NCERT SOLUTIONS

CLASS - 12th



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Class : 12th
Subject : Biology
Chapter : 7
Chapter Name : Evolution

Q1 Explain antibiotic resistance observed in bacteria in light of Darwinian selection theory.

Answer. Darwinian selection theory states that individuals with favourable variations are better adapted than individuals with less favourable variation. It means that nature selects the individuals with useful variation as these individuals are better evolved to survive in the existing environment. An example of such selection is antibiotic resistance in bacteria. When bacterial population was grown on an agar plate containing antibiotic penicillin, the colonies that were sensitive to penicillin died, whereas one or few bacterial colonies that were resistant to penicillin survived. This is because these bacteria had undergone chance mutation, which resulted in the evolution of a gene that made them resistant to penicillin drug. Hence, the resistant bacteria quickly as compared to non- resistant (sensitive) bacteria, thereby increasing their number. Hence, the advantage of an individual over other helps in the struggle for existence.

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Q2 Find out from newspapers and popular science articles any new fossil discoveries or controversies about evolution.

Answer. Fossils of dinosaurs have revealed the evolution of reptiles in Jurassic period. As a result of this, evolution of other animals such as birds and mammals has also been discovered. However, two unusual fossils recently unearthed in China have ignited a controversy over the evolution of birds.Confuciusornis is one such genus of primitive birds that were crow sized and lived during the Cretaceous period in China.

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Q3 Attempt giving a clear definition of the term species

Answer. Species can be defined as a group of organisms, which have the capability to interbreed in order to produce fertile offspring.

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Q4 Try to trace the various components of human evolution (hint: brain size and function, skeletal structure, dietary preference, etc.)

Answer. The various components of human evolution are as follows.
(i) Brain capacity
(ii) Posture
(iii) Food I dietary preference and other important features

	Name	Brain capacity	Posture	Food	Features
1.	*Dryopithecus africans*	---	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.	*Ramapithecus*	---	Semi-erect (more man-like)	Seeds, nuts	Canines were small while molars were

3.	*Australopithecus africanus*	450 cm^3	Full erect posture, height (1.05 m)	Herbivorous (ate fruits)	Hunted with stone weapons, lived at trees, canines and incisors were small
4.	*Homo habilis*	735cm^3	Fully erect posture, height (1.5 m)	Carnivorous	Canines were small. They were first tool makers.
5.	*Homo erectus*	800-1100 cm^3	Fully erect posture, height(1.5-1.8 m)	Omnivorous	They used stone and bone tools for hunting games.
6.	*Homo neandertha lnsis*	1300-1600 cm^3	Fully erect posture, height (1.5-1.66 m)	Omnivorous	Cave dwellers, used hides to protect their bodies, and buried their dead

7.	*Homo sapiens fossilis*	1650 cm^3	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.	*Homo sapiens sapiens*	1200-1600 cm^3	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.

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Q5 Find out through internet and popular science articles whether animals other than man have self-consciousness.

Answer. There are many animals other than humans, which have self consciousness. An example of an animal being self conscious is dolphins. They are highly intelligent. They have a sense of self and they also recognize others among themselves and others. They communicate with each other by whistles, tail-slapping, and other body movements. Not only dolphins, there are certain other animals such as crow, parrot, chimpanzee, gorilla, orangutan, etc., which exhibit self-consciousness.

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Q6 List 10 modern-day animals and using the internet resources link it to a corresponding ancient fossil. Name both.

Answer. The modern day animals and their ancient fossils are listed in the following table.

Animal		Fossil
1.	Man	*Ramapithecus*
2.	Horse	*Eohippus*
3.	Dog	*Leptocyon*
4.	Camel	*Protylopus*
5.	Elephant	*Moerithers*
6.	Whale	*Protocetus*
7.	Fish	*Arandaspis*
8.	Tetrapods	*Icthyostega*
9.	Bat	*Archaeonycteris*
10.	Giraffe	*Palaeotragus*

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Q7 Practise drawing various animals and plants.

Answer. Ask your teachers and parents to suggest the names of plants and animals and practice drawing them. You can also take help from your book to find the names of plants and animals.

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Q8 Describe one example of adaptive radiation.

Answer. Adaptive radiation is an evolutionary process that produces new species from a single, rapidly diversifying lineage. This process occurs due to natural selection. An example of adaptive radiation is Darwin finches, found in Galapagos Island. A large variety of finches is present in Galapagos Island that arose from a single species, which reached this land accidentally. As a result, many new species have evolved, diverged, and adapted to occupy new habitats. These finches have developed different eating habits and different types of beaks to suit their feeding

habits. The insectivorous, blood sucking, and other species of finches with varied dietary habits have evolved from a single seed eating finch ancestor.

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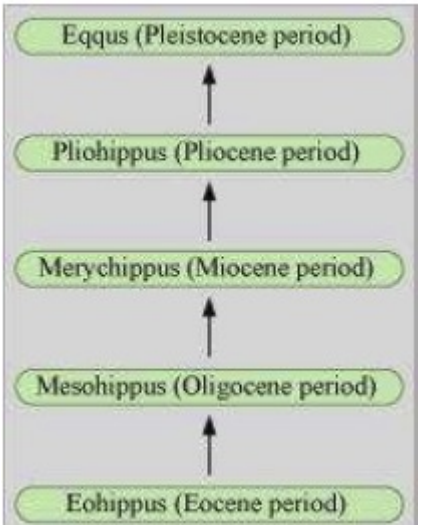
Q9 Can we call human evolution as adaptive radiation?

Answer. No, human evolution cannot be called adaptive radiation. This is because adaptive radiation is an evolutionary process that produces new species from a single, rapidly diversifying lineage, which is not the case with human evolution. Human evolution is a gradual process that took place slowly in time. It represents an example of anagenesis.

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Q10 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 horse started with Eohippus during Eocene period.
following evolutionary stages.
(i) Gradual increase in body size
(ii) Elongation of head and neck region
(iii) Increase in the length of limbs and feet
(iv) Gradual reduction of lateral digits
(v) Enlargement of third functional toe
(vi) Strengthening of the back
(vii) Development of brain and sensory organs
(viii) Increase in the complexity of teeth for feeding on grass
The evolution of horse is represented as It involved the



(i) Eohippus : It had a short head and neck. It had four functional toes and a splint of 1 and 5 on each hind limb and a splint of 1 and 3 in each forelimb. The molars were short crowned that were adapted for grinding the plant diet.

(ii) Mesohippus: It was slightly taller than Eohippus. It had three toes in each foot.

(iii) Merychippus : It had the size of approximately 100 cm. Although it still had three toes in each foot, but it could run on one toe. The side toe did not touch the ground. The molars were adapted for chewing the grass.

(iv) Pliohippus : It resembled the modern horse and was around 108 cm tall. It had a single functional toe with splint of 2nd and 4th in each limb.

(v) Equus : Pliohippus gave rise to Equus or the modern horse with one toe in each foot. They have incisors for cutting grass and molars for grinding food.

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