

My research project implemented molecular methods of snail and schistosome identification in a novel attempt to better understand schistosomiasis transmission in Malawi. I investigated several factors that each may play important roles within and the country settings. We conducted three malacological surveys measuring key environmental variables, mapping snail and parasite populations and thereafter using molecular characterisation methods, for example, by PCR-RFLP, DNA sequencing, microsatellite markers and phylogenetic tree construction methods.

Novel snail distribution maps of various planorbid snail species, with focus upon *Biomphalaria* and *Bulinus*, were presented. We also noted the presence of *Lymnaea*, conducting basic DNA typing. Most importantly, the spread of *Biomphalaria pfeifferi*, a keystone intermediate host for *Schistosoma mansoni*, between 2017 and 2019, was confirmed. Assembled molecular evidence pointed towards a recent populational founder effect for this species as it exhibited low genetic diversity at all loci inspected. By real-time PCR, the prevalence of *S. mansoni* within *Bi. pfeifferi* was 18% and underpins the newly appreciated environmental risk of intestinal schistosomiasis transmission within Lake Malawi.

Similarly, DNA evidence confirmed the presence of *Bulinus globosus* but newly reported the presence of *Bulinus africanus* and two, as of yet, poorly known species within the *Bu. africanus* species group. These can now be better recognised and more easily detected with a PCR-RFLP assay of the *cox1* using double digestion with *HaeIII* and *SacI* restriction enzymes. By real-time PCR the prevalence of *Schistosoma haematobium* within snails was 31%. Furthermore, characterisation of available miracidia, using a combination of mitochondrial and nuclear loci, from locally infected children identified the presence of novel schistosome hybrids of *S. haematobium*-*mattheei* as well as characterised group IV *S. mansoni*.

The information we presented is of direct use to national schistosomiasis control planning by providing up-to-date information on snail and schistosomes distributions in Malawi. Moreover, updated information provides help to clarify previously cryptic aspects within the snail-schistosome relationship.