



The Arctic

Man: A Course of Study

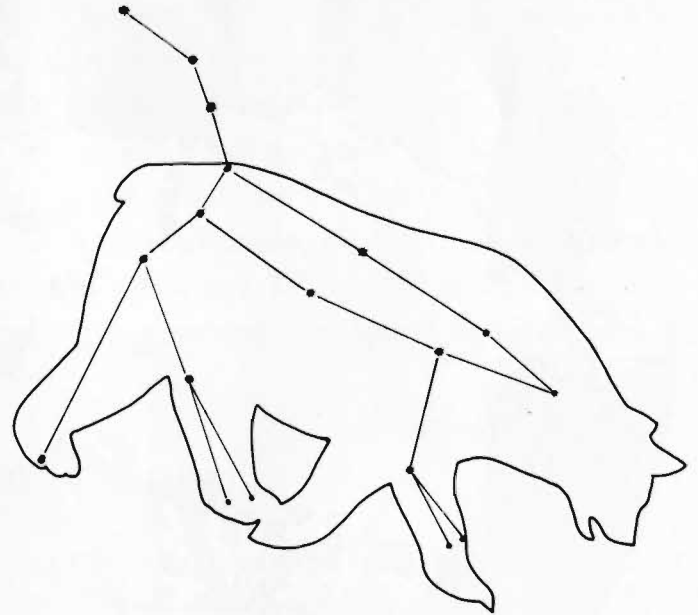
Developed by Education Development Center, Inc., under grants from the National Science Foundation.

First commercial edition 1970

Disseminated and produced by Curriculum Development Associates, Inc., Suite 414, 1211 Connecticut Avenue, Washington, D.C. 20036.

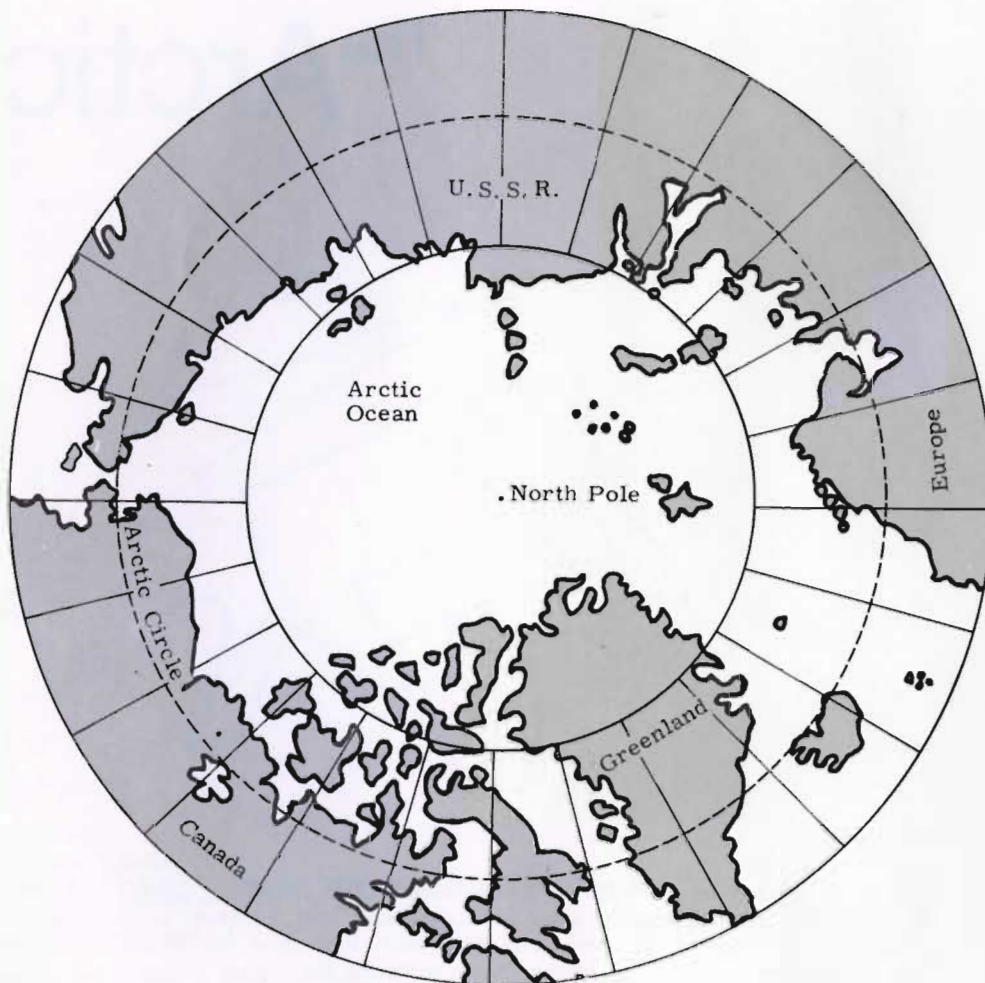
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The Arctic



The word "Arctic" comes from the Greek word *Arktos*, meaning "bear." The Arctic is where the constellation of the Great Bear can best be seen. In the northern skies there is a group of more than fifty stars that form the shape of a bear. The seven brightest stars of the constellation make the Big Dipper.

