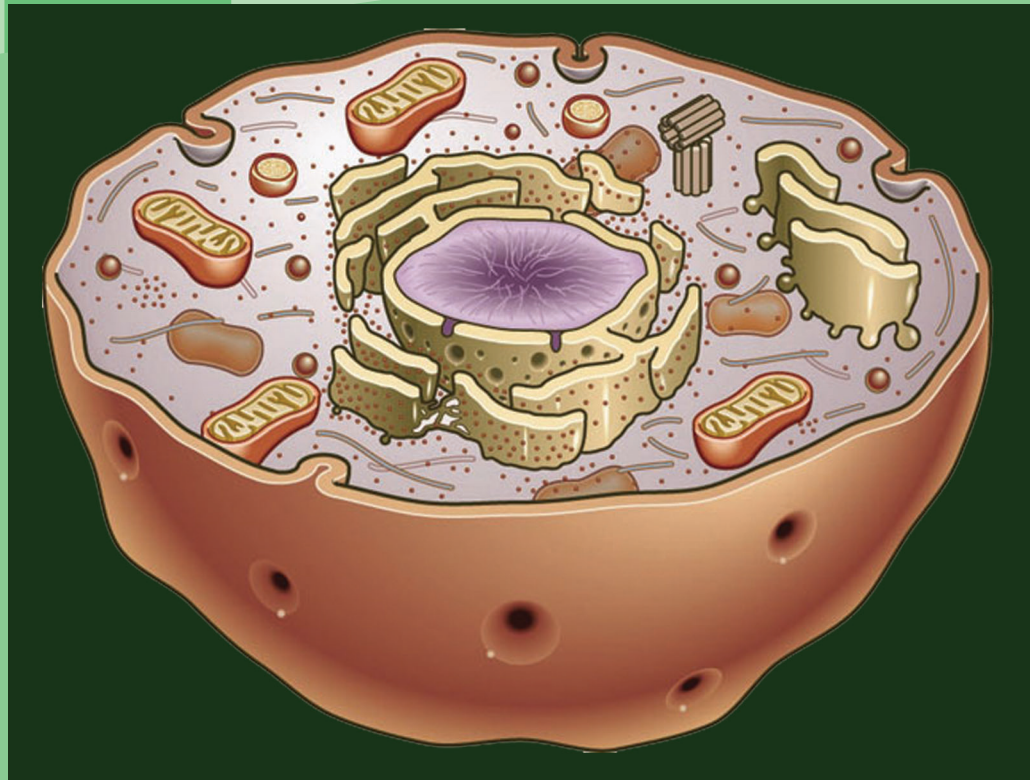


2

Cells the building block



What

you will learn

Alive or ...?

The 'blocks' of life

The blocks

Unicellular organisms

Alive or ...?

Who was the first person to go to the moon?
His most important job was to bring samples from moon
back to Earth for testing. Was there life on the moon?

How would you tell if a new and strange object
was living or non- living?



Checklist for life

Pictures A and B both show cats, but only the one in A is alive. How do we know?

A



B



Here is a checklist of things that living things do or need. Fill it in for the cat A and cat B

- Does it move some or all of itself?
- Does it need food for energy (fuel)?
- Does it need oxygen?
- Does it produce and get rid of waste?
- Can it grow?
- Can it have offspring (babies)?
- Does it feel things and respond to them?

Do you Know?

*The human population of the world
is expected to be nearly tripled by
the year 2100.*

What is the total number now?

What is an organism?

All living things, big or small are known as **organisms**.

The scientific name used for a living thing is an organism. Humans are living, so they are organisms. Living organisms do all the things on your checklist. Non-living things might do some of them, but will never do them all.

There are two main groups or **kingdoms** of organisms. They are **plants** and **animals**.



The characteristics of living things

We all agree that humans are living. But what exactly does this mean?

Things, which all living things need or do are given special names.

These are called characteristics of living things.

Meet MR GREFS and his family.

MR GREFS will help you remember the characteristics of living things.



- 1 To a visitor from another planet, a car may seem very much alive. List the things about a car which are like a living organism. Why isn't it alive?
- 2 All the features of life are shown in the picture of MR GREFS. Look carefully and find an example of each one.



