

# Biology Top-Up

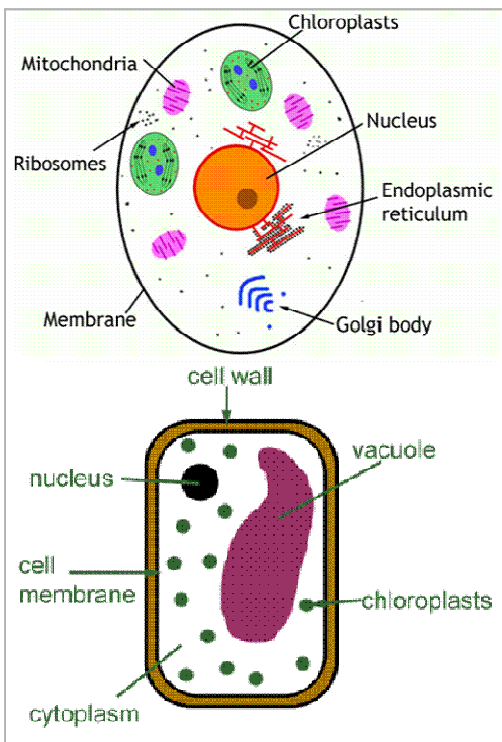
## Cell Biology

There are two types of microscope used to study cell structure: light microscopes and electron microscopes.

Light microscopes use a series of lenses to focus light on or through a specimen that has been stained. Not all organelles can be viewed with a light microscope - the nucleus, mitochondria, chloroplasts and vacuole can be viewed. The cell membrane and cell wall can also be seen. The best light microscopes can magnify objects up to 1,500 times.



Electron microscopes allow the study of smaller organelles that are found in the cytoplasm (such as ribosomes and the endoplasmic reticulum), as well as showing the larger organelles in much more detail. Electron microscopes can magnify an object up to 1,500,000 times



### Some organelle functions

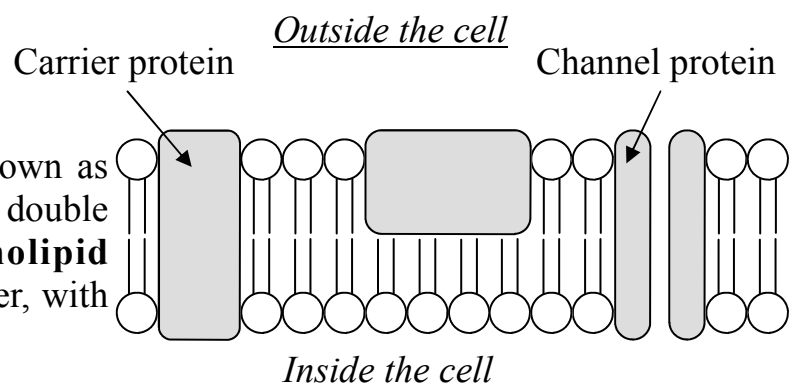
**Nucleus** Has a double membrane; contains DNA; only found in eukaryotic cells (prokaryotic cells do not have membrane-bound organelles)

**Mitochondria** Have a smooth outer membrane and a folded inner membrane; site of aerobic respiration which produces energy in the form of ATP (adenosine triphosphate)

**Cell wall** Made of cellulose molecules lying together to form microfibrils; provides support for the cell

NOTE: plant cells also contain the other organelles shown in the diagram of the animal cell

The cell membrane is also known as the plasma membrane. It is a double layer (bilayer) of **phospholipid** molecules tightly packed together, with protein molecules embedded.



Molecules pass through the cell membrane in one of four ways: osmosis (movement of water from a region where there are more to where there are less); diffusion (movement of molecules from an area of high concentration to an area of low concentration); facilitated diffusion (diffusion using carrier proteins which change shape - e.g. glucose); active transport (movement *against* a concentration gradient using specific carrier proteins and ATP as an energy source)