PhD position:
Ecology and trapping of *Simulium* and surveillance of *Onchocerca volvulus* for the control of human Onchocerciasis in Cameroun

Category
Science – Ecological sciences and epidemiology

Contract
PhD contract, 36 months

Organization
CIRAD, UMR CIRAD-IRD-UM INTERTRYP

PhD director and co-director: Dr. Anne Geiger and Dr. Sophie Thévenon
PhD main supervision: Dr Geoffrey Gimonneau
Co-supervision: Dr. Marc Desquesnes, Dr. Arnauld Efon

Inscription
Montpellier University, GAIA doctoral school, BDI pathway

Job title
Ecology and trapping of *Simulium.* and surveillance of *Onchocerca volvulus* for the control of human Onchocerciasis in Cameroun

Key-words
Trapping, Vector-borne diseases, molecular biology, chemical attractants, xenomonitoring

Expected beginning date
From 01/03/2025

Job location and work environment
Montpellier, FRANCE (Cirad Baillarguet) and Yaoundé, CAMEROON (ISM, Higher Institute for Scientific and Medical Research)

Summary
As a PhD student in entomology, you will contribute to an international, interdisciplinary project investigating how climate and environmental changes affect vector-borne diseases (VBD) in Africa. Based on your skills in entomology, you will focus on the development and evaluation of novel chemical attractant and traps for *Simulium*, and surveillance tools for the transmission of *Onchocerca volvulus*.

Job description
Context: VBDs remain a critical public health concern in Africa, disproportionately affecting the most vulnerable populations. Global environmental changes driven by human activity are reshaping ecosystems and intensifying exposure to vector-borne pathogens. Addressing these threats requires an interdisciplinary and cross-sectoral research approach. This PhD position is part of the EU-funded Global health EDCTP3 project IMPACTING (Integrated multi-vector-

borne diseases platform to assess global change impacts on transmission using innovative systems modelling, novel monitoring tools, and transmission-blocking microorganisms) started in June 2025.

The project focuses on key VBDs including malaria, dengue, human African trypanosomiasis (HAT), onchocerciasis, and Crimean-Congo haemorrhagic fever (CCHF). IMPACTING brings together 10 institutions from East (Kenya), Central (Cameroon), and Southern Africa (Mozambique), as well as Europe (France and Portugal), with expertise spanning entomology, vector ecology, disease modeling, diagnostics, and community engagement. The project aims to develop a user-friendly dashboard integrating robust modeling outputs to inform policy and enhance disease surveillance and control under global change. Across the participating countries, the focus is on vectors such as Aedes mosquitoes (dengue, chikungunya, yellow fever), Anopheles mosquitoes (malaria), Glossina tsetse flies (gHAT and rHAT), Simulium blackflies (onchocerciasis), and Hyalomma and Rhipicephalus ticks (CCHF).

The present PhD focuses on blackflies, vectors of *Onchocerca volvulus* responsible of human onchocerciasis, a parasitic disease affecting more than 14 million people, primarily in sub-Saharan Africa, and representing a major cause of socio-economic disruption. To date, entomological and epidemiological surveillance relies on the field collection of blackflies using the Human Landing Collection (HLC) method, a technique that raises ethical concerns. Current alternatives involve sticky traps, which have several limitations, notably their negative impact on the physical integrity of insects—especially problematic when live specimens are required for research and surveillance purposes. Moreover, catching live insects is a useful and growing approach for epidemiological studies based on molecular xenomonitoring avoiding processing thousands of insects. Activities proposed are parts of IMPACTING's WP2 entitled “Developing innovative vector monitoring and diagnostic tool for improved surveillance”.

Your role: Depending on your background and interests, and in agreement with your PhD supervisors, you will focus on the following areas:

1) **Validation and optimisation of novel traps for blackflies suitable for research, monitoring, and control.**

The main objective is to capture live insects (which excludes sticky traps) as an alternative to HLC. Comparative evaluation of prototypes (including BioFlytraps) in Latin squares, with human capture as a reference, carried out over at least two seasons and possibly different environments.

- Develop and perform evaluation of trap candidates
- Evaluate the advantage of host-derived attractants (developed by ICIPE, the International Centre of Insect Physiology and Ecology, Kenya) associated to traps
- Involve communities in traps development, deployment, and scaling of surveillance and control innovations (in association with WP3 leaders)

2) **Ecology and epidemiology of Onchocerciasis**

Blackflies collection from 1) will be used to generate ecological and epidemiological data across seasons and environments

- Species identification, sex ratio, infection rates through PCR (O-150 PCR), and blood meals (PCR CO1).

3) Molecular xenomoritoring in Onchocerciasis focus

Molecular xenomonitoring (MX) offers several advantages over the direct analysis of individual insects, including: analysing excreta collected from traps is more time- and cost-efficient than sorting dozens or hundreds of insects and analysing them in pools, which requires multiple molecular assays ; this approach enables faster detection of pathogen circulation within a surveillance system, allowing for the timely implementation of prevention and control measures.

