

# A NEW COMPETENCE BASED BIOLOGY

A COMPREHENSIVE GUIDE TO EXCELLING IN ORDINARY LEVEL BIOLOGY

## STUDENTS' BOOK ONE

A PERSPECTIVE OF THE COMPETENCE BASED CURRICULUM

(A must-read handbook for young visionary Biologists)

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*Courtesy of;*



A handwritten signature in black ink, appearing to read "Bagoole Daniel", with a flourish at the end.

Bagoole Daniel.

## CHAPTER I

## INTRODUCTION TO BIOLOGY

**Chapter objectives**

By the end of this chapter, you should be able to know;

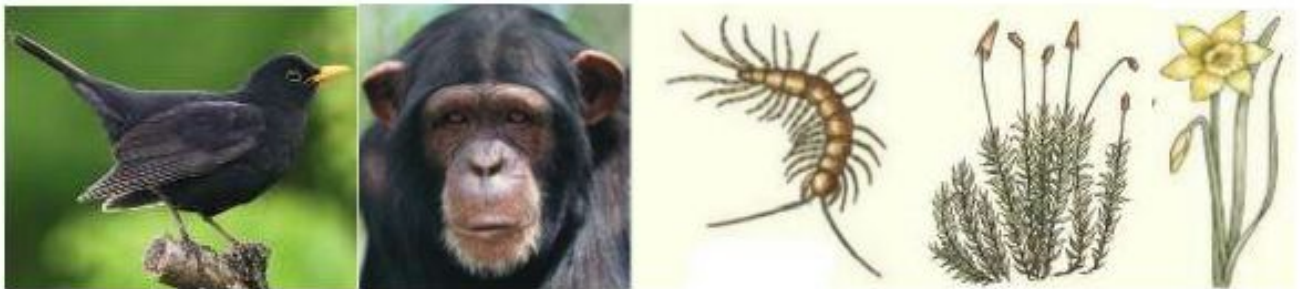


- that Biology is the science of living things.
- that Biology is applied in everyday life.
- the importance of life processes and how they are manifested differently in different organisms.

**Competency:** You should be able to understand that biology is the study of life and that all living organisms experience common life processes.

## MY FIRST LESSON ABOUT LIFE

Biology, an immensely important area of science, plays a variety of crucial roles in ensuring protection and welfare of all living beings on earth. With the progress of scientific development, humans are enjoying a much more comfortable life, but side by side many more problems are viciously emerging and causing a serious threat to all forms of life and their environment. In that case, biology can help human to face some critical challenges of the century, and some of these are the production of food, development of medical science and conservation of organisms in their hostile environment. In this chapter, the definition of biology, names of its branches and naming system of organisms have been discussed.

**Concept of Biology**

In nature, we generally find two types of objects, nonliving things and living organisms. The characteristics of nonliving things are usually discussed in Physics and Chemistry. Biology is a branch of scientific knowledge concerning life and characteristics of organisms. It is one of the oldest branches of natural science. Its background was even created before the origin of life on the earth, and you will learn more about it at your higher classes. By studying biology, one can acquire interesting knowledge of different

plants and animals and human life. In the realm of living creation, the presence of life in a living cell is remarkable. This is why a good command of biology plays an important role in knowing more about the different parts and organ structure of organisms, different chemical activities in them, their adaptation with their environment, their intake of nutrition and reproduction. The roles of a cell or cells in all steps of life are indisputable. Science has a great contribution in our everyday activities and developing our



- To acquire knowledge about proper nutrition in order to avoid mal-nutritional diseases like marasmus, kwashiorkor, rickets, obesity, night blindness etc.

### So, what are some of the careers in life that I can take up if I love, perform well and succeed in Biology?

- Biology education; One can become a very good teacher of Biology, for example teacher Bagoole Daniel.
- Medicine; you can become a doctor and treat people when you study well in Biology.
- Pharmacy; this career involves administering / giving medicines to sick people. They are called pharmacists.
- Nursing; This involves taking care of sick people in the hospital / clinics.
- Biotechnology; this involves modification and improvement of naturally occurring varieties of crops and animals. For example, production of Genetically Modified Organisms (GMOs) at Kawanda agricultural research centre. They are called Biotechnologists.
- Biomedical laboratory technology; People who study this deal with analysis of blood samples in the laboratory, for example those who test for presence HIV and malaria in the hospital.
- Gynecology; People that study this specialize in treating diseases about reproductive health in women. They are called gynecologists.
- Midwifery; People that take this career are the ones that help pregnant women in giving birth / delivery. They can either be women or men, though majority of them are women.

