

1.3 Major discoveries that revolutionized biology

Activity 1.6 Group discussion

In a group of 4 -5 students, discuss at least five major discoveries that revolutionized biology.

Let your group's secretary present your findings to the whole class.

Objectives

At the end of this section, the student will be able to:

- *Discuss at least five major discoveries that revolutionized biology*

Biology is a fascinating and diverse subject area. If you're thinking of studying Biology, here are the twelve famous discoveries to inspire you.

1. Aristotle (384–322 BC)

Despite the fact that his name is rarely mentioned when discussing important biological discoveries, the ancient Greek philosopher Aristotle was responsible for a breakthrough classification system for living things. Aristotle's classification system was known as the 'Ladder of Life' until the nineteenth century. For the first time, he established species relationships and grouped them correctly. He classified organisms based on their ability to move from one place to another and with their characteristics as herbs, shrubs, and trees.

Unit One: Sub-fields of Biology



Figure 1.3 Aristotle

2. Galen (129–161 AD)

Galen's efforts transformed medical science. Galen had a significant impact on the advancement of numerous medical specialties, including Anatomy, Pathology, Physiology, and Neurology. Among his important findings were the distinctions between veins and arteries, as well as the recognition that the larynx produces voice. Although many of his concepts contained scientific mistakes, his contribution to medical science is undeniable



Figure 1.4 Galen

3. Antonie van Leeuwenhoek (1632–1723)

Antonie van Leeuwenhoek is well renowned for his contributions to microscopy and how he applied it to the field of biology. He invented a method for making strong lenses that, according to some, could magnify up to 500 times. Leeuwenhoek employed microscopes to learn more about the biological world; among his findings were bacteria and the vacuole of the cell.



Figure 1.5 Antonie van Leeuwenhoek

4. Carl Linnaeus (1707–1775)

Carl Linnaeus, a botanist, physician, and naturalist, devised the method for naming, ordering, and classifying creatures that we still use today. His extensive collection of plant, animal, and shell specimens inspired him to devise a system for classifying and naming species. He separated items into three categories – animals, plants, and minerals – and further organized living things into classes, orders, genera, and species. In *Homo sapiens*, for example - 'homo' is the genus and 'sapiens' is the species.

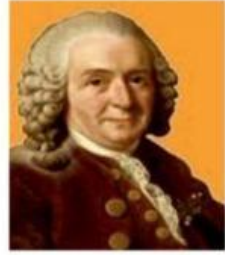


Figure 1.6 Carl Linnaeus

5. Charles Darwin (1809–1882)

Probably the most famous naturalist of all time, Charles Darwin's contribution to biology and society is immense. He established that all species of life descended over time from common ancestors, with species continuing to exist through the process of natural selection. His theory of evolution was published in *On the Origin of Species* in 1859 and it caused quite the stir – he was disputing the long-held belief that all species had been created by God at the beginning of the world. Evolution by natural selection combined with Mendelian genetics is now accepted

as the modern evolutionary synthesis and forms the foundations of much biological scientific endeavour.

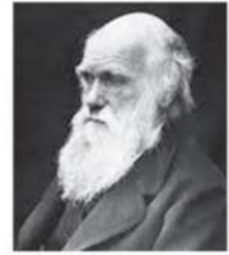


Figure 1.7 Charles Darwin



Figure 1.8 Gregor Mendel

6. Gregor Mendel (1822–1884)

Gregor Mendel's extraordinary contribution didn't get the recognition it deserved until long after the friar's death. He used peas to discover and demonstrate the laws of genetic inheritance, coining the terms 'dominant' and 'recessive' genes in the process. The laws were rediscovered at the turn of the 20th century and provided the mechanism for Darwin's theory of natural selection to occur. The two theories combine to form our current understanding of the evolutionary process.

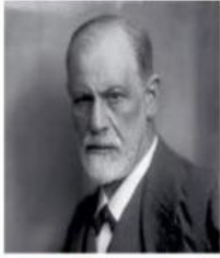


Figure 1.9. Louis Pasteur

7. Louis Pasteur (1822-1895)

Louis Pasteur is regarded as the father of medical microbiology. His contributions to science, technology, and medicine are nearly unparalleled in history. He pioneered molecular asymmetry research, demonstrated that bacteria cause fermentation and disease, introduced pasteurization, rescued France's beer, wine, and silk industries, and developed anthrax and rabies vaccines.



