How does the cerebellum process thoughts and feelings to guide healthy behaviour?

Project ID: 264

Supervisory team

Main supervisor: Dr Paul Chadderton (University of Bristol)
Second supervisor: Dr Paul Anastasiades (University of Bristol)

Collaborators: Dr Seán Froudist-Walsh (University of Bristol), Dr Rui Ponte Costa (University of Oxford

Host institution: University of Bristol

Project description: To survive and thrive in the world our brains must combine and process many different types of information in contextually appropriate ways. A brain area called the cerebellum has recently been recognised to play a critical role in this task. Previously considered to regulate mostly movement and simple reflexes, the cerebellum is now known to make important contributions to thought (cognition), language, emotion, and social behaviour. Intriguingly, many of these behaviours have been linked to a specific subregion of the cerebellum called Crus 1, and altered function in this region has also been linked to the neurodevelopmental condition, autism spectrum disorder (ASD). This PhD project seeks to understand how neurons in the cerebellar region Crus 1 process diverse behavioural signals including information about internal- (e.g. emotions) and external states (e.g. social cues). Cerebellar region Crus 1 is disproportionately enlarged in humans, so this project has exciting potential to provide insight into how the human brain has evolved its sophisticated cognitive and emotional processing capabilities.The project will involve cutting-edge, interdisciplinary research conducted in the Chadderton and Anastasiades labs at the University of Bristol. The successful student will use mouse models to determine how cognitive and emotional information is encoded within the cerebellum, and how these signals are subsequently relayed to different regions of the brain. In the Anastasiades lab, the student will use powerful viral tools such as monosynaptic rabies tracing to develop detailed 'wiring maps' revealing how the Crus 1 region communicates with the rest of the brain. In the Chadderton lab, the student will use cutting edge technology to monitor neural activity within the cerebellum as mice perform different behaviours. Together, these approaches will enable the student to answer the questions, what does Crus 1 hear, and what does it say to the rest of the brain?This project will provide training in a wide range of techniques relevant to understanding the organisation and function of neural circuits within the brain. The successful candidate will apply these tools to answer a fundamental question relating to how the brain is organised for effective control of behaviour. Interested candidates are encouraged to email Dr Chadderton or Dr Anastasiades to further discuss the project.

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.