

Opportunity Title: Biotechnologically Useful Determinants of Extremophiles

Opportunity Reference Code: ICPD-2023-25

Organization Office of the Director of National Intelligence (ODNI)

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How to Apply **Create and release your Profile on Zintellect** – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at: <https://orise.orau.gov/icpostdoc/index.html>.

If you have questions, send an email to ICPostdoc@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline 2/28/2023 6:00:00 PM Eastern Time Zone

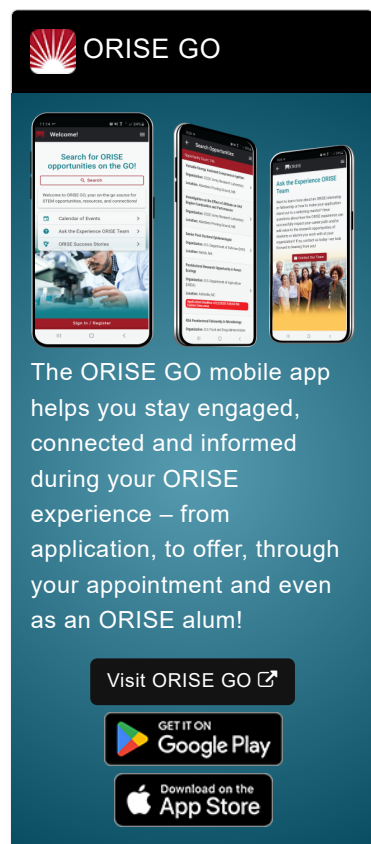
Description **Research Topic Description, including Problem Statement:**

Understanding how bacteria and other organisms adapt and evolve under extreme conditions has several applications in biomanufacturing and bioeconomy, micronutrient research, biosensor development, climate change, and human survival in extreme conditions etc.

Many microorganisms have evolved to thrive in extreme environments. For example, some hyperthermophilic archaea such as *Methanopyrus kandleri* can grow up to a temperature of 122 °C and *Geogemma barossii* can survive up to 130 °C. Other microorganisms have adapted to life in the extreme cold. *Planococcus halocryophilus* OR1 grows at –15 °C, and *Deinococcus geothermalis* can grow at temperatures as low as –25 °C. Extremophilic microorganisms can also withstand high levels of radiation, for example, *Deinococcus radiodurans*, when exposed to conditions outside the International Space Station, tolerated radiation levels more than 200 times those that are present on Earth and survived 3 years of exposure in space. In 2021, bacteria such as *Methylobacterium rhodesianum* and *Methylobacterium aymalii* were isolated from International Space Station, an extreme environment. Another example is halophiles growing in high-salt environments.


The Intelligence Community Postdoc program seeks post-doctoral level research proposals focused on improving our understanding of these organisms and potential implications for biosecurity and the bioeconomy. This can include researching evolutionary drivers, environmental limitations, internal and external survival requirements, expression and control mechanisms associated with survival, functional characterization of unique biomolecules, and methods for translating extremophile-related research to drive novel capabilities in other organisms.


Research proposals are expected to potentially include computational




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modeling, environmental collection, to molecular interrogation of organisms and their components – including modifications, structure, and function, to improve our understanding of these organisms.

Proposers should ensure they have reviewed recent literature and are proposing research driving the state of the art and in alignment with the IC Postdoc program's length and funding.

Example Approaches:

Understanding the evolutionary and molecular drivers of survivability for these organisms may enable the development of more robust biosensors capable of surviving a wide range of extremes on Earth and beyond.

Relevance to the Intelligence Community (IC):

The S&T priority on biotechnology directly aligns with this research topic as the better we characterize these extremophiles, and their proteins, the more directed the communities' wider efforts for understanding and engineering novel biological elements or organisms.

Qualifications **Postdoc Eligibility**

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Key Words: #Extremophiles, #Extremozymes, #Extremomorphs, #Halophiles, #Hyperthermophile, #Psychrophiles, #Genetic Determinants, #Bioeconomy

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Chemistry and Materials Sciences** ([12](#))
 - **Communications and Graphics Design** ([6](#))
 - **Computer, Information, and Data Sciences** ([17](#))
 - **Earth and Geosciences** ([21](#))
 - **Engineering** ([27](#))
 - **Environmental and Marine Sciences** ([14](#))
 - **Life Health and Medical Sciences** ([48](#))
 - **Mathematics and Statistics** ([11](#))
 - **Other Non-Science & Engineering** ([2](#))

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- **Physics** ([16](#) )
- **Science & Engineering-related** ([1](#) )
- **Social and Behavioral Sciences** ([29](#) )