### BRANCHES OF BIOLOGY

Based on the **type of organism**, biology is divided into two branches – **Botany** and **Zoology**. *Botany is a branch of Biology that deals with the study of plants. Zoology is a Branch of Biology that deals with the study of animals.*

Grounded on the aspect of consideration, there are also two other divisions of biology - **physical biology** and **applied biology**.

#### Physical Biology

In the field of physical biology, theoretical concepts are usually discussed.

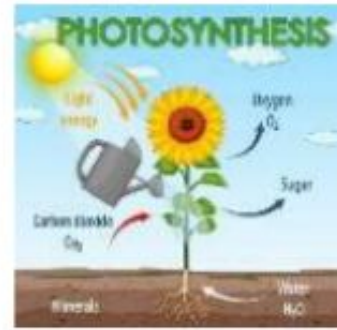
The following are some of the areas of study (branches) under physical Biology;

1. **Morphology / Anatomy**: The field deals with the form and structure of organisms. It is usually divided into two branches – external and internal morphology. The external description of the body is called external morphology and the

internal description of the body is called internal morphology.

2. **Taxonomy**: Classification of organisms and the principles related to this task are discussed in the field

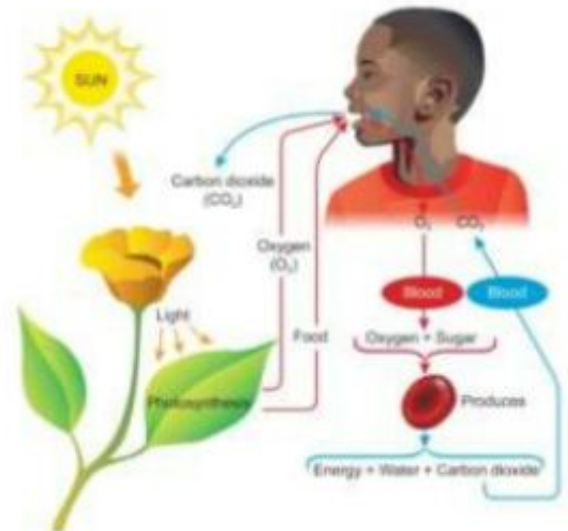
3. **Physiology**: This branch of biology deals with the biochemical activities of different organs of organisms. Besides, detailed description of all the physiological process of organisms is found in it.



### 3. Respiration

This is the process that involves breaking down the food we eat / plants make; in body cells to release energy that is required by our body to carry out many other life processes. Respiration occurs inside cells; and at times we realise its occurrence by the carbon dioxide gas we breathe out.

All living things need oxygen to breathe. If they had no oxygen, they would die. When divers are exploring under the water, they need aqualungs that contain oxygen so that they can continue to breathe.



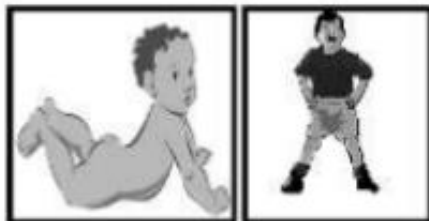
### 4. Excretion

Life processes like feeding and breathing produce waste products that are poisonous when they increase in concentration in the body of an organism. Getting rid of these wastes is another important life process. The passing out of waste from the organism is called **excretion**.

For instance, our body releases waste by urinating or by sweating.

### 5. Growth

It is simply the increase in size brought about by the development of new cells and tissues. In some organism's growth is shown when the organism becomes more complicated and more efficient. A tree growing more leaves can make more food or a human growing more muscles can lift heavier loads. Growth can also be shown when an organism changes shape or form.



Growth is also shown when a frog changes form and shape in metamorphosis



### General characteristics

They are mostly green in colour thus carry out photosynthesis

They are multicellular/ made up of many body cells

Their cells are surrounded by cellulose cell wall.

