

RNase P in Archaea
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RNase P is a ribonuclease responsible for the processing of pre-tRNA by removing the 5' leader sequences. Thus far, in all organisms examined, the enzyme is a ribonuclease and the RNA, rather than the protein, is the catalyst. Therefore RNase P, by definition, is a ribozyme. In my research I will primarily be examining RNase P from *Methanococcus jannashii*. *Methanococcus jannashii*'s RNase P is type M, meaning it's secondary structure is essentially the same as other RNase P RNA's but lacks P8 and everything distal of p15. This is interesting because P8 is known to be involved in substrate T-loop recognition and the L15 loop, which is distal of P15, is known to be involved in substrate 3' -CAA recognition. This raises the question, "How does RNase P compensate for the loss of these critical secondary structures in its RNA?" Our hypothesis is that these RNA sequences/structures have been replaced in *Methanococcus jannashii* with by a protein or proteins. If so, this would be the first demonstration that RNA structure and function can be specifically replaced by protein via evolutionary mechanisms- a critical "proof of principle" required by the RNA World hypothesis. In addition, because the RNase P holoenzyme in bacteria is highly conserved but differs significantly from Eukaryotes it makes it an ideal target for the development of antibiotics. Through the research in our lab we are exploring these exciting aspects of this remarkable enzymes evolutionary divergence.

