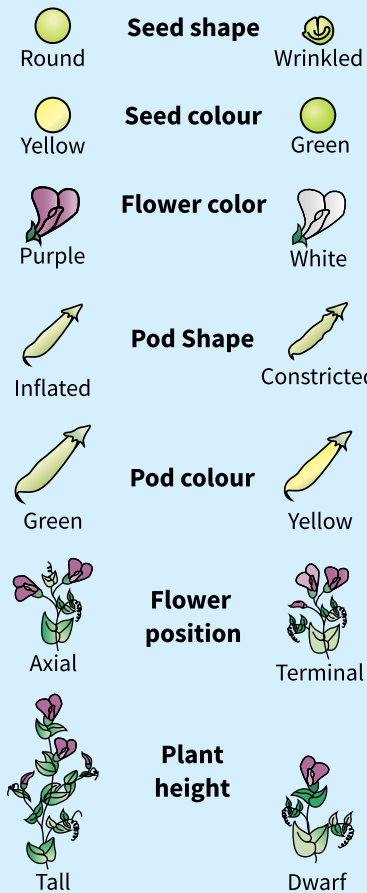


## 7 CONTRASTING CHARACTERS



## TWO GENE INHERITANCE

### 3) Law of Independent Assortment

When two pairs of traits are combined in a hybrid segregation of one pair of character is independent of the other pair of characters.

DIHYBRID CROSS	♂ Gametes			
	RY	rY	Ry	ry
♀ Gametes	RY			
	rY			
	Ry			
	ry			

Phenotypic ratio - 9:3:3:1  
Genotypic ratio - 1:2:1:2:4:2:1:2:1

## GREGOR MENDEL ( FATHER OF GENETICS )

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

## ONE GENE INHERITANCE

### 1) Law Of Dominance

- Characters are controlled by discrete unit called factors.
- Factors occur in pair.
- In dissimilar pair one dominated over other.

### 2) Law of Segregation (law of Purity of Gametes)

- During the gamete formation the factors segregate from each other.
- Homozygous produces similar gametes while heterozygous produce dissimilar.

MONOHYBRID CROSS		♂ Male gamete	
		T	t
♀ Egg	T		
	t		

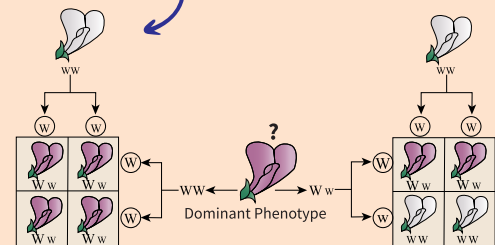
Phenotypic ratio - 3:1  
Genotypic ratio - 1:2:1

### TEST CROSS

Cross hybrid and recessive parent.

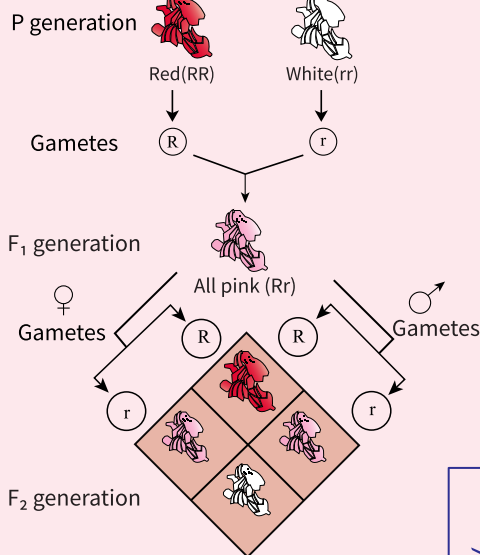
### BACK CROSS

Cross hybrid and any one of the parents.



## MENDELIAN INHERITANCE

## 4. PRINCIPLES OF INHERITANCE AND VARIATION



Phenotypic ratio - 1:2:1  
Genotypic ratio - 1:2:1

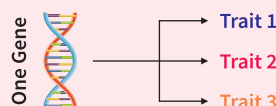
### INCOMPLETE DOMINANCE

The heterozygous offspring shows intermediate characters.  
Eg - Mirabilis jalapa

## NON - MENDELIAN INHERITANCE

### PLEIOTROPY

Ability of gene to have multiple phenotypic effects as it influences number of characters simultaneously. Eg:- PKU



