My Drift

Title: The Deep Ocean
Written by: Jerry D. Petersen
Date: 15 Nov 2020
Article Number: 348-2020-26

The deep ocean. **A place so different, filled with many strange life forms. But how much do we really know about it? As it turns out, not very much. More than 90% of the global ocean remains unexplored, most of which is considered the deep ocean.**

But what exactly is the deep ocean? **The first 200 meters (650 feet) of the ocean is the Epipelagic or the Sunlight Zone. Most of the marine life we know lives here because that is where there is light and warmer water.**

Between 200 and 1,000 meters (3280 feet), where there is little light left, you have entered the Mesopelagic or Twilight Zone.

Once you pass 1,000 meters, the water is completely devoid of light, and you have reached the deep ocean or the Midnight Zone.

See the 5 Ocean Layers (Depth Zones) Chart on next page.

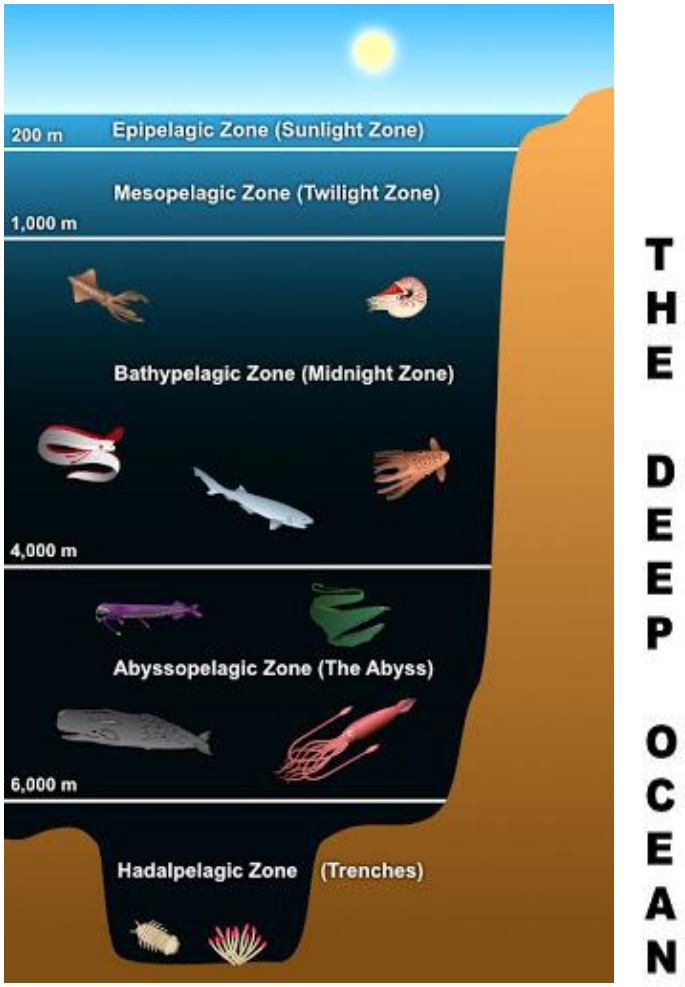
Down there in the deep ocean temperatures plummet below 40 degrees Fahrenheit, and constantly stays near freezing. The pressures at these depths range from about 40 to over 110 times the pressure of Earth's atmosphere. So, how could anything thrive in these conditions?

It was originally thought that life cannot survive without light. We now know that despite this lack of light, many creatures can live in this extreme place, such as: microorganisms in hydrothermal vents, deep sea corals, some fish, and many other bizarre creatures.

Exploring the deep ocean is challenging because of the harsh conditions, but marine scientists are on a mission to document new species in this unusual place.

The purpose of this article is to find out what's down there in the Deep Ocean.

Keep in mind that the average depth of the ocean is about 2.65 miles or 4,267 meters or 14,000 feet deep. The deepest part of the ocean is called the Challenger Deep, which is about 6.86 miles or 11,034 meters or 36,200 feet deep. Challenger Deep is located beneath the western Pacific Ocean in the southern end of the Mariana Trench.



