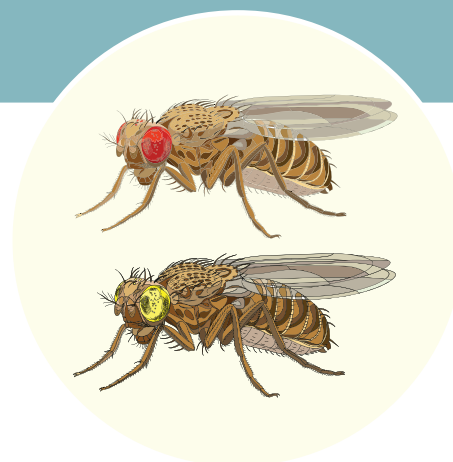


4

CHAPTER

UNIT - II

Principles of Inheritance and Variation



Drosophila are ideal for the study of genetics and development

Chapter outline

- 4.1 Multiple alleles
- 4.2 Human blood groups
- 4.3 Genetic control of Rh factor
- 4.4 Sex determination
- 4.5 Sex linked inheritance
- 4.6 Karyotyping
- 4.7 Pedigree analysis
- 4.8 Mendelian disorders
- 4.9 Chromosomal abnormalities
- 4.10. Extra chromosomal inheritance
- 4.11. Eugenics, euphenics and euthenics



Learning objectives

- *Learns the inheritance of multiple alleles with reference to human blood groups.*
- *Understands the mechanism of sex determination in human beings, insects and birds.*
- *Learns about sex linked (X and Y) inherited diseases in human beings.*
- *Understands the Mendelian disorders and diseases associated with chromosomal abnormalities.*
- *Gains knowledge on extra chromosomal inheritance.*
- *Realises the significance of the applications of genetics in the improvement of human race.*



Genetics is a branch of biology that deals with the study of heredity and variations. It describes how characteristics and features pass on from the parents to their offsprings in each successive generation. The unit of heredity is known as the gene. Gene is the inherited factor that determines the biological character of an organism. A variation is the degree by which the progeny differs from their parents.

In this chapter, we are going to learn about multiple alleles with reference to the human blood groups, sex determination in man, insects and birds, sex linked inherited traits, genetic disorders and extra chromosomal inheritance. The betterment of human race can be achieved by methods like eugenics, euphenics and euphenics.

4.1 Multiple alleles

The genetic segregations in Mendelian inheritance reveal that all genes have two alternative forms – dominant and recessive alleles e.g. tall versus dwarf (T and t). The former is the normal allele or wild allele and the latter the mutant allele. A gene can mutate several times producing several alternative forms. When three or more alleles of a gene that control a particular trait occupy the same locus on the homologous chromosome of an organism, they are called multiple alleles and their inheritance is called **multiple allelism**.