Experiment No. ..... Part-5 Date .....

Class - 12th

"Biology"

M.M. - 30

1. Write the full form of → ZIFT, GIFT. (20)
2. What is lactational Amenorrhea?
3. Tubectomy is highly effective but it is not used by people, why?
4. Name the two plants which shows special flowering.
5. Write difference between mestrual and oestrous cycle.
6. Explain parthenogenesis with examples.
7. Why some organism produce large number of gametes.
8. Write the vegetative propagules of :— Garlic, Ginger, Colacasia, oxalis.
9. Why some organisms followed asexual R.D.?
10. Why variation arises?

11. Write a note on incomplete dominance using an example of Mirabilis Jalapa. (3)
12. Mention the advantages of selecting the pea plant for experiment by Mendel. (3)
13. When across is made between tall plant with yellow seeds (TtYy) and tall plant with green seeds (Ttyy) what proportion of phenotype is the offspring could be expected to be 1. tall and green 2. dwarf & green. (4)

Remarks .....

Teacher's Signature ..... Seema Bhandari

Difference between crossing over and linkage

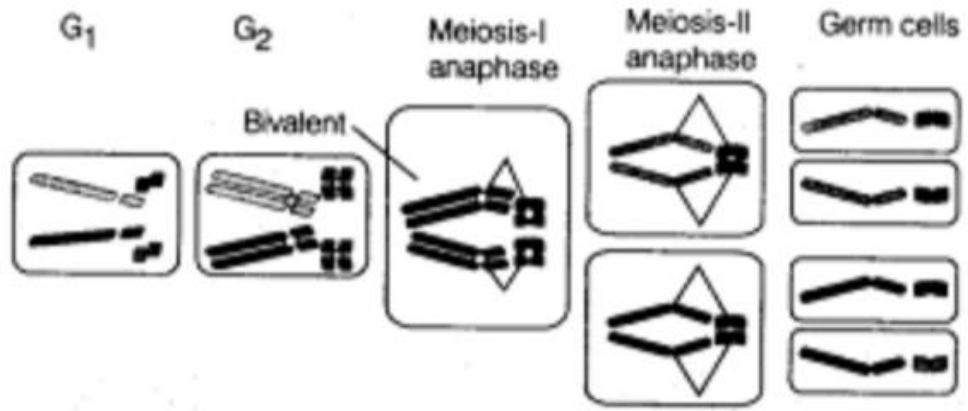
Crossing over	Linkage
1. It leads to separation of linked genes	1. keeps the genes together
2. It involves exchange of segments between non-sister chromatics of homologous chromosomes.	2. It involves individual chromosomes.
3. The frequency of crossing over can never exceed 50%.	3. The number of linkage group can never be more than haploid Chromosome number.
4. It increases variability by forming new gene combinations.	4. It reduces variability.

Sex Determination

Remaining part of the chapter 5

Chromosomal Theory of Inheritance

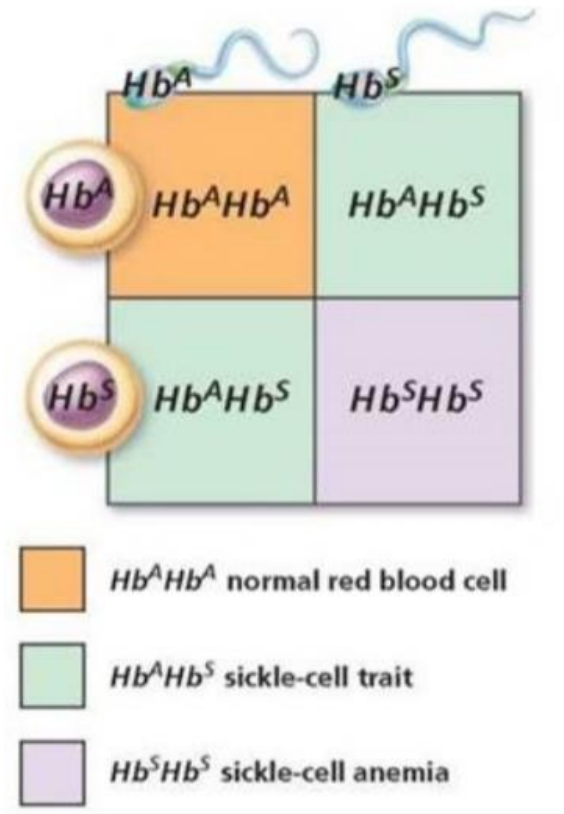
- Chromosome as well as gene both occurs in pair. The two alleles of a gene pair are located on the same locus on homologous chromosomes.
- Sutton and Boveri argued that the pairing and separation of a pair of chromosomes would lead to segregation of a pair of factors (gene) they carried.
- Sutton united the knowledge of chromosomal segregation with mendelian principles and called it the chromosomal theory of inheritance.



