

PhD Scholarships for Study in Spatial Genomics and Modelling Dormant Vector Species of Malaria

at the

International Centre of Insect Physiology and Ecology (*icipe*), Kenya

Three-Year Doctoral Training in Spatial Genomics and Modelling Dormant Vector Species of Malaria

Deadline for applications to *icipe*: 20th May 2022



Three (3) PhD positions are available at *icipe* to work on developing a spatial model for dominant vector species (DVS) for malaria at Africa continent scale. In addition, the PhD candidates will model the spatial extent of insecticide resistance (IR) of the DVS and prominent secondary vectors (PSV) and fill the gaps where data reporting on IR, DVS and PSV is poor. The PhD fellows will be based at *icipe* Duduville Campus in Nairobi, Kenya.

The three PhD studies are part of the project “The Vector Atlas” granted to the International Centre of Insect Physiology Ecology (*icipe*) and funded by the Bill and Melinda Gates foundation (BMGF).

Project description

Mosquito vector data are collected in a myriad of different ways by multiple data collectors for a wide variety of purposes. They are distributed in literature, among individual scientists, organisations and countries that are not always well connected. In isolation, these mosquito vector data are useful in answering the research questions that they were initially collected for, but when combined, their value multiplies. The **Vector Atlas** project aims to update and create malaria vector species maps and spatial products that improve the disease prediction, mitigation and preparedness. We propose to build a **Vector Atlas** data-hub that links ‘core’ (e.g., existing vector occurrence, bionomics and insecticide resistance data, Malaria Atlas Project - MAP covariates) and ‘complimentary’ (e.g., GBIF, MalariaGEN, VectorBase, Amplicon Panel project) data resources to provide a ‘one stop shop’ of reliable and cross-referenced data access. These data will underpin a suite of intuitive and informative maps generated using cutting-edge modelling techniques tailored to inform the control of mosquito vector diseases.

Methodology

To strengthen the need for strong evidence to support results measurements, institutional memory and evidence-based decision making, the PhD candidates will develop, adapt and implement tools for databasing and storage of vector data e.g., the common data model (CDM), data workflows and PostgreSQL DBMS holding the updated and expanded suite of vector datasets and analytical tools. Data abstraction will follow our published and widely used data abstraction protocols. We do not envisage developing the CMD from scratch; we will use an existing framework

and structure <https://odysseusinc.com/>. The PhD fellows will be required to automate pipelines to mobilise, label and publish historical and ongoing collection of malaria vector data (occurrence, bionomic, and IR) into a single searchable PostgreSQL database.

The collected vector data (occurrence, bionomic, and IR) will be used to develop risk models and IR phenotype maps. The fellows will collate climatic and environmental covariates relevant to *Anopheles* sp. at a resolution most suitable for use with the updated occurrence data (maximum 10x10 km) and run spatio-temporal models for dispersal of each DVS and PSV including sibling species.

The candidates will use geographic information systems (GIS) data-driven approaches to investigate geospatial patterns of IR and analyse remote sensing data like Landsat, RapidEye, MODIS, ALOS and SPOT to create series of visual risk maps. The fellows will update the Vector Atlas front-end, including a web based, intuitive interface overlaying a data upload workflow and end user data display, including a PostGIS add-on e.g., software programs that control the organization, storage, management, and retrieval of data in various databases. The application programming interface (API) should allow public querying of the databased on geolocations, time spans or other search parameters and allow data modellers/other systems to upload data to the staging area.

The first PhD research will apply the CDM, data workflows and PostgreSQL DBMS holding the updated and expanded suite of vector datasets (species distribution, bionomics, and genomics/insecticide resistance) and analytical tools to develop the **Vector Atlas** data-hub backend and frontend. The second PhD research will use the collected vector data (occurrence, bionomic, and IR) to develop risk models and IR phenotype maps, while the third PhD research will apply GIS data-driven approaches to investigate geospatial patterns of IR and analyse remote sensing data like Landsat, RapidEye, MODIS, ALOS and SPOT to create series of visual risk maps.

Eligibility criteria

- MSc in a quantitative subject, preferably Mathematics, Physics, Bioinformatics, GIS, Computer Science, Data Science, Statistics, or related discipline with knowledge of programming languages, preferably PERL, Python, C/C++, MATLAB, R, Java and Django platform. Experience in spatial and/or temporal statistics/modelling and infectious disease modelling is a plus.
- Willingness to commit full time effort to his/her PhD training programme.
- Candidates who have MSc in Bioinformatics, Entomology and Biological sciences with a strong foundation in quantitative analysis, experience in molecular data analysis, developing and using mathematical models are also encouraged to apply.
- The successful candidates should also have a proven track record of R&D relating to growth and spatial analysis models and demonstrated ability to publish in high quality peer-reviewed scientific journals. Good communication skills and proficiency in English (both oral and written) are a prerequisite. Qualified female candidates and candidates from less privileged regions or groups are especially encouraged to apply. The Master's degree must have been completed less than ten years ago at the time of application. Preference will be given to applicants with a maximum age of 36 years (men) or 40 years (women).

Workplace

The three PhD positions are based at the Data Management, Modelling and Geo-Information (DMMG) unit at *icipe's* Duduville campus, Nairobi, Kenya, with occasional travels to international partners at the University of Oxford UK (Department of Zoology), and CapGemini, Oxfordshire, UK.

Funding

The PhD projects are funded through a research grant from the Bill and Melinda Gates foundation (BMGF) and will be jointly supervised by *icipe* scientists. The scholarships will cover all costs of the PhD programme, including travel, living expenses, medical insurance, university fees and all research and training costs.

Application

Download and complete the scholarship Application Form

- a. To download the Application Form as a doc file click [here](#)
- b. To download the Application Form as a docx file click [here](#)

Go to the online application platform by clicking [here](#) to apply and upload the following documents:

- Completed application form
- Curriculum Vitae (please use the Europass Format: <http://europass.cedefop.europa.eu>)
- Certified copies of official university certificates and transcripts, and any other professional or academic certificates. Please combine into 1 file. If necessary, you may zip the file to make it smaller for uploading. For pdf files, can reduce the size using the online tool at <https://smallpdf.com/compress-pdf>
- Copy of a signed recommendation letter from your employer (if currently employed) or University where MSc was undertaken. The letter *must be on institute letterhead*.
- Close-up photograph in colour of your full head and upper shoulders (passport-style photograph)
- Copy of National ID
- For foreign nationals, copy of Passport biodata page (the page that has your picture and personal details)

Timeline

Closing date for applications 20th May 2022. Successful candidates will be notified by 6th June 2022. The PhD positions will be a 3-year doctoral training by research: start: July 2022, end: June 2025. Please note that successful candidates will develop a full proposal and register with a university after they commence their PhD programme at *icipe*.

Further information

More information about the vacancy can be obtained from:

Dr. Henri Tonnang, Email: htonnang@icipe.org