

# CHAPTER 6

# EVOLUTION

VEDA  
ACADEMY

CLASS 12<sup>TH</sup>

## NCERT EXERCISE AND SOLUTIONS - BIOLOGY

**Q. 1.** Explain antibiotic resistance observed in bacteria in light of Darwinian selection theory.

**ANSWER:-**

Darwin's selection theory suggests that individuals with advantageous variations are better adapted to their environment than those with less favourable traits.

Nature selects individuals possessing useful variations, enabling them to survive and reproduce more effectively in their surroundings.

A clear example of this is antibiotic resistance in bacteria: When a bacterial population is exposed to an agar plate containing the antibiotic penicillin, colonies sensitive to penicillin perish, while a few resistant colonies survive. This resistance arises from random mutations that lead to the development of a gene conferring resistance to the drug. Consequently, the resistant bacteria reproduce rapidly compared to the sensitive bacteria, increasing their population. Thus, the competitive advantage of certain individuals aids them in the struggle for existence.

**Q. 2.** Find out from newspapers and popular science articles any new fossil discoveries or controversies about evolution.

**ANSWER:-**

Dinosaur fossils have provided insights into the evolution of reptiles during the Jurassic period, shedding light on the subsequent evolution of other animals like birds and mammals. However, two remarkable fossils recently discovered in China have sparked debate about the origin of birds. One such genus is *Confuciusornis*, a primitive bird species from the Cretaceous period in China, roughly the size of a crow.

**Q. 3.** Attempt giving a clear definition of the term species.

**ANSWER:-**

A species is defined as a group of organisms capable of interbreeding to produce fertile offspring.



**Q. 4. Try to trace the various components of human evolution (hint: brain size and function, skeletal structure, dietary preference, etc.)**

**ANSWER:-**

S. no.	Species Name	Cranial Capacity	Physical Characteristics	Diet type	Additional preference
1.	<i>Dryopithecus</i>	-	Knuckle walker, walked similar to gorillas and chimpanzees (was more ape-like)	Soft fruit and leaves	Canines large, arms and legs are of equal size
2.	<i>Ramapithecus</i>	-	Semi-erect (more manlike)	Seeds, nuts	Canines were small while molars were large.
3.	<i>Australopithecus</i>	450 cm <sup>3</sup>	Fully erect posture, height (1.05 m)	Herbivorous (ate fruits)	Hunted with stone weapons, lived at trees, canines and incisors were small
4.	<i>Homo habilis</i>	735 cm <sup>3</sup>	Fully erect posture, height (1.5 m)	Carnivorous	Canines were small. They were first tool makers.
5.	<i>Homo erectus</i>	800-1100 cm <sup>3</sup>	Fully erect posture, height (1.5-1.8 m)	Omnivorous	They used stone and bone tools for hunting games.
6.	<i>Homo neanderthalensis</i>	1300-1100 cm <sup>3</sup>	Fully erect posture, height (1.5-1.66 m)	Omnivorous	Cave dwellers, used hides to protect their bodies, and buried their dead
7.	<i>Homo sapiens fossilis</i>	1650 cm <sup>3</sup>	Fully erect posture with height (1.8 m)	Omnivorous	They had strong jaw with teeth close together. They were cave dwellers, made paintings and carvings in the caves. They developed a culture and were called first modern men.
8.	<i>Homo sapiens sapiens</i>	1200-1600 cm <sup>3</sup>	Fully erect posture, height (1.5-1.8 m)	Omnivorous	They are the living modern men, with high intelligence. They developed art, culture, language, speech, etc. They cultivated crops and domesticated animals

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**Q. 5. Find out through internet and popular science articles whether animals other than man has self-consciousness.**

**ANSWER:-**

Many animals besides humans display self-consciousness. For instance, dolphins are known for their high intelligence and self-awareness. They can recognize themselves and others, and they communicate using whistles, tail-slapping, and various body movements. Alongside dolphins, other animals such as crows, parrots, chimpanzees, gorillas, and orangutans also exhibit self-consciousness.



- Q. 6.** List 10 modern-day animals and using the internet resources link it to a corresponding ancient fossil. Name both.

**ANSWER:-**

S. no.	Animal	Fossil
1.	Man	<i>Ramapithecus</i>
2.	Horse	<i>Eohippus</i>
3.	Dog	<i>Leptocyon</i>
4.	Camel	<i>Protylopus</i>
5.	Elephant	<i>Moerithers</i>
6.	Whale	<i>Protocetus</i>
7.	Fish	<i>Arandaspis</i>
8.	Tetrapods	<i>Ichthyostega</i>
9.	Bat	<i>Archaeonycteris</i>
10.	Giraffe	<i>Palaeotragus</i>

- Q. 7.** Practise drawing various animals and plants.

**ANSWER:-**

Seek suggestions from your teachers and parents for the names of various plants and animals to practice drawing. You can also refer to your book to find additional names of plants and animals.

- Q. 8.** Describe one example of adaptive radiation.

**ANSWER:-**

Adaptive radiation refers to an evolutionary process in which a single lineage rapidly diversifies, giving rise to new species. This process is driven by natural selection. A classic example is Darwin's finches on the Galapagos Islands.

These finches originated from a single ancestral species that likely arrived on the islands by chance. Over time, they evolved, diversified, and adapted to different habitats. The finches developed varied feeding habits and specialized beak types suited to their diets.

For instance, insectivorous, blood-sucking, and other species with unique dietary adaptations all evolved from an ancestral seed-eating finch.

- Q. 9.** Can we call human evolution as adaptive radiation?

**ANSWER:-**

No, human evolution cannot be classified as adaptive radiation. Adaptive radiation refers to the rapid diversification of a single lineage into multiple new species, which is not observed in human evolution. Instead, human evolution is a gradual process that occurred over an extended period and serves as an example of anagenesis.



**Q. 10.** Using various resources such as your school Library or the internet and discussions with your teacher, trace the evolutionary stages of any one animal, say horse.

**ANSWER:-**

The evolution of the horse began with *Eohippus* during the Eocene period and progressed through the following stages:

- Gradual increase in body size
- Elongation of the head and neck regions
- Extension of limb and foot length
- Progressive reduction of lateral digits
- Enlargement of the third functional toe
- Strengthening of the back
- Enhanced development of the brain and sensory organs
- Increased complexity of teeth, adapted for grazing on grass

This sequence illustrates the evolutionary journey of the horse.