Meiosis and germ cell formation in a cell with four chromosomes

Linkage and Recombination

b. **Sickle cell anemia-** an autosome linked recessive trait in which mutant haemoglobin molecules undergo polymerization under low oxygen tension causing change in shape of the RBC from biconvex disc to elongated sickle like structure. The defect is caused by the substitution of Glutamic acid (Glu) by Valine (Val) at the sixth position of the beta globin chain of the haemoglobin molecule. The substitution of amino acid in the globin protein results due to the single base substitution at the sixth codon of the beta globin gene from GAG to GUG



c. **Phenylketonuria-** inborn error of metabolism inherited as autosomal recessive trait. The affected individual lacks an enzyme that converts the amino acids phenylalanine to tyrosine . . As a result of this phenylalanine is accumulated and converted into phenylpyruvic acid and other derivatives that results into mental retardation.

Chromosomal Disorders-Failure of segregation of chromatids during cell division results in loss or gain of chromosome called **aneuploidy**. The failure of cytokinesis leads to two sets of chromosome called **polyploidy**.

a. **Down's Syndrome**- is due to presence of additional copy of the chromosome number 21. The affected individual is short statured with small rounded head, furrowed tongue and partially opened mouth. Mental development is retarded.

b. **Klinefleter's Syndrome**- due to presence of an additional copy of X-chromosome (XXY). Such persons have overall masculine development however, the feminine development (development of breast, i.e., Gynaecomastia) is also expressed. They are sterile.

Linkage and Recombination

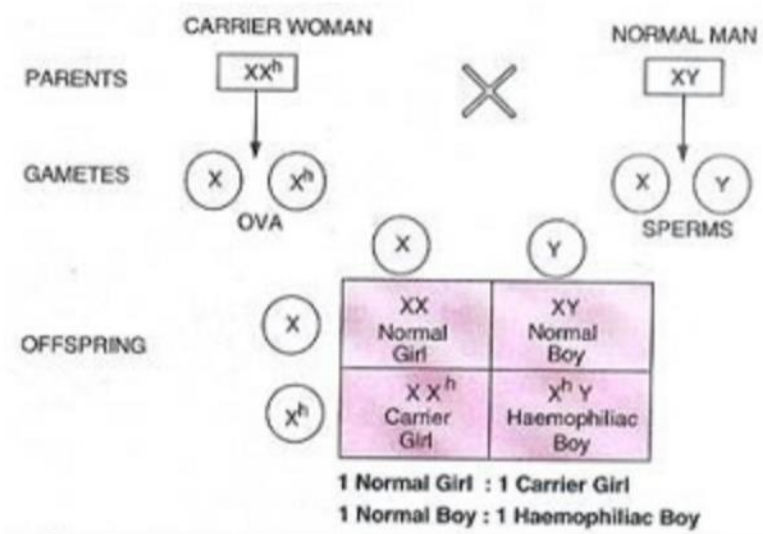
- When two genes in a Dihybrid cross were situated on same chromosome, the proportion of parental gene combination was much higher than the non-parental type. Morgan attributed this due to the physical association or the linkage of the two genes and coined the **linkage** to describe the physical association of genes on same chromosome.
- The generation of non-parental gene combination during Dihybrid cross is called recombination. When genes are located on same chromosome, they are tightly linked and show very low recombination.

Difference between crossing over and linkage

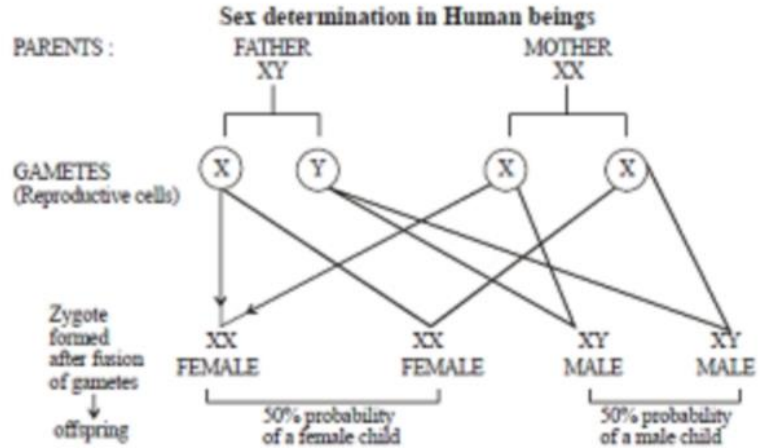
They may be recessive or dominant in nature.	This is always dominant in nature.
Examples: Colour blindness Pheffykenonia.	Examples: Downs syndrome, Turner's syndrome

Medelian disorder includes-

a. **Haemophilia-** sex linked recessive disease in which, in an infected individual, a minor cut leads to non-stop bleeding. Heterozygous female (carrier) can transmit the disease to their son. The possibility of a female becoming a haemophilic is extremely rare because mother of such a female has to be at least carrier and the father should be haemophilic (unviable in the later stage of life).



