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B-se-I. (Zool Honrs)

Paper-I B

## structure of chromosomes

The chromosomes of interphase nucleus look like thin coiled, elastic and contractile thread like structures. These threadlike structures are known as chromatin threads. These were named chromonemata (singular chromonema) by Veydovsky in 1912.

A typical chromosome has following structures:

- (i) CHROMONEMA.
- (ii) CHROMOMERES.
- (iii) CENTROMERE OR PRIMARY CONSTRICTION.
- (iv) NUCLEAR ORGANISER OR SECONDARY CONSTRICTION.
- (v) TELOMERES
- (vi) SATELLITE.

(1) CHROMONEMA:— A typical chromosome appears to be composed of two subunits during metaphase. These subunits are named chromatids. The latter are held together at a point along their length. The point of their attachment is known as centromere.

Each chromatid to be composed of two longitudinal sub divisions known as subchromatids. The latter are also known as chromonemata (singular chromonema).

Each chromonema is composed of a variable number of microfibrils. The number of microfibrils may be one, two, four or eight.

The chromonemal threads remain coiled with each other. This coiling may be of the following two types:

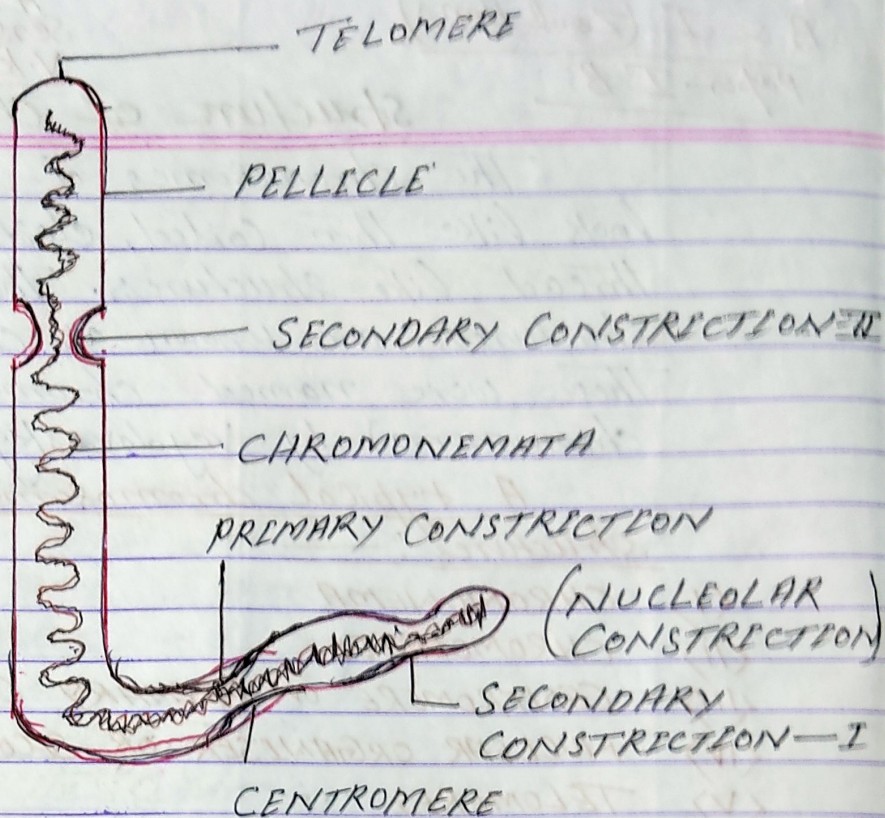


Fig: — Internal Structure of Chromonemata

(a) PARANEMIC COILS: — When two chromonemal threads are coiled in such a way that these can be separated easily then this is known as paranemic coils.

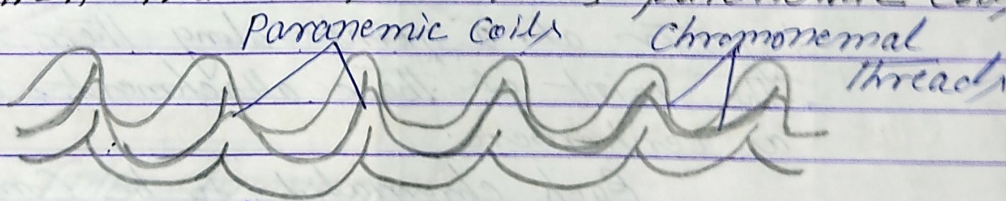


Fig: — Paranemic coils.

(b) PLECTONEMIC COILS: — When chromonemal threads are twisted around each other in such a way that during separation these remain in an interlocked state i.e. can not be separated easily then coils are known as plectonemic coils.

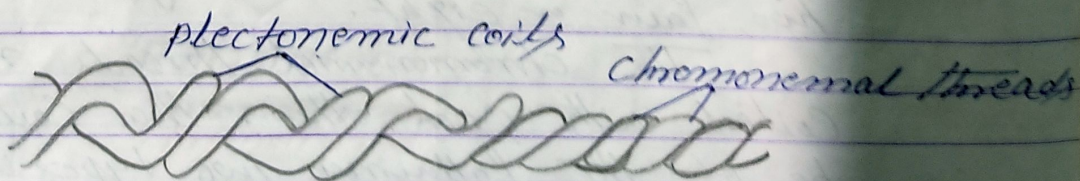


Fig: — plectonemic coils.

Chromonemata may have paranemtic coils in one part and plectonemic coils in other parts.

