Exploiting animal personality to reduce chronic stress in captive fish populations

Supervisory team:
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Project description:
Over recent years the study of personality, defined as the presence of consistent behavioural differences between individuals in a population, has become an important theme in animal behaviour. In this project, the student will build on recently demonstrated links between behaviour and stress physiology to determine how we can harness knowledge of animal personality to improve the welfare of animals, and specifically fish, in captivity.

Stress responses are the behavioural and physiological pathways by which animals maintain fitness when challenged by adverse environments. Over evolutionary time natural selection has shaped stress responses to cope with the inevitable risks and dangers of life in the wild. However, many animals now live in captivity under conditions very different from those in which their stress responses evolved. This can lead to problems. For example, chronic activation of endocrine stress pathways is common and can negatively impact health. Although we understand mechanistically why problems can occur, we are not very good at predicting in advance where and when they actually will. However, recent studies show that individuals vary in susceptibility to chronic stress in ways that can be predicted by behavioural profile or 'personality'. This is intuitive - behaviour is often the first line of defence when challenged by adverse environments and so personality traits (e.g. boldness) can be understood as part of an integrated stress response. Additionally, studies show that genetic factors underpin many of the among-individual (i.e. personality) differences. This raises the prospect that selective breeding for particular personality types could be used to improve stress resistance in captive populations.

The goal of this project will be to develop and validate behavioural biomarkers of stress resistance for use in captive fishes. The student will investigate integration of behaviour (personality), physiology, and welfare indicators (e.g. growth, longevity) at individual and genetic levels. They will do this in a range of fish species used in scientific research (e.g., guppies, zebrafish). Investigating multiple models is important because, while physiological stress pathways are conserved across species, the structure of personality variation is labile across environmental conditions and evolutionary time. So we don't yet know, for example, if the same personality types will always be more resistant to chronic stress or whether this will vary across housing conditions, populations and species. The project will combine theory and analytical methods from livestock genetics with physiology, welfare science, and assays of animal personality developed largely by behavioural ecologists.

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.