cause breathing difficulties. But immobilizing drugs are still problematic. One bear biologist told me, "Every time I chase an animal to put a dart in it, I am in conflict. How can I justify getting the information like this?"

That afternoon on Lancaster Sound, in the completion of the somewhat somber duties of tagging and recording data and fitting the animals with radio collars to permit satellite tracking, we saw many bears. We landed once to inspect the remains of a walrus that had been killed, perhaps, or possibly only scavenged, by a bear. We saw two-year-old cubs with their mothers striding apprehensively away from the sound of our helicopter, and we saw males and females together, mating pairs, turning beneath us to stare. And females with five-month-old cubs, scrambling over pressure ridges with a boost from their mother's nose.

One of the females we darted went down near a jumble of shattered ice. While the others made measurements, I looked at her feet. I had once been told that polar bear claws show an annual shading, faint rings, which could be used reliably to age a bear, as is the case with ringed seals. But there were none that I could detect. I looked at details of her fur and felt the thickness of her ears, as though examining a museum specimen. Uncomfortable with all this, I walked over to the pressure ridge and sat on a slab of broken sea ice. It was a beautiful day, the skies clear behind a thin layer of very high cirrus, which made the sky a paler blue. About five below zero. No wind.

As I sat there my companions rolled the unconscious bear over on her back and I saw a trace of pink in the white fur between her legs. The lips of her vulva were swollen. Her genitalia were in size and shape like a woman's. I looked away. I felt I had invaded her privacy.

For the remainder of the day I could not rid myself of this image of vulnerability.

Four

LANCASTER SOUND
Monodon monoceros

I AM STANDING at the margin of the sea ice called the floe edge at the mouth of Admiralty Inlet, northern Baffin Island, three or four miles out to sea. The firmness beneath my feet belies the ordinary sense of the phrase "out to sea." Several Eskimo camps stand here along the white and black edge of ice and water. All of us have come from another place—Nuvua, 30 miles to the south at the tip of Uluksan Peninsula. We are here to hunt narwhals. They axe out there in the open water of Lancaster Sound somewhere, waiting for this last ice barrier to break up so they can enter their summer feeding grounds in Admiralty Inlet.

As I walk along the floe edge—the light is brilliant, the ceaseless light of July; but after so many weeks I am weary of it; I stare

at the few shadows on the ice with a kind of hunger—as I walk along here I am aware of both fear and elation, a mix that comes in remote regions with the realization that you are exposed and the weather can be capricious, and fatal. The wind is light and from the north—I can see its corrugation on the surface of the water. Should it swing around and come from the south, the ice behind us would begin to open up. Traverse cracks across the inlet, only a few inches wide yesterday, would begin to widen. We would have difficulty getting back to Nuvua, even if we left at the first sign of a wind shift.

A few days ago one of these men was caught like that. A distant explosion, like dynamite, told him what a compass bearing he quickly took on Borden Peninsula confirmed—that the five-square-mile sheet of floe ice he had camped on was being swept out of Admiralty Inlet toward open water in Lancaster Sound. He and his companion, knowing the set of local currents, struck out immediately to the east. Twelve hours later, near exhaustion, they came to a place where the ice floe was grounded in shallow coastal water, making a huge, slow turn in the current before breaking loose into Lancaster Sound. They leaped and plunged across broken ice cakes for the firm shore.

I am not so much thinking of these things, however, as I am feeling the exuberance of birds around me. Black-legged kittiwakes, northern fulmars, and black guillemots are wheeling and hovering in weightless acrobatics over the streams and lenses of life in the water—zooplankton and arctic cod—into which they plunge repeatedly for their sustenance. Out on the ice, at piles of offal from the narwhal hunt, glaucous and Thayer's gulls stake a rough-tempered claim to some piece of flesh, brash, shouldering birds alongside the more reticent and rarer ivory gulls.