Figure 1.10 Robert Koch

8. Robert Koch (1843-1910)

Robert Koch was a well-known German physician who pioneered microbiology. As the father of modern bacteriology, he is credited with pinpointing the precise causal agents of tuberculosis, cholera, and anthrax, as well as providing experimental support for the concept of infectious disease.



Figure 1.11 Jane Goodall

9. Jane Goodall (1934)

Our knowledge of wildlife and conservation has been transformed by Jane Goodall, the UK ethologist. Best known for her career-long studies of chimpanzees, she discovered the animals are omnivores and tool users. She's a global leader in animal rights and was awarded a Ph.D. degree from the University of Cambridge without holding a bachelor's degree.

10) Barbara McClintock (1902–1992)



Figure 1.12 Barbara McClintock

American geneticist Barbara McClintock spent her career analyzing maize, where she developed a technique for identifying and examining chromosomes individually. Despite it not being immediately recognized, her work made it possible for us to map human genomes. She was awarded the Nobel Peace Prize in 1983 for her discovery of transposition and how genes could turn their physical characteristics on and off.

11. Watson (1928–) and Crick (1916–2004)

James Watson and Francis Crick were shot to fame in 1962 for their discovery of the structure of DNA, winning the medical Nobel Prize in the process. Their model of DNA (double helix) explains how DNA replicates, and hereditary information is coded and passed on to descendants. The discovery of DNA structure has led to a much more developed understanding of function – used in disease diagnosis and treatment, forensics, and more.



Figure 1.13 Watson and Crick

12. Wilmut (1944) and Campbell (1954–2012)

In 1996 Ian Wilmut and Keith Campbell cloned a mammal, famously named Dolly the Sheep. The pair cloned Dolly using a single adult sheep cell and a process of nuclear transfer. Dolly died after six years but cloning continues, although still not perfect, and certainly not ready for human application.



Figure 1.14 Wilmut and Campbell

Unit One : 1.3 Major discoveries that revolutionized Biology....

Work sheet One

Choose the correct answer for the questions given below

Question 1

Which ancient Greek philosopher developed a classification system for living things known as the 'Ladder of Life'?

- A. Gregor Mendel
- B. Galen
- C. Carl Linnaeus
- D. Aristotle

Question 2

What was a major physiological discovery attributed to Galen?

- A. The process of nuclear transfer in cloning
- B. The double-helix structure of DNA
- C. Distinctions between veins and arteries
- D. The chromosomal basis of transposition

Question 3

Which scientist invented a method for making strong lenses magnifying up to 500 times and discovered bacteria?

- A. Louis Pasteur
- B. Antonie van Leeuwenhoek
- C. James Watson
- D. Robert Koch

Question 4

In Carl Linnaeus's binomial system of classification, what does the word 'sapiens' represent in *Homo sapiens*?

- A. Domain
- B. Class
- C. Species
- D. Genus

Question 5

When was Charles Darwin's seminal theory of evolution published in *On the Origin of Species*?

- A. 1859
- B. 1996
- C. 1962
- D. 1903

Question 6

Which scientist used pea plants to discover the laws of genetic inheritance and coined the terms 'dominant' and 'recessive'?

- A. Ian Wilmut
- B. Gregor Mendel
- C. Barbara McClintock
- D. Francis Crick

Question 7

Louis Pasteur is widely regarded as the father of which scientific discipline?

- A. Ethology
- B. Gross anatomy
- C. Medical microbiology
- D. Plant taxonomy

Question 8

Which physician is credited with pinpointing the precise causal agents of tuberculosis, cholera, and anthrax?

- A. Robert Koch
- B. Galen
- C. Louis Pasteur
- D. Antonie van Leeuwenhoek

Question 9

What major breakthrough in primatology and wildlife conservation was made by Jane Goodall?

- A. Formulating the laws of natural selection
- B. Mapping the complete human genome sequence
- C. Demonstrating that bacteria cause fermentation
- D. Discovering chimpanzees are omnivores and tool users

Question 10

For what major discovery was Barbara McClintock awarded the Nobel Prize in 1983?

- A. The principles of vaccination against rabies
- B. Transposition and genes turning physical characteristics on and off
- C. The double-helix molecular structure of DNA
- D. The cloning of a mammal named Dolly

Question 11

Who discovered the double-helix structure of DNA, winning a Nobel Prize in 1962?

- A. Ian Wilmut and Keith Campbell
- B. Gregor Mendel and Charles Darwin
- C. James Watson and Francis Crick
- D. Louis Pasteur and Robert Koch