Opportunity Title: CDC Fellowship on Development of Molecular Typing and Characterization Methods of Free-Living Amoebas
Opportunity Reference Code: CDC-NCEZID-2022-0263

Organization Centers for Disease Control and Prevention (CDC)

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How to Apply ***Connect with ORISE...on the GO!*** Download the new ORISE GO mobile app in the Apple App Store or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!

A complete application consists of:

- An application
- Transcripts – Click here for detailed information about acceptable transcripts
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- One educational or professional recommendation. Your application will be considered incomplete, and will not be reviewed until one recommendation is submitted.

All documents must be in English or include an official English translation.

Application Deadline 9/5/2022 3:00:00 PM Eastern Time Zone

Description ***Applications will be reviewed on a rolling-basis.**

CDC Office and Location: A research opportunity is currently available within the National Center for Zoonotic and Emerging Infectious Diseases (NCEZID) at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia.

The Centers for Disease Control and Prevention (CDC) is one of the major operation components of the Department of Health and Human Services. CDC works to protect America from health, safety and security threats, both foreign and in the U.S. Whether diseases start at home or abroad, are chronic or acute, curable or preventable, human error or deliberate attack, CDC fights disease and supports communities and citizens to do the same.

Research Project: Objectives of the project:

- 1) to develop a simple, morphology-independent tool to identify *Acanthamoeba* species, and
- 2) to complete the ongoing efforts of developing *N. fowleri* genotyping tools. To meet these, we will conduct whole genome sequencing (WGS) of representative isolates of *Acanthamoeba* species and MiSeq-based amplicon sequencing of *N. fowleri.*

Brief narrative:

Acanthamoeba species: Only 11 of the 26 *Acanthamoeba* species are pathogenic. Sequence-based species identification tools are not yet available for *Acanthamoeba*.. The FLIA lab will use 50+ year collection of clinical and environmental *Acanthamoeba* isolates to perform WGS. Samples will include two to three representative isolates from a given species with priority given to pathogenic *Acanthamoeba* species.

- Method: Isolates will be revived from cryopreservation and used to extract genomic DNA. Illumina Novagen sequencing will be performed via the CDC BCFB. The WGS data will be analyzed to identify

conserved and divergent genomic regions between the representative *Acanthamoeba* isolates and species. Unique sequences will be utilized to design species-specific primers for molecular characterization.
- Outcome: Species-specific multiplex (conventional or real-time) PCRs will be developed that would remove reliance on ameba culture or intact ameba morphology to determine species identity and can easily be implemented in diagnostic laboratories. WGS data will be deposited in public databases.

Naegleria fowleri: The FLIA lab's novel *N. fowleri* genotyping tool was preliminarily evaluated in recent primary amebic meningoencephalitis (PAM) case investigations, but additional validations are required for final QA/QC of the method. Existing amplicons of the four loci from the tool will be used from a selection of representative isolates.

Method: MiSeq-based amplicon sequencing will be completed by CDC BCFB. Data will be analyzed by multiple sequence alignment to compare obtained sequences.

Significance: Validated, easily implemented tools are important for clinical care and prevention of high consequence pathogen infections caused by *Acanthamoeba* and *N. fowleri*. *Acanthamoeba* species can cause diverse human diseases ranging from highly fatal brain infection, vision threatening *Acanthamoeba* keratitis, to less severe skin lesions. However, links between *Acanthamoeba* species and clinical manifestation are unclear. Here, molecular tools will be developed to identify clinical outcomes of *Acanthamoeba* infections, ready to transfer to clinical laboratories. For *N. fowleri* case investigations, our validated genotyping tools will be critical for accurate environmental source attribution, leading to PAM prevention strategies in the future.

Learning Objectives: The fellow will first be trained on:

- (1) Free-living ameba (FLA) culture methods including procedure to revive a FLA culture cryopreserved in liquid nitrogen,
- (2) DNA extraction method,
- (3) Polymerase chain reaction (PCR) and real-time PCR methods,
- (4) PCR primer and probe design,
- (5) Gel running of PCR amplicons,
- (6) Gel extraction of PCR bands,
- (7) Preparation of samples for sequencing, and
- (8) Preliminary analysis of DNA sequence data, etc.

Once trained, the fellow will perform the above activities with supervision from the FLIA lab PI.

Mentor(s): The mentor(s) for this opportunity is Ibne Ali (xzn5@cdc.gov). Please contact them if you have questions about the nature of this research.

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Anticipated Appointment Start Date: August 21, 2022. Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for one year, but may be renewed upon recommendation of CDC and is contingent on the availability of funds.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant will receive a monthly stipend commensurate with educational level and experience.

Citizenship Requirements: This opportunity is available to U.S. citizens only.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and CDC. Participants do not become employees of CDC, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

The successful applicant(s) will be required to comply with Environmental, Safety and Health (ES&H) requirements of the hosting facility, including but not limited to, COVID-19 requirements (e.g. facial covering, physical distancing, testing, vaccination).

Questions: Please visit our Program Website. After reading, if you have additional questions about the application process please email ORISE.CDC.NCEZID@orau.org and include the reference code for this opportunity.

Qualifications

The qualified candidate should be currently pursuing or have received a master's degree in one of the relevant fields. Degree must have been received within five years of the appointment start date.

Candidates with some laboratory work experience preferred.

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Master's Degree.
- **Discipline(s):**
  - **Life Health and Medical Sciences** (48 👁)

Affirmation

I certify that I have not previously been employed by CDC or by a contractor working directly for CDC. I understand that CDC does not permit individuals with a prior employment relationship with CDC or its contractors to participate as trainees in the ORISE program. (Exceptions may be granted for individuals who, since the previous CDC employment, have obtained a new STEM degree which necessitates training in a new field.)