(II) CHROMOMERES: — Numerous bead like structures located linearly along the whole length of the chromonemal threads are named chromomeres.

Each chromomere has a diameter of about 0.5 to 2  $\mu$ . These can be seen obviously during early prophase of meiotic division. These are formed by coiling of ~~chromomere~~ threads.

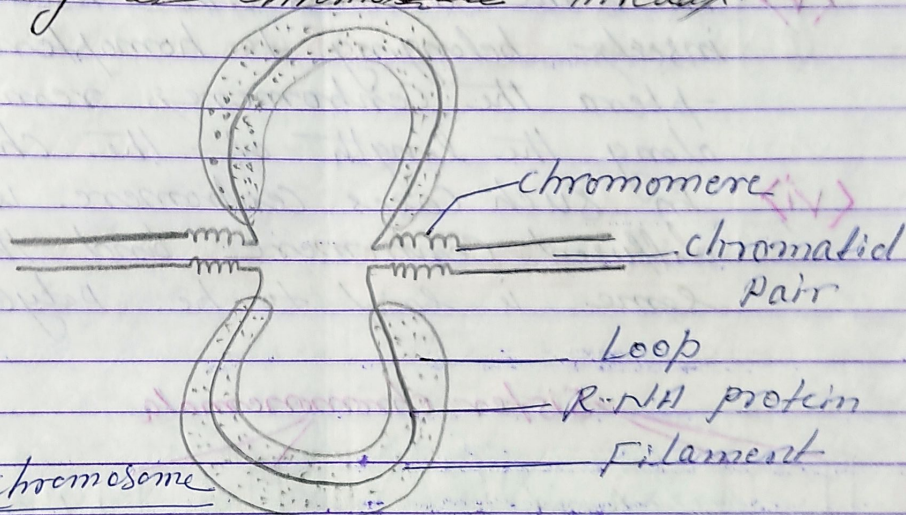


Fig: — Chromosome

(III) CENTROMERE OR PRIMARY CONSTRICTIONS: —

Non-staining constricted area along the length of chromosome which joins two chromatids together is designated as centromere or primary constriction or kinetochore. It provides site for attachment of chromosomes to the spindle fibers during cell division and determines the shape of the chromosomes during anaphasic movement.

A centromere is composed of one or more granular structures known as centromeric chromomeres and interchromosomal fibrillae.

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- (i) Daughter chromatids have only two gra-  
-ules when they are separating during  
anaphase.
  - (ii) Their duplication occurs at some time  
during mitosis or meiosis.
  - (iii) The chromosomes of most organisms have  
only one centromere and are known as  
monocentric chromosomes.
  - (iv) Certain chromosomes are provided with  
two or more centromeres and are known  
as dicentric and polycentric chromosomes.
  - (v) In some animals like *Ascaris* and some  
insects belonging to homoptera and hemi-  
-ptera the centromeres remain diffused  
along the length of the chromosomes.
  - (vi) In such cases centromere is termed  
diffused centromere and the chromo-  
-some is said to be polycentric.

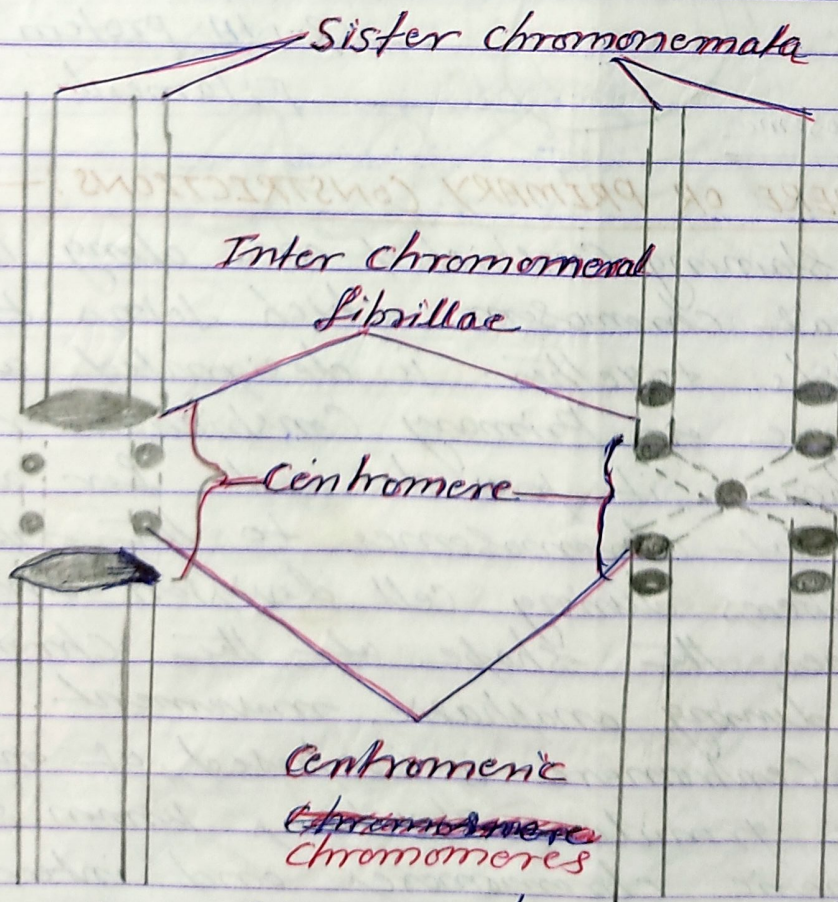


Fig: — Diagrammatic representation of centromere structure. (1)