Chromosomal Aberration (Genetics)

22

Chromosomal aberration and Chromosomal mutation

It is the changes in the gross structure of chromosomes number or in structure are called chromosomal aberration. It resulted in important changes in body characters. It is common in plants as doubling of chromosome number is called Polyploidy. In some animal also occurs and resulted change the character of the animal causes of a new species appearens. chromosomal mutation is an important factor for evolution. changes the character of species from one gene ration equal next generation and after a longe time, a new species appears. Mutation occurs in all direction it is usefull or Harmfull.

Chromosomal aberration are as follows: —

change in number of chromosome : —

change in number of whole chromosomes is called heteroploidy (Burns and Bottino 1989). It involves entire sets of chromosome — Euploidy or loss or addition of single whole chromosome — aneuploidy

Euploidy → In euploidy the whole haploid set and is either loss orgain called Euploidy. It is three

It is three types of euploidy

(a) monoploidy → In this type the somatic cells have one haploid set.
ex - male honey bee.

(b) Diploidy → Each and every species have diploid set of chromosome in they somatic cell.

(c) Polyploidy → Any organism which have more than two genomes (set) it's called as polyploidy. and this
- According to number of genome
It is triploid, tetraploid, pentaploid etc.
Polyploidy occurs generally in plants as rose genus have somatic number - 14, 21, 28, 35, 42 and 56 some times species and Drosophila also have polyploids chromosome. ex - wheat - hexaploid, strawberries - octaploid.

Aneuploidy : → Aneuploidy can be involves either loss of one or more chromosome number or addition of one or more chromosome to the complete chromosome set. Loss of one or more chromosome is hypoploidy and addition of one or more chromosome is hyperploidy. and caused
It is five types of aneuploidy.

(a) Monosomy → Diploid organism which are missing one chromosome of a single pair are monosomic number of chromosome is $2n-1$.

(b) Nullisomy → An organism which has lost one pair of homologous chromosome, number of chromosomes are $2n-2$.

(c) Trisomy → Those diploid organism which have an extra chromosome. that have $2n+1$. It mean Trisomic causes down syndrome - male have 45+XY chromosome.

(d) Tetrasomy → Diploid organism have two extra chromosomes. number of chromosomes are $2n+2$. Tetrasomic example of wheat.

(e) Double trisomy : → In diploid organism when two different chromosomes are represented. number of chromosomes are $2n+1+1$.

(2) Change in the structure of chromosome :-

During prophase first of meiosis, homologous chromosomes show a change in their structure and gene arrangement between chromosome.

Types of structural changes :-

(a) Deletion : → some part of the chromosome

Teacher's Signature .....

loss after breakage is such loss of a part of a chromosome is called deletion. This deletion is transmitted to the next generation as short arm of one X-chromosome produces a typical turner syndrome.

(b) Duplication ⟶ During meiosis crossing over take place in which some part of chromosome exchange between homologous chromosome. During the process some part of one chromosome attached the other chromosome but some part of other chromosome not attached with the first chromosome then at this condition first chromosome is deleted at other chromosome called duplicated.

It is two type :

(i) Tandemduplication — when duplicated segment situated just behind each other.
As example — ABC.DEF.DEF.GH.

(ii) Reversetandem :— when duplicated segment situated opposite with each other.
As example :- ABC.DEF.FED.GH.

(c) Inversion : ⟶ when some part of a chromosome break and again attached by a rotation of 180° with that chromosome then called inversion. This change the arrangement of genes.

[Type text]

d) Translocation :- ⟶ when chromosomal exchange takes place between two nonhomologous chromosome or transfer of a part of chromosome then it called translocation. There is no addition or loss of genes during translocation, only re-arrangement of gene.

