Where’s the Octopus? *Modified transcript with vocabulary*

Based on the “[Where’s the Octopus](http://www.sciencefriday.com/video/08/05/2011/where-s-the-octopus.html)” interview with Dr. Roger Hanlon (in quotes), narrated and produced by Flora Lichtman, 8/05/2011

|  |  |  |
| --- | --- | --- |
| 1 | “I have to admit I was screaming when I got this video…”    What makes a **marine biologist** scream? Roger Hanlon captured this [video] about 10 years ago when he was doing a study in the Caribbean, and he’d been following this octopus for about an hour. When it crept behind a rock and went into **camouflage** mode, he “jammed the camera right in its face, so to speak,” prompting it to go from camouflage to a **startle** defense, “**blanching** white very quickly” and then inking him.    “But I followed the animal and finished the dive. I popped to the surface (it was only about five feet deep), and I screamed bloody murder, and they thought I was having a dive accident”—when actually he was having “a **Eureka moment**, there’s no doubt about it.” | **Marine biologist** – a scientist who studies organisms that live in the ocean  **Camouflage** – color, shape, or textural markings used to help an organism hide by blending into the surrounding environment.  **Startle** – cause shock or alarm  **Blanch** – turn pale or white in color |
| 2 | Hanlon is trying to understand just how camouflage works in **cephalopods**: squid, octopus, and cuttlefish. They are masters of **optical illusion**. “They are the animals best known to go anywhere and camouflage. No animal comes even close to the speed and diversity of appearances of this animal,” Hanlon says.  They have a few tricks at their **disposal**: octopus and cuttlefish can change their skin texture. “This is the only animal group that we know of that has fine control of its skin to create bumpiness.” And they match their skin **dimensionality** by sight, not by touch, which is “a **vexing** visual perception question.” And of course they change color. | **Cephalopod -**  a class of organisms that includes squid, octopus, and cuttlefish  **Optical illusion** –something that appears to exist but does not, or that is not what it seems.  **Disposal –** ready to be used  **Dimensionality –** appearance of dimension, having depth, shape, or length  **Vexing** – annoying or frustrating |
| 3 | So, here’s an octopus “doing what we call the ‘moving rock trick’”: “I’m a rock, I’m a rock”…Now, watch this: [octopus changes to match the kelp]. “The amazing thing is that these animals are colorblind, yet they are capable of creating color-matched patterns, but we don’t know how.”  But of course Hanlon would like to [know], and one way he’s studying this is by looking closely at squid skin. That’s what you’re seeing here: [image of **chromatophores**]. “These are super close-up images of live, un-anaesthetized squid.” And those dots of pigment are called chromatophores. They come in three colors: “Yellow, red, and brown. But there are reflectors under the **pigments**, and the reflectors produce the short wavelengths, the blues and the greens.” | **Chromatophores –** a cell that contains color or pigment  **Anaesthetized** – Given medicine (anaesthetic) to go to sleep and/or or not feel pain  **Pigment -** a natural coloring substance |
| 4 | The chromatophores can change shape to change the **predominant** skin color. “Each one of those little spots on there can expand up to 15 times its **diameter**.” And these chromatophores seem to be twitching all the time. “They camouflage all night long; they don’t sleep, as far as we know.”    That’s because cephalopods, with their squishy bodies, rely on camouflage as their main protection from predators. | **Predominant** – overall, most common  **Diameter –** distance across the center of a round object or circle |
| 5 | Of course, camouflage is not just color—it’s also pattern. This is one of Hanlon’s major **hypotheses**. “We found only three to four basic pattern templates that they use to achieve all this camouflage.”    There’s **uniform**: “By uniform, we mean that there is little or no contrast in the pattern.”  There’s **mottled:** “Mottle is small-scale light and dark splotches.”  And there’s **disruptive**, and the idea there is to “interfere with the recognition of what the animal is.”  Based on lab studies, Hanlon says that the animals flash particular patterns based on a few visual cues they encounter in the environment. Hanlon wouldn’t call it a reflex, because so much visual analysis is involved, “but it is very fast”—the **palette** and pattern can change in less than a second. | **Hypotheses –** testablepredictions based on preliminary evidence  **Uniform -** the same throughout  **Mottled -**  spots or smears of color  **Disruptive –** having interruptions in a patter, not consistent  **Palette** –range or family of colors |
| 6 | But just why these patterns work is still kind of a mystery. Let’s take the octopus video again. Hanlon analyzed this video frame-by-frame, but he can’t tell you why you don’t see the animal: “We can’t find any true **statistical** matches—whether it’s brightness [or] color—between the animal and the background, so camouflage is not looking exactly like the background.”  Camouflage just means fooling whatever is looking at you, which suggests that “we’re behind the 8-ball, as it were, if we think the world looks like how we see it. There’s much more information there, and other animals see it very differently” | **Statistical –** following a numerical pattern in data |

**Questioning for Key Ideas and Details**

CCSS.ELA-Literacy Reading Informational Text Sample Questions (grade 2 standards are presented)

[CCSS.ELA-Literacy.RI.2.1](http://www.corestandards.org/ELA-Literacy/RI/2/1/) Ask and answer such questions as *who, what, where, when, why*, and *how* to demonstrate understanding of key details in a text.

* Who is the scientist that this video is about, and what is he studying?
* What is so special about octopus, squid, and cuttlefish skin? How is it different from our skin?
* How do octopus, squid, and cuttlefish camouflage themselves? What do they have to change about their bodies to blend in?
* How do animals like octopus, squid, and cuttlefish manage to hide so well?
* What *specific tricks, tools, or skills* help them blend into the environment?
* Highlight examples in the text that show how cephalopods change their bodies to help them blend in.

[CCSS.ELA-Literacy.RI.2.2](http://www.corestandards.org/ELA-Literacy/RI/2/2/) Identify the main topic of a multi-paragraph text as well as the focus of specific paragraphs within the text.

* Are most animals able to change their skin color? Their texture? What clues in the text communicate that the camouflage of octopus and squid is unique?

[CCSS.ELA-Literacy.RI.2.7](http://www.corestandards.org/ELA-Literacy/RI/2/7/) Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.

* After watching the video of the octopus changing color, does it look like these animals can change their skin color quickly? Slowly? What in the text agrees with your observations of the video?
* Other than changing its color, how else does an octopus change its skin to blend in? What do you notice in the video? What clues in the text indicate the other ways that octopuses might change their skin to camouflage themselves?