

Dive 6: Lesson Plan - Why Are Coral Reefs So Colourful?

Module Summary

This module is an exploration dive to discover the different functions of colour on coral reefs. Colour is used by all organisms on the reef, but for different reasons: camouflage, distraction, warning, reproduction, countershading, and counter-illumination. Students will be given an in-class activity to complete and an opportunity to discuss with the underwater educator why different fish have evolved to be a particular colour.

Year 6

Learning Objectives

- Identify colour loss on the reef at various depths
- Describe why there is colour loss on the reef at various depths
- Explain how colour is used by some animals on the reef to avoid predation
- Differentiate how colour is used during reproduction for male versus female fish
- Summarize countershading or counter-illumination

Science National Curriculum Alignment

- Discuss the use of colour in the natural environment. *For example, in camouflage, talk about how animals adapt to their surroundings (Year 6).*

Description of the live dive

The dive takes place on a colourful and pristine coral reef. The underwater educator communicates with the live lesson host on the boat and with the engaged remote class. The educator takes the students through a series of fun facts and learning objectives regarding our colourful coral reefs, all in alignment with the Science National Curriculum of the Cayman Islands. Students will have an in-class activity to complete during the lesson. Pre-recorded footage and images are included to show the diversity of different colours and functions on the coral reef, adding to these processes that were discovered naturally during the broadcast. The live lesson concludes with a game of “Why is that fish that colour?”.



Live broadcast outline (45 mins)

- 00:00 - 03:00 CCMI host on the boat welcomes students and outlines the lesson
- 03:00 - 05:00 CCMI host introduced in lesson activity to along with the educator
- 05:00 - 10:00 Fish that use colour for distraction e.g. foureye butterflyfish
- 10:00 - 15:00 Fish that use colour for camouflage e.g. Nassau grouper
- 15:00 - 20:00 Questions
- 20:00 - 25:00 Fish that use colour for warning e.g. lionfish/blue tang
- 25:00 - 30:00 Fish that use colour for reproduction e.g. parrotfish/Nassau grouper
- 30:00 - 35:00 Student game: Why is that fish that colour?
- 35:00 - 40:00 Questions
- 40:00 - 45:00 CCMI host on the boat recaps the live dive and concludes the lesson

Materials

Internet connection, laptop, projector, speakers, paper, pencils/pens, CCMI activity sheet, and CCMI fun fact sheet.

Useful resources

- www.reefresearch.org/reefs-go-live
- www.projectaware.org
- www.oceanservice.noaa.gov/kids/
- www.education.gov.ky/education/curriculum
- www.doe.ky

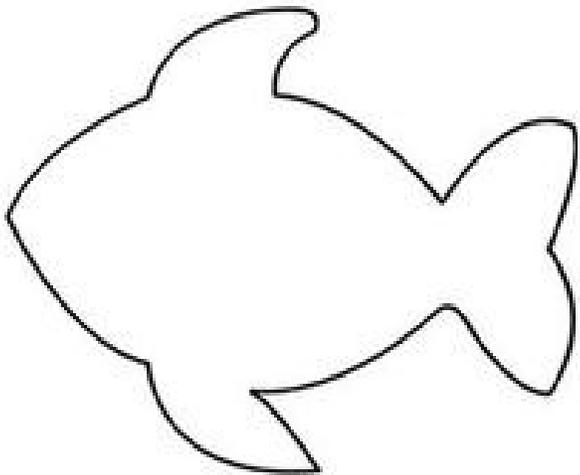
Fun Fact Sheet - Why Are Coral Reefs So Colourful?

