



The Arctic Ocean may be very cold, but it's filled with lots of different organisms.

The Arctic Ecosystem

Chapter 1: Life in the Arctic

At first glance, the Arctic Ocean might not look like a great place to live. After all, it's cold there! However, despite its year-round cold climate, the Arctic is full of life. The chilly Arctic waters are home to many different populations of organisms, from tiny algae to giant whales. To learn more about the populations that can make up an Arctic ecosystem like the Gulf of Alaska, read one or more of the chapters that follow.

Chapter 2: Moon Jellies

Moon jellies got their name because of their pale, round bodies, which look like the full moon. Unlike many types of jellies, moon jellies do not have long tentacles for catching food. Instead, they trap zooplankton (ZOH-plankton)—tiny animals floating in the water—on the sticky undersides of their bell-shaped bodies. These jellies do sting the zooplankton they catch, but they need only a mild sting because the zooplankton are so small. The sting of a moon jelly is harmless to humans.

Moon jellies can move themselves through the water by squeezing their bodies in and out, but they are not strong swimmers. Most

of the time, they let water currents move them from place to place. These jellies are seldom seen alone: they usually appear in huge groups of hundreds or even millions of jellies. Gathering in groups may provide some protection from predators such as sea turtles.

Another reason that moon jellies gather in large groups is their method of reproduction. Jellies never actually pair up and mate—instead, males send out sperm, letting water currents carry the sperm to nearby females. The females produce dozens of eggs, protecting the eggs with their bodies as they develop.



Moon jellies can appear in groups of hundreds or even millions at once!

Chapter 3: Walleye Pollock

People eat a lot of walleye pollock. If you have ever eaten a fish stick or a fish sandwich from a fast food place, you've probably eaten walleye pollock yourself. This type of fish is valuable to humans as a commercial fishing catch. Scientists and fishermen keep careful track of the pollock population to make sure it doesn't get too small.

Walleye pollock are silvery in color, with speckles that help them blend in with the sandy bottom of the ocean. They grow to about half a meter (one to two feet) in length and weigh up to 1 kilogram (2 pounds). Part of the pollock diet is made up of zooplankton (ZOH-plank-tun)—tiny animals floating in the water. For protection from predators, large numbers of pollock swim together in dense schools. Predators that eat pollock include larger fish and sea lions.



Walleye pollock gather in large groups to reproduce, which makes them more likely to reproduce successfully.

Pollock gather in very large groups for the purpose of reproduction. Each female sends thousands of eggs out into the water, and the males send out lots of sperm at the same time. Carried by the water, the sperm and eggs meet and the eggs are fertilized. The larger the female, the more eggs she will produce—up to one million!



Walleye pollock is a popular fish for humans to eat.



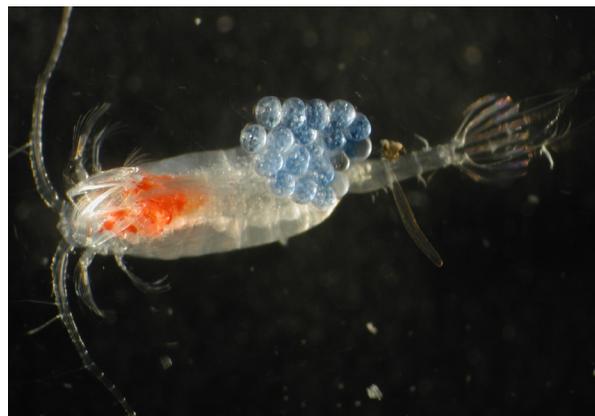
Any animal that is tiny and drifts through the water is considered zooplankton.

