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This is the 10th module.

Chromosomes, genes and DNA.

A part of Unit 2, Biological Foundations of

Behavior.

Having covered the nervous system,

with the brain in detail,

and the endocrine system we now move

on to the basis of our heredity.

When we see a newborn baby,

It's a very natural tendency.

To wonder who the baby looks like,

does the baby look like the

father or the mother?

Oh, the eyes are exactly like, the mother.

The smile is exactly like the father.

Well, we all know that we inherit

these traits from our parents.

But how exactly does this take place?

That's exactly what we're

going to study in this module.

I'm going to talk about chromosomes, genes,

genetic inheritance and expression of

recessive traits.

At the end of this module,

students will be able to describe

the relationship between genes,

chromosomes and DNA.

And explain how genes express themselves.

What are chromosomes?

Let's see.

Human life begins from a single cell,

a fertilized egg.

Human beings are made up

of trillions of cells.

The nucleus of each cell

contains 46 chromosomes.

These are threadlike structures

found in the nucleus of the cells.

The 46 chromosomes are,

They actually come in 23 pairs.

One member from each pair

comes from each parent.

If you observe this picture,

you find 23 pairs of chromosomes.

The 23rd pair determines sex of the person,

so if it is XX chromosome,

it results in a female.

If it is XY chromosome,

it results in a male.

Now genes are bead like structures which

are found on the threadlike structures,

which are nothing but the chromosomes.

So genes are are short segments

of chromosomes.

Which are composed of DNA

deoxyribonucleic acid.

DNA is a complex molecule that

contains genetic information.

This genes are units of

hereditary information.

Genes act like blueprints for cells.

Why are they called blueprints?

Because they provide a plan of action

to the cells. They provide information

regarding growth, development,

reproduction to all the cells.

They enable cells to reproduce and

manufacture the proteins that are

necessary for maintaining life.

This is the Chromosome structure.

There is a somatic cell.

A closer picture of a closer

view of the nucleus.

The nucleus contains chromosomes,

the X shaped structure there.

The chromosome contains beadlike

structures which are genes,

and genes contain the DNA.

So you see the link between the

chromosome, genes and DNA in this picture.

Now fertilized human egg is a single cell
made up of 30,000 genes from each parent.

Multiple genes interact to give
rise to observable characteristics.

Something as simple as the color of the eye.

It was believed earlier that
there is only one gene that
determines the color of the eye.

But researchers today know that
there are around 8 different genes
that determine the color of the eye.

So multiple genes interact to give
rise to observable characteristics.

Observable characteristics are
nothing but structural, structure
or other behaviors other traits
expressed by the individual.

In some gene pairs,
1 gene is dominant over the other.

So genes can be dominant genes or recessive genes.

Genes are of two types and in some

pairs one is dominant over the other.

A dominant gene always shows

a characteristic.

But a recessive gene shows a characteristic

only in the absence of a dominant gene.

To take the example of eye color.

Brown color of the eyes is a dominant trait,

so it will show the color Brown,

if the dominant gene is present.

But blue color or green color

of the eye is a recessive trait,

and that color will be expressed

only if there is no dominant gene

in the pair inherited by the child.

Brown color of the eyes is a dominant trait.

Thus, 2 Brown eyed parents can have

a blue eyed child only if each parent

has a dominant gene for Brown eyes

and a recessive gene for blue eyes.

Okay, so basically the parents ought

to have a dominant gene as well as a

recessive gene. Because the parents

already have Brown eyes, it is,

it is understood that the parent

has a dominant gene of brown eyes.

Because dominant

genes override recessive genes

the parents have Brown eyes.

However, the child can inherit a

recessive gene for blue eyes from

each parent. So it is possible that,

in case of both parents,

the recessive gene passes onto the child,

so the child has inherited,

both recessive genes.

Since there is no dominant gene

it is the recessive gene which

will express itself.

So even though parents have Brown eyes,

they have passed on the recessive

genes to the child and so the

child will have blue eyes.

Having understood how.

Recessive traits are expressed and how
we inherit traits from our parents,
we wonder how complex characteristics are
expressed like personality or intelligence.

For such characteristics,
a number of chains come into play.

And this is referred to as
polygenic inheritance.

Have you ever wondered how
researchers have understood
these genes? why they have
why they have studied

Genes and their interaction?

How we inherit traits?

How do you think researchers
map chromosomes and the genes?

Well,

to understand this you have
to do some reading.

These are mandatory references

for this topic,

but I would also recommend that you read

go through these suggested readings.

And find an answer for yourself.

Thank you.