Preface

The tree of life is divided into three domains namely Bacteria, Archaea and Eukaryotes. Archaea are the prokaryotes having features of both the bacteria and the Eukaryotes. This unique characteristics makes them interesting to study. In this thesis we have studied Riboswitches and different types of ncRNAs in Archaeal domin. This thesis has been organized into five chapters.

Chapter 1 briefly introduces an overview of the Archaeal domain. It includes Archaeal classification, habitat, morphology and important cellular characters. It also includes a general introduction about different types of ncRNAs and RNA secondary structure prediction. The major part of this chapter is covered thorough a literature survey of various research work done in this area. This chapter provides a detailed description of the RNA world, RNA structure, gene regulation, riboswitches and different types of ncRNAs. gene control mechanism of riboswitches and their classification.

In Chapter 2 the focus is on the identification of different types of Riboswitches in Archaeal genomes. Sequence and structural comparison are used for the prediction of different types of Riboswitches in Archaeal organisms. The multiple sequence alignment, secondary and tertiary structure prediction, structural alignment, minimum free energy calculation of the predicted structures to the already known instances of riboswitches in the Bacteria and Eukaryotes are described in this chapter.

In Chapter 3 the focus is on the identification of Riboswitches in Archaeal Metagenomes. Environmental samples deposited in the NCBI were taken and searched for different classes of Riboswitches using Bioinformatics approach. The identified hits are confirmed by comparing them to already defined riboswitches in bacteria on the basis of sequence and structure conservation.

In Chapter 4 a detailed study of different types of Ribozymes is done including Hammerhead Ribozyme, Group II Introns, RNase P and glmS Ribozyme. It is
observed that these ncRNAs are evolutionary conserved throughout all the domains life but there are few compensatory variations present in the secondary structures of few Riboswitches and Ribozymes.

**Chapter 5** gives the conclusion of the thesis. The summary of the results of comparative study of riboswitches and other non-coding RNAs in Archaeal genomes is given in this chapter along with the new scopes to find more novel types of ncRNAs that will help in placing a better phylogenetic position of Archaeal domain.