# Divergent sleep behaviour - An evolutionary approach to understand why we sleep

**Supervisory team:**
**Main supervisor:** Dr Alice French (University of Bristol)
**Second supervisor:** Prof Helen White-Cooper (Cardiff University)
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**Host institution:** University of Bristol

**Project description:**
Getting a full night of high-quality sleep is vital for our health and well-being- we've all heard this mantra a thousand times: So how can an African elephant survive on just 2 hours? The pervasiveness of sleep across the animal kingdom suggests that it serves vital functions, yet we see astonishing variation in the amount different species exhibit. "Why?" remains one of the most fascinating conundrums of the natural world and prompts the following: Do all animals sleep for the same reasons?

We can approach this question in two main ways. Firstly, through studying many species that naturally sleep for different durations, we can identify unique characteristics (which relate to function) in short vs long sleeping ones. Secondly, by removing sleep all together we can determine whether different species are impacted equally in terms of their lifespan, survival, health, fertility and brain function.

Previous attempts to attribute variability in sleep behaviour to different characteristics including body and brain size, metabolic rate, activity, and trophic level, have not been particularly fruitful due to the eclecticism of species typically compared. As a solution, we propose to study the physiology of closely related fruit fly species which already display an impressive range in their sleep behaviour (Joyce et al., 2023), are easy to study in a controlled lab environment and, importantly, are genetically amenable. This means we can begin to explain inter-specific variability in sleep behaviour mechanistically, but also interrogate the pathways leading to pathology following deprivation. This may enable us to identify novel mechanisms of resilience with important clinical insights. During rotation 1 in Dr French's lab, the candidate will use the state-of-the-art video tracking Ethoscope platform (Geissmann et al., 2017) to record and manipulate sleep as well as develop physiology assays to determine whether any resulting health consequences are ubiquitous across species. The candidate will also use the Drosophila genetic toolkit to investigate underpinnings of divergent sleep behaviour as well as the development of health problems following its loss. During rotation 2 in Professor Helen White-Coopers lab, the candidate will look specifically at the reproductive consequences of sleep deprivation in different species. The comparative approach outlined here represents a bold step towards understanding why animals sleep, whether these reasons are ubiquitous and further, it may reveal important mechanisms of resilience in those that can largely forgo it without detriment.

**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.**