

The Biology:

The term biology is derived from the Greek word : bios, "life" and the suffix :logia, "study of." The Latin form of the term first appeared in 1736 by Linnaeus (Carl von Linné).

Biology is the study of living things. It deals with what all living things can do, how they do it and why they do it. In biology, there is always a relationship between the structure of an organism, its function and its adaptation to its function or environment. An individual living thing, such as an animal or a plant, is called an organism. The term 'living organism' is usually used to describe something which displays all the characteristics of living things .

The science has been divided into many sub disciplines, such as:

botany, bacteriology, anatomy, zoology, histology, mycology, embryology, parasitology, genetics, molecular biology, systematics, immunology, microbiology, physiology, cell biology, cytology, ecology, and virology.

Famous Scientists and Their Inventions

Charles Darwin (1809–1882): *Theory of Evolution*

Formulated the theory of evolution, explaining the huge diversity in organisms as a result of millions of years of unceasing evolution programmed by natural selection.

Gregor Mendel (1822-1884)

Famous For: Modern Genetics

When he wrote "Experiments on Plant Hybridization", he paved the way for biology students to study genetic traits in peas. During his experiments, Gregor found that a specific trait would be dominant over other traits in the same species

Louis Pasteur (1822–1895)

Famous For: Created the process of pasteurization for treating milk and wine

Robert Hooke (1635–1703)

Famous For: Coined the term "cell"

Robert Koch (1843-1910): Renowned for the isolation of *Bacillus anthracis*, *Mycobacterium tuberculosis* and *Vibrio cholerae*, the bacteria responsible for the

diseases anthrax tuberculosis and cholera, respectively. Although the diseases may not sound sinister in the 21st century, they were among the deadliest in the 19th century. Koch is also known for his eponymous postulates about the determination of the particular microbe responsible for a disease.

Edward Jenner (1749–1823)

Famous For: Creating the first effective vaccine for smallpox Edward Jenner is considered as the “father of immunology” mainly because of his pioneering work on the smallpox vaccine and the use of vaccination

Antonie van Leeuwenhoek (1632–1723)

Famous For: The Father of Microbiology

Robert Brown (1773–1858)

Famous For: Discovered the cell nucleus

Carl Linnaeus (May 12, 1707 - January 10, 1778):

Formed the taxonomical system of binomial nomenclature, wherein the name of the genus is followed by the name of the species. For instance, human beings are termed as Homo sapiens, wherein Homo is the genus and sapiens is the species.

The hypotheses of Origin of life:

There are 3 hypotheses explain the origin of life :

- Extraterrestrial origin (panspermia): meteor, comet borne from elsewhere in universe
 1. evidence of amino acids and other organic material in space (but often both D & Lforms)
 2. questionable bacterial fossils in Martian rock-However, this would imply that some other origin of life was likely because it would have had to happen elsewhere before it could be transported here, and the only difference wouldbe that life did not originate on Earth.

- Spontaneous origin on earth: primitive self-replicating macromolecules acted upon by natural selection ((macro)Evolution is one example of this)
 - This is often attacked for the seeming impossibility for life to have been produced by a chemical reaction triggered by lightning and the ability of any produced DNA

to actually be in a sequence that could produce a working model of life if replicated. It is also attacked for religious reasons,

- Special creation: religious explanations (Intelligent Design is one popular example of this.) These explanations contend that life was created by God (or perhaps some other Intelligent Designer).

-Proponents of Intelligent design suggest that the vast complexity of life could only have been purposely designed while other creationists refer to holy books

Characteristics of living things

There are seven activities which make organisms different from non-living things:

1 .Nutrition :Living things take in materials from their surroundings that they use for growth or to provide energy. Nutrition is the process by which organisms obtain energy and raw materials from nutrients such as proteins, carbohydrates and fats.

2 .Respiration :Respiration is the release of energy from food substances in all living cells. Living things break down food within their cells to release energy.

3 .Movement :All organisms are able to move. Some, including most animals, are able to move their whole body from place to place, and this is called locomotion. But even seemingly non-moving organisms, such as plants, are able to move parts of themselves. If you look at some living plant cells under a microscope, you may be able to see the tiny structures within each cell moving around .

4.Excretion :All living things excrete. As a result of the many chemical reactions occurring in cells, they have to get rid of waste products which might poison the cells. Excretion is defined as the removal of toxic materials, the waste products of metabolism and substances in excess from the body of an organism.

5 .Growth :Growth is seen in all living things. It involves using food to produce new cells. The permanent increase in cell number and size is called growth.

6 .Reproduction :All living organisms have the ability to produce offspring of the same kind.

7 .Sensitivity :All living things are able to sense and respond to stimuli around them such as light, temperature, water, gravity and chemical substances. Learn these characteristics of living organisms. They form the basis of the study of Biology.

THE PROCESS OF SCIENCE STUDY (Scientific Method):

THE PROCESS OF SCIENCE	الطريقة العلمية
Discovery Science	العلم الاستقرائي – يستخدم مشاهدات وقياسات متنوعة لوصف العلم
Hypothesis- Based Science	العلم الافتراضي (الإستنتاجي – الإستدلالي) – يستخدم البيانات الذي يوفرها العلم الاستقرائي وذلك لوضع تفسيرات علمية (إنه العلم التجريبي)
A Hypothesis	الفرضية هي تفسير مقترح لمجموعة من المشاهدات وبمعنى آخر هي الإجابة التخمينية للأسئلة التي تثيرها المشاهدة
A Theory	النظرية هي إستنتاج علمي مبني على التجربة مؤيد بعدد كبير ومتزايد من الأدلة المدعومة بالتجارب

Two approaches are used to understand natural causes for natural phenomena

1. Discovery based science:

- is results that have been found from actually having carried out the experiment or investigation.
- uses verifiable observations and measurements to describe science.

➤ **Hypothesis- based science:**

- is an educated guess by a scientist of what will happen during an experiment or investigation.
- uses the data from discovery science to explain science.This requires proposing and testing of hypotheses.

➤ **There is a difference between a theory and a hypothesis**

- **A hypothesis is a proposed explanation for a set of observations**
- **A theory is supported by a large and usually growing body of evidence.**

Steps in the Scientific Method:

- **Observation**
- **Hypothesis**
- **Experiment**
- **Data Collection**
- **Conclusion**
- **Retest**

