1.2 Cells and Cell Contents

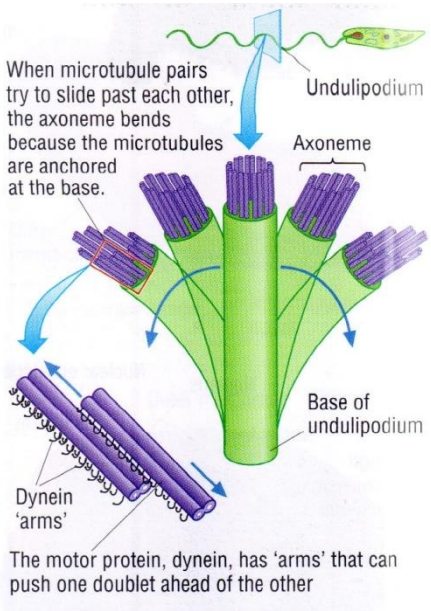
Cell ultrastructure and the importance of the cytoskeleton of cells

When you look at animal or plant cells under the electron microscope, you can see a lot more detail. You are able to see the inside structures – **organelles** – of the cells, which together make a cell's **ultrastructure**. Most organelles are common to both animal and plant cells. They have the same function in teach type of cell. Each organelle has its own specific role within the cell, all working together and each contributing towards the survival of the cell. This process is called **division of labour**.

Cytoskeleton

Cells contain a network of fibres made of **protein**. These fibres keep the cell's shape stable by providing an internal framework called the **cytoskeleton**:

- Some of the fibres, called **actin filaments** are able to move against each other – these cause the movement seen in some white blood cells, and they move some organelles around inside cells
- There are other fibres, called **microtubules**. These are cylinders about 25nm in diameter made of a protein called **tubulin**, and may be used to move a microorganism through a liquid or to waft a liquid past a cell. Other proteins present on the microtubules move organelles and other cell contents along the fibres – these proteins are called **microtubule motors**



Undulipodia & Cilia

Structurally, **flagella** of eukaryotes (correctly named **undulipodia**) and **cilia** are the same. Each one is made up of a cylinder than contains nine microtubules arranged in a circle and another two microtubules in a central bundle. Undulipodia are longer than cilia.

The undulipodium that forms the tail of a sperm cell can move the entire cell. Undulipodia and cilia can move because the microtubules can use energy produced by **ATP** (**adenosine triphosphate**).

Some bacteria have flagella. These look like the same as eukaryotic undulipodia, but their internal structure is different. These are true motors; they are made of a spiral of protein, called **flagellin**, attached by a hook to a protein disc at the base. Using energy from ATP, the disc rotates, spinning the flagellum