

## CBSE Test Paper 02

### Ch-7 Evolution

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1. Assertion: The earliest organisms that appeared on the earth were non-green and presumably anaerobes.  
Reason: The first autotrophic organisms were the chemo-autotrophs that never released oxygen.
  - a. Both Assertion and Reason are true and the Reason is not the correct explanation of the Assertion
  - b. Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion
  - c. Assertion is true statement but Reason is false
  - d. Both Assertion and Reason are false statements
2. Genetic drift is found in
  - a. Animal population
  - b. Large population with random mating
  - c. Plant population
  - d. Small population with or without mutated genes
3. Which of the following is not a factor that affects Hardy-Weinberg equilibrium?
  - a. Migration
  - b. Mutation
  - c. Vegetative propagation
  - d. Genetic drift
4. The idea of Natural selection as the fundamental process of evolutionary changes was reached
  - a. Independently by Charles Darwin and Alfred Russell Wallace in 1859
  - b. Independently by Charles Darwin and Alfred Russell Wallace in 1900
  - c. By Alfred Russell Wallace in 1901
  - d. By Charles Darwin in 1866
5. Founder effect is the
  - a. Small change in the allele frequency to become different species.
  - b. Large scale change in allele frequency to become different species.
  - c. Stabilization of gene of a population

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d. Foundation of plants

6. What do you mean by parallel evolution?
7. Describe one example of adaptive radiation.
8. Which theory is also referred as chemical theory or naturalistic theory?
9. Mention the type of evolution that has brought the similarity as seen in potato tuber and sweet potato.
10. State the significance of the study of fossils in evolution.
11. If the theory of natural selection is the survival of the fittest, and the fittest are identified as those who survive, why isn't it regarded as a tautology (a statement that is true only because of the meaning of the terms)?
12. What is divergent evolution? Explain by taking examples of plants.



- i. Write your observation on the variations seen in Darwin's finches shown above.
  - ii. How did Darwin explain the existence of different varieties of finches on the Galapagos Islands?
14. (a) How does the Hardy-Weinberg's expression  $p^2 + 2pq + q^2 = 1$  explain that genetic equilibrium is maintained in a population?  
(b) List any two factors that can disturb the genetic equilibrium.
15. (a) How did Hardy-Weinberg explain that allelic frequencies in a population are stable and are constant from generation to generation?  
(b) Why does genetic equilibrium get disturbed in a population? Give reasons.

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#### Answer

1. a. Both Assertion and Reason are true and the Reason is not the correct explanation of the Assertion  
**Explanation:** Primitive earth was devoid of oxygen so, only those organisms that were able to survive within anaerobic conditions developed. All these were heterotrophic organisms (taking nutrients from outside). Then after autotrophic organisms were developed that used inorganic sources such as  $H_2S$ ,  $NH_3$ ,  $CH_4$  as the principle sources of energy. These organisms are called chemo-autotrophs.
2. d. Small population with or without mutated genes, **Explanation:** Genetic drift is found in small population with or without mutated genes. Loss of some member of species having small population leads to decrease in variation called genetic drift.
3. c. Vegetative propagation, **Explanation:** Hardy-Weinberg equilibrium cannot be disturbed by vegetative propagation as the all new offspring are clone of each other having same gene. Migration, genetic drift, mutation and natural selection affect the equilibrium of alleles in a population.
4. a. Independently by Charles Darwin and Alfred Russell Wallace in 1859  
**Explanation:** The idea of natural selection for evolutionary changes was independently concluded by Charles Darwin and Alfred Russell in 1859 in separate investigation. Natural selection is the base of evolution as naturally selected traits remain in organism.
5. b. Large scale change in allele frequency to become different species.  
**Explanation:** The founder effect is the loss of genetic variation that occurs when a new population is established by a very small number of individuals from a larger population.  
Sometimes the change in frequency is so different in the new sample of population that they become a different species. The original drifted population becomes founders.

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6. Parallel evolution is the independent evolution of similar traits, starting from a similar ancestral condition. Frequently this is the situation in more closely related lineages, where several species respond to similar challenges in a similar way.
  7. Darwin's finches of Galapago island exhibiting a variety of beaks.
  8. Oparin Haldane theory.
  9. Convergent evolution.
  10. The fossils support organic evolution. Study of fossils in different sedimentary layers indicates the geological period in which they exist.
    - The fossil records have helped in building the broad historical sequence of biological evolution.
  11. The effect of traits on the fitness of an organism can be assessed independently of whether the organism indeed survives. There may be some statements in science that are useful even if they are not falsifiable or refutable in principle. The theory of natural selection is the survival of the fittest and the fittest are identified as those who survive but the effect of traits on the fitness of an organism can be assessed independent to others, although statements are true but refutable in principle.
  12. The same structure developed along different directions due to adaptations to different needs. This is divergent evolution and these structures are homologous. For e.g. thorn of Bougainvillea and tendrils of Cucurbita represents homology.
  13.
    - i. The Darwin's finches show a variety of beaks, which is an adaptation to different food habits.
    - ii. Darwin explained that all the varieties evolved on the island itself.
      - From the original seed-eating birds, many other forms with altered beaks arose some of them became insectivorous while some remained the vegetarian finches.
      - Such a process of evolution of different species in a given geographical area, starting from a point and literally radiating to other habitats, is called an adaptive radiation.
  14. (a) This principle states that allele frequencies in a population are stable and constant from generation to generation. In the expression  $p$  and  $q$  represent the frequency of

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allele A and allele a. The frequency of AA in a population is  $p^2$ , of aa is  $q^2$  and of Aa is  $2pq$ . Hence  $p^2 + 2pq + q^2 = 1$ , where  $p^2$  represents the frequency of the homozygous dominant genotype (AA),  $2pq$  represents the frequency of the heterozygous genotype (Aa) and  $q^2$  represents the frequency of homozygous recessive genotype (aa). Sum total of all the allelic frequencies is 1.

(b) The factors which can disturb the genetic equilibrium are -

(i) Genetic drift (ii) Mutation

15. (a) The sum total of allelic frequencies in a stable population is one - Individual frequencies of alleles A and a can be taken as p and q, i.e. the frequencies of AA in the population is  $p^2$  of aa is  $q^2$  and that of Aa is  $2pq$ . - Hence  $p^2 + 2pq + q^2 = 1$  - When the frequency actually measured differs from the expected values, the difference indicates the extent of evolutionary change.

(b) Genetic equilibrium is disturbed by following factors -

(i) Gene migration

(ii) Genetic drift,

(iii) Mutation

(iv) Gene recombination during gamete formation.