Chapter 4: Zooplankton

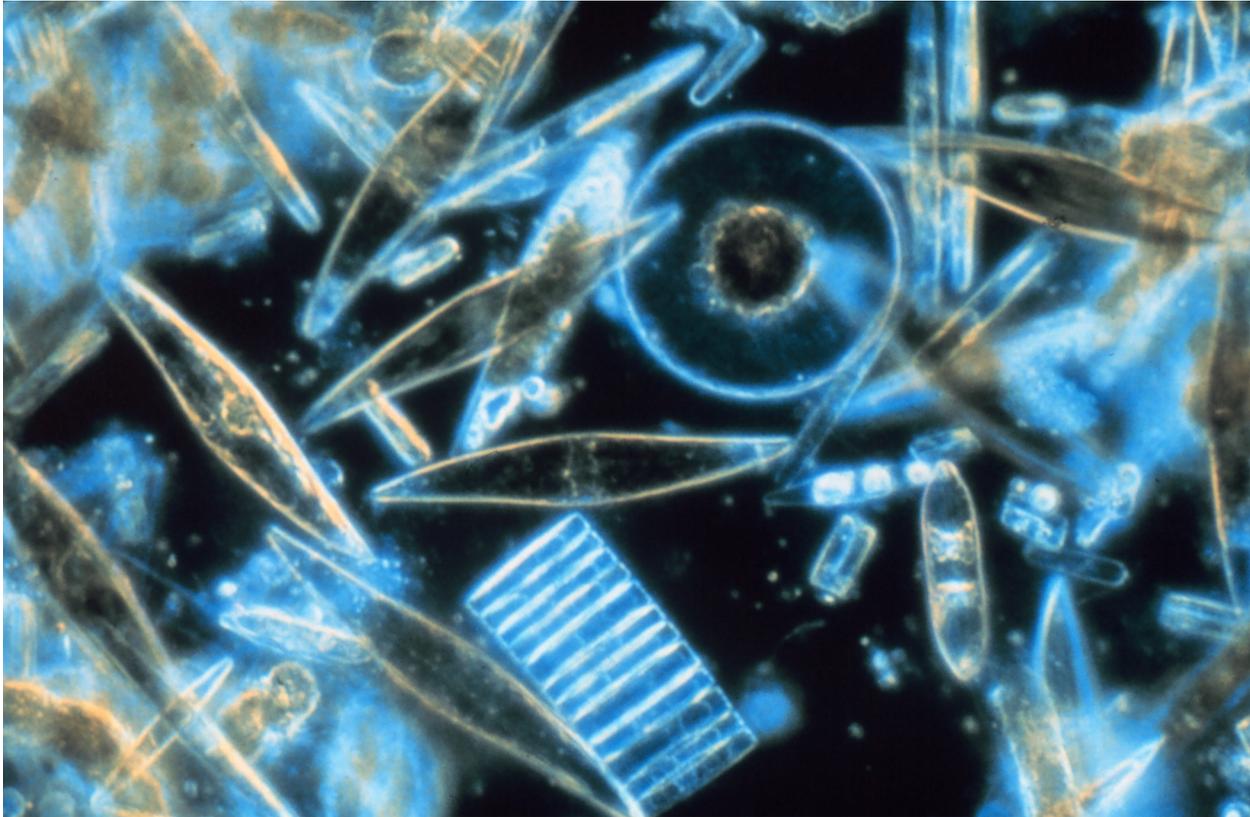
Zooplankton (ZOH-plank-tun) are tiny animals that drift through the water, moved from place to place by currents. There are many different kinds of zooplankton, and most are too small to be seen. Some zooplankton eventually grow and change into fish, crabs, sea stars, and other larger animals. However, many zooplankton remain tiny for their whole lives—for example, copepods. These tiny animals have hard outer coverings, legs with joints, and long antennae.

Different types of zooplankton have different ways to keep themselves from sinking to the bottom, such as gas-filled floats in their bodies and flat body shapes that act like tiny parachutes. Many zooplankton are clear, so that they are harder for fish and other predators to see. Zooplankton eat tiny algae that drift through the water. Another source of food for zooplankton is other zooplankton.

Because there are so many different types of zooplankton, they have many different methods of reproduction. Some mate and lay eggs, while others simply divide themselves in half.



Some types of zooplankton lay eggs, like this copepod. In this photo, its eggs are light blue.



All of these shapes are different types of algae!

