

HEREDITY AND EVOLUTION

Gist of the Lesson:

1. Heredity:

Transmission of features or characters from one generation to another or from parents to offspring through their genes

2. Variation:

It occurs due to sexual reproduction, inaccuracies during DNA replicating (mutation) and due to environmental factors.

3. Genetics:

Branch of biology dealing with the study of heredity and variations.

4. Alleles:

A pair of Gene that controls a specific character is called an allele. Eg - T (tallness in pea plant), R (round seeds in pea plant)

5. Gregor Johann Mendel:

(1822-1884): He is known as the father of genetics'. He worked on Garden pea plant (pisum sativum).

6. Genotype:

Genetic composition of an individual, eg - pure tall-TT, hybrid tall-Tt

7. Phenotype:

Visible traits of an individual. Eg - Tallness iir Dwarfness.

8. Evolution:

Slow and continuous changes in traits of organisms from pre existing organisms is called Evolution.

9. Speciation:

It may take place when variations combined with geographical isolation. (Formation of new species)

Two Marks Questions (30 words)

1. What is F_2 generation?

A. The generation produced by the offspring of F_1 generation i.e., first generation as parent is called F_2 or second generation.

2. If YYRR is Round yellow, what do the following represent?

yyrr **yyRR**

A. yyrr - Wrinkled, green seeds
yyRR - Round, green seeds

3. What is micro evolution? Does it explain speciation?

A.

- In micro evolution, the changes are small which occurs in lower categories and change the common characteristics of a particular species.
- It does not properly explain speciation.

4. Sometimes, accidentally a dead body or its parts get buried under depositing sediments and are preserved. These are fossils. How can the estimation of the age of fossils be done?

A. There are two important ways to estimate the age of fossils:

(i) **Carbon dating method:** By finding out the percentage of radioactive carbon in fossils.

(ii) **Relative depth:** The fossil we find closer to the surface are more recent than the fossils we find in deeper layers.

Three Marks Questions (50 words)

1. Evolution is a process in which simple life forms change into complex life forms by gradual changes. But, there is a difference between chemical and organic evolution. Differentiate by giving three points?

A. In chemical reactions, the new substances with different properties are formed from simple basic substances. The chemical reactions are faster and carried out by human.

But in organic evolution, slow, gradual (continuous), irreversible changes takes place over a long period of time in which complex living forms are evolved from simpler ones. It is the process which takes place in living beings, so called organic evolution as the body of all living beings is composed of organic matter.

2. List three main factors responsible for the speciation and briefly describe each one of them?

- A. **(a) Genetic Variations:** The variations which are accumulated generation after generation give rise to a new species over a long period of them.
- (b) Natural Selection:** It is the phenomenon of selection of a particular type of species which has better chances of survival in a particular environment.
- (c) Genetic Drift:** Genetic drift also accumulates different variations in each of the two geographically separated populations and finally gives rise to a new species.

3. Natural selection of traits is different from artificial selection. Differentiate between the two by giving three points?

A.

Natural Selection	Artificial Selection
1. The nature selects the favorable traits for the species in its environment.	1. The process by which the man selects the useful trait to be inherited in next generation.
2. It is natural phenomenon.	2. It is an artificial process.
3. The traits selected for evolution are beneficial to the species.	3. The traits selected are for improvement of species and beneficial to man.
4. It takes place over a long period of time.	4. It takes place in a short period.
	(any three)

4. Homologous organs are different from analogous organs?

(a) Mention the two basic characteristics that decide about analogy and between the two organs

(B) On what basis the classification of organisms into Prokaryotic and Eukaryotic is done?

- A. (a) The basic characteristics are:
 (i) Basic structure, (ii) Embryonic origin, (iii) Functions.

In homologous organs, the first two are similar but third i.e., functions are different while in analogous organs, the first two are different but the third i.e., the function is same.

- (b) Prokaryotic and Eukaryotic organisms are classified on the basis of presence or absence of true nucleus and membrane bound cell organelles in their cells.

Five Marks Questions (70 words)

1. (i) What is meant by the term genetics ?
(ii) Name the plant on which Mendel performed his experiments?
(iii) In Mendel's theory what is meant by the term factors?
(iv) What are genes and where are they located?
- A. (i) Genetics is a branch of biology which deals with the study of heredity and variation
(ii) Garden pea
(iii) Genes
(iv) Genes are a segment of DNA that control characteristic or traits of an individual. Genes are located in chromosomes.
2. Give reasons why acquired characters are not inherited. Explain with the help of example of mice?
- A. The acquired characters are not inherited because they do not bring/cause any change in DNA.
A group of mice was allowed to breed to give rise their progeny. All the members of group have tails. This tail was cut by surgery for several generations, but none of the offspring in successive generation was tailless. It was so because the trait of having no tail (removed by surgery) has not brought any change in the DNA of germ cells of mice and so no tailless mice was produced in next generation.
Other Examples: woman's ear piercing does not produce a girl or boy having ear pierced or a wrestler does not produce his progeny already with developed musculature, etc.
3. (a) Why do we say that homozygous plants produce pure progeny?
(b) Define heterozygous.
(c) Explain how the process of speciation takes place? (Imp.)
- A. (a) The homozygous plants when allowed to self pollinate, thus no variations occur in the DNA. When no variation/no change occur in DNA. The progeny will have same DNA as the parents and hence the same traits as parent

plants. It is called pure progeny i.e. the progeny in which the same trait is repeated generation after generation.

- (b) The state in which both the chromosomes have the genes of different trait e.g., if one chromosome has trait of tallness and its companion chromosome has the gene of dwarfness, the condition is called heterozygous state.
- (c) The process of formation of new species is called speciation. It may take by
 - (i) Gene migration or gene transfer
 - (ii) Genetic Drift
 - (iii) Natural Selection
 - (iv) Reproductive isolation or
 - (v) Variations/Mutations.

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