Ideas

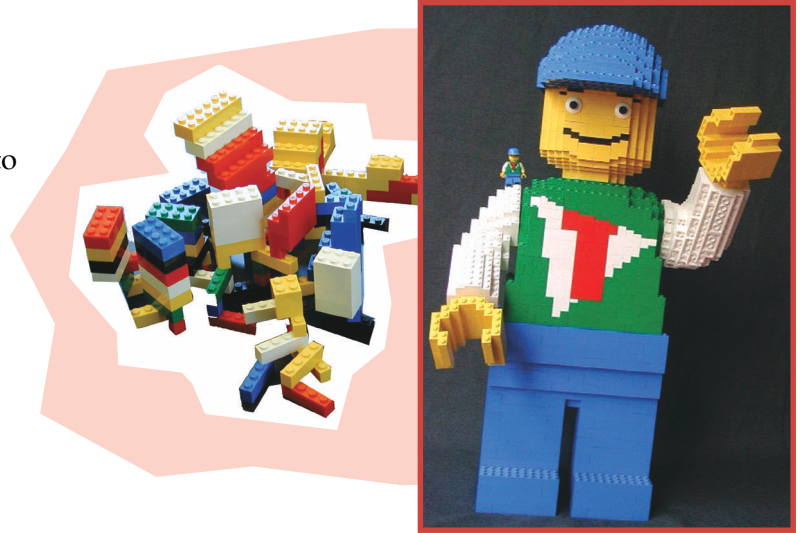
→ **Living organisms** all carry out the common features of life.

→ **Non-living material** may have some of the features of life, but not all.

The 'blocks' of life

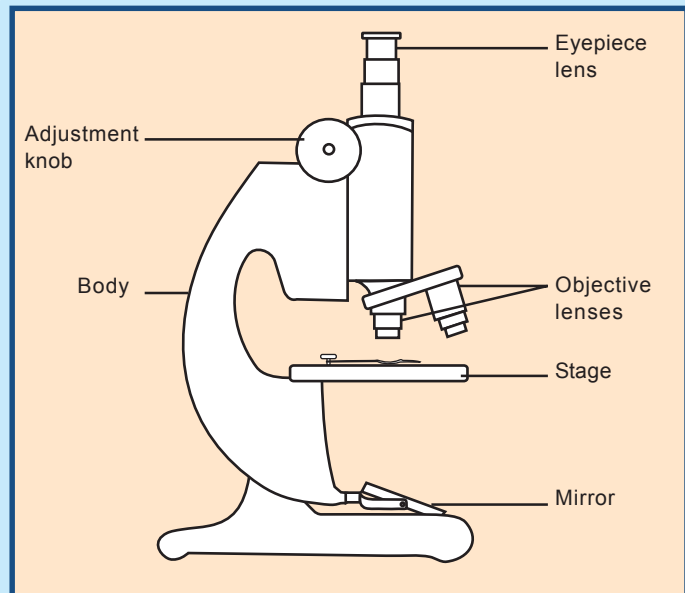
Look at the picture opposite, the bricks used to make them are all very similar. In the same way, all living things are made of building blocks called **cells**.

Cells are very small. We need a special tool called a **microscope** to see them.



Look small

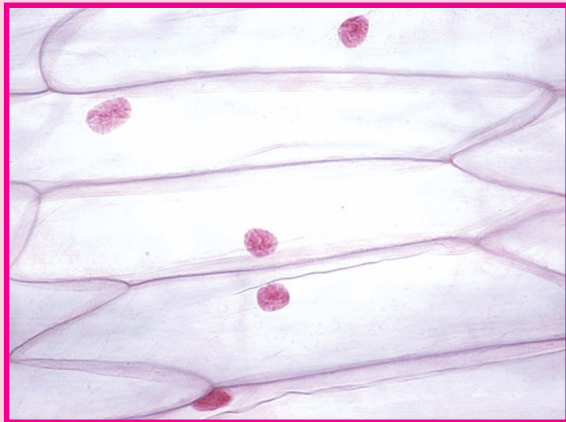
Your eyes need help to see very small things. A microscope magnifies small things, making them appear bigger. There are different kinds of microscopes.



