

**Tuesday, April 27, 2010**  
**PREBIOTIC EVOLUTION: FROM CHEMISTRY TO LIFE I**  
**8:00 a.m. Crystal Salon B**

*This session brings together researchers working to understand which molecules and reactions gave rise to the first biopolymers.*

**Chairs:** Nicholas Hud

- 8:00 a.m. Bryant D. E. Marriott K. E. R. Macgregor S. A. Fishwick C. W. G. Kilner C. Bullough E. K. Pasek M. A. Kee T. P. \*  
[Prebiotic Potential Of Reduced Oxidation State Phosphorus.](#)  
[The H-Phosphinate-Pyruvate System \[#5264\]](#)  
Phosphorus (P) is central to life as we know it but problems with using geologically available orthophosphate en route to life remain. Here we discuss how reduced oxidation state P-chemistry may offer additional possibilities for prebiotic chemistry.
- 8:15 a.m. Weber A. L. \*  
[Sugars as the Source of Energized Carbon for Abiogenesis \[#5095\]](#)  
Reaction of sugars with nitrite under mild conditions yielded ammonia needed for the synthesis of nitrogenous organics for abiogenesis, thereby eliminating the need for a planet-wide source of unstable ammonia for origins processes based on sugars.
- 8:30 a.m. Wei C. \* Pohorille A.  
[Permeation of Membranes by Ribose and its Diastereomers \[#5447\]](#)  
The favorable permeation of membranes by ribose over its diastereomers and permeation of nucleosides is investigated with molecular dynamics simulations. The relevance of our calculations to understanding the origins of life is also discussed.
- 8:45 a.m. Joshi P. C. \* Aldersley M. F. Ferris J. P.  
[Homochiral Selection in Montmorillonite-catalyzed Prebiotic Synthesis of RNA \[#5245\]](#)  
Reaction of D, L-ImpA with D, L-ImpU on montmorillonite, produced longer oligomers with higher yield as compared to reactions carried out with D-enantiomer only. Montmorillonite plays an important role in the prebiotic synthesis and homochiral selection of RNA.
- 9:00 a.m. Horowitz E. D. Engelhart A. E. Hud N. V. \*  
[Nucleic Acid Intercalators Suppress Strand Cyclization in Model Prebiotic Polymerization Reactions \[#5569\]](#)  
We show that base pair intercalation by small molecules, which stabilizes and rigidifies nucleic acid duplexes, reduces strand cyclization, allowing for chemical ligation of tetranucleotides into duplex polymers of at least 100 bp in length.
- 9:15 a.m. Biondi E. \* Nickens D. G. Burke D. H.  
[Substrate Interactions by Metabolic RNA: A Double-Site Acting Kinase Ribozyme \[#5615\]](#)  
A major goal of our research is to establish whether metabolic ribozymes are capable of sustaining life. This work describes the characterization of a kinase ribozyme that promotes self-phosphorylation of two distinct 2' hydroxyls.

9:30 a.m. Lau M. Wang S. Cheng L. Unrau P. J. \*

[RNA Polymerization and Promiscuous Nucleotide Synthesis by RNA](#) [#5010]

We report on nucleotide synthesis and RNA polymerase ribozymes selected in the laboratory that have implications for the very early evolution of life.

9:45 a.m. Pudritz R. E. \* Higgs P. G.

[Thermodynamic Basis for Prebiotic Amino Acid Synthesis and Constraints on the First Genetic Code](#) [#5171]

We analyze data on the frequency of early (prebiotic) amino acids that arise in a variety of experiments and observations and find that it has a thermodynamic explanation. This has many implications for the nature of the first genetic code.

10:00 a.m. BREAK