Independent assortment

none of the genes should be linked. They should move freely.

But later understood, the genes in the same chromosome is linked.

Frequency of Recombination measures the intensity of linkage.

At any 1 pt, the Process of exchange involves only 2 of the 4 chromatids in the meiotic tetrad.

Late in prophase I, crossovers become visible as chiasmata.

Non-disjunction → leads to chromosomal - irregular.

Diploid & Tetraploid – Stable
Triploid - Not stable.

Chromosomal mapping

linked genes can be mapped on a chromosome by studying how often their alleles recombine.

Formation of Chiasmata in late prophase.

Recombin b/w genes on opposites of the crossover pt.

Triple crossover - bring back the original one.

Average no. of crossover

$$0 \times \left(\frac{70}{100}\right) + 1 \times \left(\frac{20}{100}\right) + 2\left(\frac{5}{100}\right) + 3\left(\frac{2}{100}\right)$$

$$= 0.42$$

Recombination frequency

$$= 0.3.$$

$$\frac{\text{Recombinants}}{\text{Total no. of offsprings.}}$$

Recombination mapping

with 2 pt Test cross

Vg Vg BB

R.F blw Vg & b is 18%.

This is equal 2 (18) map units / 18 CM on the genetic map.

No recombinants · Recombinants.

0 x 0.82 + (1) x 0.18 = 0.18

Vg+ b+

Vg+ b+

Vg b

Vg b

F1 = Vg

415 405 92 88

Frequency of recombination =

Problem

Maize

leaves = 2 col. alleles

G → purple leaves (D)

g → green " (R)

S → short Stalk (R)

S → Tall " (D)

F1 → purple & Tall.

When they were back crossed to plants with. g & s, produced in F2 in which.

GGSS x ggss

↓

F1 GgSs

GS gs

F1 => GgSs x & ggss

Total 200 plants.

(1) green short (2) purple tall

(3) green tall (4) purple short

(1) => what is the evidence that the genes are linked.

New combination is possible only if u have recombination

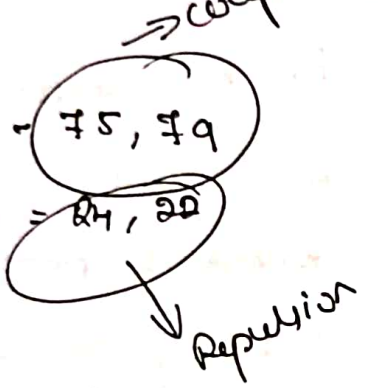
Parental no (high)

R. Com (no less)

1 cross over

2 cross over (no ↓)

Total 200



bf

we calculate R.F

$$\frac{\text{Total no. of Recombin}}{\text{Offspring}}$$

0.3 is less than 0.5.

cf RF

Cross overing happen

Repulsion heterozygote

Crossing over does not

coupling heterozygote.

0.23 is the RF

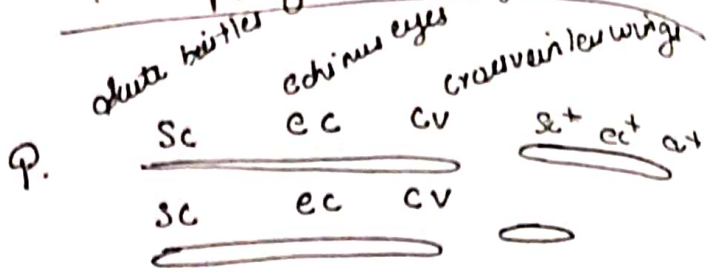
df

Genetic distance is directly proportional to R.F.

0.23 morgan |

23 cM |

R. Mapping with 3pt Testcross



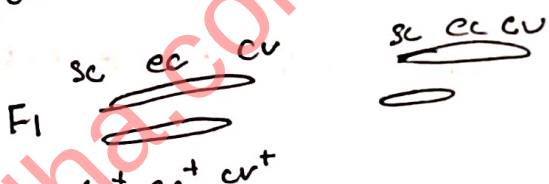
light dide by side align.

just opposite.

Pseudoautosomal region.

for seggregate properly.

Pair with one region.



