

Ecological relationships among parasites co-infecting the same host: The case of Microsporidia parasitising mosquitoes

More than 80% of all known species are considered to be depended on the host organism. In natural populations, most hosts have their own symbionts, including living at their expense, i.e. parasites, which can affect each other. In natural populations, infections of the same host with different parasite species are common and may influence to shaping community structure and generating biodiversity. In addition, co-infection may lead to adverse or mutually effects on co-infecting parasites, which affect their spread, evolution and species diversity.

Intestinal parasites are the most common pathogens with significant potential for interactions. Among them, more than 1,500 microsporidian species were described as obligate intracellular eukaryotic parasites, infect all animal phyla, including humans. Microsporidia are widespread on all continents except Antarctica. The microsporidian spores are the only developmental stage with the ability to survive outside the host cell. Spores possess a unique infective apparatus, which is coiled inside the spore and shot directly into the host cells during infection. Microsporidia mainly cause gastrointestinal and ocular infections, however, during strong infections these organisms can infect any organ. So far, few studies shown that some microsporidian species can interact with each other and/or with other pathogens. For example, infection of the mosquito by Microsporidia causes inhibition of the development of protozoan *Plasmodium* spp., which causing disease, called malaria. Mosquitoes (Culicidae) are one of the most important disease vectors in the world. They may be hosts of protozoans, viruses, nematodes, pathogenic bacteria, and over 90 microsporidian species. In addition, at the same time mosquitoes may be infected by more than one pathogen species. Therefore, mosquitoes have become an important model for the study of parasite-parasite interactions.

The main purpose of the proposed project is to investigate the influence of the parasites in a co-infection with another parasite and/or a specific bacterial species based on the case of Microsporidia parasitising mosquitos. The obtained results will answer the questions: what species of microsporidia co-infect mosquitoes and how they interact with each other or with other parasites and/or bacteria. Identifying the interactions between pathogens are an essential prerequisite to understanding the epidemiological dynamics and evolution of parasites, and thus for the control and regulation of pathogens that are highly pathogenic to humans and/or generate high economic losses.