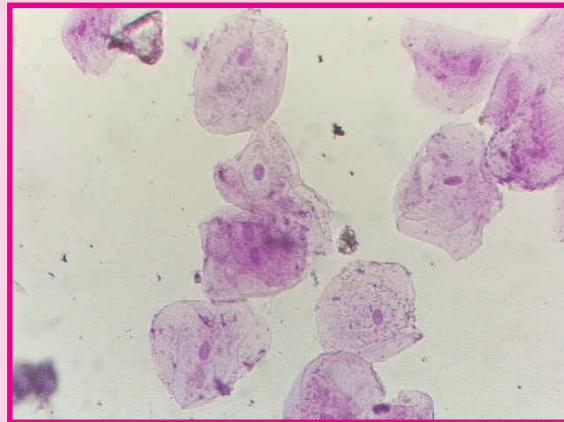
Do you know?

The largest cell in a human being is the ovum or egg, which is produced by the female reproductive organ. It is slightly smaller than a pinhead.

About 330 years ago, Robert Hooke, an English scientist, observed box like shapes when he looked at thin slices of plants through his microscope. He called them 'cells'. Let us take a look at some cells seen under the microscope as shown in the photographs below.



onion cell



human cheek cells

A cell is the basic unit of all living things. It is the smallest part of a living thing which is fully alive. Thousands of chemical reactions take place in a cell to keep an organism alive.

Cells can grow and divide to make new cells (in other words cells can reproduce). Different cells can do different jobs.

Cells are called the building blocks of organisms (just like the bricks that make up the walls of your house).



1 Complete the diagram below by adding labels.



2 Make a table of two columns in your book to show the parts of the microscope and what each part does.



Ideas

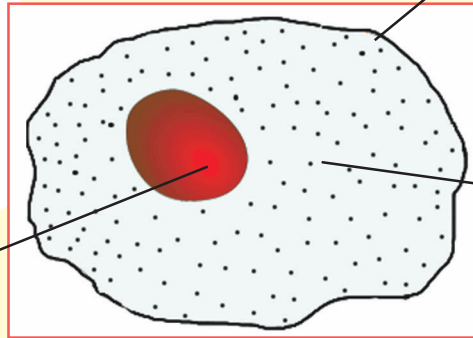
→ A cell is the basic unit of living matter. All living things are made up of one or more cells.

→ We need a special tool called a microscope to see cells.

The blocks

• Animal Cells

Each person is made up of several billion cells. If we look at one of them under a microscope, this is what we see. All animals are made of cells like these.



Nucleus

It controls all the chemical reactions that take place in the cell, hence it is known as the 'control centre' of the cell.

Cell membrane

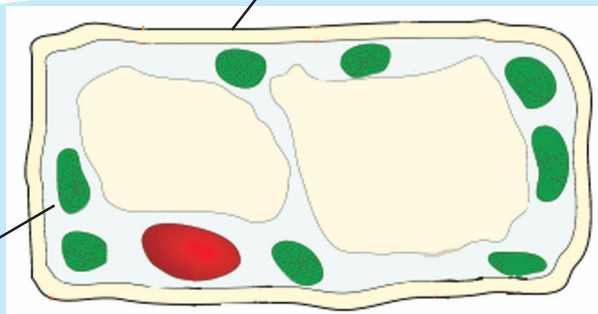
It is a thin partially permeable layer, which controls the movement of materials in and out of the cell.

Cytoplasm

It is a jell-like substance that contains many tiny structures. Chemical reactions take place in the cytoplasm. The cytoplasm almost fills the cell.

• Plant Cells

Plant cells are different to animal cells. A quick look at plant cell under a microscope shows us a big difference.



Cell wall

It is made up of a thick layer of cellulose. It supports a plant cell, gives it a regular shape and holds it together with other plant cells.

Chloroplast

These are tiny disc-like structures containing a green substance called chlorophyll. The chlorophyll absorbs energy from the Sun and uses it to make food through the process of photosynthesis.

Do you Know?

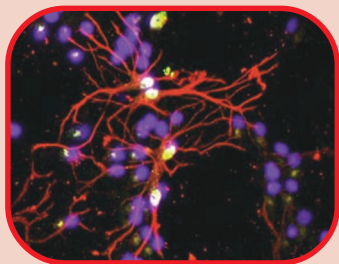
The scientific name of an animal or plant is the same all over the world.

From Cells to Organism

Tools have different shapes and structures designed for doing their particular jobs. Similarly, cells have different shapes and structures to carry out different functions.

