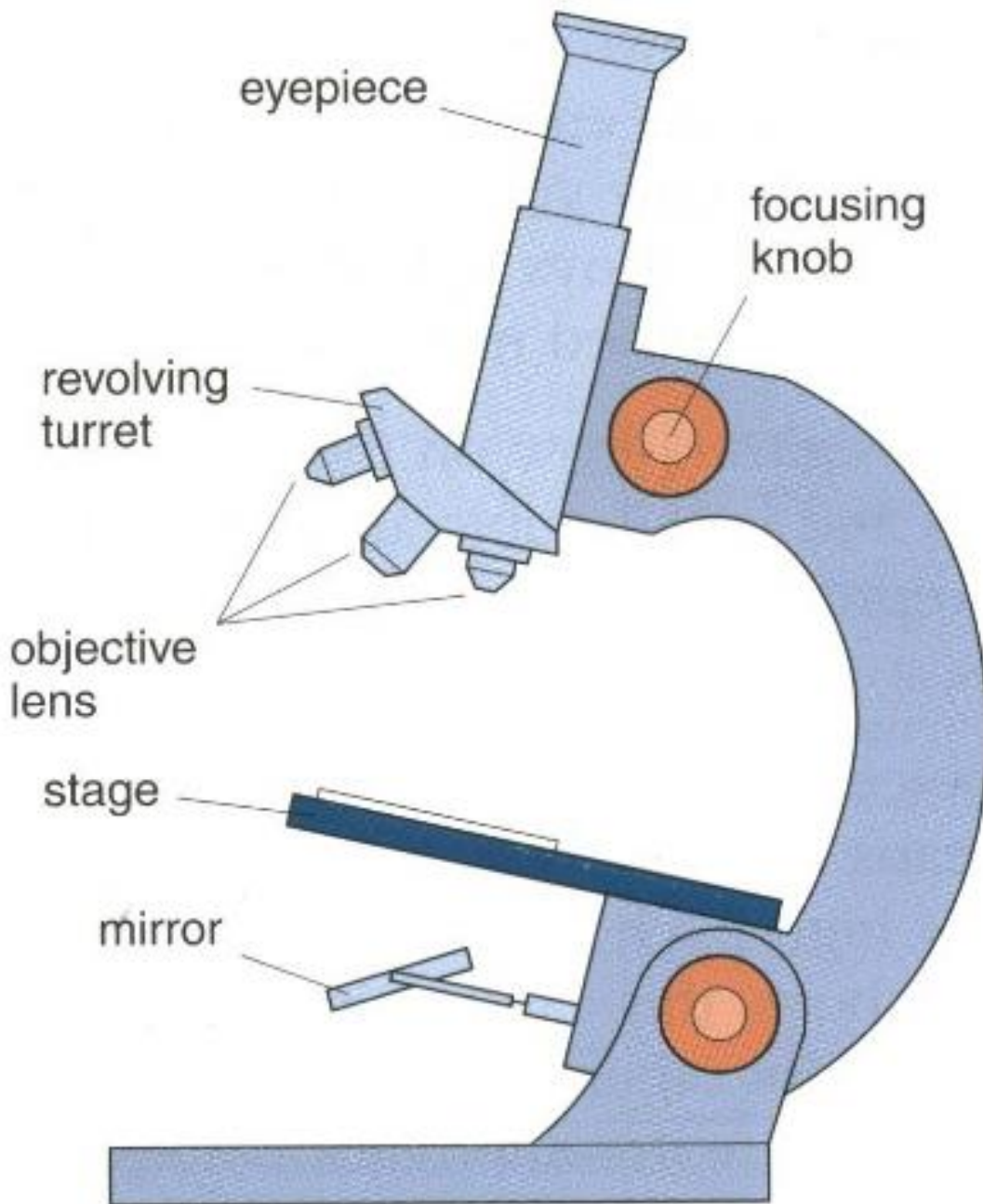


## Cells

Cells are the basic unit of all living things

We have to use a **microscope** to magnify them so we can look at them.



