

Amazing Adaptations

Life Deep Down

The deep-sea environment, characterized by low oxygen saturation, cold (except near hydrothermal vents, where temperatures reach 400 degrees Celsius) and tremendous pressure, is hostile. At the ocean's deepest point, the water pressure is the equivalent of having about 50 jumbo jets piled on top of one- yet life thrives here.

Some Common Adaptations

- Soft and flabby bodies.
- Able to fast for long periods.
- Usually blind or with small eyes. Some have large, sensitive eyes, presumably to aid vision in dim light.
- Transparent bodies. Examples: Salpa, the Sword- fish squid (*Chiroteuthis*) and Cockatoo squid (*Galiteuthis*).
- Bioluminescence. Most produce blue-green or red light to attract prey or to confuse predators. The light diffuses the animal's outline, effectively "cloaking" its presence- a phenomenon called counter illumination.
- Some are wait-and watch type predators, while others. Such as the pompom anemone (*Liponema brevicornis*), can assume many shapes- from low and flat to round and puffy, to roll along the seafloor like tumbleweeds, "blown" by deep sea currents to look for more hospitable areas.
- There is a tendency to have "thin" appendages as these uses less energy. The (10 cm across) large-clawed spider crab (*Macroregonia macrochiera*) walk long distances on the seabed on thin, 50 cm long legs.
- Association with symbiotic bacteria. Most are bioluminescent. Others oxidize hydrogen sulphide, turning it into usable nutrients-as in the guts of giant tubeworms and gills of the Giant hydrothermal vent clam *Calyptogena*.
- Tendency towards gigantism. Sea spiders can grow to the " size of dinnerplates." The tubeworm *Riftia pachyptila*, can grow 1.5 meters long. Terrestrial woodlice range in size from 1-5 cm, but their marine relative, *Bathynomus giganteus* grows up to 37 cm and weight 1.7 kg.

Lurking in the Dark

- Red to orange- brown coloured Flabby whalefishes are practically invisible because longer wavelengths (such as red and orange) do not penetrate into these waters and animals here cannot see these wavelengths.
- Giantred mysid (*Gnathophausia ingens*) are actually invisible to most eyes.
- Midwater shrimp's (*Sergestes similis*) blue glow matches the colour and intensity of dim light from above; essentially making it "disappear".

Lighting up the Dark

- Stoplight loosejaw (*Malacosteus Niger*) flashes a red light from an orange beneath the eye. Behind that, another orange flashes a bright green light.
- The jellyfish *Erenna* produces fatally attractive (for prey) red light at the tips of its writhing, twisting tentacles.
- Shrimp- Like *Gnathophausia ingens* spits out glowing fluid when attacked; the light flash distracts the predator.
- Sea Cucumber, *Enypniastes eximia*, lights up on contact, swimming away to safety after shedding the glowing skin when attacked.
- Shining tube- Shoulder (*Sagamichthys abei*) releases glowing slime from the two "tubes" to distract predators.
- Vampire squid produces disorienting flashes of light. It can vary both duration and intensity of light.
- Lanternfish and Hatchetfish have lights arranged in specific patterns all over their bodies to signal to mates.

Tempting Lures

- Anglerfish bear a fishing pole with illuminated bait. *Linophryne arborifera* has a light lure atop the head and a tangle of bioluminescent filaments below.
- Wolftrap anglers (*Lasiognathus sp.* And *Thaumatichthys sp.*) And Viperfish (*Chaulodus sp.*) have a light hanging inside their enormous mouths!
- The female Triplewart sea devil (*Cryptopsaras couesui*) has elaborate lures that house bioluminescent bacteria. The fish slides the rod part of the apparatus back into a groove, drawing the lure and prey closer to the mouth.

- Footballfish (*Himantolophus groenlandicus*) bear a “fishing rod” at the end of which is a bulbous structure called Esca that houses luminescent bacteria.

Big Mouths and Toothsome Tool

- Because very little food reaches here, deepsea denizens exhibit extraordinary adaptations guaranteeing no prey escapes. Many, such as the Fangtooth (*Anoplogaster cornuta*), have large mouths, armed with extremely long, inwardly pointed teeth.
- Viperfish have huge, fang-like teeth. Powerful muscles pull the head up with the mouth opening at the same time. The lower jaw shot forward. The throat opens at the sides. The heart is simultaneously carried forward and the gills extended sideways. prey passes without hurting delicate internal organs; then very swiftly all organs return to normal positions.
- Stoplight loosejaw has an enormous lower jaw that can be extended forward. The long, inward pointing teeth act as hooks to grab prey.
- Bristlemouths (*Cyclothone sp.*) have a prodigious gape for fish so small. Their mouth is lined with bristle-like teeth.
- Giganturids (*Gigantura sp.*) and Atlantic footballfish have needle sharp teeth that can be lowered, allowing large prey to be swallowed easily.
- The Umbrellamouth gulper- *Eurypharynx pelecanooides*- has wide loosely-hinged jaws allowing the mouth to balloon out. The lower jaw is like a pouch, therefore, the second nickname, pelican eel.
- Flabby Whalefish, Gulper eel and Giganturids have distensible stomachs to store large prey.

Stay Together

- The male Angerfish are permanently attached to and parasitic on the female Anglerfish.
- As many as 50-100 microscopic Osedax tubeworm males live within the body of a female.