1. Coral reefs are some of the most colourful places in the world. Some organisms only see limited parts of the light spectrum while others see far beyond visible colours into ultraviolet light that humans cannot see. The bright colours serve many functions including camouflage, defence, and mate attraction (National Geographic 2005).
2. Red is the first colour of the colour spectrum to be absorbed or filtered out underwater, which is why nocturnal fishes are usually a shade of deep red or orange to help them hide from predators (National Geographic 2015).
3. Small ornamental reef fishes are a beautiful variety of colours; however, underwater in natural light, these colour combinations blend into the background of the coral reef and provide camouflage from predators (Marshall 2017).
4. Some reef fishes have very detailed and intricate patterns on their bodies. When these fishes school together the patterns confuse predators allowing the fish to retreat quickly, creating an obscure blur (Rosenthal 2017).
5. Many coral reef animals have chromatophores, which are skin cells that create the appearance of colour or patterns through pigment and light manipulation. Expressing different colours or patterns with chromatophores can be used to attract prey, deter predators, or attract a mate (Kaufman 2016).
6. Many fish that are planktivores can see ultraviolet light, which makes plankton appear black in the water column and much easier to see during feeding (Lose et al. 2015).
7. Stomatopods, also known as mantis shrimps, have the world's most complex eye with up to 16 different kinds of photoreceptors for visible light (what humans can see), ultraviolet light, and polarisation. Humans only have four photoreceptors (Marshall 2017).
8. Many reef fishes use colourisation as warning patterns to predators to keep away; scorpionfishes have a flame red spot on their pectoral fins, lionfishes flare their bold red and white pectoral fins, while doctorfishes and surgeonfishes highlight their bone spur (Campbell and Reece 2002).
9. The photic zone, or the top approximately 150 m of the water column, is where you find most of world's coral reefs where visible colour is determined by light intensity, turbidity, and depth (Marshall 1998).
10. Counterillumination or countershading is a colouration adaptation that make many pelagic (oceanic) marine animals appear dark in colour if you look down at them from above (to blend in with the dark water or coral reef below) and appear light in colour if you look up at them from below (to blend in with the bright water or sky above) (Warrant 2004).
11. Most large predatory animals and fish living on coral reefs are colour blind; instead, they rely on countershading, colour contrasts and differing colour patterns to find food, attract mates, and defend themselves (Marshall 1995).

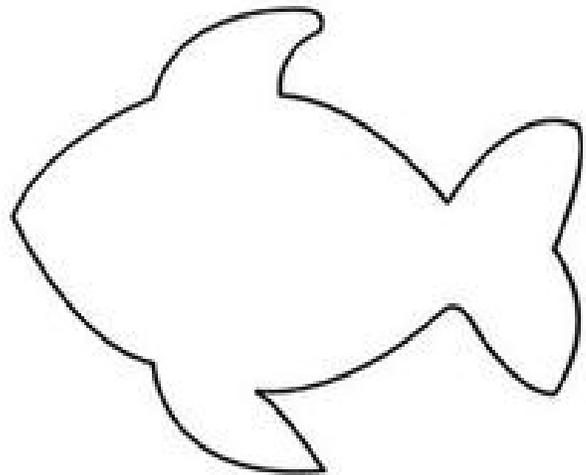


In Class Activity Sheet - Why Are Coral Reefs So Colourful?

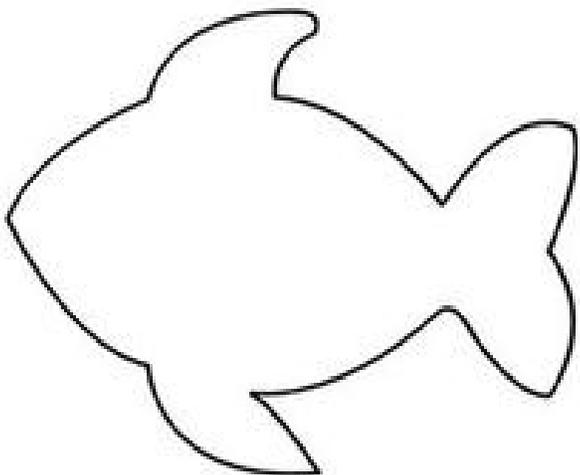
You're the scientist! Help our CCMI scientist identify how or why fishes have certain colours on the coral reef. When you see an example of (or hear our CCMI scientist describe) one of the colour patterns below, draw out those colours or patterns and name that fish. If you don't see one of these examples during our broadcast, you can research what a fish with these patterns would look like so that you can colour it. Then you may see and be able to correctly identify that fish on the reef in the future.



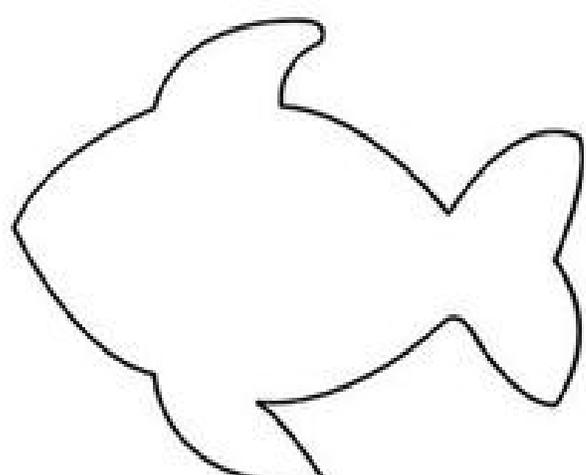
Countershading



Reef fish at night



Reef fish during the day



Reef fish against the sand