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Red fish, blue fish, speciation?

Capturing the eye of a potential mate is the first step in propagating a species. But can the way a female sees males of a certain color lead a single species of fish to split into linkurl:two?;http://www.the-scientist.com/article/display/14251/ A study published this week in *Nature* suggests two species of cichlid fish -- one red and one blue -- may have arisen from the female mating preference for males she is best able to see. "We've wanted since Darwin to understand how species originate,

By Jennifer Evans | October 2, 2008

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Capturing the eye of a potential mate is the first step in propagating a species. But can the way a female sees males of a certain color lead a single species of fish to split into linkurl:two?;http://www.the-scientist.com/article/display/14251/ A study published this week in *Nature* suggests two species of cichlid fish -- one red and one blue -- may have arisen from the female mating preference for males she is best able to see. "We've wanted since Darwin to understand how species originate," said linkurl: Karen Carleton;http://www.biology.umd.edu/faculty/kcarleton/index.html a biologist at the University of Maryland and co-author of the study. "This is one of first times we've been able to understand from the molecular level to the fish to the environment to get the whole picture." Researchers have long believed that linkurl: geographic isolation;http://www.the-scientist.com/news/display/23103/ was the primary force behind the evolution of a single species into two reproductively incompatible groups, yet, as lead author and evolutionary biologist linkurl:Ole Seehausen;http://www.eawag.ch/kuerze/personen/homepages/seehauso/index_EN found in Lake Victoria in eastern Africa, the red and blue cichlids were separated by as little as 15 meters of water. Earlier studies showed that red cichlids live closer to the lake bottom, while the blue cichlids frequent more shallow waters, and the females (dressed in muted yellow fins) chose the most linkurl:vibrantly colored;http://www.ncbi.nlm.nih.gov/pubmed/15590594?ordinalpos=2&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pub of the males at their water depth. To understand factors driving female mating preference, Seehausen's team examined light gradients in different depths of water and the opsin gene, which produces a protein that detects color. "We knew about the mating preferences [in cichlids] but we did not know where in the process the divergent evolution at the opsin gene locus occurred," Seehausen said. The researchers genotyped the opsin gene of cichlids from five islands in Lake Victoria and identified the gene's variants in the red and blue cichlids. They then expressed the genes in vitro, showing that the protein product of each variant absorbed light at a different wavelength: in red cichlids, the protein was more sensitive to red light, while in blue cichlids it was more sensitive to blue light. Meanwhile, light gradient data showed blue light was more easily visible in shallow water and red light in deep water. The findings suggest that natural selection in each species' visual system toward red- or blue- sensitivity, which allows cichlids to best navigate their environment, may also drive females to the males they are best able to see. "The evidence shows that in a heterogeneous environment, where different conditions prevail along a gradient, selection is strong enough to create two species," said Seehausen. linkurl: Trevor Price;http://pondside.uchicago.edu/ecol-evol/faculty/price_t.html who studies the evolution of color patterns in birds at the University of Chicago, said he's excited about Seehausen's model, but stressed that more evidence is needed to "make the connection that female color vision is driving speciation." Females with the red-biased and blue-biased opsin variants generated from controlled crosses in Seehausen's lab demonstrated no preference between red and blue males in the lab tank. "These findings suggests the opsin gene themselves are not causing mating preference," Seehausen said. "It could be the interaction of visual gene and ambient lighting." Seehausen said his group plans to look for additional genes and traits involved in mate choice in cichlids in order to understand how these interact with the adaptation of the visual system.

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October 4, 2008

"Researchers have long believed that geographic isolation was the primary force behind the evolution of a single species into two reproductively incompatible groups, yet, as lead author and evolutionary biologist Ole

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