Fig:-

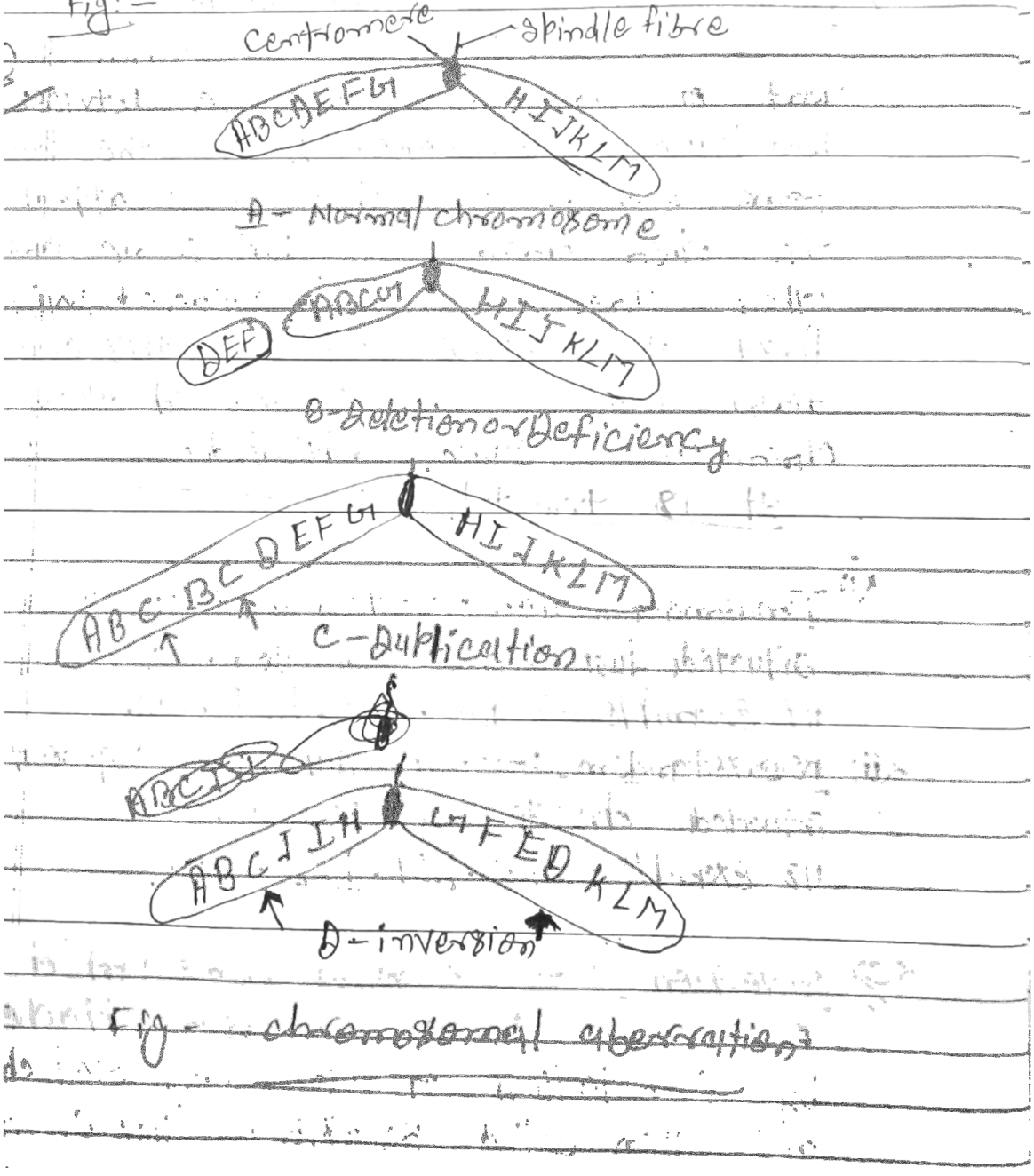

Fig:- chromosomal aberration

[Type text]

