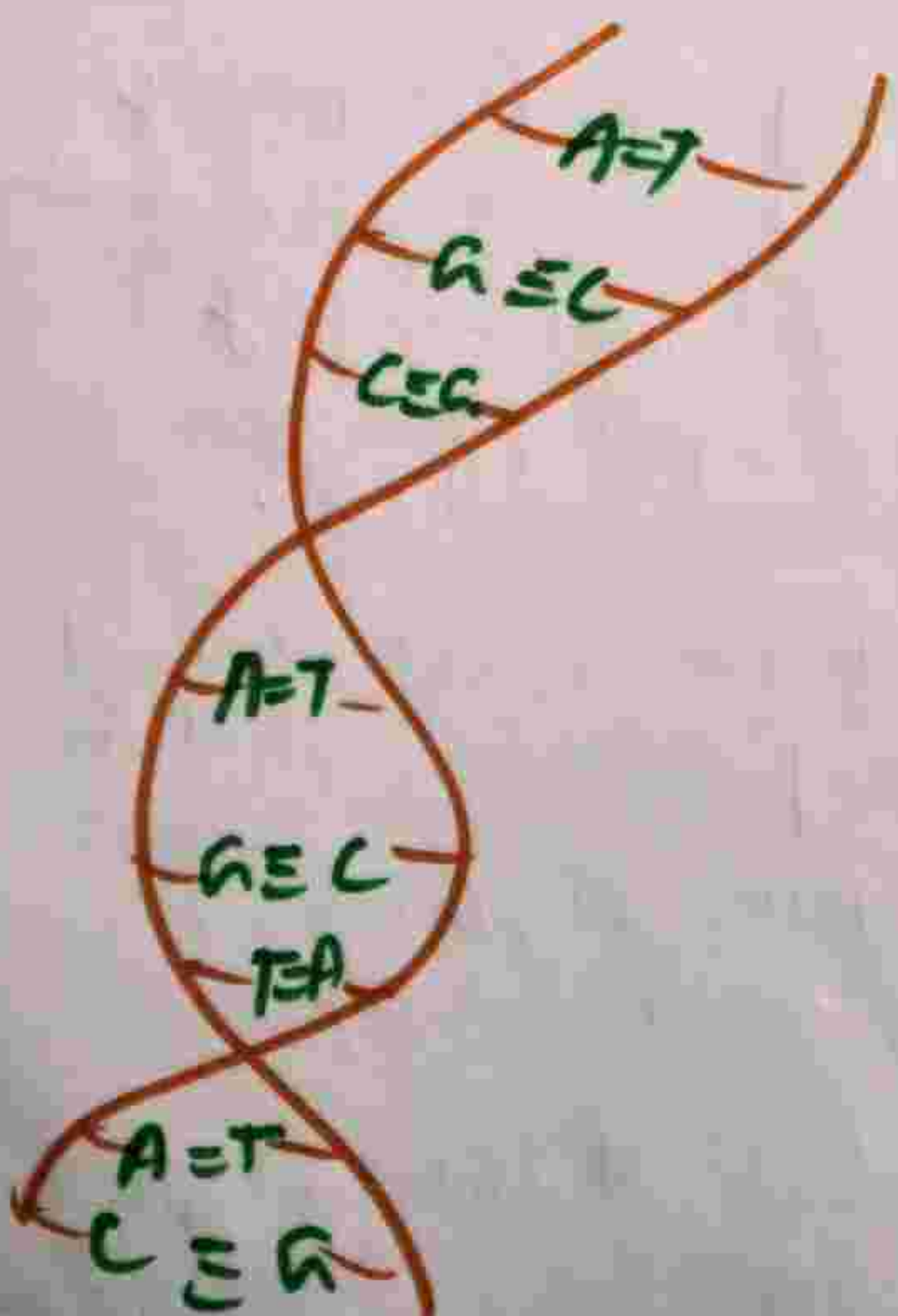
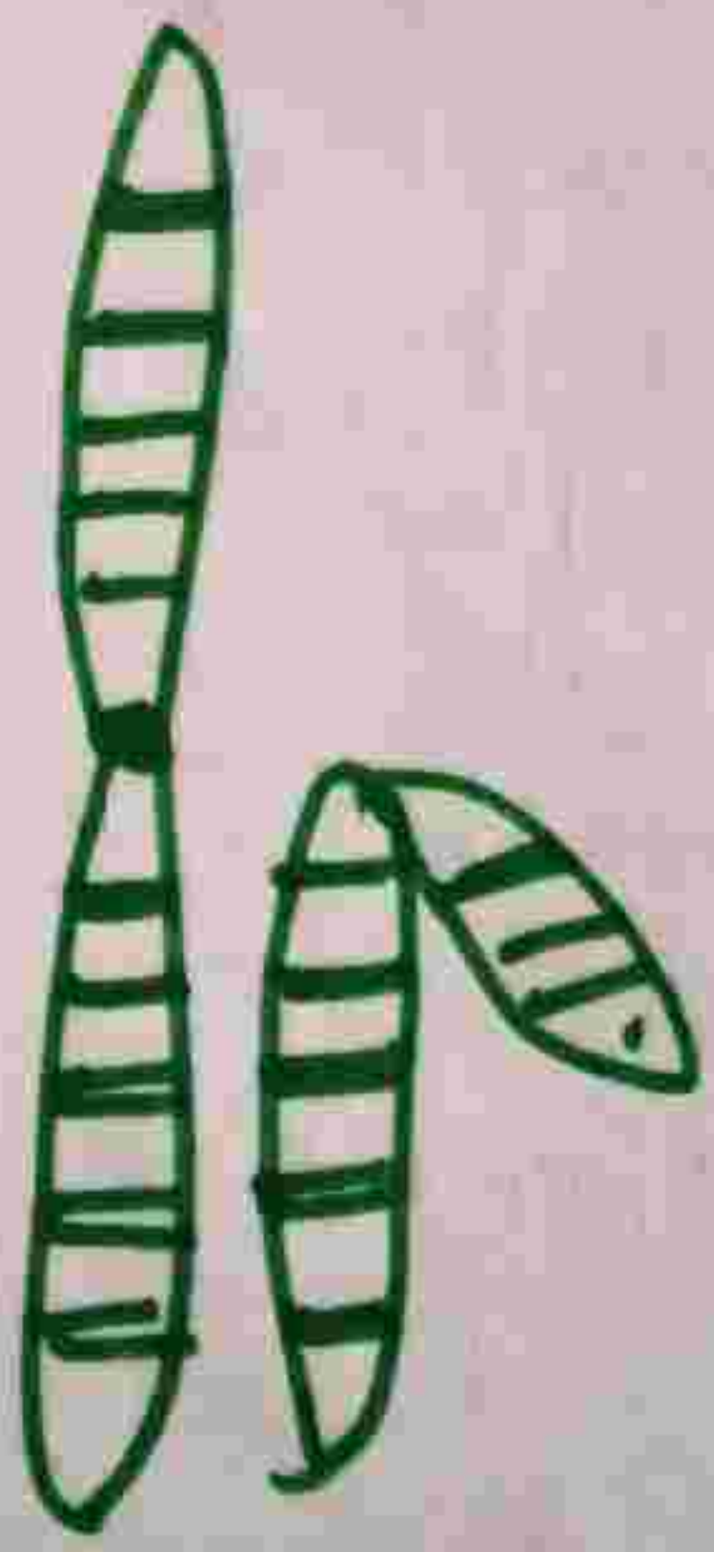
UNIT II

