

Living Cells

Part A Cell Structure and Function

Cells are the basic units of life. All living things are made up of cells.

Animal cells contain a nucleus, cell membrane and cytoplasm

Plant cells contain a nucleus, cell membrane, cytoplasm, cell wall, vacuole and sometimes chloroplasts.

Different parts of the cell do different jobs.

The nucleus controls all the activities of the cell.

The cell membrane controls what enters and leaves a cell.

The cytoplasm is where the chemical reactions of the cell take place.

The cell wall gives the cell physical support.

The vacuole is a store of dissolved sugar and salts. It controls the water content of the cell by osmosis.

Chloroplasts are found in the cells of green plants. They use light energy to manufacture food, in the form of carbohydrates, by photosynthesis.

Humans and many other animals are made up of many millions of cells. Any organism made up of more than one cell is said to be multicellular.

Bacteria and yeast are made up of only a single cell. Any organism made up of only one cell is said to be unicellular.

Yeast is a type of unicellular fungus that is unable to manufacture its own food by photosynthesis due to not containing any chloroplasts. Instead yeast cells must feed off of the sugars produced by other organisms. Yeast cells reproduce asexually by budding.

Under anaerobic conditions (in a reduced oxygen supply) yeast cells produce alcohol and carbon dioxide. Bakers use yeast undergoing anaerobic respiration to make their dough rise by producing carbon dioxide. Brewers and wine-makers use yeast to convert sugars into alcohol. The production of alcohol by yeast is also known as alcoholic fermentation. The concentration of alcohol that can be produced by yeast

is limited. Alcohol becomes toxic to yeast cells and kills them, once the concentration has risen to approximately 14% alcohol.

Alcoholic fermentation is now being used to produce an alcohol based alternative to petrol called **gasohol**.

Bacteria are responsible for causing many different diseases. Modern medicine uses special chemicals called antibiotics to control or kill bacteria. An **antibiotic** is a chemical made by micro-organisms (usually a fungus) that either restricts the growth or kills other micro-organisms.

Fungi naturally produce antibiotics to allow them to compete and survive in their natural environments.

If a bacteria's growth is restricted, or they are killed, by the action of an antibiotic then we say that the bacteria is **sensitive** to the antibiotic. If a bacteria is unaffected by an antibiotic then we say the bacteria is **resistant** to the antibiotic.

Doctors require a wide range of different antibiotics as no single antibiotic is effective against all bacteria. Some strains of bacteria are naturally resistant to a range of antibiotics. Over-use of antibiotics can lead to certain strains of bacteria acquiring **resistance** to certain antibiotics.

Bacteria can be used to produce many useful substances. e.g. bacteria are used to produce insulin for diabetics.

Bacteria are used to manufacture **yoghurt**. Milk sugar (lactose) is converted into **lactic acid** by bacteria under anaerobic conditions. The lactic acid lowers the pH of the milk and causes protein molecules found in the milk to clump together. When the milk proteins clump together the milk thickens. Yoghurt formation is a way of naturally **preserving** milk. The lactic acid prevents the growth of other micro-organisms, and acts as a **preservative**.