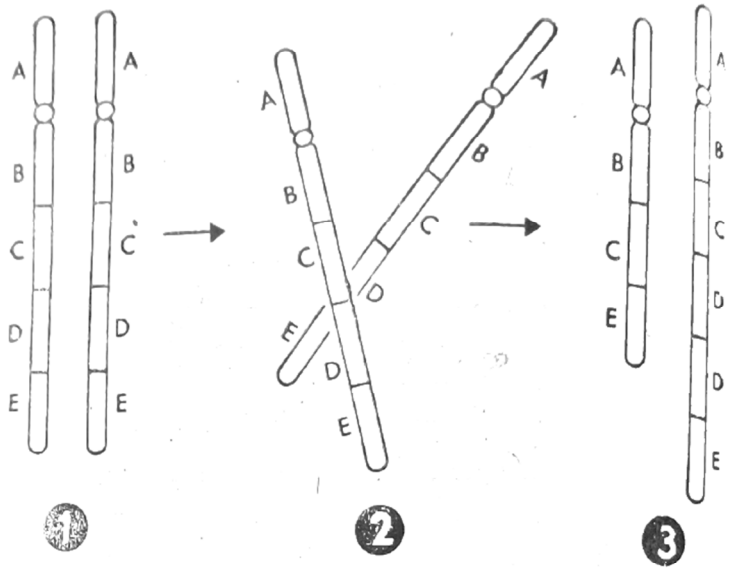

Fig. 8.2. Duplication

(c) Inversion—When a broken part of the chromosome reunites with the parts in a reverse order (Fig. 8.3). It reduces the rate of crossing over and maintains heterozygosity in offsprings.

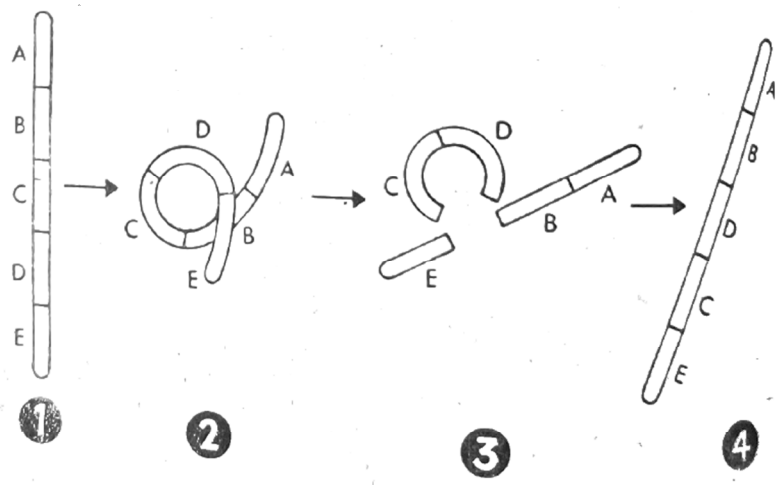

Fig. 8.3. Inversion

Interchromosomal aberration

Translocation—It involves the exchange of parts between two non-homologous chromosomes (Fig. 8.4).

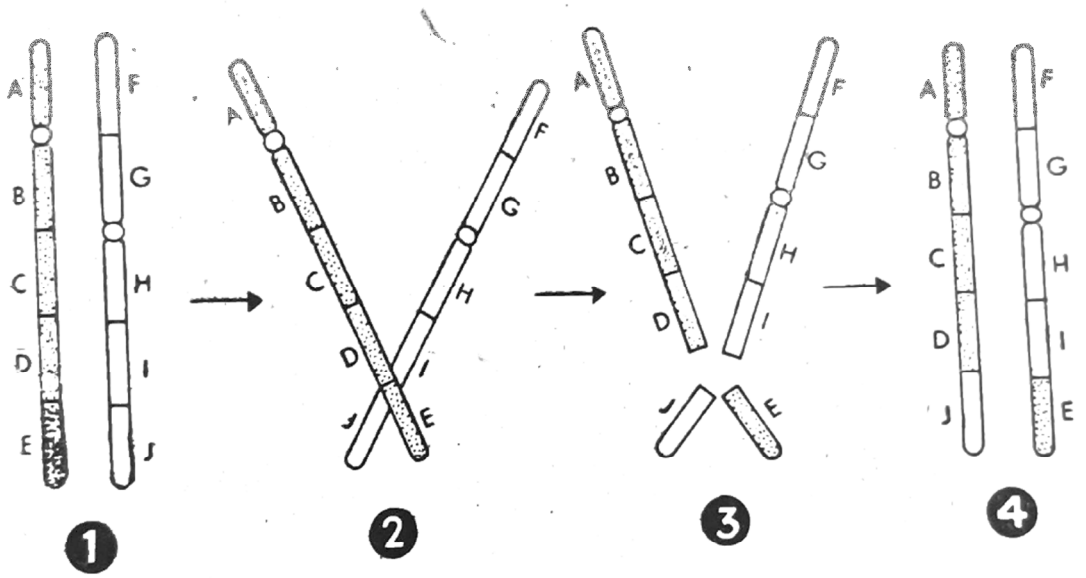

Fig. 8.4. Translocation between two non-homologous chromosomes