TAM conference abstract template

**Title (Max. 150 characters)**

The Role of Proteins in the Origin of the Genetic Code

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**Abstract** (Max. 200 words)

Proteins are often overlooked in research focused on the origin of life and the development of the genetic code. The RNA World Hypothesis supposes that nucleic acids once replicated alone and incorporated proteins later on to boost the process. Other hypotheses propose that nucleic acids and proteins coevolved. We provide evidence for the latter by examining certain proteins with vital roles in the functioning of the genetic code. The aminoacyl-tRNA synthetases (aaRSs) are enzymes which catalyse the attachment of amino acids to tRNA molecules, effectively translating genes into functional proteins which then propagate the replication of the code and in doing so, themselves. There are two classes of aaRSs based on their core structures: Class I and Class II. Each has distinct structure and ways of interacting with tRNA, which differ greatly between the two classes but are universally shared across all domains of life within each class. Life is estimated to have originated ~4 billion years ago, yet these internal structures have been remarkably well-conserved. Using structural alignment and a unique persepective on amino acid substitution in the organisational stages of the genetic code, we investigate the evolutionary signals preserved in the aaRSs and gain insight into early life.