NCERT Class 12 Biology Exercise Solutions

Chapter 6 – Evolution

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

Ans: According to Darwin's observation, the environment selects organisms with favourable variations, and these organisms are able to survive. When a population of bacteria is attacked by a particular antibiotic, the sensitive bacteria tend to perish, while other bacteria with favourable mutations become resistant even in the presence of antibiotics and survive, thrive and multiply rapidly when the other competing bacteria have died out. The number of bacteria therefore increases. In addition, they transfer these genes that make bacteria resistant to other bacteria. As a result, the antibiotic- resistant bacteria spread widely so that the entire population becomes antibiotic-resistant.

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

Ans: The discovery of dinosaur fossils has brought some interesting revelations. It sheds light on the evolution of reptiles in the Jurassic era. This revelation led to the discovery of the evolution of other animals, such as mammals and birds. Two unknown fossils recently unearthed in China led to a controversy over the evolution of birds. One of these genera of primitive birds was Confuciusornis. These were crow-sized and lived in China during the Cretaceous period.

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

Ans: A species is a group or population of individuals that have the potential to interbreed and produce fertile offspring in the long term.

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

Ans: Human evolution can be based on different components, namely:

- Size of the brain
- Posture
- Eating habits/dietary preferences
- Traits/characteristics

The following table illustrates this:

Human evolution stages	Size of the brain	Body posture	Food preferences	Features
Dryopithecus africans	–	Knuckle-walking, ape-like walk	Leaves and tender fruits	Equal-sized arms and legs, large canines
Ramapethicus	–	Semi-erect posture	Nuts and seeds	Large molars, small canines
Australopithecus africanus	450 cm^3	Completely erect posture, around 1.05m tall	Fruits (herbivorous)	Inhabited trees, stone weapons for hunting, incisors & canines are smaller
Homo habilis	735cm^3	Completely erect posture, around 1.5m tall	Carnivorous	Small canines, first to make tools
Homo erectus	800 cm^3 to 1100 cm^3	Completely erect posture, around 1.5m – 1.8m tall	Omnivorous	For hunting, used bone and stone tools
Homo neanderthalnsis	1300 cm^3 to 1600 cm^3	Completely erect posture, around 1.5m – 1.66m tall	Omnivorous	Inhabited caves, buried their deads, hid their bodies for protection
Homo sapiens fossils	1650 cm^3	Completely erect posture, 1.8m	Omnivorous	Possessed strong jaw with teeth closely placed, inhabited caves, and made carvings and paintings in caves. Developed a culture and were referred to as the first modern men
Homo sapiens sapiens	1200 $cm^3$to 1600 cm^3	Completely erect posture, around 1.5m – 1.8m tall	Omnivorous	Possess a high intelligence quotient, referred to as the living modern man. Developed language, speech, culture, art, and language. Cultivation of crops and domestication of animals observed.

5. Find out through the internet and popular science articles whether animals other than man have self-consciousness.

Ans: In addition to humans, there are many other animals that possess self-awareness. One such example is the dolphin. They are thought to have a high level of intelligence. They also have a sense of self and can identify with others. They whistle, flap their tails and make body movements to communicate with each other. Some other animals that have self-awareness are parrots, crows, gorillas, orangutans, chimpanzees, etc.

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

Ans: Following are the 10 modern-day animals corresponding to ancient fossil:

Name of the animal	**Name of the fossil**
Man	Ramapithecus
Horse	Eohippus
Elephant	Moerithers
Whale	Protocetus
Dog	Leptocyon
Giraffe	Palaeotragus
Fish	Arandaspis
Camel	Protylopus
Tetrapods	Icthyospega
Bat	Archaeonycteris

7. Practise drawing various animals and plants.

Ans: Find out the names of different plants and animals from seniors and teachers. Read different scientific books, journals and encyclopedias to get an idea of the different plant and animal species. To find out more details, the internet is the best choice. There is a huge selection of plants and animals from which you can pick the easiest ones to start with. Try tracing the outline first and then fill in the details.

8. Describe one example of adaptive radiation.

Ans: When the members of a single group or lineage evolve into a series of different forms, this is adaptive radiation. These are the forms that are determined by natural selection and the use of resources or habitats. The Darwin's finches on the Galapagos Islands had common ancestors, while today we have different types of modified beaks based on their food preferences. To accommodate their feeding habits, these finches have adopted different food preferences and different beak types. From a single seed-eating

finch ancestor, different species of finches with different feeding habits have evolved, such as blood-sucking, insectivorous creatures, etc.

9. Can we call human evolution as adaptive radiation?

Ans: Human evolution can be described as adaptive radiation, because adaptive radiation is an evolutionary process in which new species arise from a single common ancestor. In the case of human evolution, although we humans have a common ancestor, we have experienced eventual but progressive change in food preferences, body structure, etc. Human evolution does not involve diversification and radiation into different species, which is indeed a characteristic feature of adaptive radiation.

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.

Solution:

During the Eocene, the evolution of the horse began with Eohippus and included the following evolutionary phases:

Eohippus → Mesohippus →Merychippus → Pliohippus → Equus

The following evolutionary features have been observed:

- Increase in body size
- Elongated neck
- Enlargement of the third finger
- Improved structural nature of the teeth to feed on grass
- Widening of the limbs
- Possible decrease in lateral toes
- Strengthened back
- Development of the sensory organs and the brain