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The Arctic Region

The Arctic

The northernmost part of the earth is a huge expanse of ice and snow floating on an ocean almost entirely surrounded by land. This sea and the land around it — all the area within the Arctic Circle — is what we call the Arctic.

The land area of the Arctic, some 1,500,000 square miles, includes parts of three continents: North America, Asia and Europe. Another 5,500,000 square miles is ocean. The entire Arctic, land and water combined, is almost twice the size of the United States.

The Arctic Ocean

The Arctic Ocean is the smallest and least salty ocean in the world. It is not as salty as other oceans for two reasons: first, the many rivers of the Arctic carry melting snow into it, and second, the water in the Arctic Ocean does not evaporate as rapidly as the water in warmer oceans that are not partly covered with ice. Much of the Arctic Ocean is covered with floating ice that is more than 40 feet thick and has been frozen for at least 1,000 years.

The ice in the Arctic Ocean is constantly moving. It is blown by the wind and swept along by the ocean currents. Moving ice makes travel by boat very dangerous. Huge blocks of ice often collide, and pieces with jagged edges break off. These pieces, or icebergs, can float away into the paths of boats.

The Arctic Ocean has only three openings into neighboring oceans. Most of the Arctic's water is locked in by the land and is very cold. Even in summer, the water in the ocean is only a few degrees above 28°F, the temperature at which sea water freezes.

The Land of the Arctic

In Greenland and many other places, high mountains come down to the edge of the Arctic Ocean. But much of the land area of the Arctic is low and treeless and frozen — the kind of landscape called *tundra*.

The tundra begins at the tree line, the northern edge of the forests. In some places the tree line is far south of the Arctic Circle and in other places far north. Beyond the tree line the ground never thaws completely, and trees cannot get nourishment or support in the frozen ground. Ground that does not thaw for many years on end is known as *permafrost*, or permanently frozen ground.

The tundra is wrinkled by many small hills and creased by many rivers and lakes, but it is mostly flat. The hills are not very high and the rivers and lakes are not very deep.

During the last ice age huge sheets of ice moved over the earth. The ice flattened the landscape by scraping the soil off the hills and piling it into the valleys. As the ice moved, it scratched the surface of the land. When it melted, the water flowed into the scratches and made many long, narrow lakes.



In the short Arctic summer, only the top few inches of the ground thaw. The water from melting snow cannot drain down into the ground because of the layer of permafrost beneath it. The water trapped on the land makes great marshes, which drain slowly into the lakes and rivers that eventually empty into the Arctic Ocean.

Because the tundra is frozen just under the surface, roots of plants cannot grow deep. Tundra plants are not tall. Instead, they grow along the ground. The strong winds that blow across the land would knock over tall plants with so little support in the ground.

The range of temperature is great in the tundra area. In some places it can be 60° or 70° F below zero in the winter and up to 70° F in the summer. Those extreme and sometimes quick changes of temperature have changed the land. The surface of the tundra appears to be covered with patterns formed by lines of stones. These stones have been pushed up through the soil as the top layers of the ground freeze in winter, then thaw in the summer.

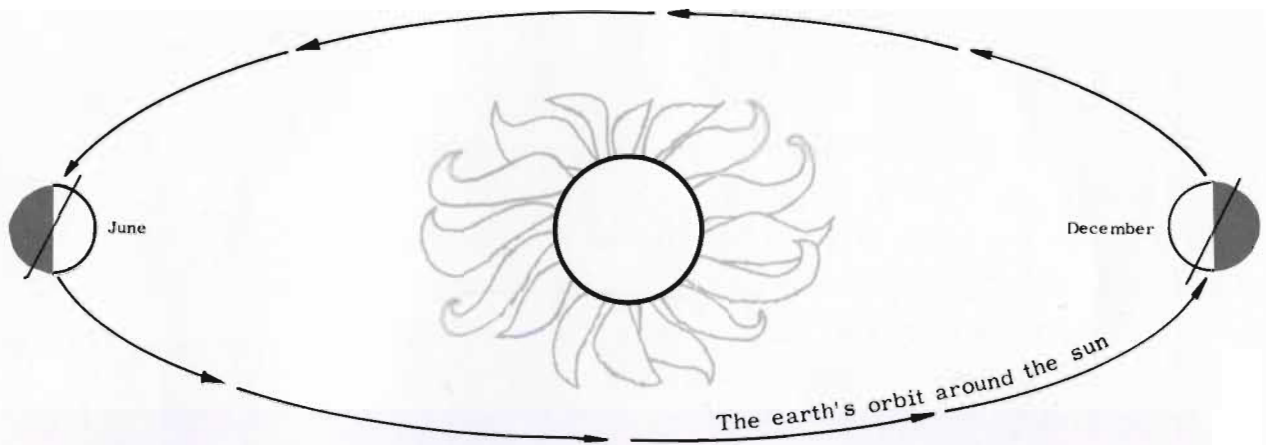
All of these features found in the Arctic and nowhere else are a result of the cold climate. But why is it cold in the Arctic?

