

Wednesday, April 28, 2010
ORIGINS AND EVOLUTION OF GENETIC SYSTEMS
10:30 a.m. Crystal Salon B

This session will examine the origins and evolution of genetic systems that characterize life as we know it.

Chairs: George Fox

Aaron Goldman

10:30 a.m. Turk R. M. * Yarus M.

[Multiple Translational Products from a Five-Nucleotide Ribozyme](#) [#5385]

This work shows that a tiny RNA enzyme can catalyze one of the key reactions in modern protein synthesis. The small size and minimal chemical requirements for this ribozyme support the idea of facile assembly and function of RNA enzymes during the origin of life on Earth.

10:45 a.m. Fox G. E. *

[Ribosome Evolution has Implications for the Origins of the Genetic Code and Chirality](#) [#5093]

The implications of ribosome evolution for the origins of coding and the onset of homochirality will be considered. With respect to chirality, it is shown that the two step nature of ribosomal protein synthesis can rapidly produce near homochirality.

11:00 a.m. Hsiao C. Williams L. D. *

[Ribosome Paleontology](#) [#5429]

We discuss on the molecular paleontology of the ribosomes of *H. marismortui* and *T. thermophilus*, which represent lineages that diverged at the LUCA, several billions of years ago.

11:15 a.m. Tran Q. * Fox G. E.

[GNRA Loops in Ribosomal RNAs May Provide Timing Information Regarding the Relative Age of Various RNA Regions](#) [#5433]

The relative age of various sections of the large ribosomal RNAs can be deduced from long-range interactions such as the A-minor motif that emerged over time in a directional manner. The utility of GNRA tetraloops as timing elements is investigated.

11:30 a.m. Hsiao C. * Bowman J. C. Trippe C. Williams L. D.

[Molecular Resurrection of the Ancestral Peptidyl Transferase Center](#) [#5647]

We discuss the molecular paleontology of the ribosomes of *H. marismortui* and *T. thermophilus*, which represent lineages that diverged at the LUCA, several billions of years ago.

11:45 a.m. Song G. Altuntop M. E. Wang Y. *

[Dynamics of Peptidyl Transferase Center in the Single Ribosomes](#) [#5087]

The ribosome is proposed to be a ribozyme, implying the origin of life from a "RNA world". Using single molecule method, we want to test the stringency of the "ribozyme model".

12:00 p.m. Goldman A. D. * Samudrala R. Baross J. A.

[The Rapid Development of Early Protein Biosynthesis](#) [#5025]

We survey the most highly conserved structures within translation proteins. Our analysis reveals a rapid structural expansion well before the establishment of the DNA genome in which all of the core functions are established.

12:15 p.m. Chen F. Gaucher E. A. Yang Z. Leal N. A. Chamberlin S. G. Benner S. A. *

[Next-Generation Tools for Extracting Function from Genomic Sequence Data. A Working Synthetic Biology](#) [#5106]

Synthetic organic chemistry, next-generation bioinformatics tools, and structural biology, all together have permitted the creation in the laboratory of the first example of an artificial chemical system capable of Darwinian evolution.

12:30 p.m. LUNCH