Unit II Mendelian genetics and its

extension module name complementary

gene interaction myself Miss Shreeveni

Tari from PES's RSN College of Arts and

Science outline includes introduction

to complementary gene interaction.

Examples of complementary gene interaction.

Learning outcomes explains

complementary gene interaction,

cites the examples for complementary

gene interaction, interaction of gene.

Here Gregor Mendel an other

workers assumed that the characters

are governed by single gene,

but later it was discovered that many

characters are governed by two or more genes.

Such genes affect the development

of concerned character.

The phenomenon of two or more genes.

Affecting the expression of each other

in various ways in the development

of a single character of an Organism

is known as gene interaction.

Now here we are dealing with

complementary gene interaction,

wherein the characters are produced by

the interaction of two or more genes.

These genes are complementary to one another.

That is,

if any of the two gene is present alone,

it remains unexpressed.

But are expressed only when they

are combined together.

That means for the expression of the

gene both the jeans should be present.

Now this interacting genes are present

on two different loci which can be

present on the homologous chromosome.

Or they can be present on

nonhomologous chromosome.

Now let us study this complementary gene

interaction with the help of an example.

Example is flower color in Lathyrus

Or in other words that is nothing but the.

Sweet pea,

wherein we can see two colored flowers one

is purple and the other one is white.

Now the purple color flower is

produced due to the interaction of two

genes that is gene C and gene P

How exactly it occurs will see now

for the formation of this purple

color will require something called

as precursor that is converted to

chromogen by the action of Gene C.

And for the conversion and the

formation of chromogen,

the heterozygous dominant or the

homozygous dominant form of gene

C is required.

Also,

when the gene C is present in

its homozygous recessive form,

then also it will form the chromogen

because that is nothing but the white

phenotype that you will see now when

the chromosome is to be converted.

To anthocyanin,

that is,

the pigment that gives purple colored flower.

Here,

Gene P is responsible now the heterozygous

form of P in the dominant form

or the homozygous form of P in the

dominant state will be required for

the formation of anthocyanin pigment.

Now if G and P is present in homozygous

recessive form anthocyanin pigment.

Will not be formed.

Rather you will get the formation of

white colored pigment wherein you will

see the development of white color flower.

So from this mechanism we need

to understand that for the

appearance of anthocyanin that is

Purple color flower formation,

we will require the presence of P and C

gene either in homozygous dominant

form or heterozygous dominant form.

Wherein we will see capital C in

the homozygous form an capital P in

the homozygous form will form purple

color C&P in their heterozygous dominant

form will also form purple color,

whereas when either of the genes are

present in their homozygous recessive form

will lead to the formation of white color.

Let us understand it in a more detailed way.

Here we are taking parents as white.

Geno type, which will form the

gametes and ultimately in the F1

generation we are going to get heterozygous

dominant Geno type of C&P gene,

where in the phenotype will be purple flower.

Now when this F1 are allowed to self

they will form the gamete and the F1

individuals will be formed as shown in

the Punnett square wherein we can see

the Genotype Now when we are going for

understanding the phenotypic expression.

We need to remember that,

for the appearance of purple colored

flower we need C and P gene in there,

either homozygous dominant form or

heterozygous dominant form if either

1 gene are present in their homozygous

recessive form they will lead to the

formation of white colored flower.

So here we can see how they are

expressed phenotypically.

Typically if we count the number of purple.

Colored flower we will see to it

that there are nine which are purple

and seven which are white,

so the ratio that is obtained is

9:7.

Now if we check the ratio it is 9:7,

which is actually a modified dihybrid

ratio which is 9 :3:3:1.

One is actually giving us the

combined phenotype to give.

Total number of seven individuals.

The second example that we can

take is green color in sorghum.

Now here we can see two varieties

with two colored grains.

One is brown and the other one is white.

Now brown colored grain is the result

of interaction of two genes that is A&B

and the interaction is complementary.

Type now in this case also we need

A and B gene.

To be present in their homozygous dominant

form or heterozygous dominant form.

Now we will understand it with the

help of a cross wherein we are taking

the parents as white phenotype,

an after the formation of the gametes

and the fusion of the gametes.

They will form the F1 generation

that will be giving us the Genotype

that will be having the presence

of heterozygous dominant A&B that

will result in the formation of.

Brown colored grains.

When the F1 individuals are allowed to self,

they will form the gamut and

the resulting gametes will fuse.

An F2 generation will be as per

the Punnett square depiction.

Here again,

we need to remember that for the

formation of brown color where it

is the result of interaction of

two genes that is A&B,

it has to be like you have to have.

A&B in the either dominant homozygous

form or heterozygous dominant form,

so here all the individuals

which are showing brown color

you can see the A&BG they are present

in either homozygous dominant form

or heterozygous dominant form,

whereas in all the individual

wherein we can see white phenotype.

The Genotype consists of

either of the genes in there.

Homozygous recessive form that is A or B,

so the ratio that is obtained is 9 : 7

wherein nine are brown and seven are white.

To summarize what we have learned here,

we have the characters which are produced

by the interaction between two or more

genes inherited from different parents.

These genes are complementary

to one another.

That is, if any of the two

dominant genes is present alone.

It remains unexpressed,

but are expressed only when they

are combined together in F1.

Through suitable crossing.

They complement each other

to produce the concern,

phenotype and the ratio obtained

is 9:7.

Now these are some of the

references you can use for your

online and the offline reading.

Thank you.