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(5) Haemophilia

i) First discovered by John Otto.
ii) It is a hereditary disease.
iii) It is also known as bleeder's disease.
iv) In haemophilia blood fails to coagulate.
v) A person suffering from haemophilia can bleed to death even from small cut.

Symbol

X^hX^h - haemophilic female

X^hY - haemophilic male

X^hX - carrier

XX - Normal female

XY - Normal male

Inheritance :-

Case - I :- If a haemophilic male marries with normal female

Case - II :- If a haemophilic male marries with carrier

Case - III :- If a normal male marries with carrier

Case - IV :- If a normal male marries with haemophilic female

Case - V :- If a haemophilic male marries with haemophilic female.

* Case-I :- If a haemophilic male marries with normal female

haemophilic male × normal female

(X^hY) × (XX)

R/D → (X^h), (Y) ; R/D → (X), (X)

(X^hX) — carrier — 25%

(X^hX) — carrier — 25%

(XY) — normal male — 25%

(XY) — normal male — 25%

Result :-

Daughter – carrier – (X^hX) – 50%

Son – normal male – (XY) – 50%

* Case-II :- If a haemophilic male marries with carrier.

haemophilic male × carrier

(X^hY) R/D (X^hX)

(X^h), Y ; (X^h), (X)

(X^hX^h) — haemophilic female (25%)

(X^hX) — carrier (25%)

(X^hY) — haemophilic male (25%)

(XY) — normal male (25%)

Result :- ~~Daughter~~ -

Daughter – haemophilic female – (X^hX^h) – 25%

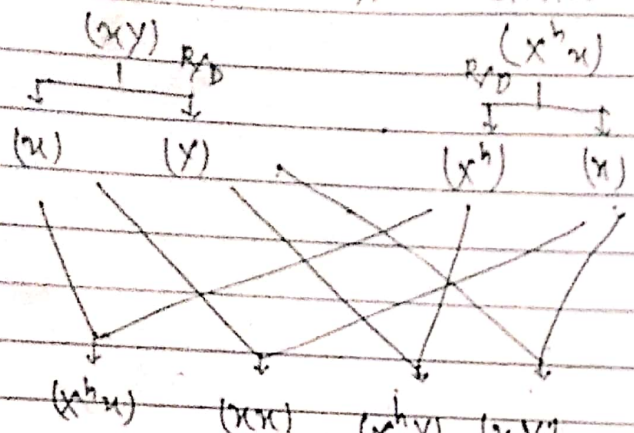
carrier – (X^hX) – 25%

Son – haemophilic male – (X^hY) – 25%

normal male – (XY) – 25%

Case III:- If a normal male carries with carrier.

normal male × Carrier



Carrier	normal female	haemophilic male	normal male
25%	25%	25%	25%

Result:-

Daughter – carrier – (X^hX) – 25%

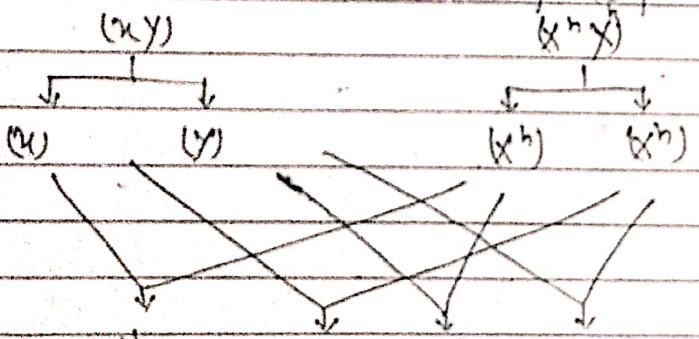
normal female – (XX) – 25%

Son – haemophilic male – (X^hY) – 25%

normal male – (XY) – 25%

Case-IV:- If a normal male marries with haemophilic female.

