

Chapter no: 8

Heredity

- Heredity is transmission of character from parents to offspring
- The differences in the character / traits among the individual of the same species are called variation.
- * Advantages of variation
 - it brings adaptation in individual
 - it helps in survival of species
 - it is the basis of evolution

Variation
Trait

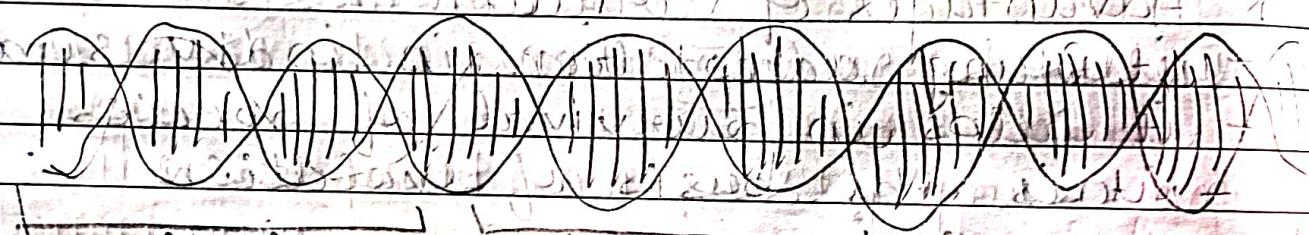
Acquired /
Somatic traits

Inherited / genetic
traits.

- These traits are neither inherited nor transmitted to next generation
- These traits can be inherited as well as transmitted to next generation
- These traits are acquired after birth
- These traits are inherited during reproduction
- Ex: acquiring knowledge
- Eg: eye, skin, hair colour

* Some Important terms

- **DNA**
 - Thread like structure present in nucleus
 - carry genetic information to generation
- Chromosome is condensed and coiled form of DNA
- The segment of DNA of particular character is called gene.

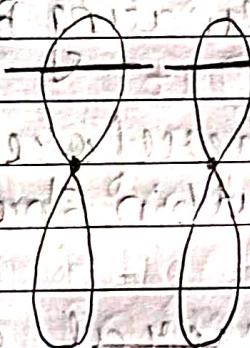


- diploid cell are chromosome in pairs
- haploid cell are single set of chromosome.

Note: all human cell are diploid except germ cell (Sperm, ova)

- Inheritance is the process by which characters are passed from parent to progeny. The concept heredity is based on inheritance.

- Alleles are the alternate form of genes that occupy a specific location on a particular chromosome and control the character or trait
- Dominant allele is stronger one from the two alleles Always represented by Capital letter (A, B, C)
- Recessive allele is the weaker one from the two alleles Always represented by (smaller letter) [a, b, c]
- The character which is expressed by dominant allele is called dominant character.

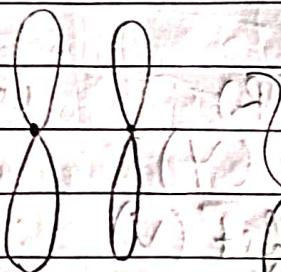


This condition is called

Heterozygous or Hybrid condition.

Tall Dwarf

[Dominant] [Recessive]

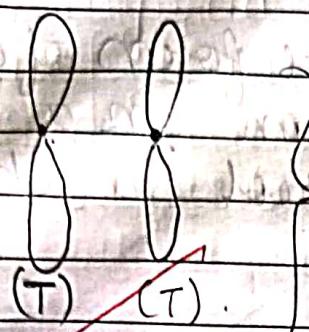


condition is called as

Homozygous Recessive

Dwarf

(T) (t)



This condition is called:
Homozygous dominant,

- * Why did Mendel choose garden pea in his experiments?
 - He chose pea plant because of following Reason
 - The pea plant can easily grown and maintain
 - They are naturally self pollinating BUT can also be cross pollinated
 - it is an annual flower therefore many generation can be studied within short period of time
 - contrasting traits of several character
 - short life span of the plant
 - Large no of seeds are produced.

Gene character	Dominant	Recessive
1. Seed shape	Round (R)	wrinkled (r)
2. Seed colour	Yellow (Y)	green (y)
3. Flower colour	Red violet (V)	white (v)
4. Pod shape	full (F)	constricted (f)
5. Pod colour	green (G)	yellow (g)
6. Flower position	Axial (A)	Terminal (a)
7. Stem length	Tall (T)	Dwarf (t)

~~During gamete genesis [gamete formation] the process of meiosis occurs~~

Reductional

division

chromosome no.

