

# Infrared vision in a cichlid fish

October 30 2012

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Biologists from the University of Bonn have discovered that the cichlid fish *Pelvicachromis taeniatus* can see in the near infrared range; this was thought to be unlikely until now. Seeing in the infrared range is apparently helping fish to hunt in shallow African rivers. The results will be published in the journal "*Naturwissenschaften*" and are already available online now.

A research team in the work group of Prof. Dr. T. C. M. Bakker at the Institute for Evolutionary Biology and Ecology, University of Bonn, has been studying the biology of the [African cichlid fish](#) *Pelvicachromis taeniatus* for years.

## Researchers conducted a prey choice experiment

Researchers investigated the ability to see in the infrared range using a classical prey choice experiment. *P. taeniatus* also feeds on small crustaceans, such as freshwater shrimp. These [prey animals](#) reflect near infrared radiation. The researchers used this fact to examine the perception of [infrared light](#). In a dark room a prey selection experiment was set up illuminated by infrared lamps. In front of the water basin containing the fish freshwater shrimp were offered in two separate chambers. One of the chambers with the prey was covered with a filter blocking infrared wavelengths. The other chamber was covered with a filter that would let only infrared light pass. "Consequently, the fish were only able to perceive the freshwater shrimp in one chamber in the near infrared range" explains Dr. Sebastian Baldauf, one of the scientists involved in the study.

## **Physiologists thought that seeing in the near ir range would be unlikely**

The experiment showed that the fish spent more time and were more frequently in front of the chamber that let infrared light pass. "The fish detect their prey based on infrared radiation alone" reports the biologist from the University of Bonn. "Until now, physiologists thought that noise levels in the near-infrared range were too high to allow visual perception." As the experiment has shown, the fish were capable of perceiving prey in a wavelength range above 780 nanometers. It is well-known that snakes can perceive far infrared radiation at longer wavelengths above 2,000 nanometers. "But they don't use their eyes for this purpose; instead they have a heat-sensitive pit organ," says Dr. Baldauf. Human eyes are not capable of seeing infrared radiation.

## **Seeing infrared is useful in the natural habitat**

The advantage of the fish's ability to see infrared may become obvious when you look at its natural habitat. The shallow rivers of West Africa have a relatively large amount of infrared radiation. "That's exactly why it makes sense to use infrared cues for detecting [prey](#) organisms," explains Dr. Baldauf. "It is a clear selective advantage if you can perceive additional signals that others cannot perceive." It is quite likely that other animals also have evolved a perception of near-infrared radiation, e.g. for hunting or orientation, such as other fishes or birds. The researchers from the University of Bonn now want to study more closely the physiology of infrared vision, and to what extent infrared radiation is relevant in other contexts.

## **Infrared radiation in partner selection?**

When performing color measurements on these [fish](#) the researchers

found that certain regions of the cichlid body reflect the light in the near-infrared range. "We found that females reflect infrared radiation from their belly region, and males from their fins" says Dr. Baldauf. The female belly is important for mate choice, and the fins are displayed during aggressive encounters between males. "Perhaps near-infrared signals play a role in visual communication in this species" says the biologist. "And that's what we additionally would like to study in further experiments."

**More information:** *Naturwissenschaften*, [DOI: 10.1007/s00114-012-0980-7](https://doi.org/10.1007/s00114-012-0980-7)

Provided by University of Bonn

Citation: Infrared vision in a cichlid fish (2012, October 30) retrieved 24 April 2024 from <https://phys.org/news/2012-10-infrared-vision-cichlid-fish.html>

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