SEX - DETERMINATION

Introduction :- Sex-determination in most of the plant and animal is concerned with the study of factor which are responsible for making an individual male or female. In advent time, it was very difficult to answer that how a male and female plant is formed.

Mc-clung (1901) 1st discovered the sex-~~determination~~ chromosome and explained that sex-chromosome plays an important role in sex-determination Wilson and steven (1905) gene chromosomal theory of sex-determination. They named x and Y chromosome as sex-chromosome or heteochromosome.

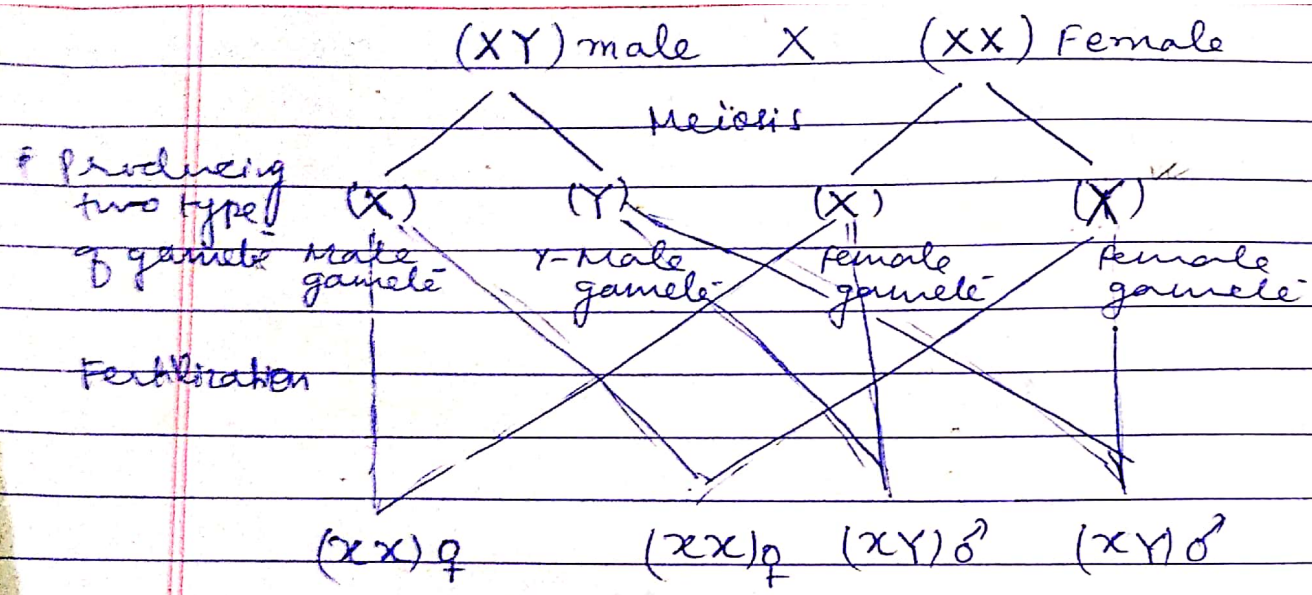
T. H. Morgan (1910) described the sex-linkage in drosophila where he showed that gene for white eyed colour was carried on the x-chromosome. He could explain the co-relation between segregation of sex-chromosome and the inheritance of a sex-chromosome. Bridge (1922) in Drosophila. Melanogaster and Goldschmidt in moth ~~&~~ revealed that chromosom are responsible for sex-determination.

Various theories have been proposed to describe the sex determination such as

1. Chromosomal Theory
2. Genic balance theory
3. Environmental Theory
4. Hormonal Theory
5. Cytoplasmic factor Theory

In plant, the individuals are classified as male and female or hermaphrodite. If the one sex is present in plant is called unisexual when both sexes are present in same flower or plant are called bisexual

XY Mechanism:- This type of sex determining mechanism is most common in drosophila, Human being and many animal but also in some plant like Rumex, Coccinea Sphaerocarpos and others. XY is the male and XX is the female. When these two produces gamete, there is 50% chance of fertilization to result in male offspring and 50% is a female offspring. This indicates that the sex can be determined at the time of fertilization.



50% offspring female, 50% offspring male.

Fig- Sex determination by 'XY' mechanism in Coccinia

Sex determination in Melandrium:—

Majority of plants are m
ecious and problems of sex determinati
does not arise in them. But in case of di
cious plant male and female plants are
separate. Westergaard (1948) and Warmke (
demonstrated in Melandium that the ge
of male determiners are located only
onesone. In dioecious Melandrium the
male plant are with xy as the sex pair
female plants have xx as chromoso
pair. The plant of Melandrium exili e
loids, triploids and tetraploids with th

following no. of autosome and sex chrom

Autosome	Sex-chromosome	Sex
2A	XX	F
2A	XY	M
3A	XX	F
3A	XY	M
3A	XXX	F
3A	XXY	M
3A	XXXYY	M
4A	XXXX	F
4A	XXXXY	M

The mechanism of sex-determination in Co
xia indica was studied in detail by prof. S.B
and his co-workers at patna university. The
studied the sex in diploid, triploid and tetra
plants with or without Y-chromosome and obser
that irrespective of the number of X-chromosom
or autosome, presence of a single Y-chromos
gave a ~~male~~ male individual which can be
explained diagramatically as follows:-

The relation between chromosome con
tuli and sex in Coccinia indica

(5) ?

	Chromosome	X/A	Sex
1.	2A + xx (diploid)	2/2 = 1.0	F
2.	2A + xY (diploid)	1/2 = 0.5	M
3.	2A + xYY (diploid)	1/2 = 0.5	M
4.	3A + xxY (triploid)	2/3 = 0.67	M
5.	3A + xxx (triploid)	3/3 = 1.0	F
6.	4A + xxxx (tetraploid)	4/4 = 1.0	F
7.	4A + xxxY (tetraploid)	3/4 = 0.75	M

It is clear from the above table that Y chromosome is the sex-determined. Even in the presence of four x-chromosome, one Y-chromosome expriers the male characteristics. In absence of Y-chromosome, the plant is female. This indicates that Genic balance Theory of Bridges does not hold good in Melandrium.

Sex determination in liverwort :-

Allan first studied the sex determination in liverwort. The gametophyte of liverwort are haploid in nature and sex-organs. The male gametophyte in case of Sphaerocarpos has seven autosome and one y-chromosome. While the female gametophyte has seven ~~chromosome~~ autosome and an x-chromosome. The Zygote produce inside the venter of archegonium is diploid