DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : BIOLOGY
DPP No. : 1

Topic :- Evolution

1 **(a)**
Genetic drift is an evolutionary force operating in small populations. It is responsible for fixing in population of neutral characteristics.

2 **(b)**
Mutation is more common when it is present in **dominant condition**. The reason is that the dominant mutant gene can express in both homozygous and heterozygous conditions.

3 **(d)**
Von Bear's law The development of an organism proceeds from the general to the special forms and the embryos belonging to various classes closely resemble one another in their earlier stages but diverge more and more as development proceeds. He formulated Baer's laws of embryology
(i) General characteristics of the group to which an embryo belongs, develops before the special characteristics
(ii) General structural relations are likewise formed before the most specific relations appear
(iii) The form of any given embryo does not converge upon other definite forms but, on the contrary, separates itself from them
(iv) Fundamentally, the embryo of a higher animal form never resembles the adult of another animal form

4 **(b)**
Charles Darwin (1809-1882) tried to suggest the physical basis of heredity by pangenesis theory and suggested that every cell of the body contributes gemmules to the germ cells and so shares in the transmission of inherited characters.

5 **(a)**
The synthetic theory of evolution is the result of the work of a number of scientist namely T Dobzhansky, RA Fisher, JBS Haldane, Sewall Wright, Ernst Mayer.
Homology is also seen amongst the molecules. This is called molecular. For example, the proteins found in the blood of man and ape are similar. The phylogeny of an organism can be traced by using the base sequence in nucleic acids and the amino acid sequence of the proteins in related organisms

6 **(c)**
Lichen are very sensitive to the air pollution specially to the sulphur dioxide. Lichen are the symbiotic association of algae and fungi. Generally, lichens are not found in the industrial areas

7 **(b)**
Lamarckian theory is also known as theory of inheritance of acquried characters or theory of use

and disuse of organs. This theory can not explain the reason of weak muscles in the son of a wrestler.

8 **(a)**
The correct order of the poriods of Palaeozoic era in ancending order in a geological time scale is —

Cambrian –Ordovician –Silurian –Devonian –Carboniferous -Permian

9 **(c)**
Distantly related animals (as whale, seal and shark) inhabiting similar habitats often develop similar morphological features that make them look similar. This is termed as **adaptive convergence** or **convergent evolution**. Dogfish (pisces) and whale (mammals) have acquried aquatic character though distantly related.

10 **(a)**
Plants were the first who invaded land. They prominanted modern era

11 **(d)**
$p^2 + 2pq + q^2 = 1$
Hardy-Weinberg Principle
It was proposed by GH Hardy an English mathematician and W Weinberg a German physician independently in 1908
(i) It describes a theoretical situation in which a population is undergoing no evolutionary change. This is called genetic or Hardy-Weinberg equilibrium
(ii) It can be expressed as $p^2 + 2pq + q^2 = 1$ or $(p + q)^2 = 1$
(iii) Evolution occurs when the genetic equilibrium is up set (evolution is a departure from Hardy-Weinberg equilibrium principle)
The sum of total of Allelic frequency $(p + q) is = 1$
$p^2 + 2pq + q^2$ or $(p + q)^2$
Where, $p^2 =$ % homozygous dominant individuals
$p =$ frequency of dominant allele
$q^2 =$ % homozygous recessive individuals
$q =$ frequency of recessive allele
$2pq =$ % heterozygous individuals
Realize that $(p + q)^2 = 1$ (three are only 2 alleles)
$p^2 + 2pq + q^2 = 1$ (these are the only genotypes)
Example An investigator has determined by the inspection that 16% of a human population has a recessive trait. Using this information, we can calculate all the genotypes and allele frequencies for the population, provided the conditions for Hardy-Weinberg equilibrium are met
Given $q^2 = 16\% = 0.16$ are homozygous recessive individuals
Therefore,
$q = \sqrt{0.16} = 0.4 =$ frequency of recessive allele
$p = 1.0 - 0.4 = 0.6 =$ frequency of dominant allele
$p^2 = 0.6 \times 0.6 = 0.36$ or 36% are homozygous dominant individuals
$2pq = 2 \times 0.6 \times 0.4 = 0.48 = 48\%$ are heterozygous individuals
Or $= 1.00 - 0.52$

$= 0.48$

Thus, 84% (36+48) have the dominant phenotype

12 **(b)**

Divergent evolution.