The 5 Ocean Layers (Depth Zones)

Epipelagic (Sunlight) Zone - **The epipelagic zone reaches from the surface of the ocean down to 200 meters or around 650 feet. This is the zone most exposed to light, and as such is host to the highest concentrations of the ocean's life. There are thousands of marine species that roam this zone, including dolphins, whales, most fish, most sharks, jellyfish, tuna, and corals. Seaweed is a common plant in the epipelagic zone, along with various algae and phytoplankton.**

Dolphins and most marine life we see stays mostly in the Sunlight Zone

Mesopelagic (Twilight) Zone - **Below the epipelagic zone is the mesopelagic zone, extending from 200 meters (650 feet) to 1,000 meters (3,280 feet). The mesopelagic zone is sometimes referred to as the twilight zone. The light that penetrates to this depth is extremely faint. It is in this zone that we begin to see the twinkling lights of bioluminescent creatures. A great diversity of strange and bizarre fishes can be found here including squid, cuttlefish, wolf fish and swordfish. However, many of these fish rise to the epipelagic zone at night to feed.**

Squid - Found in Twilight and Midnight Zones

Wolf Fish

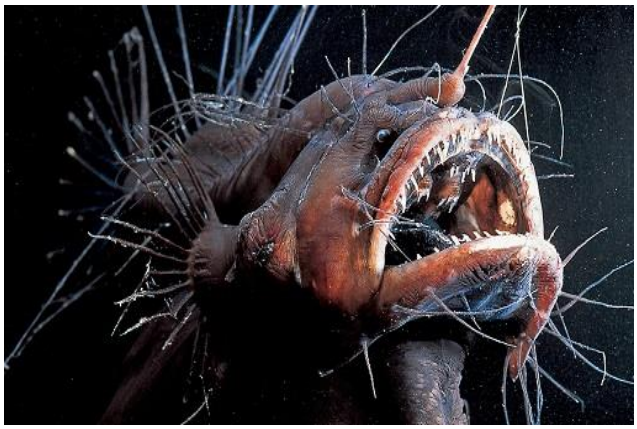
Bathypelagic (Midnight) Zone - **The bathypelagic zone, also known as the midnight zone, extends from 1,000 meters (3,280 feet) down to 4,000 meters (13,124 feet). Here it is pitch black and the only visible light is that produced by the creatures themselves. The water pressure at this depth is immense, reaching 5,850 pounds per square inch. We are now in the Deep Ocean.**

In spite of the pressure, a surprisingly large number of marine life can be found here. Inhabitants of this cold, dark environment include the elusive giant squid, various octopuses, bioluminescent jellyfish, angler fish, tripod fish, sea cucumber, snipe eel, opossum shrimp, black swallower, vampire squid, and hatchet fish. Sperm whales will occasionally enter this zone to hunt for giant squid, but they eventually return to the mesopelagic and epipelagic zones.

There is no living plant life, not even phytoplankton.

Octopuses

Bioluminescent Jellyfish



Angler Fish

Hatchet Fish

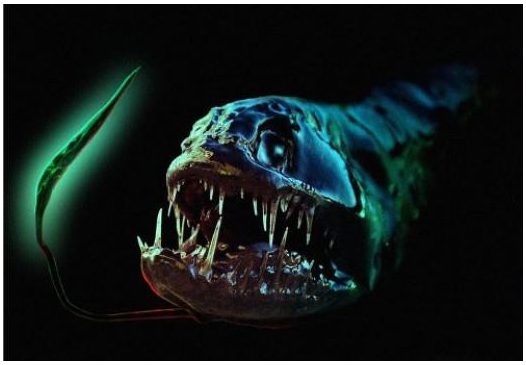
Abyssopelagic or the Abyss Zone - **The next layer is called the abyssopelagic or the abyss zone. It extends from 4,000 meters (13,124 feet) to 6,000 meters (19,686 feet). The name comes from a Greek word meaning "no bottom". The water temperature is near freezing, and there is no light at all. Three-quarters of the ocean floor lies within this zone.**

Types of marine life that can live in the Abyssopelagic zone include algae, anemones, arrow worm, cookie-cutter shark, copepods, crabs, and other crustaceans, ctenophores, dinoflagellates, fangtooth fish, lantern fish, mussels, nudibranchs, segmented worms, siphonophores, and swallower fish.

