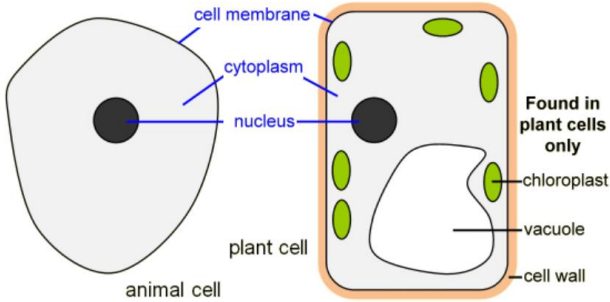


# B1 Cells

All living things are made up of cells. The structures of different types of cells are related to their functions.

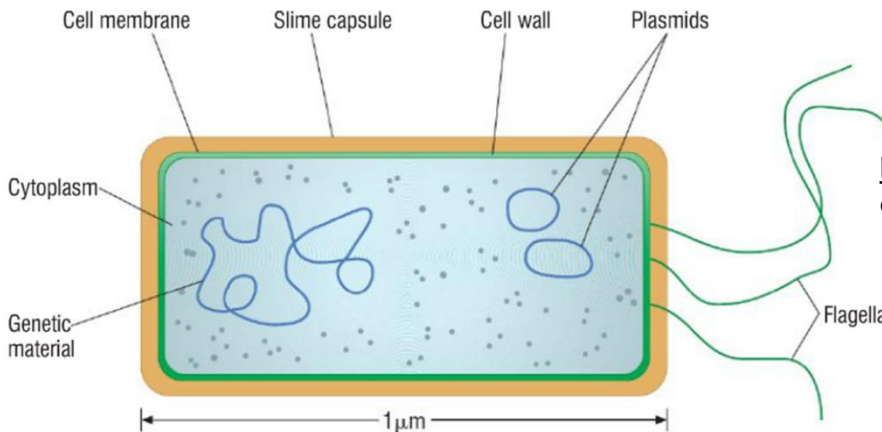
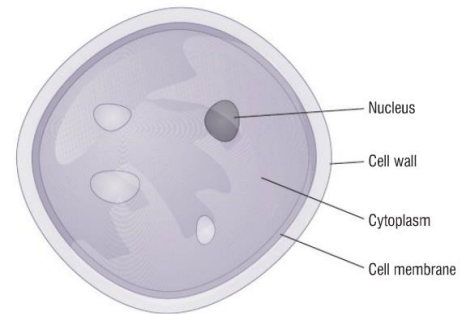


Organelles - both plant and animal	Function
Nucleus	Contains genetic material (DNA/chromosomes) which controls the activities of the cell
Cytoplasm	Most chemical processes take place here, controlled by <b>enzymes</b>
Cell membrane	Controls the movement of substances into and out of the cell
Mitochondria	Most <b>energy</b> is <b>released</b> by <b>respiration</b> here
Ribosomes	Protein synthesis happens here



Organelles - Only in plant/algal cells	Function
Cell wall	Strengthens the cell (made of <b>cellulose</b> )
Chloroplasts	Contain chlorophyll, which absorbs light energy for photosynthesis
Permanent vacuole	Filled with cell sap to help keep the cell turgid

Yeast cell



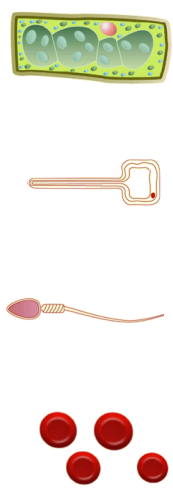
**Bacteria** are single celled organisms which contain:

- cytoplasm
- cell membrane
- cell wall
- no distinct nucleus**

Cells may be **specialised** for a particular **function**. Their structure will allow them to carry this function out.

