

PROJECT TITLE: Using fitness landscapes to learn how species persist in diverse fish communities

Project Science Theme: Evolution and Biodiversity Through Space and Time

Project keywords: Ecology, competition, aquatic, coexistence, fishes

Lead Institution: University of Bristol

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Project aims and methods:

Much of modern biological diversity rests within communities of closely related species. Biologists believe that high diversity is maintained because species partition limited ecological resources between them, thereby limiting competition and avoiding extinction. However, in species-rich fish communities, like those of tropical coral reefs, African lakes and Neotropical rivers, it is commonplace for multiple fish species to co-occur despite intense ecological overlap, even if they possess apparently unique morphological specialisms. This project will investigate core eco-evolutionary principles of species coexistence, using recent developments in fitness landscape theory and data-driven modelling, and focus on two species-rich fish communities that will be selected with the Doctoral Researcher (DR).

The project will be based on generation of community fitness landscapes, using ecological and morphological traits from multiple species, and comparing phenotypic overlap among high fitness individuals and among low fitness individuals. Using museum and wild-caught specimens from focal communities we will: 1) Quantify ecological traits, including diet and habitat. 2) Analyse ecologically-relevant anatomy, including craniofacial structures, using CT scans. 3) Generate community phylogenies to control for species relatedness. 4) Establish effective fitness proxies, including growth rates and condition factors. Collectively these data will allow groundbreaking tests how coexistence is enabled.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via:

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Bristol NERC GW4+ DTP Prospectus:

<https://www.bristol.ac.uk/study/postgraduate/research/great-western-four-doctoral-training-partnership-nerc/>

How to apply to the University of Bristol:

<http://www.bristol.ac.uk/study/postgraduate/apply/>

The application deadline is Monday 13 January 2025 at 2359 GMT.