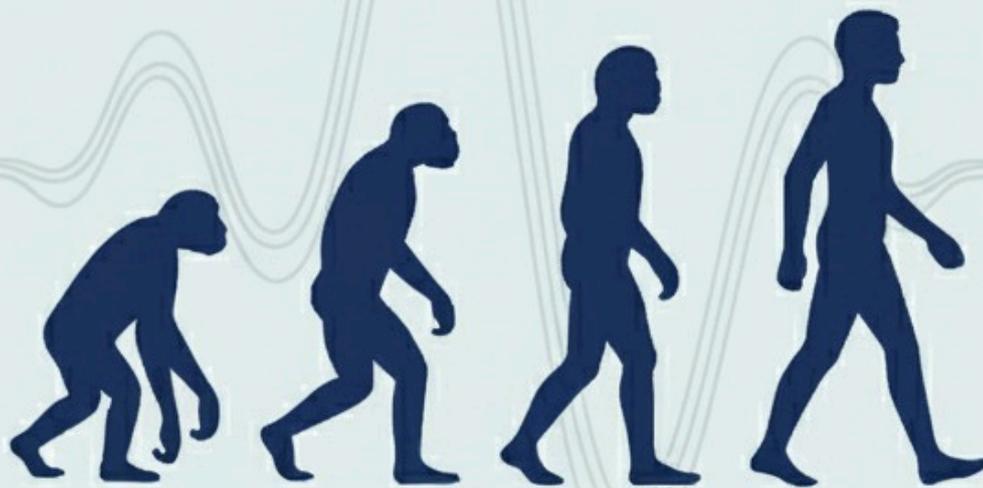# MYSTUDYMATE

BIOLOGY

CHAPTER 2
PATH OF EVOLUTION

Chapter 2 Path of evolution

1. Name the scientist who proposed the theory of natural selection.

Answer:

Charles Darwin proposed the Theory of Natural Selection.

2. State the main points of Darwin's theory of natural selection.

Answer:

1. Overproduction – organisms produce more offspring than needed.
2. Struggle for existence – competition for food, space, mates, etc.
3. Variations – natural differences occur among organisms.
4. Survival of the fittest – organisms with beneficial variations survive.
5. Origin of new species – successful variations accumulate over generations.

3. What are fossils? How are they important in the study of evolution?

Answer:

Fossils are the preserved remains or impressions of organisms from the past, found in rocks. They provide evidence of extinct species and help trace evolutionary history.

4. Who proposed the theory of inheritance of acquired characters? Why was it rejected?

Answer:

Jean Baptiste Lamarck proposed it.
It was rejected because acquired characters (like a bodybuilder's muscles) are not inherited genetically.

5. Describe the process of *speciation* and the role of isolation.

Answer:

Speciation occurs when populations become genetically distinct due to isolation—geographical, ecological, or reproductive. Over time, accumulated variations prevent them from interbreeding. This leads to the emergence of new species.

6. How is molecular biology evidence (DNA and protein similarities) used to infer evolutionary relationships?

Answer:

Comparing DNA sequences and amino acid sequences of key proteins (e.g., haemoglobin's beta chain) reveals evolutionary closeness. For example, humans and chimpanzees have identical sequences while rats show 31 differences, showing distant relation.

7. Provide a case study of *natural selection* using a plant example.

Answer:
A plant producing hundreds of seeds might face resource scarcity. Variations in traits like size or immunity cause some seedlings to survive better. Over time, these favourable traits become common, potentially leading to a new species.

8. How did Darwin's observations of Galápagos finches support evolution?

Answer:
Darwin noticed finch species with varied beak shapes suited to their diets—small beaks for insects, long sharp ones for cactus, thick for seeds—demonstrating how environmental demands drive adaptive divergence.

9. Evaluate how evolutionary concepts are applied in modern science and medicine.

Answer:
Evolution underlies areas like evolutionary medicine—tracking how bacteria evolve drug resistance, personalizing treatments based on genetics, and using AI to understand disease mechanisms.