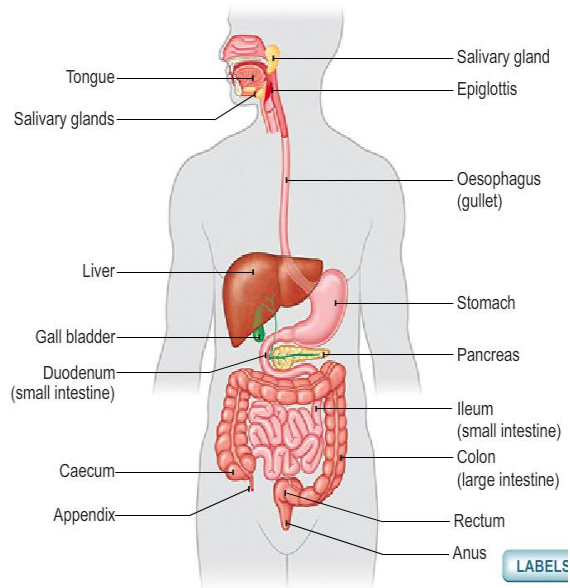
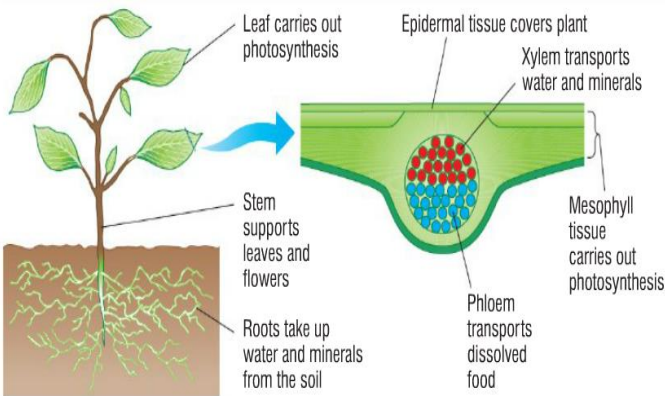
Tissues are cells with a similar function that group together. Organs are a group of tissues. They group to form Organ Systems

Tissue	Function
Muscular tissue	Contracts, bringing about movement
Glandular tissue	Produces substances such as enzymes and hormones
Epithelial tissue	Covers some parts of the body



Cell	Job	Adaptations
<b>Leaf cell:</b>	absorbs light for photosynthesis	lots of chloroplasts
<b>Root hair cell:</b>	absorbs water and mineral ions	finger like shape for large surface area
<b>Sperm cell:</b>	fertilises an egg	head contains an enzyme to help penetrate egg
<b>Red blood cell:</b>	carries oxygen to the cells	thin outer membrane so oxygen diffuses easily

**Organ systems** are groups of organs that carry out a particular function. For example, the **digestive system**:



There are two types of microscope -light and electron. Light microscopes have poor magnification and resolution. Electron microscopes have much higher magnification and resolution (ability to see things in high detail)

1mm = 1000µm  
 1µm = 1000nm  
 nm = nanometre  
 µm = micrometre

When calculating magnification use the following equation.

$$\text{Real length} = \frac{\text{Image}}{\text{Magnification}}$$

REMEMBER TO MEASURE IN mm not cm!!

Diffusion is the movement of molecules down a concentration gradient (high to low)

Osmosis is the movement of water molecules through a partially permeable membrane from dilute (lots of water) to where it is more concentrated (less water/more sugar/ions)

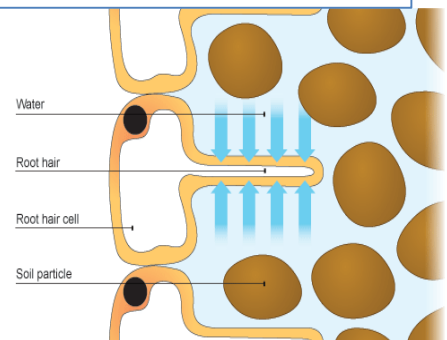
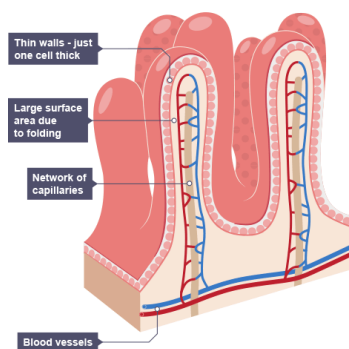
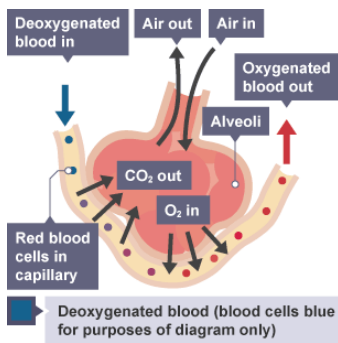
Active transport requires energy (ATP) - from respiration in mitochondria, against a concentration gradient (low to high)

