The (fish) eyes have it

November 24 2015

The harlequin tuskfish is a predatory wrasse found on the Great Barrier Reef. It was found to express four classes of opsins, including the UV-sensitive SWS1 opsin, despite having UV-blocking ocular media. Credit: Steve Parish

Understanding how fish "see" is helping a team of international scientists increase their knowledge of the Great Barrier Reef's biodiversity.

PhD student Genevieve Phillips at The University of Queensland's Queensland Brain Institute said the reef was one of the planet's most visually diverse environments in terms of light availability and the colours and patterns on the animals living there.

"We studied the visual systems of the labrids, a large family of fish that includes wrasses – which are mainly predatory – and parrotfish – which tend to eat coral and algae," she said.

"Many animals have visual systems that are tuned to the specific wavelengths of light that availablein their environment, so fish that live in rivers 'see' differently from fish living at the bottom of the ocean."

Ms Phillips said the team, which includes scientists from The University of Maryland, studied the different types of opsins in fishes' eyes.

"Opsins are light-sensitive proteins in the photoreceptors that absorb light at specific wavelengths," she said.

This absorption was the first step in the process of "seeing" an image.

Researchers could learn which colours an animal could potentially see by studying the different classes and quantities of opsins in its eyes.

"Many labrids live in the same environment with similar light availability, so you could expect that their visual systems would be fairly similar," Ms Phillips said.

"But we found that the repertoire of opsins they express is actually very different.

"In general, most of the opsins found in the fishes' eyes were sensitive to the green-blue region of the spectrum, which is typical of many reef fish

, as it is the dominant light available to fish on coral reefs.

"However, some of the labrids appeared to have specialised in opsins sensitive to orange-red light."

Ms Phillips said this could help these fish find prey against a predominantly red-brown background.

"The more we understand about what fish can see, and how this relates to their behaviour, the more we will understand about biodiversity on the Great Barrier Reef," she said.

The study is published in *Molecular Biology and Evolution*.

More information: Genevieve A.C. Phillips et al. Multiple Genetic Mechanisms Contribute to Visual Sensitivity Variation in the Labridae, *Molecular Biology and Evolution* (2015). DOI: 10.1093/molbev/msv213

Provided by University of Queensland