

## Underwater Astonishments

... [T]oday we've only explored about three percent of what's out there in the ocean. Already we've found the world's highest mountains, the world's deepest valleys, underwater lakes, underwater waterfalls—a lot of that we shared with you **from the stage**<sup>1</sup>. And in a place where we thought no life at all, we find more life, we think, and diversity and density than the tropical rainforest, which tells us that we don't know much about this planet at all. There's still 97 percent, and either that 97 percent is empty or just full of surprises.

But I want to jump up to shallow water now and look at some creatures that are positively amazing. Cephalopods—headfoots. **As a kid I knew them as calamari, mostly**<sup>2</sup>. This is an octopus—this is the work of Dr. Roger Hanlon at the **Marine Biological Lab**<sup>3</sup>—and it's just fascinating how cephalopods can, with their incredible eyes, sense their surroundings, look at light, look at patterns. Here's an octopus moving across the reef, finds a spot to settle down, curls up, and then disappears into the background. Tough thing to do.

**In the next bit**<sup>4</sup>, we're going to see a couple squid. These are squid. Now males, when they fight, if they're really aggressive, they turn white. And these two males are fighting. They do it by **bouncing their butts together, which is an interesting concept**<sup>5</sup>. Now, here's a male on the left and a female on the right, and the male has managed to split his coloration so the female only always sees the kinder gentler squid in him. And

the male . . . (Laughter) We're going to see it again. Let's take a look at it again. Watch the coloration: white on the right, brown on the left. He takes a step back—so he's keeping off the other males by splitting his body—and comes up on the other side . . . **Bingo!**<sup>6</sup> **Now I'm told that's not just a squid phenomenon with males, but I don't know**<sup>7</sup>. (Laughter)

Cuttlefish. I love cuttlefish. This is a giant Australian cuttlefish. And there he is, his droopy little eyes up here. But they can do pretty amazing things, too. Here we're going to see one backing into a **crevice**<sup>8</sup>, and watch his tentacles—he just pulls them in, makes them look just like algae. Disappears right into the background. Positively amazing. Here's two males fighting. Once again, they're smart enough, these cephalopods; they know not to hurt each other. But look at the patterns that they can do with their skin. That's an amazing thing.

Here's an octopus. Sometimes they don't want to be seen when they move because predators can see them. Here, this guy actually can make himself look like a rock, and, looking at his environment, can actually slide across the bottom, using the waves and the shadows so he can't be seen. His motion **blends right into the background**<sup>9</sup>—the moving rock **trick**<sup>10</sup>. So, we're learning lots new from the shallow water. Still exploring the deep, but learning lots from the shallow water. There's a good reason why: The shallow water's full of

<sup>1</sup> When Gallo says “from the stage,” he is referring to previous TED Talks given by colleagues or himself that focus on creatures of the deep sea.

<sup>2</sup> Gallo makes a joke here which helps connect any nonscientists in the audience to his topic. Calamari is a Mediterranean dish consisting of deep-fried squid.

<sup>3</sup> The Marine Biological Lab is an international center for research and education in biology, located in Massachusetts, United States.

<sup>4</sup> “In the next bit” is an informal way of introducing the next part or section of a talk. Gallo's presentation style is largely informal.

<sup>5</sup> Gallo inserts humor in various places throughout his talk; this is one example. Here he draws attention to how unusual the squids' behavior is by referring to it as “an interesting concept.”

<sup>6</sup> The exclamation “Bingo!” is often used to point out a result that is successful or to note that something has happened that you predicted. The term comes from a popular game where players yell out “Bingo!” to announce that they've won.

<sup>7</sup> Gallo's joke here is to liken the male squid's trait of showing a different side of their personality to females to that of human males.

<sup>8</sup> A “crevice” is a narrow gap or crack, especially in a rock.

<sup>9</sup> To “blend into the background” means to change your appearance to match your surroundings and therefore be less noticeable.

<sup>10</sup> The word “trick” often refers to acts performed by magicians. Here, Gallo uses it to draw an analogy between the octopus and a magician.

predators—here’s a barracuda—and if you’re an octopus or a cephalopod, you need to really understand how to use your surroundings to hide.

In the next scene, you’re going to see a nice coral bottom. And you see that an octopus would stand out very easily there if you couldn’t **use your camouflage, use your skin to change color and texture**<sup>11</sup>. Here’s some algae in the foreground . . . and an octopus. **Ain’t**<sup>12</sup> that amazing? Now, Roger **spooked**<sup>13</sup> him so he **took off**<sup>14</sup> in a cloud of ink, and when he lands the octopus says, “Oh, I’ve been seen.

The best thing to do is to get as big as I can get.” That big brown makes his eyespot very big. So, he’s bluffing. Let’s do it backwards—I thought he was joking when he first showed it to me. I thought it was all graphics—so here it is in reverse. Watch the skin color; watch the skin texture. Just an amazing animal, it can change color and texture to match the surroundings. Watch him blend right into this algae. One, two, three. And now he’s gone, and so am I.

Thank you very much.

This is an edited version of Gallo’s 2007 TED Talk. To watch the full talk, visit [TED.com](http://TED.com).

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<sup>11</sup> Notice here that Gallo offers a definition of “camouflage” as he uses it.

<sup>12</sup> The word “ain’t” is a colloquial way to say “is not,” “are not,” and “am not.” It is used widely in informal spoken English.

<sup>13</sup> If you “spook” someone, you scare them or make them nervous.

<sup>14</sup> The phrasal verb “take off” has a number of different meanings. Here it means to leave suddenly.