

## Class 10 Heredity and Evolution Solved Question Test paper-6

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### 1. Q. What are fossils? Of what interest are fossils to the evolutionary biologist?

Sol. A fossil is the remnant or impressions of an organism that lives in the remote past e.g. Archaeopteryx.

Use of fossils:

- (i) The fossil record has helped in building the broad historical sequence of biological evolution.
- (ii) Phylogeny, the evolutionary history can be reconstructed from fossils.
- (iii) The habits, habitat and behavior of extinct organism can be inferred from well preserved fossils.

### 2. Q. Name the two laws of inheritance postulated by Mendel?

Sol. (a) The Law of Segregation (b) The law of Independent Assortment

### 3.Q. How are fossils formed?

Sol. Fossils are formed layer by layer in the earth's crust.

- (i) 100 millions ago invertebrates that were dead on the sea bed were buried in the sand and with time more sands accumulated and sandstones are formed.

After million years, the dinosaurs living in the area die and get buried in mud which are compressed into rocks above the earlier invertebrate fossils.

But much later, due to erosion, the water flow wears some of the rocks and the horse – like fossils are exposed and as we dig into deeper layers the older fossils are found.

### 4. Q. Explain with an example. How evolutionary relationship linked to classification?

Sol. Evolutionary relationship is linked with classification in the following ways:

The more common characteristics two species have, the more closely they are related.

The closer the species are, the more nearer they have a common ancestor.

For example, a brother and a sister are closely related and they have a common ancestor, their parents in the first generation.

A girl and her first cousin are closely related but less related than her brother. The cousins have a common ancestor, their grandparents in the second generation. Thus, evolutionary relationships are traced in the classification of organisms.

### 5. Q. What are homologous organs? How do they provide evidence in support of evolution?

Sol. **homologous organs** are those organs which have the same basic structural design and developmental origin but have different functions and appearance.

Example: The forelimb of a frog, a lizard, a bird and a man seem to be built from the same basic design of bones, but they perform different functions.

**6. Q. Explain how a new species is generated.**

Sol. When a population of a species splits into two, it cannot reproduce with each other and then a new species is generated. For example:

- A huge population of beetles fed on bushes spread a wide mountain range.
- Individual beetles however feed on nearby bushes.
- There is sub – population of beetles in a neighborhood and reproduction takes place within the sub-population. Occasionally a migrant beetle enters a different sub – population and reproduces with them, thus genes of the migrant beetle enter a different sub-population and recombine with them, thus genes of the migrant beetle enter in a new population.
- Change due to genetic drift and natural selection will result in isolation of two sub – population which becomes more and more different from each other.
- Ultimately these two groups will be incapable of reproducing with each other and two generations of beetles are being generated.

**7. Q. How are variant genotypes produced?**

Sol. Variant genotypes can be produced by: -

1. Mutation in genes and chromosomes
2. Recombination of genes
3. Hybridization of genes.

**8. Q. Name any three organs homologous to human hand. Why are they considered homologous?**

Sol. The three organs homologous to human hand are whale's flipper, bat's wing and cat's paw. They are considered homologous because they have a similar plan and contain approximately the same number of bones. The pattern of their embryonic development is also similar hence they are called homologous organs.

**9. Q. Who was Mendel? Why was he called the "Father of Genetics"?**

Sol. Gregor Johann Mendel (1822 - 1884) was an Austrian geneticist.

He lives as a monk from 1843. He sowed the garden pea (*Pisum sativum*) and found flowers of different colours. He formulated the law of heredity by his experiments. His laws gave the base for further study of genetics. Therefore he was called the “Father of Genetics”

**10. Q. (a) The gene type of green stemmed tomato plants is denoted as GG and that of purple stemmed tomato plants as gg when these two are crossed.**

- (i) What colour of stem would you expect in  $F_1$  progeny?
  - (ii) Give the percentage of purple stemmed plants if  $F_1$  are self-pollinated.
  - (iii) In what ratio would you find the gene type GG and Gg in the  $F_2$  progeny?
- (b) The human hand, cat paw and horse foot when studied in detail show the same structure of bones and point to towards a common origin.
- (i) What do you conclude from this?
  - (ii) What is the term given to such structures?

Sol. (a) (i) Colour of  $F_1$  progeny – Green

(ii) Percentage of purple stemmed plants in  $F_2$  generation  $\frac{1}{4}$  or 25%

(iii) Ratio of genotypes GG and Gg 1 : 2

(b) They have common ancestry (i) Homologous organs

**11. Q. If we cross pure-bred tall (dominant) pea plant with pure-bred dwarf (recessive) pea plant we will get pea plants of  $F_1$  generation. If we now self-cross the pea plant of  $F_1$  generation, then we obtain pea plants of  $F_2$  generation.**

**(a) What do the plants of  $F_1$  generation look like ?**

**(b) State the ratio of tall plants to dwarf plants in  $F_2$  generation.**

(c) State the type of plants not found in  $F_1$  generation but appeared in  $F_2$  generation, mentioning the reason for the same.

Ans. (a) Like pure-bred pea plant.                      **(b) 3 Tall: 1 Dwarf.**

(c) Pure dwarf as in  $F_2$  generation segregation takes place.

**12. Q. List in tabular form two distinguishing features between acquired traits and inherited traits**

Ans: Acquired traits

(i) A trait of an organism which is not inherited but develops in response to the environment is called an acquired trait.

(ii) The acquired traits of an organism cannot be passed on to the future generation.

Inherited traits

(i) A trait of an organism which is caused by a change in its gene is called an inherited trait.

(ii) Inherited traits can be transmitted to future generations because the changes have occurred in the genes.

**13. Q. How are fossils formed ? Describe, in brief, two methods of determining the age of , fossils.**

Ans. When organisms (plants or animals) die, their bodies will decompose by the action of micro-organisms in the presence of oxygen, moisture, etc.

Sometimes in the lack of such conditions (oxygen, moisture, etc.), their body does not decompose completely and is preserved as fossil with the passage of time in the rocks.

In many cases the soft parts of the organism get decomposed and hard parts (like bones etc.) become fossil. Sometimes even the soft parts (like leaf etc.) remain preserved as fossils in the form of their impressions inside the rocks.

Methods to determine the age of fossils:

(i) The fossils which we find in layers closer to the surface of the earth are more recent; the fossils which are found in deeper layers are older.

(ii) Fossils were once living objects and all living objects contain some carbon-14 atoms which are radioactive.

When a living object dies and forms fossil, its carbon-14 radioactivity goes on decreasing gradually.

The age of the fossil is found by comparing the carbon-14 radioactivity left in the fossil with the carbon-14 radioactivity present in the living objects today.