normal male × haemophilic female

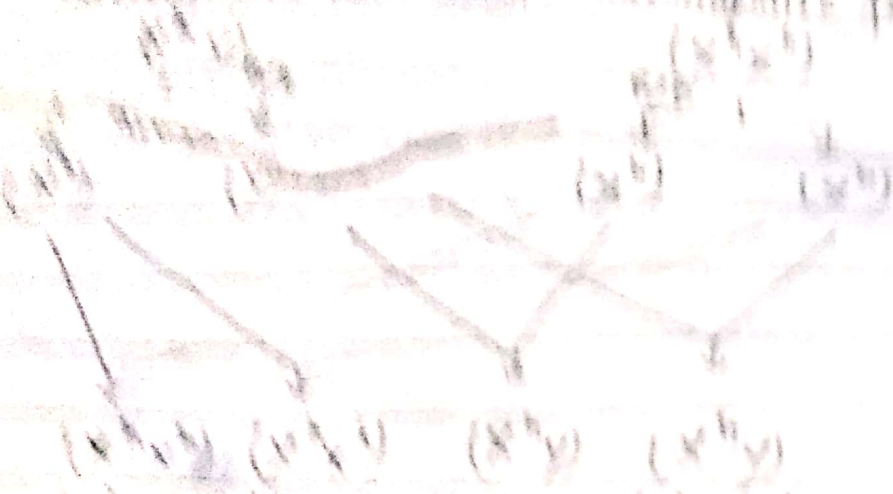


Carrier	carrier	haemophilic male	haemophilic male
25%	25%	25%	25%

Result:-

Daughter – Carrier – (X^hX) – 50%

Son – haemophilic male – (X^hY) – 50%



haemophilic female	haemophilic female	haemophilic male	haemophilic male
25%	25%	25%	25%

Result :- Daughter - haemophilic female - (X^hX^h) - 50%

Son - haemophilic male - (X^hY) - 50%

Sex Determination in Human being

i) A specific pair of chromosome determined the sex of the individual in diploid organism. These pair of chromosome known as sex chromosome.

ii) Instead of the sex chromosome, all other chromosomes are known as autosomal chromosome

Female – XX (sex chromosome)

Male – XY (sex chromosome)

iii) The autosomes carry genes which control the somatic trait & have no bearing the sex.

Mechanism of sex determination is of three type.

i) chromosomal sex determination

ii) Enivorment " "

iii) Non chromosomal " "

i) chromosomal sex determination :–

In most of the animals the sex is genetically determined at the time of fertilization. About 50% individuals are males & 50% females. These type of sex-determination is depend upon the formation of two types of gametes. In which XX – XY type is most common in man & Drosophila : (fruit fly).

Parent female (44 + XX) × Male (44 + XY)

R/D

(22 + X) (22 + X) ova (22 + X) (22 + Y) sperm

♀ \ ♂	(22 + X)	(22 + Y)
(22 + X)	(44 + XX) F	(44 + XY) M
(22 + X)	(44 + XX) F	(44 + XY) M

All the ♀ are alike each with eggs & ~~the sperms are of~~ two types. but all the sperms are not ~~all~~ alike. sperms are of two types.

One sperm with egg & one sperms with y. chromosome The y containing sperm is known as Androsperm & X-containing sperm called Gynosperm. These two are produced in equal proportion.

ii) Female has similar sex chromosome – XX (Homozygous)
Male has dissimilar sex chromosome – XY (Heterozygous)

iii) Dissimilar XY chromosomes synapses in meiosis, segregate & pass into different gametes. Thus, in humans, the female is homozygous & the male is heterozygous for the sex chromosome.

iv) ~~The~~ The male & female gamete determine the sex at the time of fertilization. ~~The~~

(B) XX – XO type :– eg :– round worm, grasshopper, cockroach, true bugs, some plant like Vallisneria.

♀	♂
F	M

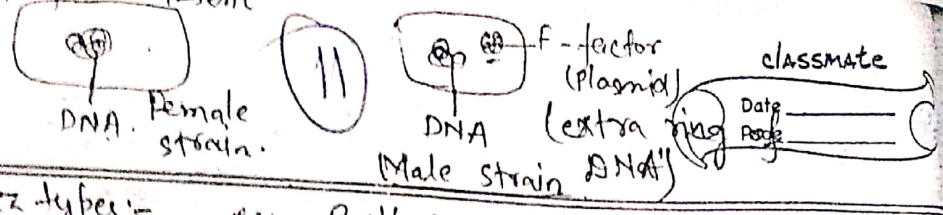
F (AA + XX) M (AA + XO)

(C) ZW – ZZ type :– eg :– birds, some reptiles, fishes & plant Fragaria

♀	♂
F	M

(AA + ZW) (AA + ZZ)

bacteria F-factor absent



1) ZO- ZZ types :- eg:- Butterfly, Moth.
   | |
   F M
   (AA+ZO) (AA+ZZ) Male

2) Enviormental sex determination :-
Sex- Enviorment is one of the factor which determined the sex in animals. Bonellia (Annelids). It is marine. When the Bonellia probosis is attached to the larvae It will develops into male & when the probosis is not attached to the larvae it will develops into female.

1) SEX LINKED INHERITANCE :-
i) It is a fact that hereditary characters migrate from one generation to other through genes.
ii) Genes are present over the surface of chromosomes.
iii) All such genes which are present in a single chromosome called linked gene.
iv) The linked gene which are associated with sex chromosomes are known as sex-linked chromosome.
v) The characters which remain linked with particular sex called sex-linked character.
vi) The transmission of sex-linked characters from one generation to other is called Sex-linked Inheritance.

There are some example of sex-linked disease.

(A) Colour blindness-
(B) Haemophilia-

(A) Colour-blindness :-
i) It is a hereditary disease. The person (patient) is suffering from colour blindness cannot differentiate between red & green colour.