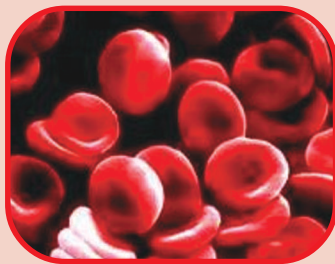
Some cells are designed

.....to carry messages



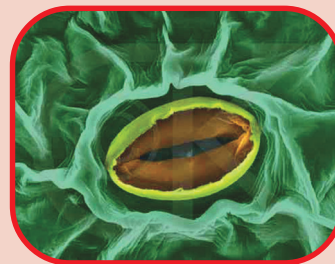
The nerve cell

....to carry oxygen around the body



The red blood cells

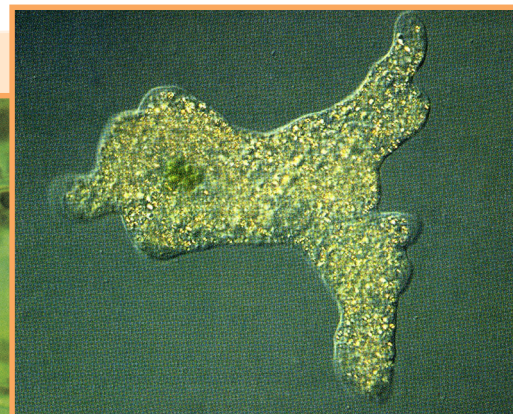
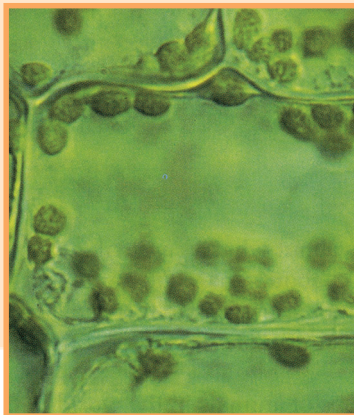
....to control the size of the openings



The plant guard cells

Which is which?

Here are an animal cell and a plant cell photographed using a very powerful microscope. Pick out the main parts in each cell and decide which cell is which.



Ideas

→ All animal cells have a membrane, nucleus and cytoplasm.

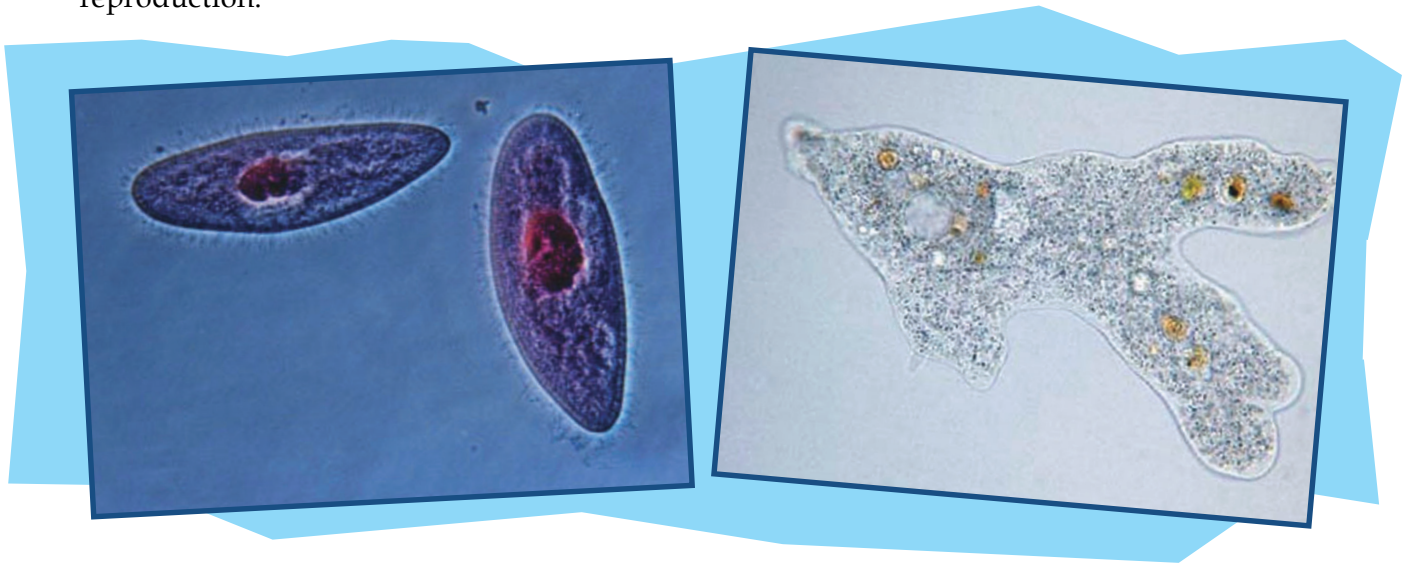
→ All plant cells have a membrane, nucleus, cytoplasm and cellwall. Cells in the green part of plant have chloroplasts



