



ZOOLOGY

Principles of Inheritance and Variation Lecture - 1

Genetics- The branch of biology which deals with study of genes.

“Genetics” word coined by scientist William Bateson from word ‘gene’.

Evolution- It is the process in which gradual changes takes place in organism change from simple to complex form.

Inheritance is the process by which characters are passed on from parent to progeny; Inheritance is the basis of heredity.

Variation is the degree by which progeny differ from their parents.

Variation result due to recombination process during sexual reproduction.

Like begets like phenomenon – Similarity between parents and progeny.

Example : An elephant always gives birth only to a baby elephant. A mango seed forms only a mango plant.

Humans knew from as early as 8000-1000 B.C. that one of the causes of variation was hidden in sexual reproduction.

Gregor Mendel is known as “Father of Genetics”.

Gregor Mendel, conducted hybridisation experiments on garden peas for seven years (1856-1863) and proposed the laws of inheritance in living organisms.

The first time statistical analysis and mathematical logic were applied to problems in biology.

Mendel investigated characters in the garden pea plant that were manifested as two opposing traits, e.g., tall or dwarf plants, yellow or green seeds.

Mendel where he crossed tall and dwarf pea plants to study the inheritance of one gene. He collected the seeds produced as a result of this cross and grew them to generate plants of the first hybrid generation.

Why mendel is considered as “Father of Genetics”?

- (i) Mendel first time proposed concept of “Factor” (Now a days called as gene) for inheritance of characters
- (ii) Mendel proposed laws of inheritance in living organisms on the basis of conclusion of experimental observations
- (iii) He first time applied statistical analysis and mathematical logic to problems in biology.
- (iv) Mendel used *Pisum sativum* as a experimental tool which is easy to grow
- (v) Mendel’s experiment had a large sampling size which gave greater credibility to the data
- (vi) He proposed laws of inheritance even in absence of well developed microscopes.

Why mendel selected *Pisum sativum* (Pea plant) as a experimental tool?

- (i) *Pisum sativum* plant has very short life span of 3-4 month so 3 generation can easily grown in a years
- (ii) *Pisum sativum* plant is suitable for hybridisation as well as self pollination
- (iii) *Pisum sativum* plant shown bisexual flower so easy for hybridization and pure line selected
- (iv) *Pisum sativum* plant shows pair of contrasting characters which are observed by naked eyes.
- (v) *Pisum sativum* plant requires very small space for growth
- (vi) Flowers are suitable for emasculation.

Biology

Single Correct Questions

1. Which of the following is the unit of inheritance ?
(A) Phenotype (B) Genotype (C) Gene (D) Genome
2. Allele is the
(A) Alternate trait of gene pair
(B) Total number of genes for a trait
(C) Total number of chromosomes
(D) Total number of chromosomes of a haploid set.
3. Genes do not occur in pairs in
(A) Zygote (B) Somatic cell (C) Endosperm cell (D) Gametes
4. Which one of the following traits of garden pea studied by Mendel was a recessive feature ?
(A) Axial flower position (B) Green seed colour (C) Green pod colour (D) round seed shape

5. Match the following :-

	Column I		Column II
1.	Genetics	a.	Father of genetics
2.	W.Bateson	b.	To become
3.	"Gen"	c.	Coined the term genetics
4.	Gregor Johann Mendel	d.	Study of heredity

- (A) (1 - d) (2 - c) (3 - a) (4 - b) (B) (1 - d) (2 - a) (3 - c) (4 - b)
(C) (1 - d) (2 - C) (3 - b) (4 - a) (D) (1 - d) (2 - b) (3 - C) (4 - a)
6. 'Like begets like, is an mportant and universal phenomenon of life due to:
(A) heredity (B) morphology (C) eugenics (D) embryology
 7. The term genetics was coined by:
(A) Griffith (B) Bateson (C) Mendel (D) Johanssen
 8. Mendel carried out his hybridization on :
(A) lens esculentus (B) sorghum vulgare (C) drosophila melanogaster (D) pisum sativum
 9. An allele is dominant if it is expressed in:
(A) heterozygous combination (B) homozygous condition
(C) second generation (D) both homozygous and heterozygous condition
 10. An organism with two identical alleles is:
(A) dominant (B) hybrid (C) heterozygous (D) homozygous
 11. The ultimate biological unit that controls heredity is called:
(A) Genome (B) Chromosome (C) Genotype (D) Factor
 12. Which one of the character studied by Mendel in the garden pea plant is dominant
(A) green seed colour (B) terminal flower position
(C) green pod colour (D) wrinkled seed