### MULTIPLE ALLELISM

A gene existing in more than two allelic forms.  
Eg:- A B O blood group

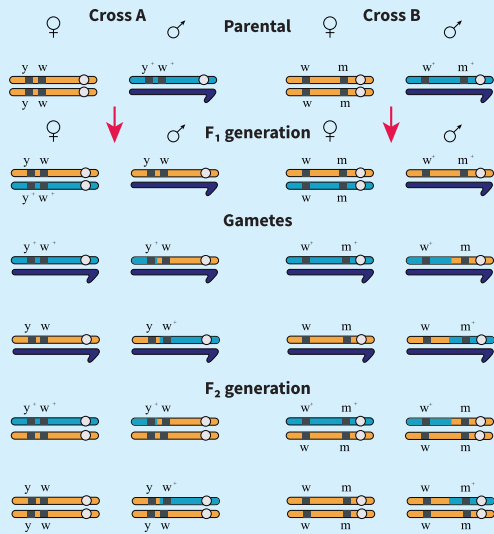


### CO - DOMINANCE

Two alleles of a gene are equally dominant.  
Eg:- AB blood group



## CHROMOSOMAL THEORY OF INHERITANCE



By Sutton and Boveri, 1902

- ✦ Behaviour of chromosome is parallel to genes behavior.
- ✦ Both occur in pairs in diploid cells.

T H Morgan (Fly man) 

### Linkage

Tendency of genes in a chromosome to remain together & pass as such to next generation.

### Crossing-over

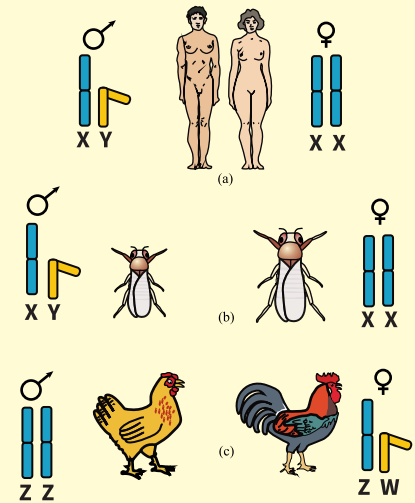
Exchange of genes or chromosomal parts to break already existing linkages & formation of new linkages.

### Recombination

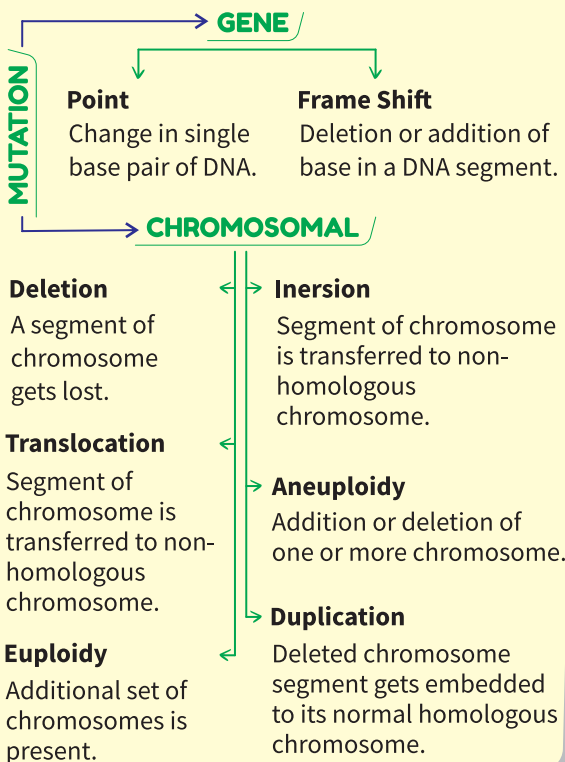
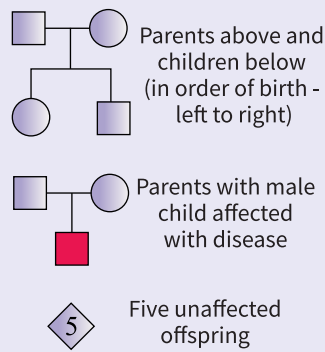
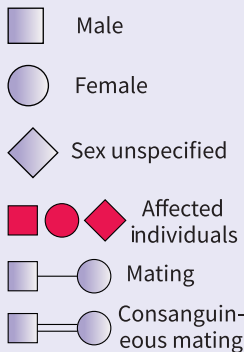
Result of Crossing over.

## SEX DETERMINATION

sex chromosomes also called allosomes.



## Pedigree Analysis



## MENDELIAN

### Phenylketonuria

Autosomal recessive. Accumulation of phenyl pyruvic acid.

### Thalassemia

Autosomal recessive formation of abnormal hemoglobin

### Cystic Fibrosis

Autosomal recessive chronic lung infection


### Haemophilia

x - linked recessive disorder. Clotting of blood is affected.

### Color Blindness

x - linked recessive disorder defect in red/ green cone of eye.

### Sickle Cell Anemia

Autosomal recessive shape of RBCs changes (Sickle Shaped) 

## CHROMOSOMAL

### Turner's Syndrome

Chromosomes 45  
Chromosomes (44+ XO)



### Down's Syndrome

Trisomy of 21st chromosome



### Klinefelter's Syndrome

Presence of additional copy of x chromosome 47 chromosomes (44+XXY)



GENETIC DISORDER