- 1 Draw an animal cell and a plant cell. Label each one carefully.
- 2 Write down the differences between plant cells and animals cells?
- 3 Write down the similarities between an animal cell and a plant cell?

Unicellular organisms

Living things with just one cell are known as **unicellular** organisms. Every unicellular organism has only one cell, which does all its bodily functions such as respiration, digestion and reproduction.

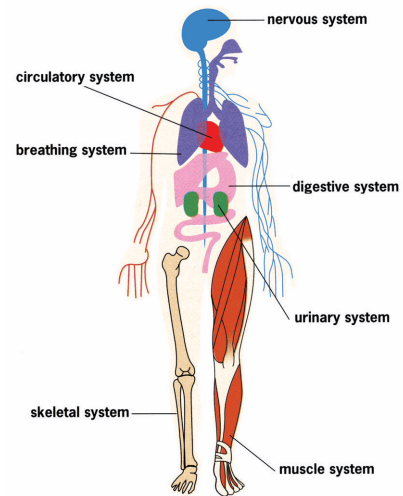


Multi-cellular organisms

Most living things are multi-cellular, that is they are made up of more than one cell. Multi-cellular organism such as human beings has billions of cells.

In multi-cellular organisms, each type of cell specialises in performing one particular function. This is known as division of labour. Different functions in a multicellular organism can be performed at the same time by the division of labour.

Can you name a few functions that have to be carried out at the same time in your body?

