

The Ecology of Polarization Vision on Coral Reefs

Supervisors:

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Project description:

Overview and Motivation: Many animals see their world very differently from humans, for example seeing at ultra-violet wavelengths. Being able to see the polarization of light is another remarkably common visual adaptation and is central to the visually guided behavior of many animals.

Whilst we currently have a good understanding of polarization vision in invertebrates, the same cannot be said for vertebrates. Despite more than 40 years of investigations, there is still almost no direct experimental evidence of how and why reef-living fish have polarization vision.

Objectives: This project has two principal aims:

1. Behaviorally test polarization vision in various species of planktivorous damselfish, both in the brand new Aquatics Facility at the University of Bristol and using field-based experimental setups at Lizard Island Research Station, Great Barrier Reef, Australia.
2. Obtain comparative physiological evidence for the retinal mechanism that provide these fish with their polarization sensitivity.

We have developed several behavioural paradigms for testing how fish use underwater background polarization information, particular in the context of improving visual distance. For example, behavioural experiments will be run testing the visual abilities of fish in different spectral lighting environments using range of relevant stimuli. We also have all the facilities and expertise necessary to make detailed optical measurements of the visual capabilities of the different species. This will allow us to identify the ecological importance of how polarization information is processed, including in the context of current pressures (particularly increasing sedimentation) on coral reef communities.