

BIOLOGY

Unicellular versus Multicellular organisms

Objectives :

- Explain the seven functions of life necessary for the survival of any organism and to be able to name and briefly explain these functions of life: nutrition, metabolism, growth, response, excretion, homeostasis and reproduction.*
- Understand that multicellular organisms have properties that emerge from the interaction of their cellular components.*

Resources :

Student book page 2

<https://www.youtube.com/watch?v=UA5UhuhDkCQ> differentiation

<https://www.youtube.com/watch?v=u87QpOOkdxI> introduction to differentiation

https://www.youtube.com/watch?v=1hrkwJ_HuR0 unicellular and multi cellular

MRS GREN



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Table 1. The seven functions of life necessary for the survival of any organism

| | |
|--------------|--|
| Movement | the ability to change place or move toward any stimulus |
| Respiration | the release of energy from food by using oxygen |
| Sensitivity | The ability to react towards a stimulus |
| Homeostasis | Keeping the internal environment of the cell within limits |
| Growth | The increase in size |
| Reproduction | The production of offspring (sexual or asexual) |
| Excretion | The removal of waste products from the cell |
| Nutrition | Getting the material needed for growing and producing energy |

Metabolism : the chemical reactions that take place inside the cell

Unicellular versus multicellular

Unicellular organisms, which are also known as single-celled organisms, are made up of a single cell.

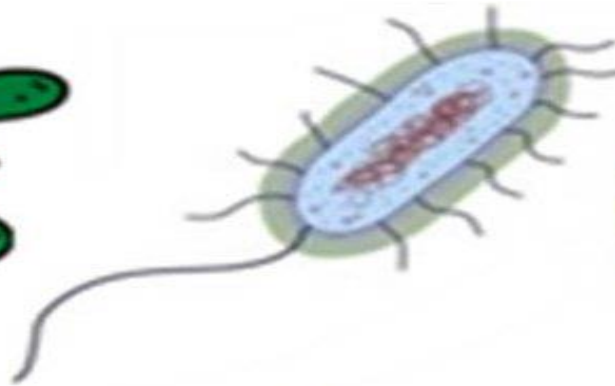
Examples of unicellular organisms include bacteria, amoeba, chlorella, paramecium and euglena. In unicellular organisms, the single cell is responsible for carrying out all the functions of life that are necessary for its survival.



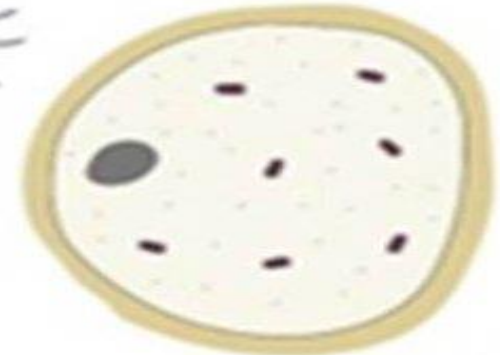
Paramecium



Amoeba



Bacteria



Yeast

Multicellular organisms, which are also known as multi-celled organisms, are made up of more than a single cell. *Examples of multicellular organisms include plants and animals.*

The cells of multicellular organisms differentiate to make different tissues that perform specialized functions. For example, red blood cells are specialized to carry oxygen, whereas nerve cells are specialized to pass a nerve impulse.

Differentiation is the process by which a cell becomes more specialized.

During the process of differentiation, some genes in the cell are "switched on". This means the gene starts to be used in the function of the cell, and we refer to the gene as being expressed. Other genes are switched off (or unexpressed). This results in cells that are more specialized and perform different functions. Differentiated cells form tissues, tissues form organs, organs form organ systems and organ systems form the multicellular organism

Becoming multicellular has enormous advantages.

An organism can grow in size and its cells can differentiate – **that is, they can take on specific functions**, so the organism can grow in complexity as well as size.

A multicellular organism may have specialized nerve cells for communication and interaction with the outside, and muscle cells for movement. It may also have special reproductive cells and secretory cells that produce enzymes for digestion.

Differentiation allows for new properties to **emerge** as different cell types interact with each other to allow more complex functions to take place. For example, nerve cells may interact with muscle cells to stimulate movement.

Emergent properties

One person playing the flute can produce a simple, recognizable tune but if several musicians with other instruments join in and play together as a group, they produce a wide variety of sounds and many different effects.

New properties emerge in the cells of multicellular organisms in a similar way. Their cellular components interact so that the organism can carry out a range of more complicated functions.

One cell can function on its own, but with other cells in a group, it can produce tissues and organs that carry out a range of roles in the organism.

For example, lungs are made of many cells – it is only when all these cells work as a unit that the lungs are able to perform their function. Cells form tissues, tissues form organs, organs form organ systems and organ systems work in synergy so that the whole organism can carry out a complex range of tasks and is greater than the composition of its parts.