Preface

Courtship and mating are important behavioral events in the life of any organism because it is the prerequisite for sexual reproduction. No doubt organisms can also reproduce asexually without exhibiting any courtship or mating activities or even without producing gametes, sexual reproduction is important because it is through this type of reproduction the organisms gain variations. The sexual reproduction is thus quite crucial from the point of view of natural selection and evolution. Many organisms exhibit elaborate courtship and mating which could be easily observed and differentiated. However, explaining the courtship activity and mating behavior in terms of genetics is not an easy task. It is a multilevel activity involving many genes acting at many different times in the organism’s life (Greenspan and Ferveur, 2000).

In the animal kingdom many groups of organisms such as insects, fishes, amphibians, birds and mammals exhibit elaborate courtship. However the genetic analysis of courtship and mating cannot be studied in these organisms because of the complexities of the systems as much as the behavior itself.

_Drosophila_ being the most useful model system for many genetic studies has also been used for analysis of courtship and mating. The basic courtship pattern and mating of _D.melanogaster_ was studied by Sturtevant (1915). Although the sexual behavior of a few other species also has been studied the genetics of it is poorly understood. This is because, courtship is a long process of many discrete, variable elements controlled by many complex genes (Hall 1994; Mackay 2001). As other complex characteristics, the genetic analysis of the courtship traits is also difficult because these traits are controlled by both polygenes whose expression is influenced by both genetic and environmental interactions. Because of the complexity and
absence of appropriate technique to analyze them little information is available on the
genetic control of courtship behavior. Although complete genetic map along with the
sequence is available for *Drosophila*, the nature of genetic control of behavioral traits
has not yet been understood. Now a few modern molecular techniques such as
Restriction Fragment Length Polymorphism (RFLP) and Random Amplified
Polymorphic DNA (RAPD) analysis have been developed for analysis of genomes of
many organisms. Even complex traits such as fecundity, fertility, longevity,
productivity etc have been subjected for genetic analysis using these molecular
techniques. So far no effort has been made to use these techniques in the genetic
analysis of behavioral traits. In this context the present work was envisaged and
experiments have been carried out to analyze a few sexual behavioral traits. Both
classical and molecular techniques have been adapted in this study. The experiments
carried out and the results obtained there in are presented in three chapters.
The first chapter deals with the selection experiments where extreme phenotypes of
four behavioral characteristics viz, orientation, tapping, wing vibration and copulation
duration were obtained through rigorous selection.
Genetic crosses were made using these selected extreme behavioral phenotypes to
understand the pattern of inheritance of these traits. The results of these experiments
are given in the second chapter.
In Chapter three, the results obtained through RAPD analysis is presented. The four
behavioral traits were analyzed using RAPD analysis. The parental flies used for
making genetic crosses and the progeny obtained were subjected to RAPD analysis to
understand the genetic structure of these traits.