CHAPTER I

Introduction

Bacterial RNase P

Ribonuclease P (RNase P) is an essential endoribonuclease found in all living organisms. RNase P is responsible for one of the earliest steps in tRNA biogenesis, removal of the 5' leader sequence from precursor tRNAs (pre-tRNAs) [1]. The simplest form of RNase P is found in bacteria, where the enzyme consists of a catalytically active RNA subunit with a single small protein subunit [1, 2]. Although *in vitro* at high salt concentrations the RNA subunit of bacterial RNase P alone is sufficient for catalysis [3], both the RNA and protein subunits are required *in vivo*. The protein subunit appears to stabilize the catalytically active conformation of RNase P RNA, assist with pre-tRNA binding, and increase the substrate versatility, for non-pre-tRNA substrates, over the RNA enzyme alone [4-7].

Bacterial RNase P substrates

RNase P processes the 5' leader sequence from the very diverse set of pre-tRNAs expressed from a large number of tRNA genes. For example, in *Bacillus subtilis* there are 40 different tRNAs produced from 86 tRNA genes. The 40 different tRNAs have very little sequence similarity; the three most conserved sequences are the two short regions known as the A and B boxes that are within the transcribed region and act as