The Seasons

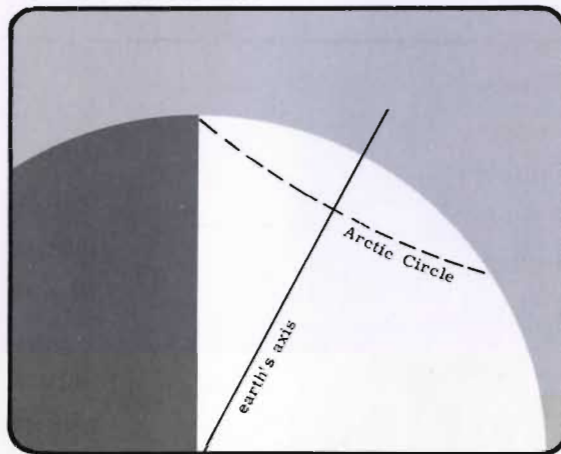
As the earth makes its yearly journey around the sun, it also spins around an imaginary line going through its center. This line is called its axis. The northern extension of the axis is the North Pole, and the southern extension is the South Pole. It takes the earth twenty-four hours to make a complete turn on its axis.

The tilt of the axis makes the northern hemisphere lean away from and then toward the sun as the earth moves around the sun. When the axis is tilted so that the North Pole is toward the sun, it is summer in the north. When the axis is tilted away from the sun, it is winter. In midwinter each year there is a time when the sun cannot be seen in the Arctic, and then there is a time in midsummer when the sun does not set — when it is daylight through the day and the night, too.

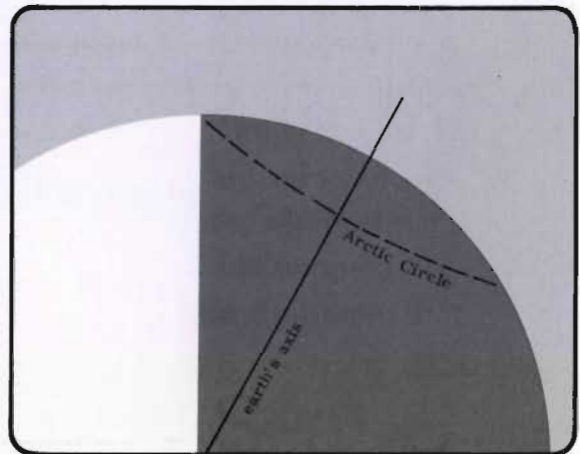
On the Arctic Circle there is one day during the year when the sun never rises above the horizon and one day when it never sets. The farther a traveler goes north of the Arctic Circle, the more days of light there are in the summer and the more days of dark in the winter. Finally at the North Pole,



The Arctic summer



The Arctic winter



Seasons in the Arctic

the year is like one long day. Half the year has sun all the time and the other half has no sun at all.

Even when they are tilted toward the sun, the poles of the earth never face the sun as directly as does the land near the equator. The light and heat from the sun always hit the Arctic region at an angle, and so there is not as much heat from the sun as there is near the equator.

In such a vast area as the Arctic, there are many different kinds of weather. Any place where the temperature never averages above 50°F in the warmest month of summer has an arctic climate, even though some of the land outside the Arctic Circle is arctic by this definition.

The Arctic has a long, cold winter, but it is not a land of constant ice and snow. Summers in the Arctic are mild and green — and very short. Before summer comes, the days have grown longer. These long hours of sunlight help to melt the snow and bring the Arctic plants to life. Summer begins with the melting of snow in June or July and it lasts only through August.

Winter then comes suddenly. There is no spring or autumn in the Arctic. The first snow usually falls late in August, and



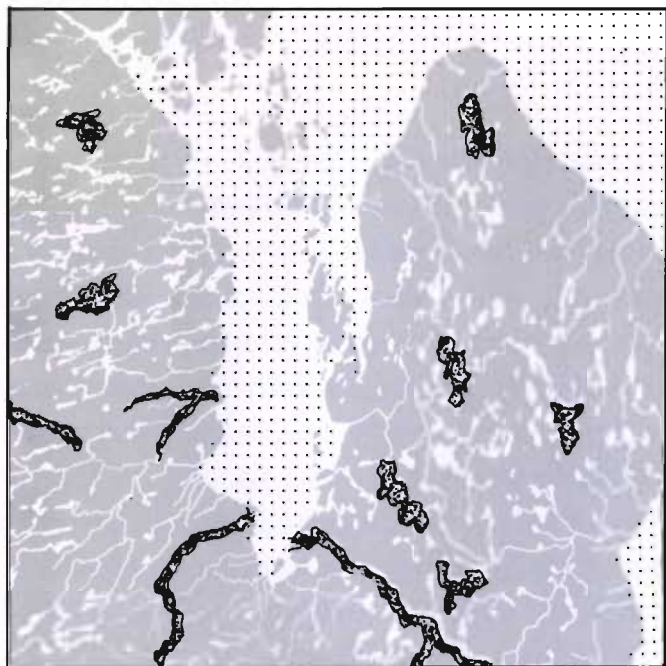
summer is gone. Soon the hours of daylight become fewer and fewer until finally the sun does not shine at all. The wind blows constantly over the treeless land and packs the snow hard against the ground.

