

Warm eyes give deep-sea predators super vision

January 11 2005



A Brisbane scientist has discovered deep-sea predators such as swordfish, tuna and sharks warm their eyes and brain to give them superior vision when hunting.

Working with researchers from the US and Sweden, the University of Queensland's Dr Kerstin Fritsches showed that by keeping their eyes warm, these powerful predators could see 10 times better than their coldblooded prey.

Big gamefish such as swordfish and marlin have a specially adapted heating organ in muscle near their eyes which warms their retinas and improves their ability to detect fast moving prey such as squid.



Swordfishes, which hunt in water as cold as three degrees several hundred metres below the surface, can maintain brain and eye temperatures up to 15 degrees above water temperature.

"The large, fast and sensitive eyes of swordfishes give them a crucial advantage in pursuing and intercepting fast-moving prey in the cold and dimly lit depths of the ocean," the scientists wrote in the science journal Current Biology.

The scientists spent most of their research time on board deep sea fishing boats in the North Pacific Ocean.

Dr Fritsches, a Research Fellow with UQ's Vision Touch and Hearing Research Centre, uncovered the advantages of warm eyes while undertaking wider research into gamefish vision.

She is investigating if tuna, marlin and other billfish see colours and movements differently, which could help make more specific fishing techniques, reducing unnecessary and illegal catches.

To expand the research, she is installing a tuna holding tank at UQ's Moreton Bay Research Station on North Stradbroke Island.

The tank will be stocked with mack tuna from Moreton Bay which will be used for experiments on vision and response to colours, schooling behaviour and night activities – as the fish have to swim constantly to survive.

An infra-red camera will be installed on top of the tank to observe their behaviour and see how they respond to obstacles in the water.

Much of the testing is with the fish's retinas, the light sensitive inner coating of the eyeball which only lasts between six and eight hours, once



removed.

Having the fish at the station maximizes research and observation time which would otherwise be spent at sea, Dr Fritsches said.

She said she believed tuna could be trained like dolphins to respond to different flashes and colours.

This could mean flashing lights and colourful lures could be added to long liners to make more selected catches.

Source: University of Queensland

Citation: Warm eyes give deep-sea predators super vision (2005, January 11) retrieved 3 May 2024 from <u>https://phys.org/news/2005-01-eyes-deep-sea-predators-super-vision.html</u>

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