

# CELL ORGANELLE STRUCTURE AND FUNCTION

## Paramecium: Surface/Cell membrane.

- The exterior membrane of the cell is known as 'pellicle'. It is stiff as well as flexible. Some flexing of the surface is possible because of this membrane.
- Paramecium has a firm surface membrane giving it a 'slipper' shape – provides structure.
- The surface membrane contains tiny darts that can be fired defensively into larger predators.
- Surface is covered with approx. 2,500 tiny hair-like projections called cilia.
- The rhythmical beating of cilia enables it to move precisely.
- It provides a boundary between itself and its environment.
- The membrane is semi-permeable, meaning that it allows passage of only certain substances. Small molecules like O<sub>2</sub>, CO<sub>2</sub> and glucose freely diffuse through the membrane but larger molecules have to be actively transported.
- Gas exchange by diffusion occurs across the cell membrane in response to a concentration gradient.

## Paramecium: Cilia.

- Hair-like outgrowths of the cytoplasm.
- Width about 200nm, they can just be seen under the microscope
- A cross section of cilia shows a ring of nine pairs of tubules surrounding 2 central ones.
- To bend, 2 members of each outer pair slide past each other in a coordinated sequence.
- Co-ordination is achieved by this network of neurofibrils which connect the bases of the cilia
- The cilia help paramecia to move. They can move at speeds of approximately 2,700 nm/second (12 body lengths per second).
- One of the amazing paramecium facts is that a paramecium, which normally moves forward in a corkscrew manner, is capable of reversing its direction when it encounters an adverse condition!

## Elodea: Plant Cell wall

- Located immediately outside the plasma membrane.
- Consist of a meshwork of very fine threads of cellulose, called microfibrils, which are oriented at right angles to one another so that they can provide strength to the cell.
- These are very strong and enable the wall to resist tension (pulling)
- The spaces between the microfibrils are wide enough for most molecules to pass through.

## Elodea: Chloroplasts

- Organelles in which plants make sugar from CO<sub>2</sub> and water in photosynthesis
- Chloroplasts contain their own DNA
- A chloroplast contains a complex system of internal membranes surrounded by two outer membranes.
- The internal membranes are packed with chlorophyll and other pigments – sacs – thylacoids.
- These sacs are piled to form a granum
- This is where light is converted to chemical energy.
- This is then used by enzymes to convert CO<sub>2</sub> into sugars ( carbohydrates )

## Rhubarb Plant: Epidermal cell - Cytoplasm

- Cytoplasm is the homogeneous, generally clear jelly-like material that fills cells.
- The cytoplasm consists of cytosol (fluid) and the cellular organelles, except the nucleus.
- Cytosol is mainly water but with many substances dissolved in it eg sugars, amino acids, mineral ions, and organic molecules.
- It also contains many enzymes that catalyze reactions.
- It is where many of the chemical reactions of the cell occur eg protein synthesis.
- Nutrients are absorbed, transported and processed within the cytoplasm.
- Cytoplasm offers support to the cell .
- It allows the cell to take up 3-dimensional space and the cell's many organelles to "float" freely throughout. It also acts as a medium for transport inside the cell.

## Rhubarb: Stomata/Guard Cell

- Stomata are the pores in the epidermal layer of the leaf.
- They allow CO<sub>2</sub> to enter the plant and oxygen to exit the plant, as well as the release of water vapour.
- Two cells called guard cells form the stomata.
- Stomata function is to regulate the process of photosynthesis, transpiration, respiration etc.
- The guard cells are able to open and close the stoma depending on if they are full of water or not.
- The turgor pressure of the guard cells controls the opening and closing of stoma.
- When light shines on the guard cells, a molecule on its cell membrane detects this signal and its cell membrane permeability changes, so that more water is gained.
- The cell swells up – becomes turgid.
- Its outer wall becomes thinner, expands more causing the stoma to open.
- Stomata are open during the day during photosynthesis, and closed at night.
- Sometimes the stomata close during the day if it is too hot and the plant starts losing too much moisture.
- Chloroplasts are found in the guard cells.