**Stains**, such as iodine solution or methylene blue, can be used to make cells more visible.

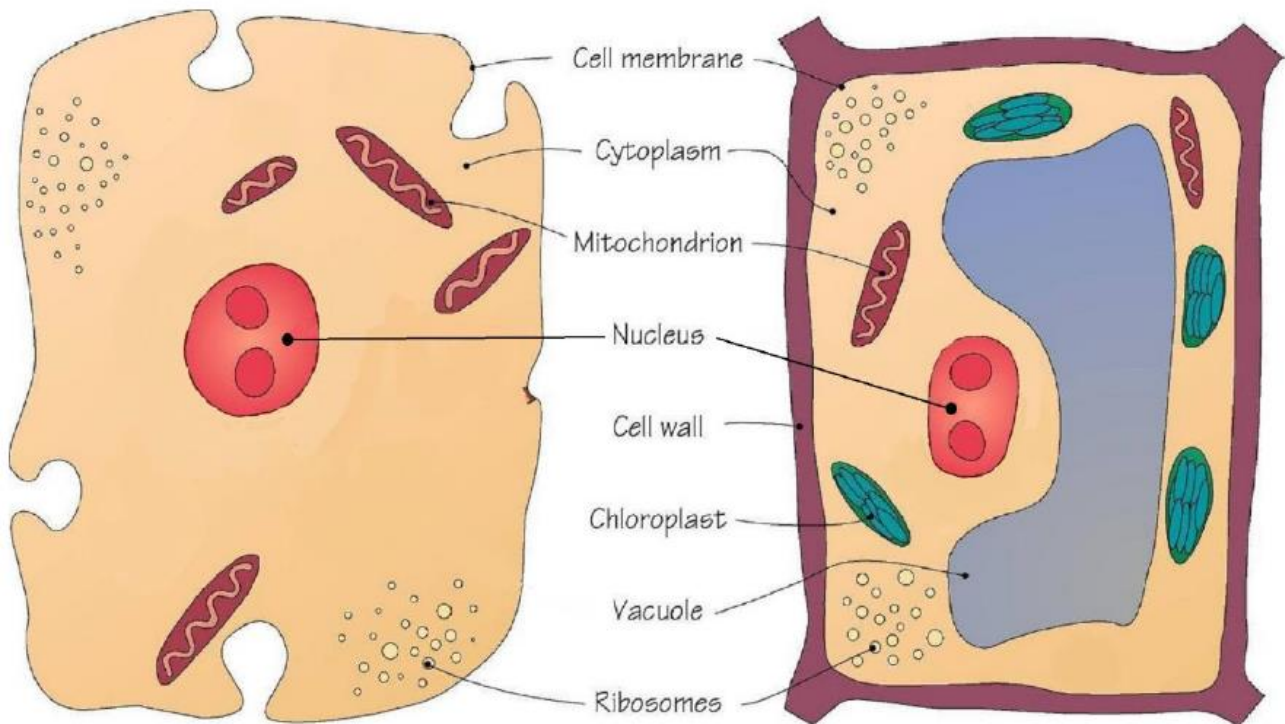
## Animal and Plant Cells

Both animal and plant cells have:

1. **Nucleus** - this controls the cell's activities.
2. **Cytoplasm** - jelly-like substance where chemical reactions occur.
3. **Cell membrane** - controls what enters and leaves the cell.
4. **Mitochondria** - where aerobic respiration takes place.
5. **Ribosomes** - where proteins are synthesised (made).

Plant cells also contain:

6. **Large Vacuole** - contains a liquid called sap.
7. **Cell wall** - gives the cell shape and support.
8. **Chloroplasts** - contain the green chemical, chlorophyll, which is needed for photosynthesis.


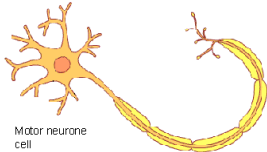

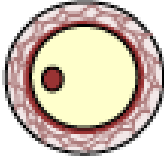
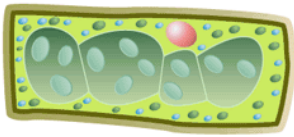





## Cells, Tissues and Organs

There are lots of **different** types of cells doing **different** jobs in living things.  
When a lot of cells of the **same** type join and do the same job they form **tissue**.  
When **tissues** join and work together they form an **organ**.

## Specialised Cells

Cells adapt to the jobs or functions they have. They have certain shapes and features to suit their job.

Name	Picture	Description	Function
Red blood cell		Biconcave shape giving a large surface area.	To transport as much oxygen as possible to cells in the body.
Nerve cell	 <small>Motor neurone cell</small>	Long thin fibres.	To carry electrical messages from one part of body to another.
Sperm		Streamlined shape with a tail.	Swim in a fluid to fertilise a female egg.
Egg cell		Thick cell membrane with large nucleus and large food store.	Contains half of a child's genetic information. Only fertilised by the fastest swimming sperm.
Palisade mesophyll		Columnar shaped cell containing chloroplasts.	Absorb lots of sunlight to be used in photosynthesis.
Root hair	 <small>Plant root hair cell</small>	Long extended cell with a large surface area.	Absorb as much water as possible from soil.
Epidermal cell		Box-shaped cell. Allows cells to fit together like a brick wall	Used for protection.
Stomata		Sausage shaped cells.	Open and close to allow gaseous exchange.