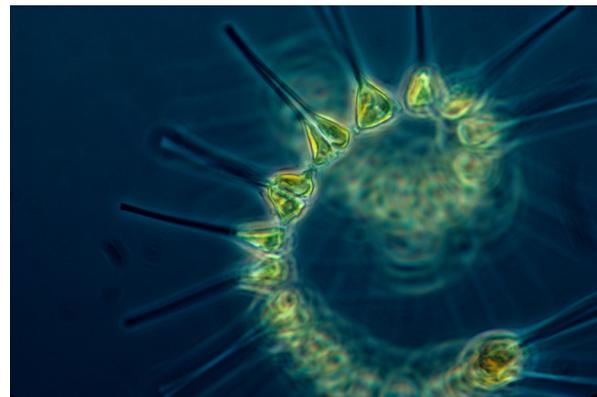
Chapter 5: Algae

Algae (AL-gee) are plant-like organisms. Some types of algae are huge, such as giant kelp. However, some of the most important types of algae are tiny—many are so small they can only be seen through a microscope. Tiny algae drift near the surface of the water, where there is plenty of sunlight. Like plants, algae produce their own food through the process of photosynthesis—using energy from sunlight, algae make glucose out of carbon dioxide and water. As they do this, they also produce oxygen. In fact, about half the oxygen we breathe is produced by algae in the ocean.

There are thousands of types of algae, many of them very different from one another. Some have beautiful clear glass-like shells; others have whip-like tails that they use to

swim through the water. Some algae even glow in the dark, producing a blue-green light.

Different types of algae have different methods of reproduction, in some cases simply dividing themselves in half.



Some types of algae, like this one, glow in the dark.

Chapter 6: Leatherback Sea Turtles



Leatherback sea turtles are the largest sea turtles on Earth. They have tough, leathery skin on their backs instead of shells.

The leatherback sea turtle is larger than any other kind of sea turtle on Earth, growing up to 2 meters (6.5 feet) long. It is different from other sea turtles in another way as well: instead of a hard outer shell, the leatherback has tough, leathery skin covering its back.

Leatherback sea turtles specialize in eating jellies. Instead of teeth or hard jaws, they have backward-pointing spines in their throats to help trap the jellies they swallow. Scientists have estimated that one adult leatherback eats more than 2,000 pounds of jellies every year!



Leatherback sea turtles have spines in their mouths to keep the jellyfish they swallow from escaping.

Despite their soft bodies, adult leatherbacks are so big and fast that they have few predators. Only large sharks and orca whales attack and eat adult leatherbacks at sea. However, leatherback eggs and newly-hatched leatherbacks are often eaten by birds and other small predators. Humans also collect leatherback eggs to eat, although egg collecting is against the law in many places.



Leatherback sea turtles lay large batches of eggs in the sand.

Leatherbacks swim far and wide across the ocean, ranging farther north than any other sea turtles. To reproduce, leatherbacks swim hundreds of miles to gather near tropical beaches. After mating, a female drags herself up onto the beach, digs a hole in the sand, and lays about 100 eggs inside. Then she buries the eggs and returns to the water. When the tiny young turtles hatch a few weeks later, they dig their way out and race to the water, already completely independent.



Orcas are also known as “killer whales” because they are fierce predators.

Chapter 7: Orca Whales

Orca whales are also known as “killer whales” because they are such fierce predators. These toothed whales hunt in packs like wolves, but they are much bigger than wolves! Orcas can grow more than 7.5 meters (25 feet) long and weigh more than 5,900 kilograms (13,000 pounds). An orca has a tall fin sticking up from its back, as high as 2 m (6 ft) in some cases.

Most orcas live in family groups called pods. A pod of orca whales is usually made up of a mother and her offspring, both male and female. Pods of orca whales work together to hunt, chasing their prey from all sides. Some pods of orcas specialize in hunting large fish, but other pods specialize in hunting seals, whales, and other large marine animals, including sea turtles. Humans are the only animals that hunt and kill orcas.

Orcas live a long time—possibly more than 80 years in some cases—and they don’t reproduce very often. Females give birth to one calf (baby whale) at a time, waiting several years between births. Orcas give birth in the water, and their calves are able to swim immediately. Like other whales (and humans), orcas are mammals, and the calves drink milk from their mothers.



Orcas hunt in packs, working together to hunt large marine animals.

Chapter 8: Green Sea Urchins

Green sea urchins are small, round animals covered with spines and tube feet that stick out in all directions. The tube feet have suction cups on the ends and are good for clinging to rocks and seaweed. Urchins also use their feet to sense the world around them—they have no eyes, but they can sense light and dark with their feet!