The kingdom is divided into two main divisions i.e. Bryophyta and Tracheophyta



Plants are grouped in divisions. A division is an equivalent of a phylum:

1. Non-vascular plants (Bryophytes)
2. Vascular plants (Pteridophytes and Spermatophytes)

| Bryophyte (mosses)                                                                 | Pteridophytes (ferns)                                                              | Angiosperm (flowering plants)                                                        |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  |  |  |

### KINGDOM: ANIMALIA (ANIMAL KINGDOM)

These are multicellular organisms. Almost all animals are capable of locomotion except the sponges. Their cells lack cell wall, chloroplasts (plastids) and vacuole in them. Because of having no chloroplasts in their cells, they are heterotrophs, and so they depend on other organisms for their

food. After ingestion, they digest their food. They have advanced and complex type of tissue systems. Sexual reproduction is their usual way of reproduction.

Example: The entire invertebrate (except protozoa) and vertebrate animals



## CHAPTER 4

## VIRUSES

**Chapter objectives:**

**By the end of this chapter, you should be able to learn:**



- Viruses have characteristics similar to other living organisms.
- Differences between viruses and other living organisms.
- Symptoms, transmission and prevention of the following viruses; HIV, Ebola, hepatitis and Cassava mosaic

**Competency:** You should understand the characteristics of viruses, their means of infection and transmission as well as the symptoms of some key examples

**INTRODUCTION**

Viruses are common in our environment. Many are harmful because they cause diseases. They are not considered to be true living organisms because they do not demonstrate most life processes; they do not feed on their own, do not respire, do not excrete or grow and so they are not placed in any kingdom of classification. They are particles considered to be either living things or non-living things, abundant on earth and exist in almost every environment. However, they resemble living things in that they can reproduce, but only do so when inside other cells.

Viruses are not classified in any of the five kingdoms because they do not have all the characteristics of all living things. For example;

- They do not have cellular structures like cytoplasm, organelles.
- They use nuclear material and organelles of other living organisms to carry out their metabolic processes.
- They can survive out their host's cell as inert organic crystals.

Viruses are much smaller and simpler in structure. Lacking the structures and metabolic machinery found in a cell, a **virus** is an infectious particle consisting of little more than genes packaged in a protein coat.



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**FURTHER READING**

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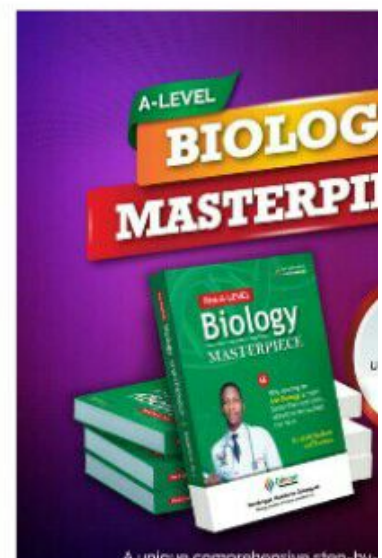
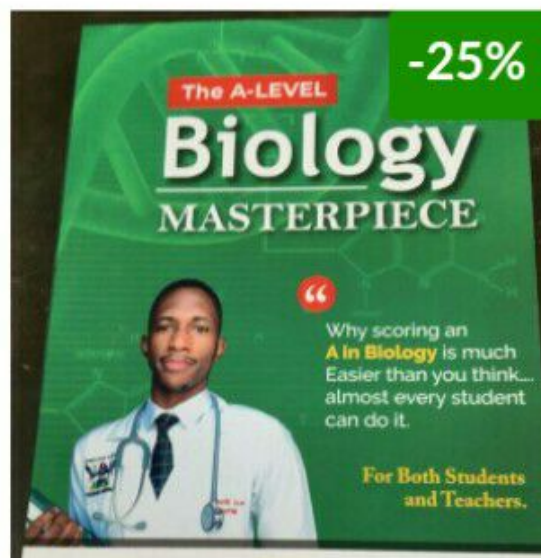
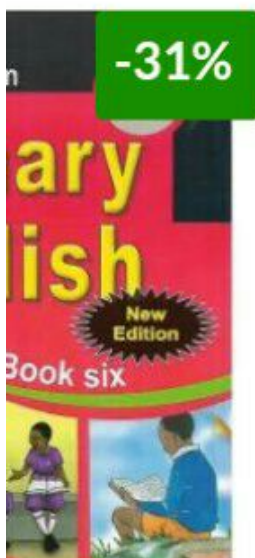


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