
GENOME MAPPING

The gene mapping describes the methods used to identify the locus of a gene and distances between genes.

The mapping is done through two methods:

1. Genetic mapping.
2. Physical mapping.

GENETIC MAPPING: It is based on the assumption that when two genes are close together, the possibilities of their being together in next generation is more likely than the genes that are far apart. Thus co-segregation pattern of the genes can be used to construct their order. The genetic mapping describes the order of genes present in genome but does not reveal the distance between two genes in terms of base pairs or the location of genes in the chromosome.

The genetic mapping is done by genetic studies using Mendelian principles and involving directed breeding programmes for farm animals. The loci that are studied are genes, whose inheritance patterns are followed by monitoring the phenotypes of the offspring produced after a cross between parents with contrasting characteristics (e.g., tall and short for pea plants studied by Mendel). The inheritance pattern reveals the extent of genetic linkage between genes present on the same chromosome, enabling the relative positions of those genes to be deduced and a genetic map to be built up.

PHYSICAL MAPPING: it indicates the physical position of a gene in a chromosome. The physical position of a gene can be found out by a method called fluorescent in-situ hybridization (FISH). In this technique, a single stranded oligonucleotide called probe labelled with a fluorescent dye is used for hybridization to chromosomes immobilized on the glass slide. This probe is complementary to the nucleotide sequence of a gene (that is to be mapped). The chromosomes placed on the slide are denatured by exposing the slides to formamide. The fluorescent labelled probe is added to slide. The probe gets attached to the site of chromosome that is complementary to the probe and the fluorescent dye starts fluorescing indicating the position of gene in the chromosome.