TRANSLOCATION

Q.Define translocation.

A translocation is a chromosomal mutation in which there is a change in position of chromosome segments and the gene sequences they contain (**Figure4**). There is no gain or loss of genetic material involved in a translocation.

Q.What are the major types of translocation?

Two simple kinds of translocations occur.

(a)One kind involves a change in position of a chromosome segment within the same chromosome this is called an **intrachromosomal** (within a chromosome) translocation.ome) (**Figure4a**).

(2)The other kind involves the transfer of a chromosome segment from one chromosome into a nonhomologous chromosome, this is called an **interchromosomal (between chromosomes) translocation** (Figure 7.12 b and c).

a)If this latter translocation involves the transfer of a segment in one direction from one chromosome to another, it is **a nonreciprocal translocation** (**Figure4b**).

b)If it involves the exchange of segments between the two chromosomes it is a **reciprocal translocation** (Figure 7.12c).

Q.With a suitable diagrammatic presentation explain different types of translocation.

In organisms homozygous for the translocations, the genetic consequence is an alteration in the linkage relationships of genes. For example, in the nonreciprocal **intrachromosomal translocation** shown in **Figure4a**. , the BC segment has moved to the other chromosome arm and has become inserted between the F and G segments. As a result, genes in the F and G segments are now farther apart than they are in the normal strain, and genes in the A and D segments are now more closely linked. Similarly, in reciprocal translocations new linkage relationships are produced.

Q.What is the significance of reciprocal translocation? Q.How translocation exerts effect on meiosis?

(1)Translocations typically affect the products of meiosis. In many cases, some of the gametes produced are unbalanced in that they have duplications and/or deletions and, are, in many cases inviable.

(2)There are other cases in which gametes are viable, such as familial Down syndrome, resulting from a duplication stemming from a translocation (see later in the chapter). We focus here on reciprocal translocations, since they are the most frequent and the most important in genetic studies.

(3)In strains homozygous for a reciprocal translocation, meiosis takes place normally. Since all chromosome pairs can pair properly and crossing-over does not produce any abnormal chromatids.

(4)In strains heterozygous for a reciprocal translocation however, all homologous chromosome parts pair as best they can. Because there is one set of normal chromosomes (N) and one set of translocated chromosomes (T) involved, the result is a cross like configuration in meiotic prophase (**Figure5**). These crosslike figure consists of four associated chromosomes, each chromosome being partially homologous to two other chromosomes in the group.

(5) Segregation at anaphase I may occur in three different ways.

i)In one way, termed **alternate segregation**, alternate centromeres segregate to the same pole(**Figure5**). Left N1 and N2 to one pole, T1, T2 to the to the other pole).

ii)This Produces two gametes, each of which is viable because it contains a complete set of genes, no more, no less. One of these gametes has two normal chromosomes and the other has two translocated chromosomes.

iii)In the second way, termed adjacent-1 segregation, adjacent nonhomologous centromeres migrate to the same pole (**Figure5**). middle: Nj and T, to one pole, N2 and Ti to the other pole).

iv) Both gametes produced contain gene duplications and deletions and are often inviable.

v)Adjacent-1 segregation occurs about as frequently as alternate segregation.

vi)**In the third way**, termed **adjacent-2 segregation**, different pairs of adjacent hommologous centromeres migrate to the same pole (**Figure 5**). N1 and T1 to one pole, N and T2 to the other pole).