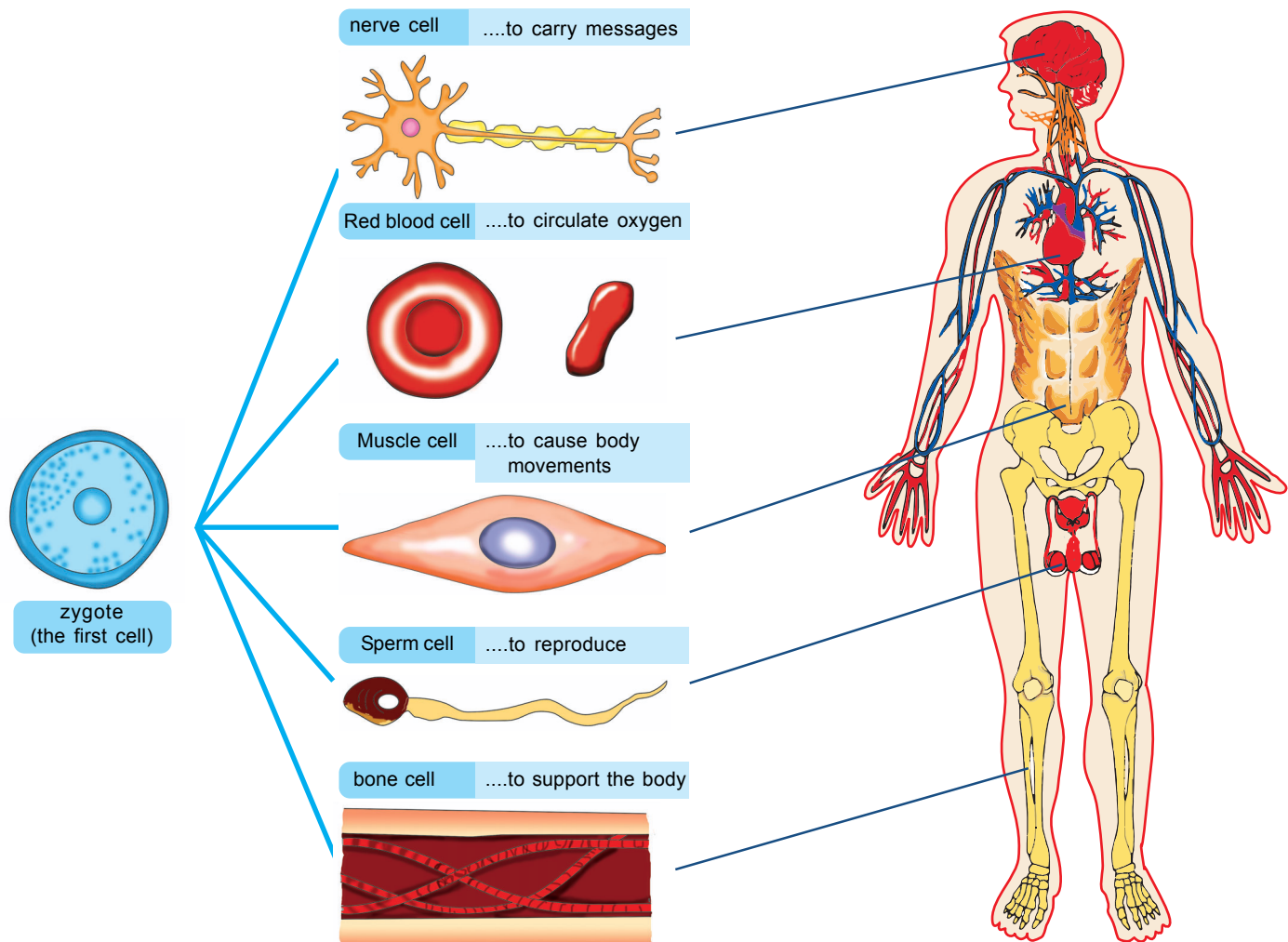


Do you Know?

Most dolphins can swim at 24-32 km/h for long periods of time.

Division of labour

In the production of lines of factories, workers specialise in doing different jobs. This leads to higher productivity and efficiency. Similarly, division of labour among cells, tissues, organs and systems ensures the smooth and efficient functioning of the organism as well as its survival.



- 1 Name an example of each of an animal cell, a plant cell, a tissue, an organ and a system. In each case, state the functions.
- 2 Scientists are experimenting with 'growing' parts of and organs for human beings, e.g. ears, skin, heart valves, and even spinal cords. This is called tissue growth technology. How do you think these experiments, if successful, will benefit humankind?



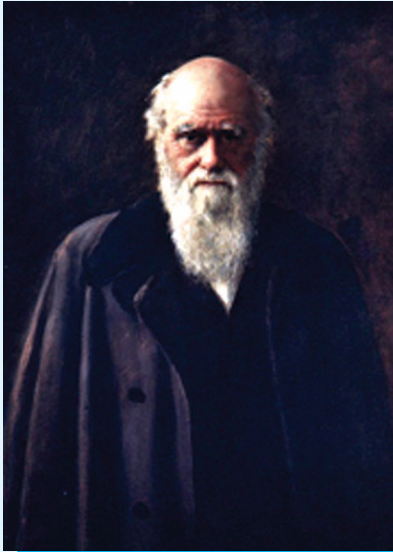
Ideas

⇒ *Unicellular organisms consist of one cell which does all its functions.*

⇒ *Multi-cellular organisms are made up of several cells which join together to form tissues.*

CHARLES DARWIN

Born in 1809



Charles Darwin was born in England in 1809. He was the son of a doctor. When he was about your age, he collected things like postage franks (which are like stamps) and minerals.

In 1831 he volunteered to sail on a survey ship to South America. The voyage was to last five years, and it was the beginning of Charles Darwin's great work.

Whenever the ship stopped, Darwin went ashore in search of interesting animals and plants. He made studies of unusual living things and also of unusual rocks and crystals. He found some very strange animals living on the Galapagos Islands, for example iguanas, which are huge lizards. He also found different varieties of finches. Each kind had a different beak. Darwin was such a good scientist because he noticed details like this. He closely observed things. He then asked himself questions like:

Why are some animals so similar and yet they live on islands far away from each other?

Why are some similar animals slightly different from each other?

What causes the differences?

Darwin sent samples back to Britain so that he could study them in more detail when he returned. He finally worked out how one kind of living thing could change slowly into another kind over a long period of time. This change is called evolution.

(J. Boyd & W.WhiteLaw 1989 John Murray)