

HEREDITY → (Genetics) → study of genes.

The transmission of characters/ traits from one generation to the next generation.

Monohybrid cross-

- cross between two organisms with one pair of contrasting characters is called a monohybrid cross.

law of dominance

law of segregation

Dihybrid cross.

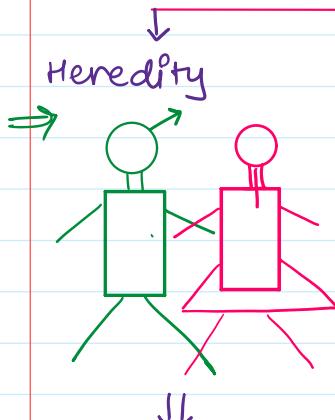
- cross between two organisms with two pairs of contrasting characters is called a dihybrid cross.



law of independent assortment

GENETICS.

→ Deals with, the study of genes.



↓
Variation.

→ Difference between in the characters/ traits between the parents & offspring

Somatic variation

- Takes place in body cells
- Neither inherited nor transmitted
- Also known as acquired traits
- Ex:- Boxing of pinna, cutting of tails in dogs.

Gametic variation

- Gametic / Reproductive cells.
- Inherited as well as transmitted
- Also known as inherited traits.
- Ex:- human height, skin colour.

⇒ Accumulation of Variation during Reproduction:-

Appear during reproduction when ever organism multiply.

Asexually

- Few variations
- Occurs due to small accuracies in DNA

Sexually

- large variations
- Occurs due to crossing over, separation of chromosomes.

- Occurs due to small accuracies in DNA copying (Mutation)
- Occurs due to crossing over, separation of chromosomes, mutations.

⇒ Importance of variations :-

- (1) Different individuals have different kinds of advantages.
Ex:- Thermostatic bacteria that can withstand heat will survive better in heat wave.
- (2) Increases the chance of survival in a changing environment.
Ex:- free ear lobes & attached ear lobes.



B - 1822 , D- 1884
" Father of Genetics."

MENDEL'S LAW OF INHERITANCE

BYJU'S
The Learning App

| Seed | | Flower | | Pod | | Stem | |
|----------|------------|--------|--|-------------|--------|-------------------------------|-----------------------------|
| Form | Cotyledons | Color | | Form | Color | Place | Size |
| Round | Yellow | White | | Full | Yellow | Axial pods, Flowers along | Long (6-7ft) |
| Wrinkled | Green | Violet | | Constricted | Green | Terminal pods, Flowers top | Short ($\frac{3}{4}$ -1ft) |

1 2 3 4 5 6 7

He selected a pea plant for his experiments for the following reasons:

1. The pea plant can be easily grown and maintained.
2. They are naturally self-pollinating but can also be cross-pollinated.
3. It is an annual plant, therefore, many generations can be studied within a short period of time.
4. It has several contrasting characters.

- (1) **Genome**:- Term used to denote the entire DNA sequence of a gamete, person, population or species.
- (2) **Progeny** :- A descendant / offspring.
- (3) **Locus** :- It is a specific, fixed position on a chromosome where a particular gene is located
- (4) **Alleles**:- Two paired genes are called "alleles"
- (5) **Homozygous**:- The situation in which allelic genes are identical.
Ex:- TT
- (6) **Heterozygous**:- The situation in which allelic genes are different.
Ex:- Tt
- (7) **Dominant**:- Trait that appears or expresses itself; shown with a capital letter. [Ex: Tall = T]
- (8) **Recessive**:- Trait whose effects are masked in the presence of Dominant gene [Ex tt' - Dwarf]
- (9) **Phenotype**:- The sum of an organism's observable characteristics.
- (10) **Genotype**:- The genetic makeup of a cell, an organism
- (11) **F₁ Generation**:- First filial → after parental generation

MONOHYBRID CROSS

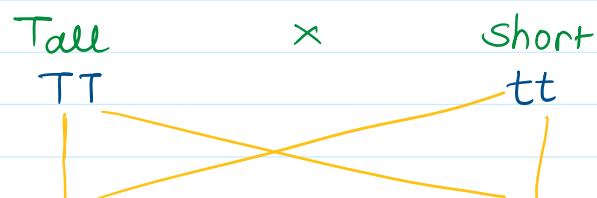
07 May 2023 13:40

→ Cross between two pea plants with one pair of contrasting characters is called a monohybrid cross.

Character → Height of plant

Dominant :- Tall
Recessive :- Dwarf.

P Generation:-



F₁ Gen.



F₂ Gen.



Ratio: 3:1

TT - Homozygous dominant - 1 (pure tall)

Tt - Heterozygous dominant - 2 (Mix tall)

tt - Homozygous Recessive - 1 (pure short)

Phenotype: 3:1.

Genotype: 1:2:1

Punnet square:-

| | | | |
|---------------------|------------|----|----|
| ♂ | ♀ | T | |
| | | t | |
| F_1 Gen | T | TT | Tt |
| | t | Tt | tt |

P.R. : 4:0

G.R. : 4:0

| | | | |
|---------------------|------------|----|----|
| ♂ | ♀ | T | T |
| | | t | |
| F_2 Gen | T | TT | Tt |
| | t | Tt | tt |

P.R: 3:1

G.R.: 1:2:1

⇒ Observation :-

- 1) All F_1 progeny were tall, No medium height plant.
- 2) F_2 generation $\frac{1}{4}$ (25%) short, $\frac{3}{4}$ (75%) tall.
- 3) P.R. \rightarrow 3:1
Q.R. \rightarrow 1:2:1

⇒ Conclusion :-

- 1) TT, Tt - Tall and tt - short
- 2) A single copy of 'T' is enough to make the plant tall, while both copies have to be 't' for the plant to be short.
- 3) Traits like "T" are called dominant trait and "t" are called recessive trait.

DIHYBRID CROSS

11 May 2023 11:12

→ A cross between two plants having two pairs of contrasting characters is called dihybrid cross.

P gen. → Round green seeds × Wrinkled yellow seeds



F₁ gen. → RYy

Selfing. →
gametes.

F₁
RY
Ry
rY
ry

F₂
RY
Ry
rY
ry

F₂ gen. →

♂ ♀

- (crys)
Round & Yellow
- (ring)
Round & green.
- (wrink)
Wrinkled & Yellow
- (wing)
Wrinkled & green.

| | RY | Ry | rY | ry |
|----|----------|----------|----------|----------|
| RY | RY RY | RY Ry | RY rY | RY rY |
| Ry | Ry Ry | Ry Ry | Ry ry | Ry ry |
| rY | RY rY | Ry rY | rY rY | rY rY |
| ry | RY ry | Ry ry | rY rY | rY ry |

Phenotypic ratio:- 9:3:3:1

→ Observation:-

- (1) When RYy was crossed with rrYY in F₁ gen all were RYy round and yellow seeds.
- (2) Self pollination of F₁ plants gave parental phenotype.

round and yellow seeds.

(2) Self pollination of F₁ plants gave parental phenotype.

⇒ Conclusion:-

(1) Round and yellow seeds are dominant characters.

(2) Occurrence of new phenotype combinations show that genes for round & yellow seeds are inherited independently of each other.

Mendel's law of Inheritance

11 May 2023 11:53

1) Law of Dominance:- Two alternative forms of a trait or character are present in an organism, only one factor expresses itself in F₁ progeny and is called dominant while the other that remains masked is called recessive.

2)