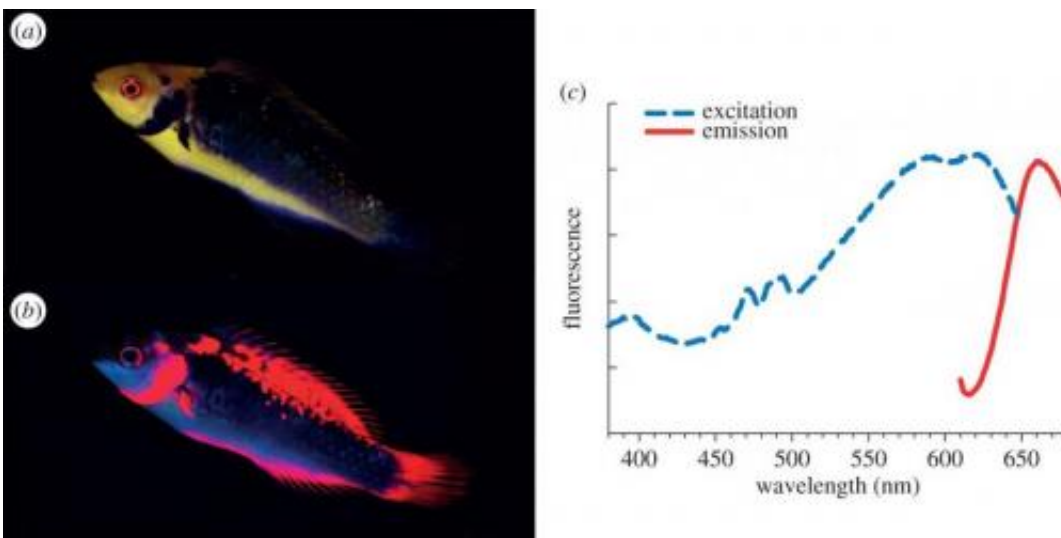


# Study shows fairy wrasses perceive and respond to their own deep red fluorescent coloration

May 28 2014, by Bob Yirka



Fluorescence characterization of *C. solorensis*. (a) Male fish illuminated with broad-spectrum white light; (b) same individual under monochromatic blue illumination. (c) Excitation (dashed line) and emission (solid line) spectra of opercular scales. Credit: *Proceedings of the Royal Society B*, doi: 10.1098/rspb.2014.0787

(Phys.org) —A trio of researchers with the University of Tübingen in Germany has found that the fairy wrasse (*Cirrhilabrus solorensis*) is able to perceive its own deep red fluorescent coloring and responds to it in aggressive ways. In their paper published in *Proceedings of the Royal Society B: Biological Sciences*, Tobias Gerlach, Dennis Sprenger and Nico

Michiels describe field and lab studies they conducted that appear to prove that the fish is able to see fluorescent colors.

Most [fish](#) that live in deep ocean water are blue, which is generally thought to be because blue light is able to pass through the water above and other colors are not. That makes it almost impossible for those that reside in such deep waters to see any other color, thus there would be no point in being any other color. No point that is, unless you're a fish that can not only produce a [fluorescent](#) color, but are able to see it as well. That appears to be the case with fairy wrasses (who live at depths of 30 to 200 feet)—the tops of their heads are colored fluorescent red and parts of their foreheads are yellow. Such coloring must have a purpose, the researchers surmised, likely to ward off rivals or predators or to attract a mate—the reasons behind most such coloring in fish that live closer to the surface. To find answers to their questions, the trio ventured to Indonesia, where the fish reside.

First they conducted a field study, watching the fish in their native environment. Then, they bought some specimens and put them in water tanks outfitted with mirrors. The mirrors were so the fish could see themselves, obviously, which being creatures with small brains, would naturally assume were other male fish. Upon seeing themselves in all their full colored glory, the males attacked. When filters were put in place that allowed the fish to see themselves without the fluorescent coloring, however, the reaction was much less pronounced, proving that the fish were able to see the coloring and had a tendency to react to it. The study is the first to demonstrate that deep red fluorescent coloration can be seen (and responded to) by a reef fish. The researchers next plan to test females of the species to determine if male coloring is also meant to attract a mate.

**More information:** Fairy wrasses perceive and respond to their deep red fluorescent coloration, *Proceedings of the Royal Society B*, Published

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## **Abstract**

Fluorescence enables the display of wavelengths that are absent in the natural environment, offering the potential to generate conspicuous colour contrasts. The marine fairy wrasse *Cirrhilabrus solorensis* displays prominent fluorescence in the deep red range (650–700 nm). This is remarkable because marine fishes are generally assumed to have poor sensitivity in this part of the visual spectrum. Here, we investigated whether *C. solorensis* males can perceive the fluorescence featured in this species by testing whether the presence or absence of red fluorescence affects male–male interactions under exclusive blue illumination. Given that males respond aggressively towards mirror-image stimuli, we quantified agonistic behaviour against mirrors covered with filters that did or did not absorb long (i.e. red) wavelengths. Males showed significantly fewer agonistic responses when their fluorescent signal was masked, independent of brightness differences. Our results unequivocally show that *C. solorensis* can see its deep red fluorescent coloration and that this pattern affects male–male interactions. This is the first study to demonstrate that deep red fluorescent body coloration can be perceived and has behavioural significance in a reef fish.

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