Adaptations for movement of molecules - increase diffusion etc

Large surface area - microvilli/root hairs/lots of alveoli

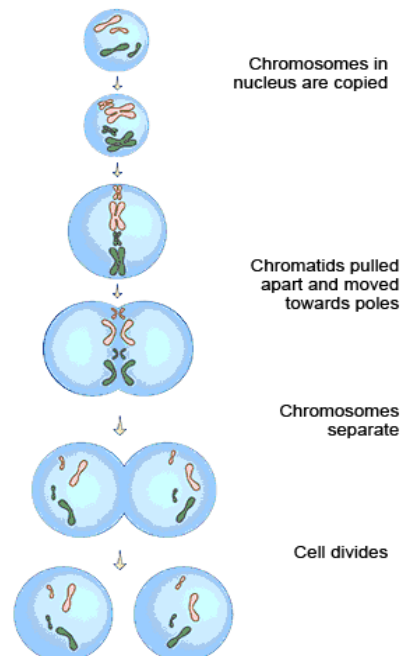
Thin - 1 cell thick - alveoli, villi, root hairs (short diffusion pathway)

Good blood supply - capillaries - this takes away the molecules - alveoli and villi



**Mitosis** - this is where cells divide to form two identical daughter cells - the chromosomes are copied, the cytoplasm and membrane divides - this is useful in growth and repair of cells

Mitosis is also used in asexual reproduction in some organisms such as bacteria



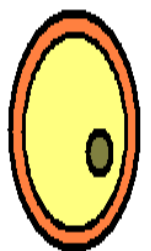
- Stem cells - are undifferentiated cells that can become a variety of cells - useful in treating disease/repair damaged tissue - embryos can be used as these can become any type of cell - these are often discarded - could become life?
- Adult stem cells only have the ability to become a small range of cells

## Therapeutic cloning

If you were to receive medical treatment with cells grown from stem cells, your body's immune system would recognise the cells as foreign, and they would be rejected and die. But this would not happen if you received cells with the same genes as you.

This could be done by cloning one of your cells to produce an embryo, then taking stem cells from this. This is called therapeutic cloning. Here are the steps involved:

## Therapeutic Cloning



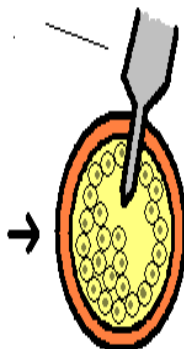
Nucleus is taken out human egg cell. It is replaced with a nucleus from one of the patient's cell.



The egg cell is triggered to develop into an embryo.



3 days

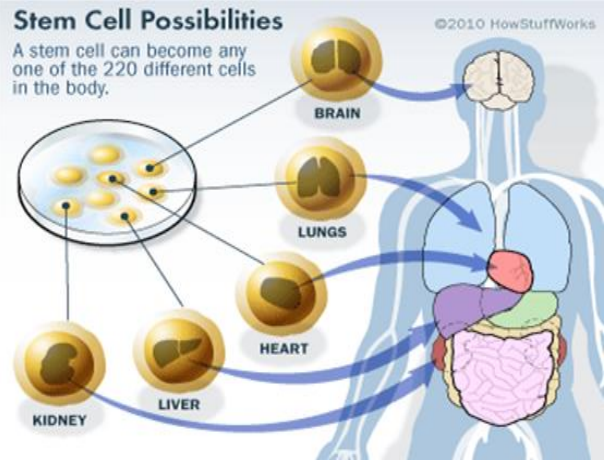


5 days  
Cells are removed from the embryos with a pipette.



Stem cells from the embryo are grown in a dish containing nutrients.

Stem cells develop into different tissues and organs. These can be used for medical treatment.



## Advantages and Disadvantages to Embryonic and Adult Stem Cells.

Embryonic S.C.	Adult S.C.
"Pluripotent" (can become any cell)	"Multipotent" ("can become many but not any")
Stable. Can undergo many cell divisions.	Less Stable. Capacity for self-renewal is limited.
Easy to obtain but blastocyst is destroyed	Difficult to isolate in adult tissue.
Possibility of rejection??	Host rejection minimized