Cookie-Cutter Shark

King Crab

Lantern Fish

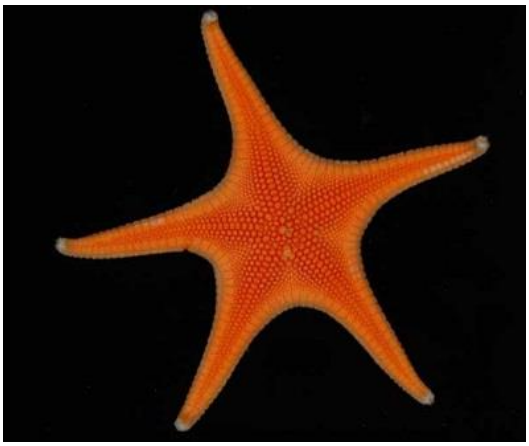


Swallower Fish

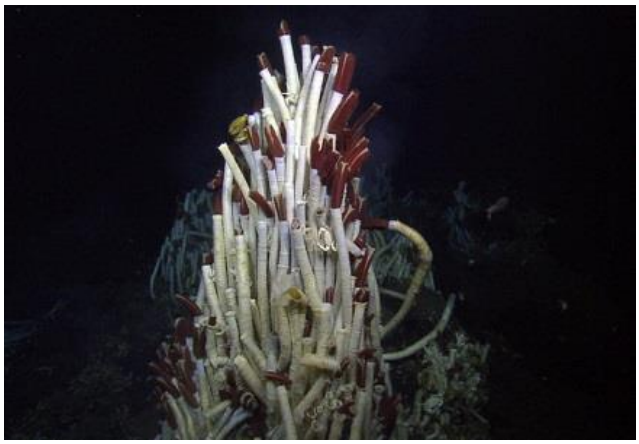
Blue Mussels

Fangtooth Fish

Hadalpelagic Zone - **Beyond the abyssopelagic zone lies the forbidding hadalpelagic zone. This layer extends from 6,000 meters (19,686 feet) to the bottom of the deepest parts of the ocean. These areas are mostly found in deep water trenches and canyons. The deepest point in the ocean is located in the Mariana Trench off the coast of Japan at 36,200 feet. The temperature of the water is just above freezing, and the pressure is an incredible eight tons per square inch. That is approximately the weight of 48 Boeing 747 jets. In spite of the pressure and temperature, life can still be found here. Invertebrates such as starfish and tube worms can thrive at these depths.**



Starfish



Tube Worms

Living Ocean

The ocean is a key element for the existence of life on Earth. 97% of all the water on Earth, and 99% of the habitable space on this planet, is in the ocean. Less than 10% of that space has been explored by humans. 85% of the area and 90% of the volume constitute the dark, cold environment called the deep ocean.

An estimated that 75% of all life on earth is found under the ocean surface. The atmosphere we breathe, and which controls the weather and climate, is intimately connected to the oceans - half of the oxygen produced by plants is produced in the ocean, and the oceans are also responsible for absorbing 50% of the carbon dioxide humans have released into the atmosphere by burning fossil fuels for energy.

How Many Species Live in the Ocean? Nobody knows! Given the vast size of the ocean, it is impossible to know the exact number of species that live there. However, there are 228,450 known species in the ocean — and as many as 2 million more that remain a total mystery. This means that about 90 percent of ocean species have yet to be discovered, classified, and named. Did you know

that more than 80 percent of our ocean is unmapped, unobserved, and unexplored?

Just in case you were wondering, there are 6.5 million species that live on land versus an estimated 2.2 million in the ocean. Why so many on land you ask? Well, go back and read about the dark, cold, and harsh environment we call the deep ocean.

How are marine scientists exploring the deep ocean?

Modern oceanography did not begin until World War II, when the U.S. Navy wanted to learn more about the oceans to gain advantages in communicating across the Atlantic and implementing submarine warfare. By the late 1950s and 1960s, underwater vehicles, known as submersibles, revolutionized oceanographic exploration. Today, buoys and water column samplers are used to monitor sea surface conditions and water quality factors, coring devices collect sediment samples, sonar helps create maps of the seafloor, and remotely operated vehicles (ROVs) allow us to safely and efficiently explore all parts of the ocean. As ocean exploration increases and technology advances, so does our understanding of the way the ocean functions and how it supports all life on Earth.

Submersibles

Submersible Alvin (DSV-2)

Submersible Ictineu 3

Remotely Operated Vehicle (ROV)

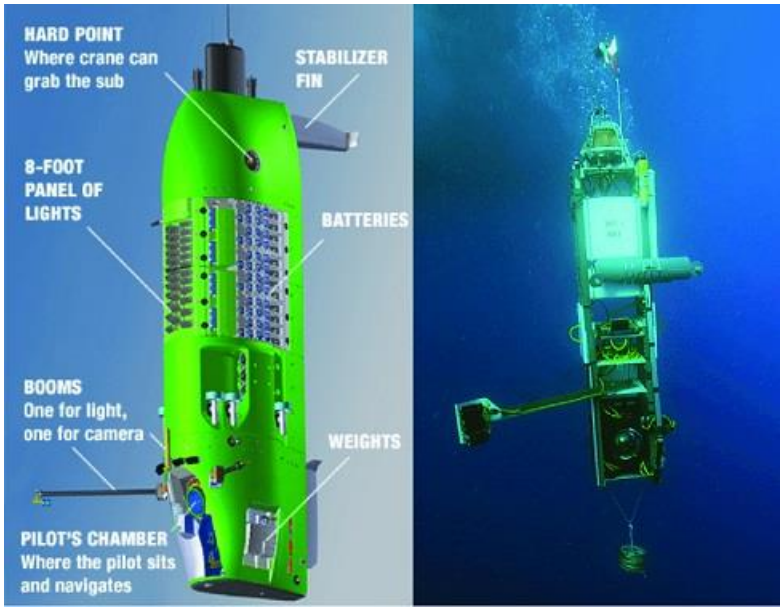
Alvin (DSV-2) is a manned deep-ocean research submersible owned by the United States Navy. Named to honor the prime mover and creative inspiration for the vehicle, Alvin Vine. The submersible has made more than 5,000 dives, carrying two scientists and a pilot, to observe the lifeforms that must cope with super-pressures and move about in total darkness, as well as exploring the wreck of Titanic. The vessel weighs 17 tons and can dive for up to nine hours down to a maximum depth of 4,500 meters (14,800 ft).