It does not snow often in the Arctic, because the cold air cannot hold enough moisture to make snow. The heaviest snows of the year come late in the winter when the air is warming up. The Arctic is so dry in the winter that the whole region is called a cold desert. It does not snow as much in the Arctic as it does in many places in the United States, but when snow falls in the Arctic, it does not melt for most of the winter.

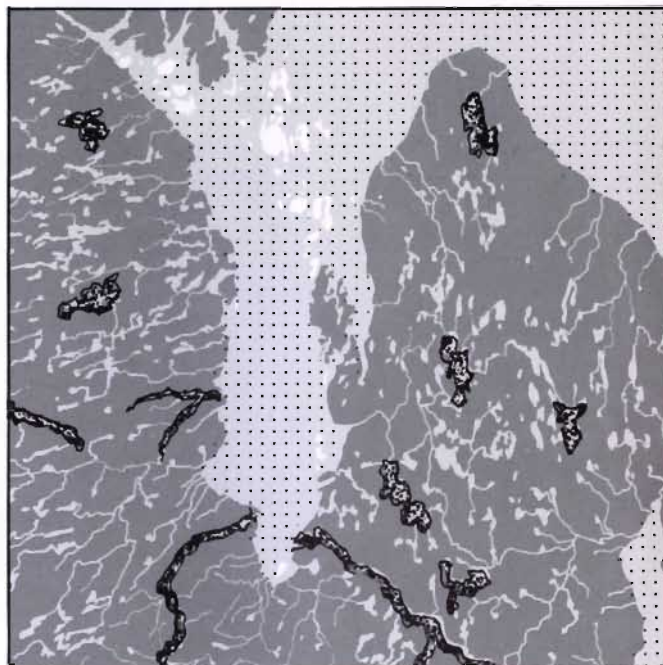
During the long dark winter, Arctic skies glow with great arches of light — yellow and red or green and violet. These are the northern lights, or *aurora borealis*. They seem to shimmer against the sky like a curtain in front of a stage. No one knows for sure what causes auroras. One explanation is that they are caused by particles of energy given off by the sun. When these particles travel toward the earth they collide with gases in the earth's atmosphere. The light from the explosion becomes the aurora.

In the Arctic, travelers often see things that are not there, or mirages. When cold air collects under warm air, a kind of mirror is made. This mirror reflects things that are too far away to be seen, and makes them look as though they are very close. A stranded traveler once told of seeing on the horizon the rescue boat coming for him. But many hours later, when the boat came into sight on the sea, he realized that he had been seeing a mirage.

The Arctic region offers some of the harshest conditions of life that can be found anywhere on our planet. Most living things — plants and animals — thrive where there is warmth, abundant moisture, nourishment and light. The Arctic supplies scarcely any of these. Still, many growing things flourish there. In the summer the land is green and bursting with life. Many animals and birds live in the Arctic all year round, and many more migrate north for the summer. Insects abound on the tundra in summer, and the sea has a world of life of its own.