GENETICS

and

EVOLUTION





Principles of Inheritance and Variation — 03

Dihybrid cross — It is the cross between individuals with contrasting trait to study the inheritance of two pairs of genes or Allele responsible for two different characters.

e.g. R — Round seed
r — wrinkled seed
I character — Shape of seed.

Y — yellow seed
y — green seed
II character — colour of seed

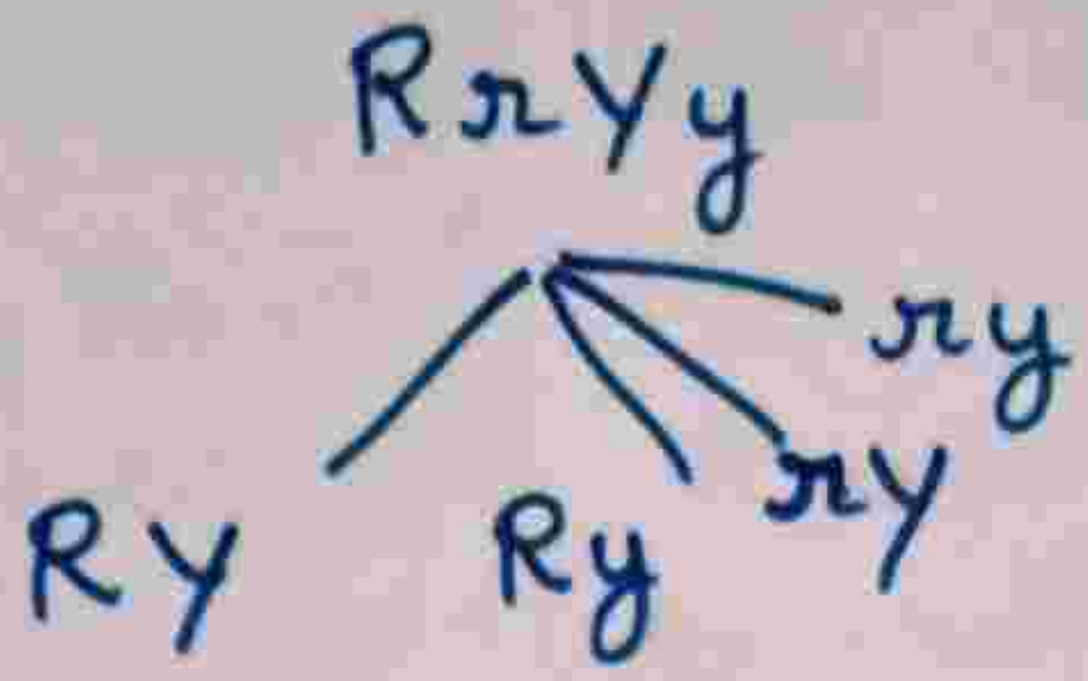
Cross - Round yellow × wrinkled green.