Begining - 2 types of chromosomes

↓

8 diff chromosomes.

dumb, echinus, crossvienless.	Sc	ec	cv
wild type	sc^+	ec^+	cv^+
dumb	sc	ec^+	cv^+
E, cross	sc^+	ec	cv
Scw, ech	sc	ec	cv^+
cross	sc^+	ec^+	cv
Scw, cross	sc	ec^+	cv^+
Echinus	sc^+	ec	cv^+

Extensions of Mendelism

Incomplete dominance
Co " "
Multiple alleles
Epistasis
Pleiotropy
In breeding

[Find out eg of incomplete & co dominance]

Mendels works

* Diff alleles may affect phenotype in diff ways
* one gene - 2 alles
* Genes → more than 2 alleles

IgE → produce epitope.

Incomple Dominance 1:2:1

WW = Red 1 (more protein)
Ww = Pink 2 (less pro)
ww = white 1 (loss / change of function)

In heterozygous condition
Dominant allele can't fully mask the recessive allele
Intermidiate phenotype.
One allele is partially / incompletely dominant over the other

Yellow + Red → orange

change of function

Code for one protein → Code for another protein

Intermidiate phenotype

Co dominance

No intermidiately phenotype.
Combination of both
No merging
Have both dominant
1 : 2 : 1 Ratio.

Multiple Alleles

① c^+c^+ → WT
② $c^{ch}c^{ch}$ - white hair with black tips on the body
③ $c^{ch}c^{h}$ → black hair
④ c^hc^h → white hair.

Heirachial phenotype.
Fashion allele & suppressed / dominant
The most common → WT
All others are mutant.

For 1 loci → diff phenotype
When multiple alleles → Dominant allele will be in heirachial
Person organisms are diploid

one gene controlling many phenotype.

P

For a given loci you can have 2 alleles

more 2 alleles for phenotype.

F

Blood group also

Singe gene is controlling

But have diff phenotype.

F

multiple alleles → also an example of co Dominance.

Allelic Series.

Hypomorphic alleles → partial function

A null allele → non functional

An allelic series describe dominance heirachy of multiple alleles

F

When 2 / more characters are inherited, individual hereditary factors assort independently during gamete production, giving diff traits

* Equal opportunity of occuring together.

During gamete formation, the alleles for each gene seggregate from each other so that gamete carry only one allele for each gene.

mutations

Testing for allelism.

A B

Same phenotype.

Only in homozygous condi (Recessive)

Understand

White gene.

White eye locus & white eye phenoty

Caused by several genes.

How eye colour of Droso is Controlled by several genes?

Meiosis

F

2 diff inbred lines crossed, the hybrids are heterozygous.

Genetic analysis of inbreeding

Genetics of eye colour in Drosophila - Assignment

linkage / crossing over / Recombination.

When two are Present in chromosome ?

They will segregate together.

Independent assortment will not happen.

TtRr x TtRr

↓

Tall Round
Short wrinkled

3 : 1

Neat present
Tall wrinkled
Short Round

↗

New combination is produced

All the genes present in one Particular chromosome is.

You will see some sort of variation

When two genes present in non homologous chromosome, they segregate independently with 100% efficiency.

They show any reduction in the chromosome.

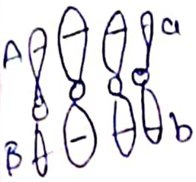
linkage => 2 genes are linked together.

When 2 genes are linked, they segregate together, No. independent assortment.

Beyond meiosis & mitosis -

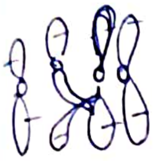
S phase - crossing happen

— Tetrad — 4 —



Homologous pair.

↓



crossing over

Gametes

sister chromatids.

Recombination – second step in evolution.

More variation.

Recombination either happens through independent assortment / seggregation.

Genes that are on the same chromosome travel through meiosis together

Thomas Hunt morgan + sturtevant - Drosophila

Wild	Mutant
b+ b	b b
vg+ vg	vg vg

Test cross.

Ratio = 1 : 1

b+ vg+ Homozygous

bb Recessive body / vestigial body.

Tt Ss tt ss = 1 : 1 : 1 : 1

b+ b	b b
vg+ vg	vg vg.

Because are in the same chromosome.

that combination is not allowed in the chromosome.

Droso is not only.

Sweet pea and also found

Partial.

Gene not should be present on the chromosome even if B present on

the chromosome → Recombination.

Unit – Tool.

Linkage = 0.1.

Recombination frequency - 50% or 0.5.