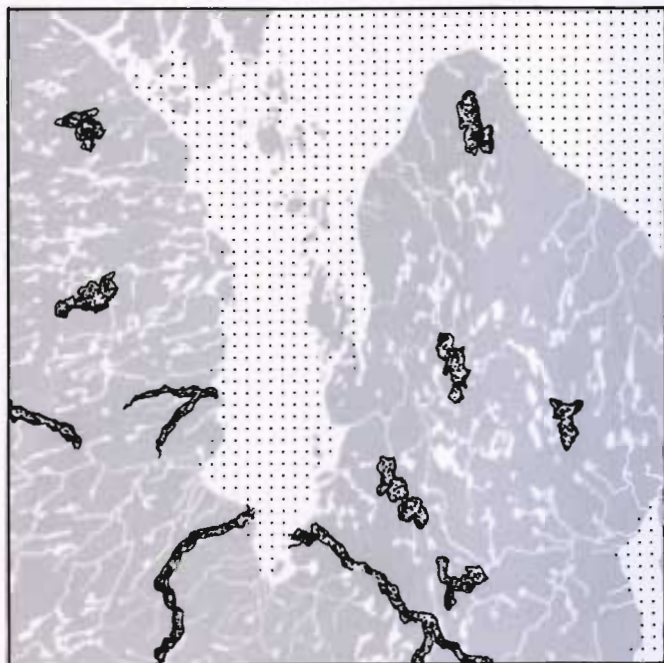


May solid ice

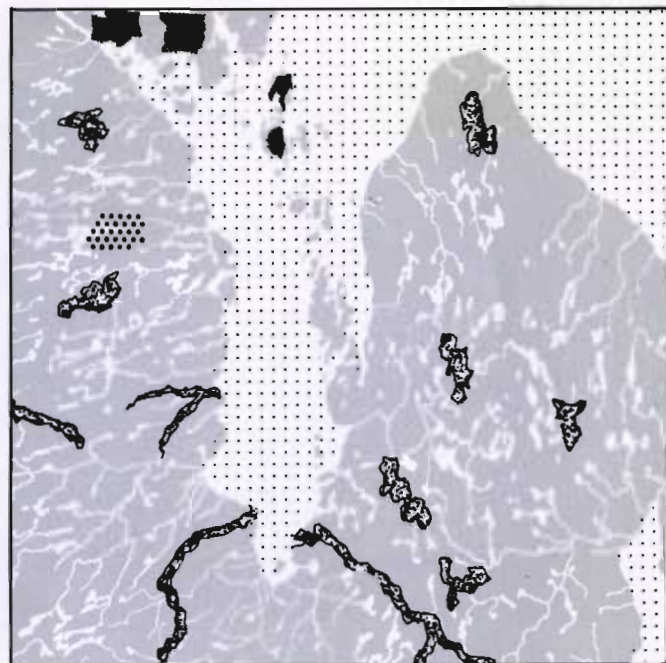


September no ice

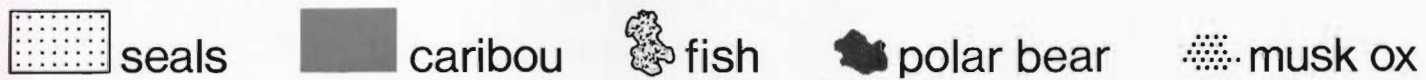
Animal Distribution Near Pelly Bay



November solid ice



January solid ice



Life in the Arctic

The harsher the climate, the fewer the species that live there. This is true all over the world. To survive in the Arctic, all living things must make use of the long, light summer days, and they must be able to withstand the long, cold winter. They must survive the floods from melting snow in spring, the damp summer and the long winter dryness. Life that begins in the warmth of summer must adapt to the bitter cold of winter or die.

Life on the Land

Plants

During the last ice age, much of the plant life of the Arctic disappeared. As the great glaciers melted, they uncovered wide areas that had been scraped bare of soil. Almost all plants need soil to grow. There is one plant, however, that can live without soil: lichen. Not only can lichens find food for growth in places without soil, they also make soil for



other plants. As a lichen grows, it breaks up the rock on which it lives. Over time these particles of rock become the soil in what was once a barren land.

Most Arctic plants are perennials, which means that they live longer than one season. Because they can survive the winter, new seeds do not have to be planted every year. The Arctic summer is so short that it takes many plants more than one season to make seeds. And so they grow through one summer, rest for the winter, and continue to grow and blossom the next summer.

Many plant species grow in the Arctic. The tundra is colorful in the summer with flowers on a background of green mosses and grasses. The Arctic has no plants with thorns or spines, nor does it have any poisonous plants. Few Arctic plants have a scent. And only a few produce fruit or other parts that are edible for human beings. But the plants of the Arctic provide food all through the year for many animals.

On the marshy tundra, thousands of insects are born every summer — flies, mosquitoes, bees and butterflies. These insects make life miserable for man and beast, but they also make much of the plant life possible by pollinating the blossoms of flowering plants.

Adapting to the Arctic

Every species of animal that lives in the Arctic must be able to satisfy its basic needs in some way or it would not be able to live there.

Every animal must eat. To do this through the Arctic year, some animals migrate to another area, others live on stored food and still others can digest foods that are not nourishing to most animals.

All animals must keep a suitable body temperature, which is not easy in the Arctic. Some animals migrate to a warmer climate. Others have extra insulation in the form of a layer of fat under the skin (seals), heavy fur (musk oxen), or thick feathers (snowy owls).

For the species to survive, each animal must be able to reproduce successfully. In almost all species the young are born at a time of year when they are most likely to survive.

Migration is an important way of adapting to a place where conditions are difficult. Many birds and a few animals spend the summer in the Arctic and leave before winter sets in. There are other animals and a few birds that spend a large part of their lives in the Canadian Arctic.



Birds

More than eighty species of birds migrate to the Arctic in early summer to build their nests, lay their eggs and hatch their young. The tundra, with its many lakes and rivers, is an especially good nesting ground for water birds. As the summer days grow shorter, most birds return to a warmer climate.