Green sea urchins mainly eat a type of seaweed called kelp. A sea urchin has five teeth in the center of its underside, and it leaves star-shaped marks when it takes a bite out of a piece of kelp. Gulls, crabs, and several other

predators eat green sea urchins, despite their sharp spines. In addition, people catch green sea urchins to eat. Eating sea urchins is especially popular in Japan.

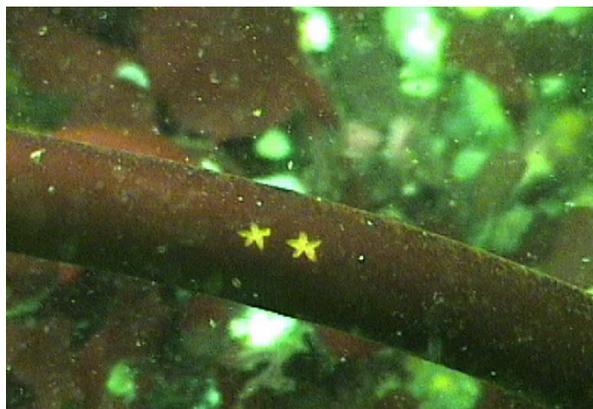
Male and female sea urchins don't get together for reproduction. Instead, all the green sea urchins in an area release eggs and sperm into the water at once. They rely on water currents to bring their sperm and eggs together and produce young. Young sea urchins can swim, and they drift with the tiny plankton until they grow into adult sea urchins.



Green sea urchins are covered with sharp spines.



Green sea urchins have star-shaped mouths.



A sea urchin left these two star-shaped bite marks on a thick strand of kelp it was eating.

Chapter 9: Kelp

There are many types of kelp, including giant kelp—the largest algae on Earth. Giant kelp can grow up to 45 meters (150 feet) long!

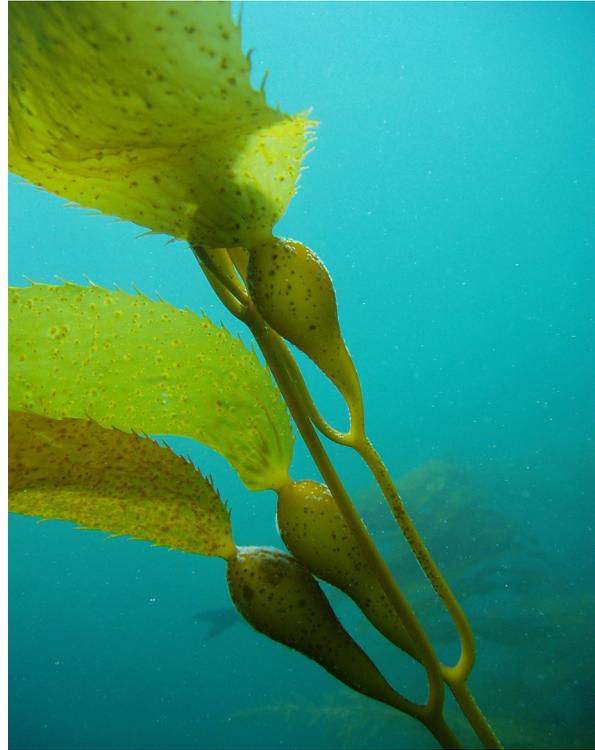
Kelp is a kind of algae (AL-gee). Like plants, kelp and other algae produce their own food through the process of photosynthesis. Using energy from sunlight, kelp makes glucose out of carbon dioxide and water. As it does this, it also produces oxygen.

Clinging to a rock with a part called a holdfast, kelp grows up toward the sunshine at the water's surface. Pockets filled with air keep the kelp floating upward. Kelp grows very quickly—up to two feet per day—and it can form huge underwater forests where ocean animals hide. Many of these animals eat kelp, including sea urchins, snails, and some fish. In addition, many humans gather and eat kelp.

To reproduce, kelp sends out male and female spores. Carried by water currents, these spores meet to form new kelp organisms that cling to rocks and begin growing upward.



Giant kelp can form large underwater forests.



Little floating bulbs help kelp leaves float toward the surface of the water, where they can get sunlight for photosynthesis.