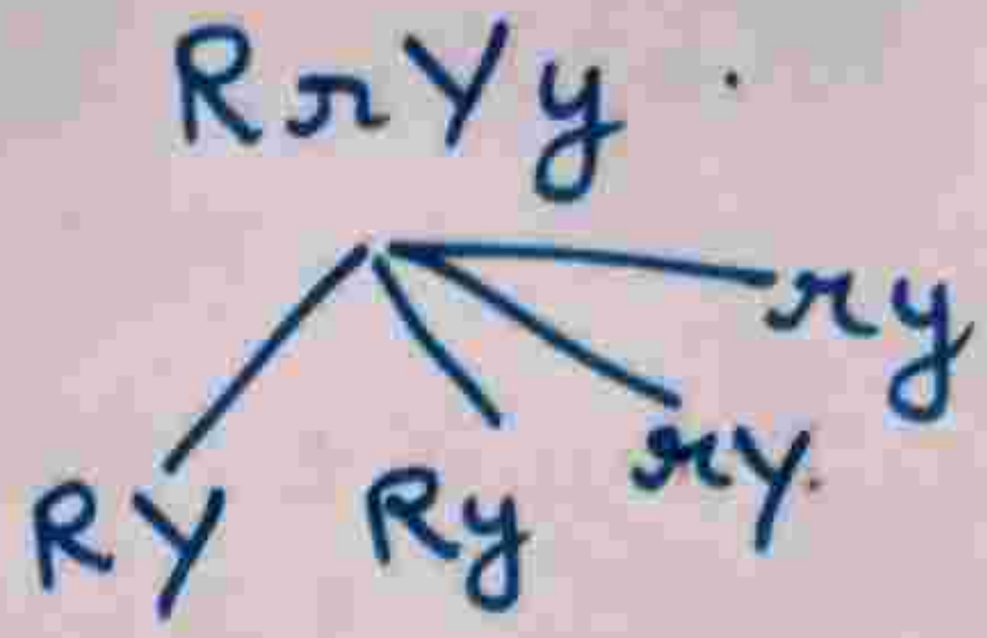
Parent RRYY × rryy

Gamete (RY) (ry)

F1 generation → RrYy Dihybrid

RrYy × RrYy





♀ \ ♂	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

Round yellow — 9

Round green — 3

Wrinkled yellow — 3

Wrinkled green — 1

Phenotypic Ratio — 9:3:3:1

Genotypic Ratio — RRYY — 1
RRYy — 2
RrYY — 2
RrYy — 4
RRyy — 2
Rryy — 2
rrYY — 1
rrYy — 1
rryy — 1

How to calculate type of Gamete.

Formula Method Fork line Method

2^n

n = no of hybrid type of gamete

e.g Monohybrid $2^1 = 2$
Dihybrid $2^2 = 4$

Trihybrid $2^3 = 8$

Q How many types of gametes will be produced by the individual which is hybrid for Four Alleles.

Ans- AaBbCcDd.

Formula - $2^n = 2^4 = 16$

16 types of gametes will be produced.

Q How many types of gametes will be produced in the given individual AABbCCDd

Ans. The given individual is Dihybrid.

Formula $2^n = 2^2 = 4$ types

Fork line Method.

I. Monohybrid.

Tt — (T), (t) — Two types.

II Dihybrid.

RrYy

R — Y — RY
R — y — Ry
r — Y — rY
r — y — ry

4 types

III Trihybrid

AaBbCc

A — B — C — ABC
A — B — c — ABc
A — b — C — AbC
A — b — c — Abc
a — B — C — aBC
a — B — c — aBc
a — b — C — abC
a — b — c — abc

8 types

Reciprocal cross

Reciprocal cross is cross which is done between individual with Contrasting trait and each group is followed to function as male or Female.

e.g character height

Trait Tall Dwarf

I

♂ ♀

T T × t t

T T

T T

♂ \ ♀	T	T
t	Tt	Tt
t	Tt	Tt

II

♂ ♀

t t × T T

t t

T T

♂ \ ♀	t	t
T	Tt	Tt
T	Tt	Tt

→ This cross has normaly no effect

→ The result changes in cytoplasmic Inheritance.

→ If the genes are located on Sex chromosome.