Some birds make the Arctic their year-round home. Of these, many are either black or white or a combination of black and white. Some Arctic birds, like the ptarmigan, change color with the seasons. In the winter the ptarmigan is all white, and in the spring it changes to grey-brown to blend into the changing tundra.

Snowy owls and ravens stay in the Arctic through the winter, moving over the snow-covered tundra in search of food. The snowy owl preys on small animals. Ravens stay near wolves in the winter, because they get much of their food from animals killed by wolves.

A common bird near the Arctic shore is the murre. It looks like a small penguin, and lives almost entirely in the sea. During the summer it comes to land to lay eggs and hatch young. Even before the young chicks can fly, the birds return to the water.

Mammals

Musk Oxen

Musk oxen live year-round in the Arctic. They do not migrate south to escape the bitter cold. In fact, they do not move from place to place any more than is absolutely necessary to find food in the winter.

Musk oxen are related to goats and sheep. An adult musk ox is as big as a small cow and weighs up to 1000 pounds. It is a broad-shouldered animal with long, shaggy brown hair. In the winter its soft undercoat of hair is so thick that snow does not melt where the animal lies down. In summer, the clouds of insects cannot disturb the musk ox through its furry armor. The Eskimos call the musk ox *omingmak*, the big bearded one, because its long neck hair hangs like a beard under its chin.

Musk oxen eat the plants of the tundra in summer and winter. In summer food is easy to get. In winter they use their strong, wide hooves to paw through the snow for lichens and mosses or hunt for areas where the wind has blown the snow away.

The curved horns of musk oxen are hollow, but they are very strong. They are used in fighting off Arctic wolves.



When a herd of musk oxen is approached by an enemy, the bulls face the danger in a semicircle with the cows and calves behind them. Their horns protect the herd from predators like wolves, but the strategy makes the animals easy prey for hunters with guns. After guns were introduced in the Arctic, the musk ox quickly became the rarest of all of the land animals there.

Caribou

A caribou is a deer adapted to survive in cold and to live in a land blanketed much of the year by snow. It has a thick coat of hair for warmth and broad hooves that make walking on snow easy. But even so, most caribou migrate south for the winter. They find shelter in the forests where the snow is softer.

In the forests in winter, caribou eat lichen and mosses. They pound through the snow with their front hooves to get at the food. As the snow melts in the spring, it settles during the day and freezes hard at night. When the snow is too hard, the caribou cannot pound through it to get food, so they search for softer snow. This search leads them north where



the weather is not yet so warm. Gradually the caribou move farther and farther north until they reach their summer grazing grounds.

Early in the fall the caribou begin to migrate south. They move south to the tree line to find bushes and trees on which to clean their antlers of their velvet-like covering. For a short time in October they move out of the trees and onto the tundra to mate. But winter is already upon them. Snow is falling, and cold winds whip across the treeless ground. The wind-driven snow of the tundra is harder than the snow of the forests, and by late October the caribou have returned to the protection of the trees, where they will be able to get food during the winter.

Both male and female caribou have antlers. A female's antlers are shorter than the male's and grow at a different time of the year. The male's antlers begin growing in early spring every year and reach full size in late summer. The huge antlers look like dangerous weapons, but they are not used for protection. In the fall, males thrash their antlers in bushes and against the antlers of other males. The thrashing arouses a caribou's urge to mate.

Female caribou mate when they are two years old, males

when they are four years old. But most caribou never live to mate. More than half die the year they are born. Those that survive their first year may live as long as fifteen years.

Caribou calves are born in June. This gives them the summer to grow before cold sets in again. A caribou calf weighs only eight pounds when it is born, but it stands up almost immediately, and in a few days it can run as fast as its mother. It is born with teeth and can eat plants when it is only a few days old, but it also nurses from its mother until fall. At the end of the summer the calf weighs seventy-five pounds and is ready for the long, cold winter.

During the summer, calves romp near their mothers. They chase each other and run in large circles, but they do not stray too far. A calf that gets separated from the group will almost surely die.

All year long caribou eat, travel and nap with other caribou nearby. Now and then one is frightened by a wolf or a man and gallops off. But a few minutes later, if it is not being chased, it settles back to its normal routine. For most of the year caribou live in small groups. But in the autumn migration, many groups come together to form huge herds of thousands of caribou.



Wolves

Out on the tundra, far from human beings, the main predator of the caribou is the wolf. The wolf is a dog-like, carnivorous animal that preys on musk oxen, hares and lemmings, as well as caribou. Wolves do not migrate with the caribou, but they

may follow a migrating herd for many miles on the chance that they can single out a member of the herd and attack it.

Wolves hunt over a wide area, often traveling twenty miles a night in search of food. They hunt singly or in packs, relying on speed to bring them close to game. When several wolves hunt together, they sometimes take turns leading the pack. One wolf puts on a burst of speed and then drops back as another takes over.

