

Opportunity Title: Mechanisms to Improve the Sensitivity of Metagenomic Analysis

Opportunity Reference Code: ICPD-2023-03

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.ora.gov/icpostdoc/index.html>.

If you have questions, send an email to ICPostdoc@ora.gov. 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:**

Accurate and reliable identification of the biological components contained in a sample of interest is crucial for multiple forensics applications including threat assessment and attribution. While unbiased metagenomic applications may be used to characterize all components of a given forensics sample, this approach may fail to identify sequences of interest present at low levels within a complex background. Current methods to overcome this challenge utilize targeted metagenomic approaches, where genomic sequences of interest are amplified or enriched prior to sequencing, effectively producing sufficient sequence data to identify and characterize rare sample components. Current amplicon-based sequencing may target a genomic region present across many organisms (e.g., 16S sequencing, barcode of life) or may be designed to identify and sequence whole viral genomes using highly multiplexed PCR to generate tiled amplicons across a full-length viral genome (e.g., amplicon-based SARS-CoV-2 sequencing). Hybridization-based enrichment relies on nucleic acid probes which are designed against known organisms and used to selectively capture and enrich nucleic acid fragments of interest prior to sequencing.

Example Approaches:

The aim of this research topic is to refine and advance these targeted metagenomics methods in order to improve identification of rare biological components. Expansion of



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multiplexed amplicon-based sequencing techniques could include methods development aimed towards generating identity informative amplicons from multiple agents in a single reaction, substantially expanding the breadth of targets that can be identified. Expansion of hybridization-based enrichment techniques could include the development of probe capture panels designed to generate a broad survey of the sample contents by targeting species or strain delineating regions of diverse groups of organisms (e.g., pan-bacterial panel). Successful project outcomes will include method advances that enhance coverage of critical information gaps and better support comprehensive forensic analysis of complex samples.

Relevance to the Intelligence Community (IC):

Development of this technology will support the ability of the community to target analysis of classes of biological signature (viral, Bacterial, animals, plants) at trace levels from environmentally complex samples. The key benefit over targeted PCR assay is this approach provides can provide significant sequence coverage and support forensic and attribution requirements.

Key Words: #Metagenomic Analysis, #Hybridization-based Enrichment, #Amplicon Sequencing, #Forensics, #Microbial Forensics, #Genomics, #Sequencing.

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

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Chemistry and Materials Sciences** (12 )
 - **Communications and Graphics Design** (5 )
 - **Computer, Information, and Data Sciences** (17 )
 - **Earth and Geosciences** (21 )
 - **Engineering** (27 )
 - **Environmental and Marine Sciences** (14 )

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- **Life Health and Medical Sciences** (48 👁)
- **Mathematics and Statistics** (11 👁)
- **Other Non-Science & Engineering** (2 👁)
- **Physics** (16 👁)
- **Science & Engineering-related** (1 👁)
- **Social and Behavioral Sciences** (29 👁)