

JOURNEY INTO MIDNIGHT

LIGHT AND LIFE BELOW THE TWILIGHT ZONE

SEAMAIL™

TO: Virtual Deep-Sea Science Team
FROM: Heather Judkins
SUBJECT: How squid and octopods are adapted to the dark

Hi everyone.

My name is Heather Judkins. I study cephalopods. Those are octopus, squid, cuttlefish, and chambered nautilus.

Cephalopods are known for their amazing ability to camouflage themselves in shallow ocean water. They can change the color of their skin, their shape, and even skin texture quickly. But, what do they do when there is no light available -- in the Midnight Zone?

I want to know, what body parts and behaviors (also called adaptations) have they developed to live beyond the light?

Of the 90 known cephalopod species found in the Gulf of Mexico, 70 are considered deep-sea animals. They live in the water column (middle of the water between the surface and seafloor) all the way down to the seafloor thousands of meters below the surface.

In the deep, we find a variety of adaptations to survive in the dark world below 1,000 meters (3,280 feet). Those include bioluminescence, transparency, red and black coloration, and gelatinous bodies.

Here are a couple examples:

The vampire squid (Photo 1) survive in the dark by matching the density of seawater to reduce their need for active swimming. What? That means they can hang or float in one spot without moving. If you've ever been swimming, you know that's hard to do. Vampire squid use their thin tentacle-like appendages to trap food. They eat small organisms and marine snow. Marine snow is bits of decaying plants and dead animals that fall/floats down from the surface. They hunt 600 to 1,500 meters (1,970 to 4,920 feet) deep.



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How are squid and octopods adapted to the dark CONTINUED

Vampire squid, whiplash squid, dumbo octopus, photos courtesy Journey into Midnight: Light and Life Below the Twilight Zone

Vampire squid are also bioluminescent. One way they use the light to hide. How? They also have light cells, called photophores on their head and body. The glow matches the dim light from the surface. When a predator below the squid looks up, the squid's body disappears into the light from the surface. Photophores on their arm tips can create a dazzling display to distract predators.

Another squid that lives in the twilight and midnight zones is the whiplash squid (Photo 2). They are more muscular. They are known for their long tentacles with microscopic suckers and a large fin which helps them hover above the seafloor. These squid also have photophores embedded in the skin that covers the body. As they grow, these squid move deeper into the water column. They move from 200 to 600 meters (650 to 1,970 feet) down to 1,000 to 1,500 meters (3,280 to 4,920 feet). They might do this to avoid being eaten by whales.



Gelatinous octopods (Photo 3) also inhabit the zones below 1,000 meters (3,280 feet). These octopods also move deeper as they mature. They spend much of their adult lives below 1,000 meters (3,280 feet).



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The dumbo octopus (Photo 4) is one of the deepest-living octopus species -it has been found 4,000 meters (13,120 feet)



deep! Benthic octopods found deeper than 1,000 meters (3,280 feet) tend to have reduced ability to produce ink. For example, the dumbo octopus does not have an ink sac. This makes sense since they always live in the dark. Dumbo octopus use their large fins to move through the water.

I hope we discover some amazing squid and octopus during our cruise!

Heather

Heather Judkins
Deep-Sea Explorer
Journey into Midnight
WhaleTimes.org



Ocean Exploration and Research

Journey into Midnight: Light and Life Below the Twilight Zone research funded by NOAA-Office of Exploration and Research