Arctic wolves look much like wolves in other parts of the world, but they are lighter in color. In winter an arctic wolf is almost snow-white. In fact, some stay white all year long. An adult male wolf usually weighs about 100 pounds. Eskimo dogs look very much like wolves, and many probably are part wolf. Like dogs, wolves often bury extra food and go back to eat it when food is scarce.

Wolves not only hunt in groups, they live in groups. Wolves mate for life, and the offspring stay with their parents even after they are fully grown. Cubs are born late in the spring. By fall they are ready to begin hunting with their parents.

Foxes

The arctic fox is a predator too, but it is too small to prey on caribou. Fully grown, an arctic fox usually weighs less than ten pounds and is little larger than a big house cat.

Lacking the strength of wolves, arctic foxes rely on cunning to kill their prey. They kill lemmings, arctic hares and birds, and eat birds' eggs and berries when they can be found. They are scavengers, too, eating remains of animals killed by larger predators. In the summer, they may find caribou meat. In winter, when food is scarce, the foxes may venture out on the pack ice to follow polar bears and eat what they leave behind.

In the summer the coat of the arctic fox is short and brownish-grey, the color of the rocky hills along the Arctic Ocean. In the winter it is all white except for its eyes and dark nose, the only features that give it away in the snowy landscape. In its dense winter coat, the arctic fox can sleep comfortably in a snowy burrow when the temperature is 50°F below zero outside. The coat that keeps the fox warm can also bring danger. The fur is so prized by the fur industry that people who live in the north trap foxes to sell their skins.





Weasels

Another animal with a valuable winter coat is the weasel. In winter when its fur turns white the weasel is called an ermine. Weasels and foxes compete for small animals to eat.

Arctic Hares

An arctic hare makes a hearty meal for a fox, because it is nearly the same size. Wolves and owls also prey on hares. Hares do not migrate and they do not hibernate in winter. They continue to search the snowy tundra for twigs and dried grasses, relying on their white winter coats to hide them from predators.

Lemmings

Lemmings are small, furry animals much like hamsters. They do not migrate, hibernate or turn white in winter. A female lemming matures in six months and can produce eight litters of five or six little lemmings a year.

Because of this rapid reproduction, now and again there is a population explosion among lemmings. Driven to distraction by overcrowding, large bands of the animals move out across the tundra. Many die of exposure or are killed by snowy owls, arctic foxes or wolves. Many others drown as they try to cross lakes and rivers. In the end the lemming population is reduced, and the cycle begins again.

In the summer lemmings feed on grasses and other plants and store food in the tunnels that serve as their winter homes. In winter they are safe and well fed underground. If they leave their burrows, where the temperature may be 50 degrees above the outside temperature, they freeze quickly — if a predator does not spot them first.



Life in the Sea

Less than one third of the area of the Arctic is land. The rest is an icy ocean in which many creatures make their home.

But is the ocean such a cold place to live? Though the water of the Arctic Ocean rarely goes more than a few degrees above 28°F, the temperature at which sea water freezes, it also does not go below that temperature. In the winter the ocean water under the sea ice is much warmer than the air.

The oceans of the world are areas of abundant life, and the Arctic Ocean is no exception. Most of the marine life consists of many different kinds of microscopic plants and animals. This teeming life, called *plankton*, is the main source of food for many of the animals of the sea. In addition to plankton, the waters of the Arctic contain other small marine creatures such as clams, crabs, shrimp and several kinds of fish.

Fish

Trout and salmon are common in the bays and gulfs of the Arctic Ocean. Some of these fish begin their lives in the rivers and streams of the tundra and eventually find their way to the sea. The arctic char, a type of salmon, is a plentiful source of food for men in the far north. A full-grown char weighs seven or eight pounds and lives either in the rivers flowing into the ocean or in inland lakes.

Mammals

Whales

Whales live in the open sea. They are mammals and have lungs instead of gills, so they must come to the surface to breathe. Whales are the largest animals of the sea, and yet most of them live on plankton, the smallest of sea life. Several kinds of whales live in the Arctic. Once they were plentiful, but years of whale-hunting have cut down their number.

Walruses

The word "walrus" comes from the Norwegian word *hvalross*, which means whale-horse. This is a good name for this animal, because a full-grown walrus sometimes weighs over a ton.

A walrus is a strange-looking animal. Its skin is thick and wrinkled, and it has two long tusks like buck teeth that never stopped growing. With its tusks, a walrus digs clams from the ocean floor. A walrus uses its flippers to walk on land. Although it is clumsy, it can move rapidly.

Walruses are sociable animals. They live in a very close group and protect one another. Because they often try to help a wounded member rather than escape from danger,



walruses are easy prey for hunters. This is one reason why walruses are now rare in the bays of the central Arctic.