- Demonstrate in laboratory that Onchocerca DNA can be identified in black fly excreta through experimental infection (Collect excreta, and monitor detection kinetics at 24h, 48h…)
- Compare different extraction methods (i.e. Qiagen vs. Chelex), primers, and PCR diagnostic methods (i.e. PCR vs. RT PCR)
- Evaluate in situ, the MX approach in association with the best trapping system in onchocerciasis focus.

You will work in a vibrant interdisciplinary environment with frequent interaction with entomologists, molecular biologists, and social scientists at CIRAD, ISM, IRD and partner institutions. You are expected to actively collaborate within this diverse, international research community.

Future organization

You will be joining CIRAD, the French Agricultural Research Centre for International Development, which works with its partners in the Global South to generate and pass on new knowledge to support agricultural development and innovation. CIRAD's mission is to build sustainable farming systems for tropical and Mediterranean regions capable of feeding ten billion human beings by 2050 while preserving the environment.

More specifically you will join UMR INTERTRYP. This CIRAD/IRD/University of Montpellier Joint Research Unit "Intertryp" is a unit composed of about 50 researchers, engineers, technicians and students dedicated to "One Health" research activities on NTDs such as sleeping sickness, leishmaniasis, or Chagas disease, which disproportionately affect the most vulnerable populations.

Following a 3-9 months integration period in the INTERTRYP research unit in Montpellier, France, you will spend most of your PhD in Cameroon hosted at the Higher Institute for Scientific and Medical Research (ISM, Yaoundé, Cameroon), where the main experimental work will be conducted. ISM is a leading Cameroonian research institution specializing in neglected tropical diseases, notably filariasis and onchocerciasis. ISM conducts cutting-edge research on vector biology (simulies, mosquitoes), disease transmission dynamics, and the impact of public health interventions. The institute brings together a multidisciplinary team of researchers and medical entomologists, skilled in advanced modelling, data analysis, and field epidemiology. ISM also hosts specialized platforms in immunobiology, biochemistry, and social sciences, and actively collaborates with international partners to strengthen research capacity and inform evidence-based control strategies in Cameroon and Central Africa.

The candidate will also return periodically to France to participate in doctoral courses at the GAIA Doctoral School, University of Montpellier and engage with the INTERTRYP team.

You will get direct supervision by Dr Geoffrey Gimonneau (CIRAD-INTERTRYP, France), entomologist, in co-supervision with Dr. Arnauld Efon (ISM, Cameroon), Dr. Marc Desquesnes, Dr. Anne Geiger and Dr. Vincent Manzanilla (CIRAD or IRD-Intertryp, France), Albin Fontaine (AMU, France) and David T'Chouassi (ICIPE, Kenya).

Desired profile
Education:

- Master's degree/MSc in entomology, parasitology, ecology or molecular biology or related fields

Experience:

- Prior experience of research in Sub-Saharan-Africa or tropical contexts is considered a plus
- Prior experience in vector ecology, trapping and insectary handling is an advantage.
- Prior experience on molecular biology diagnosis (DNA extraction, PCR, RT-PCR) is a plus.

Skills and abilities:

- Implementation of field studies, with good organisational and interpersonal skills
- Proficient with data management, statistical analyses using R, or at least good bases and appetence for that
- Good written and oral communication skills in French and English is key. Expected levels: at least B2 in both languages.
- Ability to work independently and collaboratively within a multidisciplinary and international team

Personal qualities:

- High level of autonomy, sense of organization, and initiative, combined with a spirit of collaboration.
- Motivation, adaptability
- Willingness to work in Sub-Saharan-Africa

Job constraints

- Fieldwork in remote tropical or subtropical regions.

Position constraints
Screen work in excess of 4 hours
Work performed in tropical/humid/subtropical zones
Frequent travel within Cameroon, in France and possible trips to Kenya

Funding
EDCTP IMPACTING project (Integrated multi-vector-borne diseases platform to assess global change impacts on transmission using innovative systems modeling, novel monitoring tools, and transmission blocking microorganisms)
France base salary, excluding expatriation allowances if applicable. CIRAD provides a comprehensive expatriate package with benefits for PhD students stationed out of France.

Information

How to apply:

Please direct any informal enquires to Dr GIMONNEAU, geoffrey.gimonneau@cirad.fr .

Applications should be sent by email to Geoffrey Gimonneau (geoffrey.gimonneau@cirad.fr) and to the thesis supervisory team (sophie.thevenon@cirad.fr, anne.geiger@ird.fr, and aurelie.arnou@cirad.fr), specifying the thesis subject and enclosing the following documents: CV, covering letter, full marks from L1 to L3, Master M1 and M2 (or equivalent if engineering course). If the second year of the Master's programme (M2) is in progress, please provide us with the most recent transcript available.

Incomplete applications will not be processed.

Deadline to apply

24/12/2025

Expected contract start date:

01/03/2026