

POSITION DESCRIPTION

Postdoctoral Research Fellow

Phylogenomics, Morphometrics & Ecological Modeling of Anopheline Mosquitoes

Henry M. Jackson Foundation for the Advancement of Military Medicine (HJF), Uniformed Services University of the Health Sciences (USUHS)

HIRING AGENCY	The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc. (HJF)
PRIMARY DUTY STATION	Uniformed Services University of the Health Sciences (USUHS), Bethesda, MD, Washington, DC metropolitan area (DMV region)
APPOINTMENT	Full-time (100% effort), 3-year appointment, Renewable subject to performance and funding
PRINCIPAL INVESTIGATOR	Dr. Mohamed (Moe) Sallam, PhD, Health Geography Lab, USUHS / HJF
FUNDING SOURCE	National Science Foundation (NSF)
COLLABORATING INSTITUTIONS	Virginia Tech (VT), University of Florida (UF) & Florida Museum of Natural History, Smithsonian Institution National Museum of Natural History (SI-NMNH)
COMPENSATION	Competitive; aligned with NIH postdoctoral pay scale and adjusted for Bethesda locality
BENEFITS	Comprehensive HJF benefits: medical / dental / vision, 403(b) with employer match, generous PTO, life & disability insurance, professional development support, conference travel

Why This Role

Mosquitoes are the deadliest animals on Earth. Anopheline mosquitoes alone transmit the malaria parasites responsible for hundreds of thousands of deaths every year, and their ranges are shifting in unpredictable ways under climate and land-use change. Yet fewer than 75 of the nearly 500 known Anopheline species have ever been tested for their ability to transmit human pathogens, and most lack even a basic evolutionary or ecological framework.

This NSF-funded project is building the first integrated phylogenomic, morphological, and ecological framework for the entire Anophelinae subfamily. Over three years, the team will sequence approximately 800–1,000 specimens spanning all genera, subgenera, and major species complexes; generate high-resolution micro-CT morphometrics of thoracic musculature and wing architecture to quantify dispersal capacity; delineate environmental niches globally; and identify the lineages most likely to expand under continued environmental change.

The Postdoctoral Research Fellow will sit at the center of this effort, leading genomic assembly and phylogenomic inference, contributing to 3D morphometric trait extraction and environmental niche modeling, and co-leading peer-reviewed manuscripts across multiple aims. This is an unusually broad, integrative opportunity for a scientist who wants to work at the intersection of phylogenomics, functional morphology, ecology, and public health entomology, with the training, publications, and network to launch an independent research career.

What Makes This Position Distinctive

- **Global-scale, first-of-its-kind dataset:** the first genome-scale phylogeny of Anophelinae with paired micro-CT morphometrics, environmental niche models, and integrated trait data.
- **A four-institution research environment:** you will work directly with world-class curators, evolutionary biologists, morphologists, and biodiversity informaticians at USUHS, Virginia Tech, the University of Florida / Florida Museum of Natural History, and the Smithsonian NMNH U.S. National Mosquito Collection.

- **Real translational impact:** results feed directly into surveillance guidance for the Armed Forces Pest Management Board, mosquito control districts, and public health agencies, your science will help prepare for the next *Anopheles stephensi*-style invasion.
- **Career-launching training portfolio:** phylogenomics, HPC bioinformatics, 3D morphometrics, environmental niche modeling, machine learning for label digitization, an unusually integrative skill set that is highly competitive for faculty, agency, and industry positions.
- **Publication and visibility:** multiple first-author opportunities across three linked project aims, plus co-authorship on integrative synthesis manuscripts; travel funded for major conferences (AMCA, AFPMB technical meetings, evolution and phylogenetics meetings).
- **A vibrant DMV research corridor:** USUHS sits within a rare concentration of federal science, NIH, NIAID, the Smithsonian, USDA, USGS, and the Walter Reed Biosystematics Unit are all within a short commute, opening seminars, collaborations, and future career paths.

Key Responsibilities

Genomic Data Generation & Assembly

- Lead sample preparation, DNA extraction, and library preparation from museum and contemporary specimens (in collaboration with USUHS, VT, and SI-NMNH staff).
- Perform whole-genome shotgun, reduced-representation, and long-read (ONT PromethION) sequencing workflows, adapting protocols for archival and fresh material.
- Assemble genomes and recover single-copy nuclear orthologs (BUSCO v6.0.0) in a reference-guided framework across ≈ 800 –1,000 specimens.

