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Paper - T B

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Zoology (B.Sc Part-I)

## CHROMOSOMES

Q1 - Describe the ultrastructure and functions of chromosomes

Describe the structural organisation of a chromatin fibre. How does it get packed to appear as a chromosome of definite shape and morphology?

Ans - Chromosomes were first observed by W. Hofmeister in 1884 during study of nuclear division in the pollen mother cells (stamen hairs) of Tradescantia.

The person name chromosome was introduced by W. Waldeyer in 1888. The function of chromosome in the transmission of hereditary traits was discovered by Morgan in 1933.

Definition: - Filamentous bodies present inside the nucleus of Eukaryotic cells capable of self reproduction and maintenance of their morphological as well as physiological properties during successive cell divisions are known as chromosomes.

These are carries of the genes or units of heredity and play an important role in transmission of hereditary characters, mutation, variation and evolutionary development of species. These absorb ultraviolet light of  $2600 \text{ \AA}$  intensity.

Size of the chromosomes: -

(1) The size of chromosomes varies from species to species it is relatively constant

for a particular species.

- (ii) The length ranges from 1 to 50  $\mu$ , and diameter ranges from 0.2 to 2  $\mu$ .
- (iii) The length of human chromosome ranges between 4 to 6  $\mu$ .
- (iv) The giant chromosomes of insects or other organisms may measure about 800  $\mu$  in length and 10  $\mu$  in width.

### Shape of chromosomes:

- (i) During interphase chromosomes appear as thin coiled, elastic and contractile thread like structures.
- (ii) During cell division shape of the chromosome changes from phase to phase.
- (iii) During metaphase and anaphase chromosomes become thick like  $\gamma$  filaments.
- (iv) The shape varies also according to the position of the centromere.

### Number of chromosomes:

- (i) The number of chromosomes is constant for a particular species.
- (ii) Gametes contain only one set of chromosomes. This number is represented by 'n' and known as haploid number. A haploid set of chromosome is also known as genome.
- (iii) Somatic cells contain two sets of chromosomes. This number is represented as '2n' and known as diploid number. It is minimum in *Ascaris megalocephalus* univalens only two, whereas it is maximum 1056 in *Ophioglossum*.

(iv) Some organisms are sometimes in possession of chromosomes in multiples of  $n$ . This condition is known as polyploidy and the organism is known as polyploid.

Diploid number of chromosomes of a few common species of animals are as follows: —

Animal	Zoological name	$2n$
(1) Round Worm	<i>Ascaris megalocephalus</i>	2
(2) Mosquito	<i>Culex pipiens</i>	6
(3) Fruit fly	<i>Drosophila melanogaster</i>	8
(4) House Fly	<i>Musca domestica</i>	12
(5) Toad	<i>Bufo</i>	22
(6) Frog	<i>Rana Tigrina</i>	26
(7) Rabbit	<i>Oryctolagus Cuniculus</i>	44
(8) Gorilla	<i>Gorilla gorilla</i>	48
(9) Man	<i>Homo sapiens</i>	46
(10) Pigeon	<i>Columba livia</i>	80
(11) Cat	<i>Felis domestica</i>	38
(12) Rat	<i>Rattus rattus</i>	78
(13) Fowl	<i>Gallus domesticus</i>	76
(14) Mouse	<i>Mus musculus</i>	40