



**COMPILED AND CIRCULATED BY ARPITA CHAKRABORTY, STATE  
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**STUDY MATERIAL COMPILED AND  
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TOPIC-BASIC CONCEPTS IN GENETICS.**



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**1. Name the organism with highest number of chromosome.**

*Ophioglossum reticulatum*, with 1260 chromosome.

**2. What are the different shapes of chromosome?**

**Telocentric**-When the centromere is at the proximal end of chromosome.

**Acrocentric**-When the centromere is at one end; therefore one arm of the chromosome is very short and one arm is very long.

**Sub metacentric**-When the centromere is almost near the centre of the chromosome (J or L shaped).

**Metacentric**- When the centromere is in the centre of the chromosome (V shaped) and chromosome arms are equal.

**3. What are allosomes? (or accessory chromosomes or heterochromosomes)**

Allosomes are sex chromosomes and determine the sex of its bearer. They are usually of two types X and Y chromosome.

**4. What are chromonema?**

Chromonema are the fibrils or threads of DNA in a chromosome. The chromonema remain coiled with each other and may be two in each chromosome. They are usually the structure of interphase chromosome.

**5. What is the difference between paranemic and plectonemic coiling of chromonema?**

When the chromosomal threads remain parallelly and loosely coiled with each other and are easily separable-it is called paranemic coiling.

When the chromosomal threads are intimately intertwined and cannot be separated easily-it is called plectonemic coiling.

**6. What is chromomeres?**

The chromonema in the prophase exhibit alternating thick and thin regions, the bead like thick regions are sites of superimposed coils of DNA and are called chromomeres.



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**7. What is centromere and kinetochore?**

Chromosomes have constriction and within the constriction is a clear zone containing a small granule or spherule. This clear zone is called centromere. A plate like protoplasmic body connecting the centromere is called kinetochore.

**8. What are secondary constrictions?/Nucleolar organizer.**

Apart from primary constriction or centromere, chromosomes have additional constriction at any point, these are called secondary constriction. Some secondary constriction play role in formation of nucleus and are called nucleolar organisers.

**9. What is a telomere?**

The chromosomal ends, having polarity and inhibiting fusion of other chromosomal segments are called telomeres.

**10. What do you mean by sat chromosomes? Satellites?**

Sometimes chromosomes bear round elongated or knob like appendages known as satellites. The satellite remains connected with the rest of the chromosome by a thin chromatin filament. The chromosomes with satellites are called sat chromosomes.

**11. Differentiate between euchromatin and heterochromatin.**

Heterochromatin are those regions of chromosome that remain condensed during interphase and early prophase. The parts of chromosome that remain in noncondensed state during interphase are called euchromatin. Heterochromatin during interphase have 250 Angstrom fibrils whereas euchromatin have 30 Angstrom to 80 Angstrom fibril.

**12. What are the two types of heterochromatin?**

Constitutive heterochromatin and Facultative heterochromatin.

**13. What are the functions of heterochromatin?**

The heterochromatin has specific role in the biogenesis of ribosomes and tRNA molecules. Centromeric heterochromatin may be involved in the separation of chromosomes during cell division.

**14. What is the chemical nature of chromosome?**

Chemically chromosomes of prokaryotes are composed mainly of DNA, along with associated enzymes like DNA and RNA polymerase, chromosomes of eukaryotes are composed of DNA and associated with specific nuclear protein and



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histone(H1,H2,H3,H4) and non histone or acidic proteins to form a stable nucleoprotein complex, the chromatin. Enzymes RNA and DNA polymerase and various amounts of RNA and phospholipids are also intimate by associated with chromatin.

**15. Give the ultra structural packaging model of DNA/What is a nucleosome?**

The DNA double helix is coiled around a bead like structure called Gamma bodies or nucleosomes. Nucleosomes are 110 Angstrom in diameter and 55-57 Angstrom in height and have core particle and linker DNA. The core particle of nucleosome is an octamer of 4 histone proteins(2 each),H2a,H2b,H3 and H4.The DNA makes 1.75 turns around the core particle covering 84bp per turn totalling 146bp.The linker DNA is the part of DNA that runs free between 2 adjacent core particles and is about 50-340Angstrom.Histone H1is associated with linker DNA.

Nucleosome=146 bp DNA+2(H2a,H2b,H3,H4)/core particle+linker DNA+H1

**16. What are the different levels of chromosome coiling or packaging?**

The DNA double helix is itself a coiled structure;the helicalwrapping of the double helix around the nucleosome core particles gives an effective width of 30 Angstrom. A string of nucleosome with each internucleosomal DNA bridge form a 100 Angstrom unit fibre.This fibre may be coiled and recoiled (upto 7 levels) forming a solenoid resulting in about 500 fold shortening.

**17. What is the chemical nature of DNA?**

DNA has three kinds of molecules –(a) Pentose sugar deoxyribose,

(b) a phosphoric acid

(c) nitrogen bases-(i)pyrimidine(cytosine and

Thymine) and

(ii) purine(adenine and

Guanine)

**18. What is the difference between nucleoside and nucleotide?**

Nucleoside=pentose sugar(deoxyribose)+nitrogen base

Nucleotide=deoxyribose+nitrogen base+phosphate group



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**19. Give an outline the Watson and Crick's model of DNA double helix.**

Two polynucleotide chains are wrapped helically around each other and run antiparallely i.e. one in 3'-5' and one 5'-3' direction. The coiling is right handed and a complete turn occurs every 34 Angstrom; 10 mononucleotide occur per complete turn with a distance of 3.4 Angstrom between each nucleotide. The DNA duplex has a constant diameter of 20 Angstrom.