10. According to evolutionary theory, what are *LUCA* and *MRCA*

Answer:

- LUCA : The Last Universal Common Ancestor, from which all life forms evolved.
- MRCA : Most Recent Common Ancestor, referring to the closest shared ancestor of specific organism

11. What is organic evolution?

Answer:
Organic evolution is the process by which new species of plants and animals arise through changes in their genetic makeup over a long period of time. Eg: The ancestors of horses had shorter legs than the ones in out times.

12. Explain Neo-Darwinism and how it enhances Darwin's original theory.

Answer:

Neo-Darwinism modernizes Darwin's original theory of evolution by incorporating genetic understanding. It recognizes that genetic mutations, recombination, and gene flow are the sources of variation. These genetic insights, combined with natural selection, form a more scientifically robust explanation of evolution.

13. What are the structural and functional units of the nervous system?

Answer:

Neuron is the structural and functional unit of the nervous system.

14. Describe the main parts of a neurone?

Answer:
Main parts of a neuron:

- Dendrites– receive impulses.
- Cell body (cyton)– contains nucleus and cytoplasm.
- Axon – carries impulses away.
- Axon terminals– transmit impulses to next neuron or effector.
  Myelin sheath– insulates and speeds transmission.

15. Differentiate between central nervous system (CNS) and peripheral nervous system (PNS).
Answer:

- CNS: Consists of brain and spinal cord; controls and coordinates body functions.
- PNS: Consists of cranial nerves and spinal nerves; connects CNS with rest of the body.

16. Name the three main parts of the human brain and their functions.

Answer:

1. Forebrain: Intelligence, memory, emotions, voluntary actions.
2. Midbrain: Controls reflexes of eyes and ears.
3. Hindbrain: Includes cerebellum (balance, posture), pons and medulla (involuntary actions like heartbeat, breathing).

17. What protects the brain from injury?

Answer:

- Skull bones
- Meninges (three protective membranes)
- Cerebrospinal fluid (CSF)

18. What is the function of the spinal cord?

Answer:

- Conducts impulses between brain and body.
- Controls reflex actions.

19. What is a reflex action? Give an example.

Answer:
A reflexaction is an automatic, quick, involuntary response to a stimulus.
Example:Withdrawal of hand when touching a hot object.

20. Whatisthedifferencebetweensympatheticandparasympatheticnervous system?

Answer:

- Sympathetic: Prepares body for emergencies ("fight or flight"), increases heartbeat, dilates pupils, reduces digestion.
- Parasympathetic: Brings body back to normal ("rest and digest"), slows heartbeat, stimulates digestion.

21. What are meninges?

Answer:
Meningesare three protective membranes that cover the brain and spinal cord.

22. What arethefunctionsoftheforebrain?

Answer:

- Controls voluntary activities.
- Centre of thought, intelligence, memory, imagination, and emotions.
- Regulates hunger, thirst, sleep, and body temperature.
- Olfactory lobes → sense of smell.

23. Write the functions of the cerebellum.

Answer:

- Maintains body balance.
- Coordinates voluntary muscular activities (walking, cycling, etc.).

24. What are the functions of the medulla oblongata?

Answer:

- Controls involuntary activities like heartbeat, breathing, swallowing, vomiting, and blood pressure.

25. Name the part of the brain that controls balance and posture.

Answer:
Cerebellum.

26. What is the role of the hypothalamus?

Answer:

- Maintains homeostasis.
- Regulates hunger, thirst, sleep, emotions, and body temperature.

27. Which part of the brain connects it with the spinal cord?

Answer:
Medulla oblongata.

28. Which part of the brain helps in the interpretation of sensory information?

Answer:
Cerebrum (forebrain).

29.. Explain the role of the pons.

Answer:
The ponshelpsi
            ncontrollinginvoluntaryactionssuchasrespiration.

30.Differentiate between cerebrum and cerebellum.

Answer:		
Feature	Cerebrum	Cerebellum
Size	Largest part	Smaller, belowcerebrum
Function	Intelligence, memory, voluntary actions	Balance, posture, coordination of movements