Sensory ecology and behaviours of tsetse fly larvae – from the uterus to metamorphosis

Project ID: 3728

Supervisory team

Main supervisor: Dr Andrea Adden (University of Bristol)
Second supervisor: Prof Ian Bull (University of Bristol)
Collaborators: Dr Merid Getahun (International Centre of Insect Physiology and Ecology, Nairobi, Kenya)

Host institution: University of Bristol

Project description: For a newborn child, the transition from the shelter of the womb to the outside world comes with profound changes in its sensory environment – smells, sounds and light all place new demands on the child's sensory systems. In humans, these systems mature over the course of days to weeks and months. The larvae of the viviparous tsetse fly do not have this luxury: once born, they must immediately investigate their sensory environment to find a safe spot at which to pupate and metamorphose. Which sensory systems are involved in this behaviour, and are they already functional when the larva is still in its mother's uterus? How do larval sensory capabilities compare to those of free-living fly larvae, like larvae of the house fly and fruit fly?This interdisciplinary project will investigate the sensory basis of larval behaviours in tsetse flies, both within the uterus and after birth, using the sense of smell as a convenient starting point. The student will study the chemical environment and olfactory behaviours in two different environments – in the uterus, and in the soil after birth – using a broad spectrum of comparative methods, including behavioural assays, chemical analysis, transcriptomics, and histology, across the lab and the field. The project offers a wide range of training while undertaking fundamental research that is nevertheless of substantial applied interest: Tsetse are disease vectors that are subject to ongoing population control efforts, which are however hampered by a lack of detailed knowledge of adult and larval behaviours. By uncovering the sensory ecology of tsetse larvae, this project provides the foundation for more targeted, effective vector management. The student will join a young and dynamic research group embedded in a vibrant, multidisciplinary research environment at the School of Biological Sciences, and work alongside experts in neuroethology, sensory ecology, and evolutionary neuroscience. They will be trained by chemical analysis experts at the School of Chemistry and benefit from our collaboration with vector ecology experts at the International Centre for Insect Physiology and Ecology in Nairobi, Kenya. Through this project, the student will transform into an independent researcher – driving societal impact by pursuing their scientific curiosity, building key technical expertise, and cultivating cross-disciplinary collaborations.Accessibility is important to us, and all practical work can be adapted according to the needs of the student. If you have any questions about accessibility or anything else, please contact us.

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.