## Micro-organisms (Microbes)

Microbes are very tiny living things. There are 3 main types:

- Bacteria
- Microscopic Fungi (yeast, moulds)
- Viruses

They can be found in many places including the air, soil, water and our bodies.

Microbes can be both harmful and useful. All 3 types of microbes are **tiny** and **reproduce** at a **fast rate**.

### 1. Bacteria

A bacterium cell does not have a nucleus.

They reproduce by dividing into 2 daughter cells.

### 2. Fungi

**Yeast** are fungi. They have a small circular shape and reproduce by '**budding**'.

**Moulds** are also fungi. They are made up of tiny thread-like structures and reproduce by releasing spores.

### 3. Viruses

Viruses are much smaller than bacteria and fungi. They are not cells themselves but need to find a 'host' cell to be able to reproduce.

## Useful Microbes

Fungi and bacteria can be useful for making **foods**, such as yoghurt, cheese, bread and alcoholic drinks.

Bacteria are used to clean harmful substances in our **sewage** so that we can recycle our water.

Bacteria are used to make **insulin** which diabetics need to control sugar levels in their blood.

Fungi and bacteria are also important in helping the natural decay of dead plants and animals. This returns nutrients to the soil for other plants to use. Anything broken down in this way is said to be **biodegradable**.

## Yeast

Yeast are used to make alcoholic drinks and bread. They are single-celled fungi which turn sugar into ethanol and carbon dioxide.

Equation:

Glucose  $\rightarrow$  ethanol + carbon dioxide

This reaction is called **fermentation**.

The **ethanol** is used for **alcoholic drinks**. In bread-making yeast is used because the **carbon dioxide** gas it produces makes the bread **rise**.

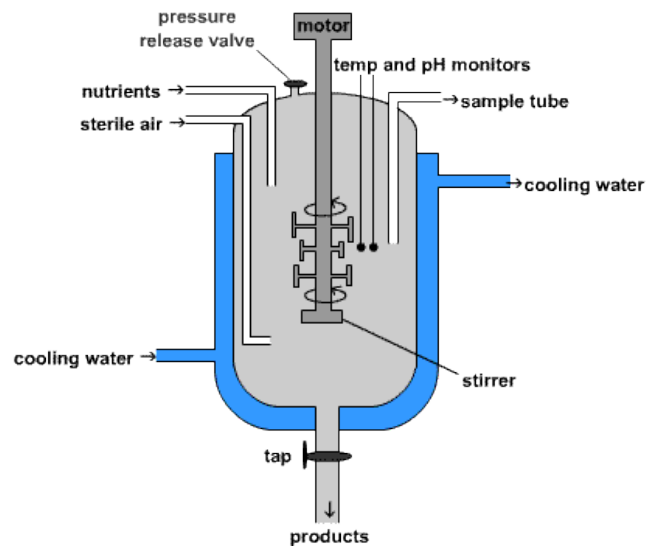
## Microbe Production

Under the correct conditions microbes can be cultured in large quantities in a **fermenter**.

Many of the useful microbes are produced in this way.

These require certain conditions for the microbes to reproduce.

- A food supply
- Optimum pH
- Optimum temperature



## Microbiology Research

Lots of work is done looking at microbes. Scientists grow microbes in petri dishes with agar. This must be done in **sterile** conditions where all surfaces and equipment are cleaned with **disinfectant**. This prevents any chance of **contamination** (spread of unwanted microbes).

**Lab coats** must also be used to prevent contamination of clothes which can then be taken from the laboratory. Even **shoes** have to be dipped in disinfectant to avoid contamination or spread of infection.

## Disposing of microbes

To avoid the spread of potentially harmful microbes we have grown in a petri dish we have to put them in a **biohazard bag** and they are then put in an **autoclave** which heats them up and kills the microbes.

## Fighting Microbial Diseases

Bacteria, fungi and viruses can be the cause of many diseases. Our bodies have several ways of fighting such diseases which include the common cold, flu, polio, meningitis, athlete's foot, cholera, measles and rabies.

The first line of defence tries to block the microbes from getting inside us in the first place. This includes the **skin**, **ear wax**, **tears** and **mucus**.

If the microbes get inside the body we then have **white blood cells** to protect us.

**Vaccinations** inject us with a virus so we can make the antibodies to fight it.

We can also be given **antibiotics** to help fight **bacterial** infections.