Ictineu 3 is a manned submersible with a large semi-spheric acrylic glass viewport capable of reaching depths of 1,200 meters or 3,900 feet. Commissioned in 2013, the submersible can carry one pilot and two passengers for 10 hours using all of the equipment.

Remotely Operated Vehicles (ROV) are unoccupied, highly maneuverable underwater machines that can be used to explore ocean depths while being operated by someone at the water surface. ROVs allow us to explore the ocean without actually being in the ocean. These underwater machines are controlled by a person typically on a surface vessel, using a joystick in a similar way that you would play a video game. A group of cables, or tether, connects the ROV to the ship, sending electrical signals back and forth between the operator and the vehicle.

Most ROVs are equipped with at least a still camera, video camera, and lights, meaning that they can transmit images and video back to the ship. Additional equipment, such as a manipulator or cutting arm, water samplers, and instruments that measure parameters like water clarity and temperature, may also be added to vehicles to allow for sample collection.

What Manned Submersibles has gone the Deepest?



Deepsea Challenger

Deepsea Challenger (DCV 1) is a 24-foot deep-diving submersible designed to reach the bottom of Challenger Deep (36,200 feet), the deepest-known point on Earth. On 26 March 2012, Canadian film director James Cameron piloted the

craft to accomplish this goal in the second manned dive reaching the Challenger Deep. Built in Sydney, Australia by the research and design company Acheron Project Pty Ltd, Deepsea Challenger includes scientific sampling equipment and high-definition 3-D cameras; it reached the ocean's deepest point after two hours and 36 minutes of descent from the surface.

Other ocean dive records

The maximum depth reached by anyone in a single breath is 702 feet (213.9 meters) and this record was set in 2007 by Herbert Nitsch. He also holds the record for the deepest dive without oxygen – reaching a depth of 831 feet (253.2 meters) but he sustained a brain injury as he was ascending.

Free diving

Deep diving is defined as a dive that exceeds 60 feet (18.28 meters). That means that most divers can dive up to a maximum of 60 feet safely. For most swimmers, a depth of 20 feet (6.09 meters) is the most they will free dive. Experienced divers can safely dive to a depth of 40 feet (12.19 meters) when exploring underwater reefs.

Free Diving with Whale Sharks

Is diving in the ocean dangerous? Yes, diving does entail some risk. Not to frighten you, but these risks include decompression sickness (DCS, the "bends"), arterial air embolism, and of course drowning. There are also effects of diving, such as nitrogen narcosis (memory loss and lack of concentration), that can contribute to the cause of these problems – like doing something stupid and dying.

When you dive with compressed air, you take in extra oxygen and nitrogen. It is these nitrogen bubbles that cause decompression sickness. The condition is called the bends because the joint and bone pains can be so severe that they double you over.

Diving Suits

The Exosuit, a 530-pound metal suit, has for the first time allowed a human to plunge down to a depth of 1,000 feet without being crushed by the pressure of the ocean. The diver inside the suit can pick up marine life using robotic claws and has thrusters on the feet to move around.

Drownings

Drowning is the 3rd leading cause of unintentional injury death worldwide, accounting for 7% of all injury-related deaths. There are an estimated 320,000 annual drowning deaths worldwide. Global estimates may significantly underestimate the actual public health problem related to drowning. Children, males, and individuals with increased access to water are most at risk of drowning.

What did I learn from this article?

- **I learned that I have no desire to visit the Deep Ocean.**
- **I learned that many divers end up being crushed to death by the extreme ocean pressure. Others just suffer brain damage or the "bends" from diving too deep.**
- **I learned that the United States is spending much more money on space exploration than on ocean exploration.**
- **I learned that there are a lot of ugly fish down there in the Deep Ocean!**
- **I also learned that there are about 2 million more ugly fish and marine life down there that has not even been discovered yet.**

Hope you learned something!

Bigdrifter44@gmail.com

Bigdrifter.com