Divergent evolution is the accumulation of differences between groups which can lead to the formation of new species. Usually, it is a result of diffusion of the same species to different and isolated environments which blocks the gene flow among the distinct populations allowing differentiated fixation of characteristics through genetic drift and natural selection

Primarily diffusion is the basis of molecular division which can be seen in some higher-level characters of the structure and function that are readily observable in organisms. For example, the vertebrate limb is one example of divergent evolution. The limb in many different species has a common origin, but has diverged somewhat in overall structure and function

13 **(a)**

Speciation is an evolutionary process by which new biological species arises.

There are five types of speciation : allopatric, peripatric, parapatric, and sympatric and artificial

(i) **Allopatric Speciation** It occurs when a species separates into two separate groups which are isolated from one another. A physical barrier, such as a mountain range or a waterway, makes it impossible to breed with one another. Each species develops differently, based on the demands of their unique habitat or the genetic characteristics of the group that are passed on to offspring

(ii) **Peripatric Speciation** When small groups of individuals break off from the larger groups and forms new species, this is called peripatric speciation. As in allopatric speciation, physical barriers make it impossible for numbers of groups to interbreed with one another, the main difference between allopatic speciation and peripatric speciation is that in peripatric speciation, one group is much smaller than the other

(iii) **Parapatric Speciation** A species is spread over a large geographic area. Although it is possible for any member of the species to mate with another member, individuals only mate with those in their own geographic region

(iv) **Sympatric Speciation** Some scientists don't believes that this form exists. Sympatric speciation occurs when there are no physical barriers preventing any member of a species from mating with another and all members are in close proximity to one another.

A new species, perhaps based on a different food source of characteristics, seems to develop. The theory is that some individuals becomes dependent on certain aspects of an environment-such as shelter or food sources, while others do not

(v) **Artificial Speciation** Is the creation of new species by people. This is achieved through lab experiments, where scientists mostly research insects like fruit files, and in animal husbandry. Animal husbandry is the care and breeding of livestock (animals). Many agricultural products, such as dairy, meat and wool, depends on animal husbandry

14 **(b)**

Homo habilis; (*homo* = human; *habilis* = able) 2-1.5 mya. Brain of *Homo habilis* was one half the size of a modern human. They were more sophisticated with rudimentary speech

15 **(b)**

Darwin's finches refers to a type of birds present on Galapagos islands.

16 **(c)**

Electrons Spin Resonance (ESR) measures number of charges occupying deep traps in crystal band gap. The basic principle of ESR is same as those for luminescene, *i.e.*, electorns become trapped and stored as a result of ionising radiations, *e.g.*, dating of tooth enamel.

17 **(b)**

Vestigial organs are incompletely developed, *i.e.*, rudimentary and generally non-functional organs, *e.g.,* tail vertebrae, nictitating membrane and vermiform appendix are vestigial organs of man.

Nails are not vestigial organs because these are the functional structure.

18 **(b)**

The organisms which are provided with the favourable variations would survive because they are fittest to face their surrounding while unfit organism are destroyed

19 **(a)**

Palaeobotany is the branch of Palaeontolgoy in which we study the fossils of plants. Coal was formed by large pteridophyte in prehistoric time

20 **(d)**

Stabilizing natural selection is a condition in which the conditions of natural selection become static. Due to static conditions, there is no origin of variation. That's way, the genetic diversity decreases in the stabilizing natural selection

ANSWER-KEY										
Q.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A.	**A**	**B**	**D**	**B**	**A**	**C**	**B**	**A**	**C**	**A**
Q.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A.	**D**	**B**	**A**	**B**	**B**	**C**	**B**	**B**	**A**	**D**