

CHROMOSOME

Chromosomes were first discovered by E. STRASBURGER as thread like structure in the nucleus during cell division.

However, the name chromosome was coined by WALDEYER. They are the carriers of genes or unit of heredity. The chromosome of eukaryotic organisms are not visible in the active nucleus prior to cell divⁿ due to high water content. Most of the chromosomes in the cells are called autosome. In addition, there are one or two sex chromosomes or heterosomes which carry the genes for determination of sex.

The chromosome number greatly varies but it is always constant for a particular sps. closely related sps. generally have similar chromosome number. Presence of whole set of chromosome is called euploidy. Gametes normally contain one set of chromosome. This is called haploid number. Somatic cells generally contain two set of chromosomes and therefore called diploid number $[2n]$. Two similar chromosomes are called as homologous chromosomes which come in contact at zygotene and paired lengthwise through out their length. Chromosomes also differ greatly in size and shape in different organism. The shape of chromosome is generally observed at anaphase and it is

usually determined by the position of centromere. And accordingly they may be V or J shaped in anaphase.

PHYSICAL STRUCTURE

The chromosomes are shortest during metaphase of cell division and appear as cylindrical rods. Generally plant chromosomes are bigger than the animal ones. And chromosomes of monocots are bigger than those of dicots and other plants. All the individuals of one sp. have similar chromosomes.

Each chromosome consists of a homologous matrix which is not stainable _____ dyes that stain the chromosome.

In the matrix of each chromosome two coiled thread like structures found called chromonemata. The chromosome was supposed to a membranous pellicle. Electron microscopic studies later showed that there is no definite membranous pellicle covering the chromosomes. The various str. present in the chromosomes are described below separately.

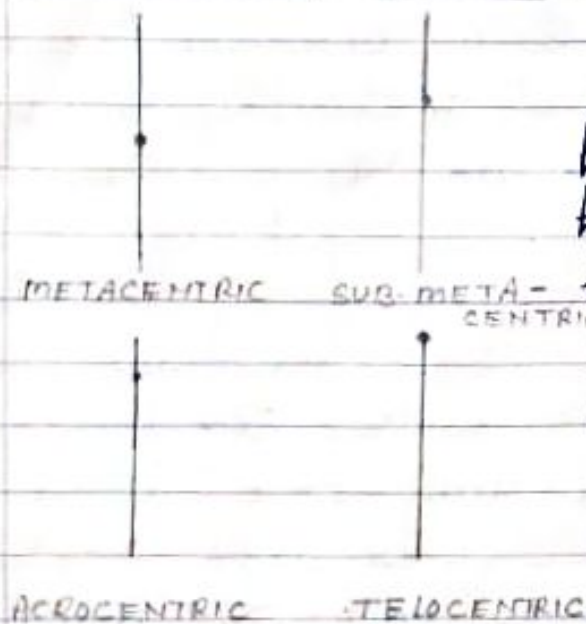
CHROMONEMATA :- Under light microscope the metaphasic chromosome appears to be made up of two sub-units called

chromatids. These are possibly twisted around each other. Each chromatid consists of two sub-chromatids. Possibly the sub-chromatids represent the chromonemata. There is, however, no general agreement regarding the number of chromonemata in each chromosome. The two chromonemata or genonema of a chromosome are plectonimically coiled around each other. And due to this coiling they are held together. Rarely they are paranemically coil. In this case they are easily separable. Because the two chromonemata are not relationally coiled around each other.

CENTROMERE OR KINETOCHORE

The chromosome has constricted region called centromere or primary constriction. Its position is constant for a particular chromosome. The structure and function of centromere is different from that of the rest of the chromosome. During division the centromere is functional, while the rest of the chromosome is generally inactive. Therefore the centromere may be the locus of genes for mitotic or meiotic activity.

Four types of ^{chromosomes} ~~types~~ are known depending on the position of the centromere. These called metacentric, sub-metacentric,

acrocentric and telocentric

Generally the chromosome has only one centromere. However, in some plants the number may be more or none. Depending upon the no. of centromere the chromosomes may be monocentric, dicentric, polycentric & acentric. The acentric

chromosomes are frequently lost because of their non-inclusion in daughter nuclei. Sometimes the chromosomes do not have definite and distinct centromere and it is spread throughout the length of the chromosome. Centromeres are the region of attachment of spindles. Centromeric DNA is highly repetitive and due to its distinct buoyant density generally bands away from the main DNA band on a density gradient. These distinct bands are known as satellite bands.

CENTROMERIC CHROMOMERES

In metaphase chromosome which consists of 2 chromatids, few granules can be seen within the centromere.