- **Sex determination in human beings** XY type. Out of 23 pairs of chromosomes, 22 pairs are exactly same in male and female called autosomes. A pair of X chromosome is present in female and XY in male. During spermatogenesis, male produce two type of gametes (sperms), 50% carries Y chromosome and remaining 50% contain X chromosome. Female, produce only one kind of gamete (ovum) having X chromosomes only.
- When sperm having Y chromosome the sex of baby is male and when sperm carrying X chromosome fertilse the egg, the sex of baby is female.



Mutationis a phenomenon which results in alternation of DNA sequence and consequently results in the change in the genotype and phenotype of an organism. The mutations that arise due to due to change in single base pair of DNA are called **point mutation** e.g Sickle cell anaemia.

Sex Determination

- Henking in 1891 observed a trace of specific nuclear structure in few insects. He also observed that this specific nuclear structure is located on 50% of sperms only. He called this **x body**. He was not able to explain its significance.
- Latter it was observed that the ovum that receive the sperms with x body become female and those not becomes males, so this x body was called as **sex chromosome** and other chromosomes are called **autosomes.**
- In humans and other organisms **XY types** of sex determination is seen but in some insects like Drosophila **XO type** of sex determination is present.
- In both types of sex determination, male produce two different types of gametes either with or without X chromosome or some with X chromosome and some with Y chromosomes. Such types of sex determination are called male heterogamety.
- In birds **ZW type** of sex determination is present., two different types of gametes are produced by females in terms of sex chromosomes; this type of sex determination is called **female heterogamety**.

b. **Klinefleter's Syndrome**- due to presence of an additional copy of X-chromosome (XXY). Such persons have overall masculine development however, the feminine development (development of breast, i.e., Gynaecomastia) is also expressed. They are sterile.

c. **Turner's Syndrome**– caused due to the absence of one of the X chromosome. 45 with XO, such females are sterile as ovaries are rudimentary. They lack secondary sexual characters.

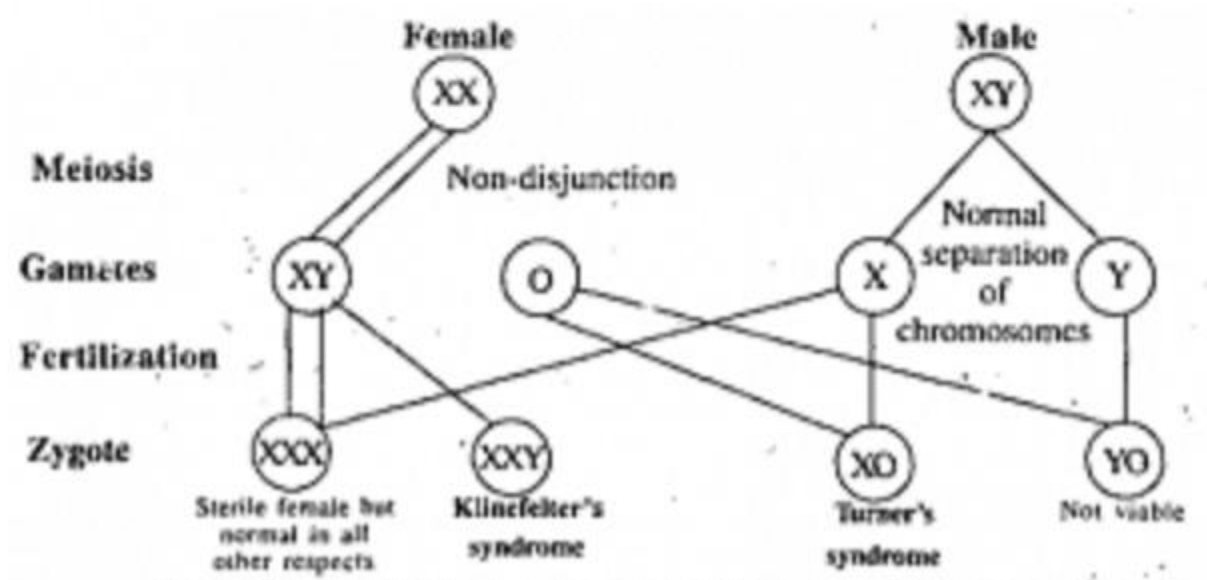


Fig 1.3.1 c_1 : Illustration to explain inheritance of Turner's syndrome

Pedigree Analysis

- The analysis of traits in several of generation of a family is called the **pedigree analysis**. The inheritance of a particular trait is represented in family tree over several generations. It is used to trace the inheritance of particular trait, abnormality and disease.

Genetic Disorders

Broadly, genetic disorders may be grouped into two categories – Mendelian disorders and Chromosomal disorders.

Mendelian Disorders	Chromosomal disorders
These are due to alteration in a single gene.	These are caused due to absence or excess of one or more chromosomes or abnormal arrangement of one/more chromosomes.
They are transmitted into generations through Mendelian principles of inheritance.	They are transmitted as the affected individual is sterile.