Single-Celled Organisms

Single-celled organisms or unicellular organisms as they are also known, are living things that are made of only one cell. Generally they have well-structured and complicated cells much the same as animals and plants, except unlike animals and plants which are made up of millions of different cells, they are only one cell in size. They have similar organelles that do similar jobs but their single cell works by itself, whereas animal and plant cells work together with other similar cells to form tissues and organs. Two examples of single celled organisms are paramecium and euglena.

There are over 800 different species of **euglena** that exist in fresh and salt water. They prefer shallow and unmoving water such as in ponds or puddles and if they form in large enough numbers they can create a green slime in the water. Their numbers tend to snowball when the water is polluted with fertilisers such as where water runs off farmland.

Model of a green euglena.

The inside of the cell is filled with a jelly-like fluid called cytoplasm which gives the cell shape and contains many materials needed for many reactions like photosynthesis to occur. Near the front of the cell is a star shaped organelle called the 'contractile vacuole'. This removes any extra water that enters the cell and without it the cell could become so full of water that it would explode.

Euglena have chloroplasts and can make their own food by photosynthesis. The chloroplasts absorb the light needed for photosynthesis and are rod-shaped structures inside the cell. Being an autotroph or autotrophic means that the organism produces its own food which is usually through photosynthesis and includes cells that contain chloroplasts. Euglena are not completely autotrophic though. Euglena can also absorb food from their environment through their cell membrane during times of poor light.

Attached to the front end of the euglena is a flagellum, which is a long whip-like organelle that acts like a tiny outboard boat motor. The flagellum twirls around and pulls the cell through the water. The Euglena is unique in that it is both heterotrophic (must consume other organisms for food) and autotrophic (can make its own food). Also at the front end of the euglena is an eyespot that is used to detect light. This gives the euglena a sense of where the most sunlight is coming from so that they can use their flagellum to position themselves in the right place and maximise photosynthesis. The euglena has a stiff outer membrane that helps it keep its shape and holds the cell together.

Near the centre of the euglena cell is its nucleus and within the nucleus is the nucleolus. The nucleus contains the DNA (which resembles squiggly strands or threads) and has the role of giving the cell all necessary instructions.

Paramecium are found throughout all water sources and also prefer still, non-flowing ponds or stagnant pools. They are often used in biological studies and science laboratory investigations because they are easily grown and demonstrate many biological behaviours such as reproduction that can be studied over a shorter time. . Without paramecium, many food chains would struggle to exist because they eat other microorganisms such as different types of algae and euglena and many small animals rely on eating them for energy.

Model of a paramecium caudatum.

The cell is surrounded by tiny hairs called cilia which have an oar-like motion that allows the cell to move through water. The outer cell membrane of the paramecium is quite thick which means that it has a fixed shape. Just inside the cell membrane are teardrop shaped organelles called trichocysts. The paramecium can shoot tiny threads out of these to tangle up a predator, hold onto food or use them to make themselves seem larger.

The inside of the cell membrane is filled with a jelly-like material called the cytoplasm. Near the end of the cell is the large nucleus that contains DNA and is responsible for controlling all of the cells processes. Like the euglena the paramecium has a star-shaped contractile vacuole to help it deal with the influx of water it experiences from living in a watery environment.

Paramecium are not autotrophs like euglena and in fact they are heterotrophs. This means that they must eat other organisms in order to gain energy. Cilia lining the oral groove, pass food particles along the surface of the oral groove and down into the gullet (found at the end of the oral groove). At the end of the gullet, food vacuoles are formed and you can see one forming in the picture in your workbook. These are small pieces of membrane that pinch off around food particles. Food vacuoles stay in the cytoplasm until the food is digested. Undigested food particles and any wastes are removed through the anal pore which is found near the cell membrane and shows waste being ejected from the cell.