Phylogenomics & Introgression Analyses

- Perform locus alignment (MACSE), gene-tree and species-tree inference (IQ-TREE, ASTRAL), and time calibration (MCMCTree) using fossil priors.
- Quantify gene-tree discordance and detect introgression using Quartet Sampling, D-statistics, f_4 -ratio tests, BPP, and GhostParser.
- Delimit cryptic species and refine complex boundaries using integrated genomic evidence.

Morphometrics & Environmental Modeling

- Contribute to micro-CT scanning at the Florida Museum of Natural History and to downstream 3D segmentation of thoracic musculature and wing architecture.
- Compute Relative Dispersal Capacity (RDC) and related biomechanical traits from micro-CT-derived morphology.
- Build and refine environmental niche hypervolumes using WorldClim, remotely sensed land cover (Google Earth Engine), and curated occurrence data.

Collaboration, Communication & Career Growth

- Coordinate weekly with the PI, co-PIs, and other trainees at USUHS, VT, UF, and SI; travel between institutions as needed for training and specimen work.
- Lead multiple first-author manuscripts and contribute to integrative synthesis papers; present at national and international meetings including the AFPMB and American Mosquito Control Association (AMCA).
- Mentor graduate and undergraduate researchers on the project; contribute to the Anopheline Atlas open-access data portal hosted at the Smithsonian.
- Engage stakeholders in the mosquito-surveillance and public-health entomology community, including the Armed Forces Pest Management Board.

Qualifications

Required

- PhD (awarded, or expected within 6 months of start) in any of the following fields: evolutionary biology, entomology, phylogenetics, bioinformatics, computational biology, ecology, or a closely related discipline.
- Proficiency with at least one general-purpose scripting language (Python, R, or bash) and comfort working in high-performance computing environments (cloud, or equivalent).
- A track record of first-author peer-reviewed publications appropriate to career stage.
- Strong written and oral communication skills; the ability to work productively across geographically distributed collaborators.

Preferred

- Prior experience with phylogenomic pipelines (IQ-TREE, ASTRAL, BUSCO, MACSE) or comparative methods (Pagel's λ , phylogenetic PCA, ancestral state reconstruction).
- Experience with archival or ancient DNA workflows, museum specimen digitization, or historical collections.
- Demonstrated experience with high-throughput sequencing data (raw read QC, assembly, variant calling, or ortholog recovery).
- Familiarity with 3D morphometrics (VGStudioMax, MorphoJ, tpsDig), CT segmentation, or biomechanical modeling.
- Experience with species distribution or niche modeling (MaxEnt, hypervolume, ENMeval), GIS, or remote sensing (Google Earth Engine).
- Interest or background in medical entomology, vector biology, or public health.
- Experience mentoring students and contributing to an inclusive, collaborative team environment.

What HJF Offers

- **Compensation:** salary aligned with the NIH postdoctoral pay scale and adjusted for Bethesda locality; annual step increases with continued performance.
- **Benefits:** comprehensive medical, dental, and vision coverage from day one; a 403(b) retirement plan with employer match; generous paid time off, sick leave, and federal holidays; life and disability insurance; and access to HJF's professional development resources.
- **Research support:** dedicated HPC allocation, sequencing budget, micro-CT time at UF, curatorial access at the Smithsonian mosquito collection, and travel funding for conferences and inter-institutional visits.
- **Career development:** structured mentorship from the PI and co-PIs across four institutions, individual development planning, external grant-writing coaching, and support for transition to independent research or applied science roles.
- **A world-class research corridor:** USUHS is embedded in the Washington, DC / DMV region alongside the NIH, NIAID, the Smithsonian Institution, USDA, USGS, and the Walter Reed Biosystematics Unit, with easy access to their seminars, resources, and career networks.

The Team

The successful candidate will report directly to the PI at USUHS and interact regularly with all co-investigators and their teams at the Smithsonian Institution, University of Florida, and Virginia Tech. Graduate and undergraduate students across the collaborating institutions round out the Anophelinae project team.

How to Apply

Applications are reviewed on a rolling basis until the position is filled. Candidates should submit the following as a single PDF through the HJF careers portal (<https://www.hjf.org/careers>):

- Cover letter (1–2 pages) describing your research background, why this project fits your career trajectory, and the earliest date you could start.
- Current CV including publication list.
- Contact information for three professional references.
- (Optional) One representative publication or preprint.

Questions about the technical scope of the role may be directed to Dr. Mohamed (Moe) Sallam (mohamed.sallam@usuhs.edu). Formal application submission and questions about employment terms should go through the HJF careers portal.

Equal Opportunity Employer

The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc. (HJF) is an equal-opportunity employer. All qualified applicants receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, protected veteran status, or any other protected characteristic. HJF is committed to building a diverse and inclusive workforce that reflects the communities served by the Uniformed Services University and its partner institutions.