Hello, we're going to learn from the

title diversity of chordates and genetics.

Course codes is ZOC 102.

This is the module from unit number 9,

Chromosome structure and the

module name is Eukaryotic Chromosome, types of chromosome based

on centromere position.

In this module, we're going to learn about structure

of eukaryotic chromosome and types of

chromosome based on position of centromere.

By the end of this module you will be

able to describe structure of eukaryotic

chromosome, classify chromosomes based

on position of the centromere and

explain different types of chromosomes.

Let us first try to know

what chromosomes are.

The chromosomes are the nuclear

components of spatial organization,

individuality and function.

They are capable of self reproduction.

And, these chromosomes play vital

role in heredity mutation variation,

an evolutionary development of species.

Let us try to know about the

history of this chromosome.

In 1879, W Fleming first of all,

describe the splitting of chromosomes

and coined the term chromatin for

stainable material of the nucleus.

Later in 1883,W Roux suspected the involvement

of chromosomes in the mechanism of inheritance.

Then scientists Benden and Bovery

in 1887 reported that the number of

chromosomes for each species was constant.

The present name chromosome is coined

by scientist W. Waldeyer in 1888 to a

darkly stained bodies of nucleus,

which means in Greek language

Chrome is color and soma is body.

That's how the name proposed.

Then scientists W.S. Sutton and T. Boveri in

1902 suggested that chromosomes

were the physical structures which

acted as messenger of heredity.

Later in 1933 Morgan discovered the

function of chromosome in transmission

of heredity traits.

Heitz, Kuwanda, Geitter and Kaufman have described

the morphology of chromosomes.

That's about the history.

Now chromosome number.

The number of chromosome is constant

for a particular species. Therefore

these are of great importance in

determination of the phylogeny

and taxonomy of the species.

The number and set of chromosome

of gametic cells such as sperm and

ova is known as the gametic,

reduced or haploid sets of chromosomes

Talking about a diploid one,

the somatic or body cells of most

organisms contain two haploid sets or

genomes and are known as the diploid cells.

The diploid cells achieve the diploid

set of chromosome by the union of

haploid male and female gametes

in the sexual reproduction.

Now the size the size of chromosomes

varies from species to species

and it relatively remains constant

for a particular species.

The length of the chromosome

may vary from 0.2 to 50 micrometer.

The diameter of the chromosome may

be from 0.2 to 20 micrometer.

For instance,

human chromosome are up to

6 micrometers in length.

The organisms with less number of

chromosomes comparatively contain

large size chromosomes than those

having more number of chromosomes.

The chromosomes in cell are

never alike in size.

Some may be exceptionally large,

another may be too small.

The largest chromosomes are Lampbrush

Chromosome which are found in certain

vertebrate oocytes and Polytene

chromosome of certain dipteran insect.

The shape of the chromosome

is changeable from face to face

during cell growth and cell division.

In the resting phase or

interphase stage of cell,

the chromosomes occur in the form of thin,

coiled elastic and contractile

thread like stainable structure, the chromatin thread.

In the metaphase and anaphase the chromosomes

become thick and filamentous.

That was about the introduction.

Now let us discuss about the

structure of eukaryotic chromosome.

This is a structure of a typical metaphase

chromosome which has got following parts.

First one is chromatic. At mitotic metaphase

each chromosome consists of two symmetrical

structures called chromaticds. And each

chromatid contains a single DNA molecule.

And both chromatids are

attached to each other

only by centromere and become separated

at the beginning of anaphase, when sister

chromatids of chromosome migrate to

opposite poles.

Next structure is chromonema.

It is a coiled filament which

is seen in the chromosome.

This was found by Vejdovsky in 1912.

Chromonema may be composed of two,

four or more fibers according to the species.

The number of threads in Chromonema

may depend on different phases.

The thread or fibres of chromonema

remain coiled with each other.

Now these coils maybe of

following two types.

Either it can be Paranemic coil or Plectonemic coil.

When chromonemal threads are

easily separable from their coils it is Paranemic coil.

But when the chromonemal threads remain

Inter-twined so intimately that

they cannot be separated easily,

these are called as Plectonemic coils.

Third part is Chromomeres.

The Chromonema contains alternating

thick and thin regions.

The thick or bead-like structure or

chromonema are called as Chromeres.

Thin region in between the Chromeres

is termed as the inter-chromomeres.

The position of the chromeres in

the cromonema is found to be constant

for a given chromosome.

Now, very important part is Centromere.

The shape of chromosome is determined

by the primary construction located at

the point where arms of the chromosome meet.

Within the construction is a clear zone

containing a small granule or spherule.

And this clear region is called Centromere

Or Kinetochore.

The chromosomes

of most organisms contain only one

centromere and are known as

monocentric chromosomes.

Whereas if there are two or more

centromeres they are termed as

dicentric and polycentric chromosomes

Secondary constriction also play a very

important role in the formation of nucleus.

And therefore known as the nuclear

zone or nucleolar organizers,

Then Tilomere,

each extremity of chromosome has a

polarity and therefore it prevents other

chromosomal segments to be fused with it.

The chromosomal ends are known as Telomere.

As you can see it is labelled in the diagram.

The last part is satellite. Chromosomes

bear round elongated or knob-like

appendages known as satellites and

the satellites remains connected

with the rest of the chromosome

by a thin chromatin filament,

The chromosomes with the satellite

are designated as Sat chromosomes.

The shape and size of satellite

remain constant.

Since we have discussed about centromere,

there are different types of chromosome

based on centromere position.

First one is Telocentric,

Acrocentric, Submetacentric,

and Metacentric

Rod like chromosomes which have the

centromere on the proximal end are known as the Telocentric chromosome.

Acrocentric

chromosomes are also rod like in shape.

But these have the centromere at one

end and thus giving a very short arm

and an exceptionally long arm.

As you can see short arm is p and long arm is q.

This is seen in Locust.

Submetacentric are J or S shaped chromosome.

In these, centromere occurs near the centre

or at the medium portion of the chromosome,

thus forming two unequal arms.

And last one is metacentric chromosome.

Which are of V shape and in these

Chromosomes, the centromere occurs in the

center and forming two equal arms.

And the amphibians will have this

metacentric types of chromosome.

That's all about the structure of

eukaryotic chromosome and different

chromosome based on position of centromere.

These are my references.