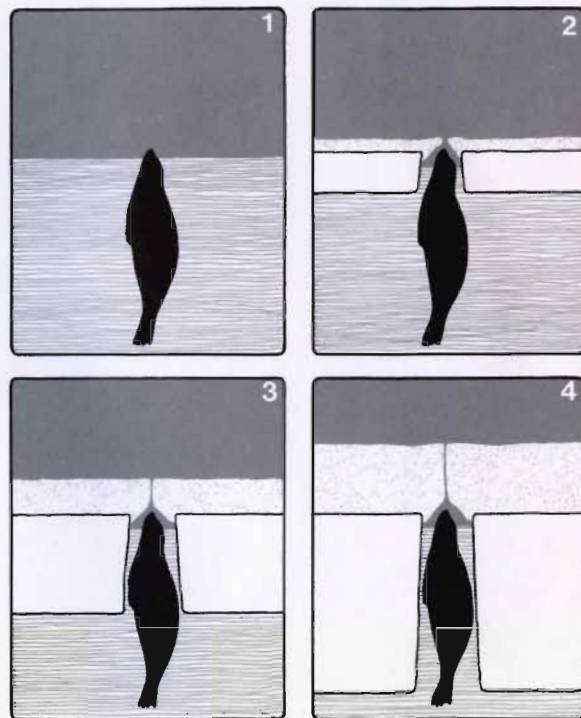
Seals

There are many different species of seals in the Arctic. The one that is most common in bays and inlets is the ringed seal, named for the dark rings on its back.

Although they live in the sea, seals are warm-blooded and they breathe air. Seals must come to the surface of the water to breathe at least once every fifteen minutes. In the summer this is easy. But to breathe during the winter, seals must chew holes through the ice. Each seal keeps several breathing holes open all winter and stays near its holes. Of course, a seal could use another seal's breathing hole, and some probably do.

The ringed seal has a sleek body just right for swimming. Like all sea mammals, the ringed seal is insulated to protect it from the bitter cold. Under its skin is a layer of fat, or blubber, which helps keep it warm. A male is about five feet long and weighs about 200 pounds. Females are slightly smaller. The seal's coat of short hair is grey with dark ring-like marks on the top and a silvery undercoat. The seal has a whiskered face and very large eyes. Its eyes are covered

Seal Breathing Hole Formation



with protective oil so it can see as well under water as it can on land.

A male seal reaches maturity when he is about eight years old. A female is mature at about six or seven. Many seals die in their first year. Of those that survive to adulthood, probably most die before they are twenty-five years old.

In late March a female seal crawls out onto the ice and makes a small den in the snow. In April she gives birth to a single seal pup. The infant spends April and May inside the den, nursing from its mother and growing. The mother leaves the den to find food but returns often to nurse the infant.

In early summer, seals often haul themselves out of the water and rest in the sun next to their breathing holes. Why they do this, no one is quite sure. Although seals are cautious, every year some of them are killed by bears and human beings while they are lying out on the ice.

Seals feed on other animals, mainly fish and small crab-like animals that are common in the Arctic Ocean. The jaw of a seal is very similar to the jaw of other flesh-eating mammals. It has strong canine teeth like dogs and cats. In fact, seals are closely related to dogs and cats.

Seals are preyed upon by several animals. In the water they are hunted by killer whales, and on the ice they are hunted by bears and by human beings.



Polar Bears

The polar bear lives on the sea, not in it. Almost all a polar bear's life is spent on the floating ice of the Arctic Ocean, and some bears never set foot on land. They are born in a cave in the ice and they spend their lives hunting on the ice or at the edge of open water. Only if the hunting is poor do they go on land.

A polar bear that finds itself on land in the summer will, like other bears, eat berries, perhaps a little lichen or moss, bird's eggs and any small rodents that cross its path. On the ice, polar bears eat young walruses, fish or stranded whales. But the food they eat most is seal meat. Polar bears hunt seal by stalking them near cracks in the ice where the seals crawl out to rest. Although the seal can dive and swim better than the polar bear, it has little chance to escape if caught unawares on the ice by a hungry polar bear.

Polar bears are good swimmers. They have been seen swimming in the open ocean 25 miles from land. They can swim comfortably in cold water because they are protected by their thick fur. The fur is so well lubricated with oil that



it is almost waterproof and makes a good insulation against the cold.

The polar bear is feared by the Eskimos, partly because of its size. A full-grown male polar bear weighs up to 1500 pounds. Female bears weigh much less, but they are still frightening at 700 pounds. They are also frightening because of their speed. They can run 25 miles an hour for short periods of time — easily outrunning a man.

For such large animals, polar bears have tiny offspring. Cubs weigh only two pounds when they are born. Each female has two cubs every other year. The tiny cubs stay with the mother until they are nearly two years old, at first clinging to her ears and tail to be towed through the icy water, later swimming on their own to follow her on hunting expeditions.

The explorers who first went to the lands of the Arctic called the tundra "the barren ground," a place without life. At first glance it may seem empty and lonely, but when we look more closely, we see that it is not empty at all. It is a land full of life. The short Arctic summer is a time of bustling activity, and even the long, cold winter has an abundant life of its own.

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