Becomes half.

* Mendel's Law of Inheritance *

• Law of Dominance :

if two alleles at a locus differ then one dominant allele determine the organism appearance ; the other recessive allele has no noticeable effect on organism's appearance

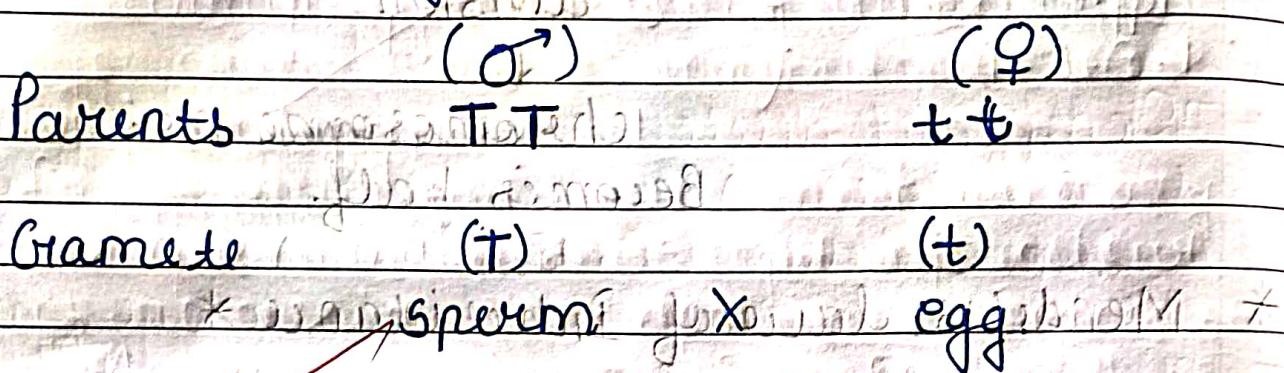
• Law of Segregation :

the two alleles for heritable character separate during gamete formation and end up in different gamete

• Law of Independent Assortment :

each pair of allele segregates independent of other pairs of alleles during gamete formation

* **Mono hybrid cross**
 Mono hybrid cross involves cross between parent which differ in only pair of contrasting character



F1-generation: (Tt) (Tt) Heterozygous or hybrid
 Gametes: (T) (t) (T) (t)

Selfing

F2 generation = 75% - tall
 25% - dwarf

	♂	♀	T	t	t	T	t
	T		TT	TT	Tt	Tt	Tt
	t		tt	tt	tt	tt	tt
			(tall)	(tall)	(dwarf)	(dwarf)	(dwarf)

TT - 25%

Tt - 50%

tt - 25%

Phenotypic ratio

3:1

genotype ratio

1:2:1

TT:Tt:tt

* Dihybrid cross *

Dihybrid cross involves cross between parent which differ in two pair of contrasting character

Parents

$R R Y y$: [round green] $r r Y Y$: [wrinkled yellow]

Gametes

$R Y$ $r Y$

\times

~~F₁~~

generation

$R r Y y$ (Round yellow)

~~F₁~~

generation

$R r Y y$ \times $R r Y y$

($R Y$)

F_2

		$R Y$	$R y$	$r Y$	$r y$
$R Y$	$R Y$	$RRYY$	$RRYy$	$RrYY$	$RrYy$
	$R y$	$RRYy$	$RRyy$	$RrYy$	$RrYY$
$r Y$	$RrYY$	$RrYy$	$rrYY$	$rrYy$	
	$rrYy$	$rryy$	$rrYy$	$rryy$	

Round yellow : 9

Round green : 3

Wrinkled yellow : 3

Wrinkled green : 1

Dihybrid cross

F₂ generation

Phenotypic Ratio

9 : 3 : 3 : 1

* Sex determination

Male

Female

sex

chromosome + pair

sex

chromosome

(XY)

(XX)

patient

Male

Female

XY

XX

Gamete

(X) (Y)

(X) (X)

fertilization

F₁
generation

♂	♀	X	X
X		XXX	XX
Y		YY	XY

Date : _____

Phenotypic Ratio

$XX : XY$

(1 : 1)

Genotypic Ratio

$XX : XY$

(1 : 1)

- Sex of children will be determined by what they inherit from their father

- A child who inherits 'X' chromosome from father will be a girl

- A child who inherits a 'Y' chromosome from father will be a boy