

Cellular organisation

Cell differentiation

Single-celled organism performs all essential life functions inside the boundaries of a single cell.

They cannot be totally efficient at all functions because each function requires a different type of cellular structure.

All cells in an organism are initially identical and as it matures, each cell takes on its own individual characteristics that suit it to the function it will perform when it's mature.

Each cell becomes specialised in structure to suit it to its role (cell differentiation).

Tissues

Examples of tissues include:

- **Epithelial tissues:** these are found in animals and are sheets of cells that line the surface of organs. They often have a protective or secretory function and there are many types including those made up of thin, flat cells that line organs where diffusion takes place.
- **Xylem:** this occurs in plants and is made of a number of cell types. It's used to transport water and mineral ions through the plant and gives mechanical support.

Organs

An organ is a combination of tissues that are coordinated to perform a range of functions.

In animals for example the stomach is made up of tissues such as:

- **Muscle** to churn and mix stomach contents.
- **Epithelium** to protect the wall and produce secretions.
- **Connective tissue** holds other tissues.

In plants a leaf is made up of the following tissues:

- **Palisade mesophyll** made of leaf palisade cells that photosynthesize.
- **Spongy mesophyll** for gaseous diffusion.
- **Epidermis** to protect the leaf and allow gaseous diffusion.
- **Phloem** to transport organic materials away from the leaf.
- **Xylem** to transport water and ions into the leaf.

Organ systems

- **The digestive system:** Digests and processes food, is made up of organs including the salivary glands, oesophagus, stomach etc.
- **The respiratory system:** Used for breathing and gas exchange. It's made up of organs that include the trachea, bronchi and lungs.
- **The circulatory system:** Pumps and circulates blood. It is made up of organs that include the heart, arteries and veins.