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Opportunity Title: ICAR - Center for the integrated Origins of Life (iCOOL)
Opportunity Reference Code: 0038-NPP-MAR25-ABProg-Astrobio

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0038-NPP-MAR25-ABProg-Astrobio

How to Apply All applications must be submitted in Zintellect

Please visit the NASA Postdoctoral Program website for application instructions and requirements: How to Apply | NASA Postdoctoral Program (orau.org)

A complete application to the NASA Postdoctoral Program includes:

1. Research proposal
2. Three letters of recommendation
3. Official doctoral transcript documents

Application Deadline 3/1/2025 6:00:59 PM Eastern Time Zone

Description **About the NASA Postdoctoral Program**

The NASA Postdoctoral Program (NPP) offers unique research opportunities to highly-talented U.S. and non-U.S. scientists to engage in ongoing NASA research projects at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institute. These one- to three-year fellowships are competitive and are designed to advance NASA's missions in space science, Earth science, aeronautics, space operations, exploration systems, and astrobiology.

Description:

Poorly understood processes on the ancient Earth caused increases in the complexity of organic molecules, creating RNA, DNA, protein, and polysaccharide. In conventional models of the origins of life, extant building blocks, or their close chemical analogs, arose and polymerized via direct synthetic chemistry, to produce RNA and other biopolymers, which initiated evolution in the form of Darwinian processes. In these models, biochemistry retains direct vestiges of prebiotic chemistry and can inform us about the origins of life. iCOOL is developing alternative models, in which extant biochemistry is the product of prolonged and creative chemical evolution. These models require a challenging integration of chemical sciences and evolutionary theory. We propose that molecules, before life, formed mutualisms, were recursively sculpted, selected and exapted via non¬ Darwinian co-evolutionary processes. These models make the unsettling prediction that biochemistry lost many vestiges of prebiotic chemistry. However, chemical evolution models of biochemistry origins are experimentally accessible, for example by wet-dry or freeze-thaw cycling. There is much to be learned about effects of duration, feeding, seeding, library composition, cycling temperature and frequency, low frequency perturbations (seasons), etc. Currently we do not know if it is possible to recapitulate specific steps in chemical evolution as it occurred on the early Earth. We hope to someday understand what evolution has done and

influence what evolution will do. We believe that new models integrating evolutionary theory into chemical sciences will lead to advances in prebiotic chemistry and in chemical sciences in general. A change of paradigm seems positive and exciting.

Applicants who apply for this research opportunity and are subsequently selected for an NPP award are expected to attend the Astrobiology Graduate Conference (AbGradCon) and/or the Astrobiology Science Conference (AbSciCon) using the travel funds that are conferred as part of the NPP award.

Field of Science: Astrobiology

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Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Questions about this opportunity? Please email npp@orau.org

Eligibility Requirements

- **Degree:** Doctoral Degree.