

# Untangling the relationships between snails, schistosomes and the environment

## Supervisors

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## Project description

Schistosomiasis is a water-borne disease transmitted through freshwater snails in tropical and sub-tropical regions. Knowledge of the ecology of snail-vectors and their role in the transmission of schistosomiasis, however, is lacking but essential for developing multidisciplinary approaches to combat this devastating neglected tropical disease. We do know that schistosomes are specialists with different parasite species/strains only developing within specific snail species in different endemic foci. Untangling the complexities of immunity and virulence that have evolved to influence snail-schistosome compatibility will facilitate monitoring, predicting and modifying transmission of schistosomiasis and other snail-borne parasites.

The overarching aim of this studentship is to use recent advances in snail-vector molecular biology to understand the interactions between snails, schistosomes and the environment. The project will investigate the ecology of snail-schistosome compatibility and explore the genetic links of infection success, prevalence and vectoral capacity. The research will focus on *Biomphalaria* and *Bulinus* snail species (vectors in schistosomiasis transmission) in the United Republic of Tanzania where we have worked extensively on related projects. Specifically, the student will use Sanger and NGS DNA sequencing technologies to determine:

1. The biodiversity/population genetics of *Biomphalaria* and *Bulinus* spp. and their schistosomes in freshwater habitats that vary according to temperature, altitude, water body type (e.g. pond, lake, stream, seasonal, perennial), substratum and conditions (turbidity, speed, salinity, rainfall)
2. If infection success/rate of snails is dictated by snail-schistosome (species, strain or genetic type) compatibility and/or other additional ecological factors (abiotic e.g. temperature or biotic e.g. age, third party symbionts bacteria or viruses) that may also influence outcomes of infection
3. If snail fauna and/or environment are key factors defining areas with persisting and/or high schistosomiasis transmission and if environmental change/differences will influence transmission

The student will utilize existing snail/schistosome collections and data within SCAN and additional samples/specimens and ecological data from freshwater habitats collected during the project. This will involve approximately 2-3 weeks per year field-based research where the student will work with our Tanzanian collaborators/field teams gaining invaluable

experience of working in the African field setting. The rest of the project will be based in the UK performing the molecular and data analysis.

This is an important project addressing these long standing but also novel questions that can be answered using both classic, advanced and developing technologies, providing diverse training opportunities in field techniques, malacology, molecular epidemiology and biodiversity, ecology and spatial analysis, while providing data with applications in human/animal health.