

**Opportunity Title:** ICAR - Engine of Innovation: How Compartmentalization Drives Evolution of Novelty and Efficiency Across Scales

**Opportunity Reference Code:** 0023-NPP-MAR26-ABProg-Astrobio

**Organization** National Aeronautics and Space Administration (NASA)

**Reference Code** 0023-NPP-MAR26-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** 3/1/2026 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 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:**

When self-replicating molecules achieved cellularity, life crossed the Darwinian threshold. Individual cells became subject to the forces of evolution, enabling the living world to diversify through biochemical and morphological innovation within and between compartments. Compartmentalization defines how all living systems are organized today, whether that means colocalizing proteins and small molecules into separate phases or dividing labor within and among cells. We define a compartment as a structure in which exchange of components with the surrounding milieu is restricted, often but not always by a membrane or a protein shell. We hypothesize that compartmentalization increases flexibility and/or efficiency in acquiring, processing and conserving resources across scales from the molecular to the ecological. Our ICAR team will explore the evolution and functional consequences of compartmentalization across scales spanning four levels of complexity: 1) encapsulation of reactive organic and inorganic constituents in a primordial membrane; 2) protected environments within cells created by protein-protein interactions that enhance the efficiency of critical reactions; 3) compartmentalization of genomes within cells created by successive rounds of endosymbiosis; and 4) compartmentalization of metabolic processes among cells created by syntrophic interactions.

**Field of Science:** Astrobiology

**Advisors:**

Frank Rosenzweig  
frank.rosenzweig@biology.gatech.edu  
(404) 385-4458



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John McCutcheon  
john.mccutcheon@asu.edu  
(404) 385-4458

Joshua Goldford  
goldford@caltech.edu  
(626) 395-6111

Victoria Orphan  
vorphan@gps.caltech.edu  
(626) 395-1786

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](mailto:npp@orau.org)

**Point of Contact** [Mikeala](#)

**Eligibility Requirements** • **Degree:** Doctoral Degree.