

The World of Plankton

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There's a fierce battle going on in the water below us. Only the biggest, the strongest and the keenest are going to survive. There are predators stalking prey, which in turn, are hiding from their enemies. There are claws and ferocious mouth parts being used to grab onto and devour each other. There are specialized eyes being used to watch out for danger and specialized legs and tails being used to propel their bodies when danger is in view. These creatures are scary monsters of the sea, and yet most of them are microscopic. We're talking here, of course, about plankton.

Plankton, by definition, are organisms that can not move against the ocean currents. As a result, the location of plankton is greatly dependent on these currents. Most planktonic organisms are very small, microscopic to a few centimeters in length, but some can be much larger. An extreme example of this is the mola mola, or ocean sunfish. This large "fish," which can weigh up to 3000 lbs, is actually not considered a fish at all, but rather a planktonic animal because it can not control its movement against a current.

There are two types of plankton: phytoplankton (the "plant" plankton) and zooplankton (the "animal" plankton). Phytoplankton photosynthesize, or make their own food using the energy from the sun. As part of the photosynthesis process, they take in carbon dioxide and produce oxygen. Since 71% of our planet is covered by oceans, phytoplankton are the greatest producers of the oxygen that we breathe. There are more than 500 genera of marine phytoplankton in the world's oceans and they range greatly in size from microplankton, which are only visible with a microscope, to macroplankton, such as seaweeds.

Zooplankton feed on the primary producers, the phytoplankton. These animals, again, range in size from microplankton to macroplankton and many familiar animals, such as jellyfish, are actually members of the zooplankton family. Zooplankton have even made their way into the world of television. In the cartoon "SpongeBob SquarePants," SpongeBob's enemy, Plankton, is a type of zooplankton called a copepod.

Copepods are about 1-2 mm long and have a tear-shaped body with large antennae, many legs and a segmented tail. They have transparent bodies with red pigmentation and one large red eye (just like *Plankton*). Some species of copepods have an oil sac. These copepods have the ability to go into a period of rest very similar to hibernation in bears. They eat copious amounts of phytoplankton for a few months and fill up their oil sac with fat reserves. Then, they migrate down to the ocean bottom and enter a period of rest called diapause. During this period, they live off the reserves in their oil sac. Copepods enter diapause as an adaptation to survive the winter months, when food is scarcer (the same reason that bears hibernate).

Many zooplankton, copepods included, also have an interesting adaptation to avoid predation by birds and fish. They feed at the surface on phytoplankton at night,

when it is dark and harder for their predators to see them. Then, when daylight comes, they migrate back down the water column to the bottom of the ocean and wait until night time to come back to the surface to feed again. This process is called diel vertical migration and we are actually able to see the animals doing this in the data we are collecting out here in the Irminger Sea.

Many of the zooplankton that we are seeing in our VPR data is being advected into the Irminger Sea by currents. This means that they are not born here, but rather, born up north and then carried into the Irminger Sea by the currents, namely the East Greenland current. The reason we have brought the VPR on this cruise is to look at what zooplankton species are being advected into the Irminger Sea by this current. So far, we have seen a high abundance of a few different species of arctic copepods. While copepods are the most abundant zooplankton in our data, there have been a few other critters as well. The chaetognath, or arrow worm, is a ferocious predator with 2 large “claws” that it uses to grab onto other species of zooplankton, such as copepods, that it preys on. There have also been a number of gelatinous zooplankton and a few large chains of phytoplankton cells as well.

So, why should we care about plankton? Plankton are the base of the oceanic food chain and all marine life depends on its existence. Copepods are the largest source of protein in the ocean and many zooplankton species are harvested around the world. Phytoplankton are used in many everyday household items, such as your toothpaste, as a thickening agent. And phytoplankton produce approximately 50% of the entire world’s oxygen. By contrast, tropical rainforests, the next higher contributor of our world’s oxygen, only produce about 20%. So, if you like breathing, you should like plankton!