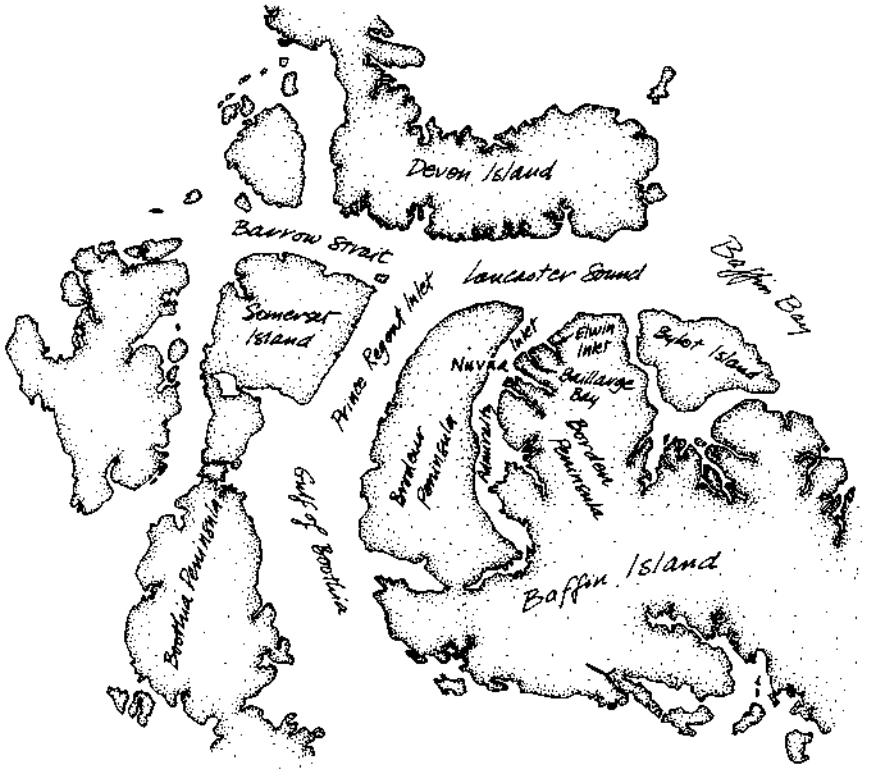
Birds fly across these waters in numbers that encourage you to simply flip your pencil in the air. Certain species end their northward migration here and nest. Others fly on to Devon and Ellesmere islands or to northwest Greenland. From where I now stand I can study some that stay, nesting in an unbroken line for i o miles

on a cliff between Baillarge Bay and Elwin Inlet, a rugged wall of sedimentary and volcanic rock pocked with indentations and ledges, rising at an angle of 8o° from the water. More than 50,000 northern fulmars. At other such rookeries around Lancaster Sound, guillemots, murres, and kittiwakes congregate in tens and even hundreds of thousands to nest and feed during the short summer. Gulls, arctic terns, snow geese, eiders, red-breasted mergansers, and dovekies have passed through in droves already. Of the dovekies—a small, stocky seabird with a black head and bright white underside—something on the order of a third of the northwest Greenland population of 30 *million* passes over Lancaster Sound in May and June.

On the white-as-eggshell ice plain where we are camped, with the mottled browns and ochers of Borden Peninsula to the east and the dark cliffs of Brodeur Peninsula obscured in haze to the west, the adroit movements of the birds above the water give the landscape an immediate, vivid dimension: the eye, drawn far out to pale hues on the horizon, comes back smartly to the black water, where, *plunk,* a guillemot disappears in a dive.

The outcry of birds, the bullet-whirr of their passing wings, the splashing of water, is, like the falling light, unending. Lancaster Sound is a rare arctic marine sanctuary, a place where creatures are concentrated in the sort of densities one finds in the Antarctic Ocean, the richest sea waters in the world. Marine ecologists are not certain why Lancaster Sound teems so with life, but local upwelling currents and a supply of nutrients from glacial runoff on Devon Island seem critical.*

* Lancaster Sound has been proposed as a world biological reserve by the International Biological Programme and singled out by the United Nations as a Natural Site of World Heritage Quality. The stability of this ecosystem is currently threatened by offshore oil development and increased shipping traffic. David Nettleship, an arctic ornithologist with preeminent experience here, has written that such economic development "should be strictly controlled in order to prevent the destruction of a uniquely rich high arctic oasis. To harm it would go far towards making a desert of arctic waters."



Three million colonial seabirds, mostly northern fulmars, kittiwakes, and guillemots, nest and feed here in the summer. It is no longer the haunt of 10,000 or so bowhead whales, but it remains a summering ground for more than 30 percent of the belukha whale population of North America, and more than three-quarters of the world's population of narwhals. No one is sure how many harp, bearded, and ringed seals are here—probably more than a quarter of a million. In addition there are thousands of Atlantic walrus. The coastal regions are a denning area for polar bear and home to thousands of arctic fox in the summer.

I am concerned, as I walk, however, more with what is immediate to my senses—the ternlike whiffle and spin of birds over the

water, the chicken-cackling of northern fulmars, and cool air full of the breath of sea life. This community of creatures, including all those invisible in the water, constitutes a unique overlap of land, water, and air. This is a special meeting ground, like that of a forest's edge with a clearing; or where the fresh waters of an estuary meet the saline tides of the sea; or at a river's riparian edge. The mingling of animals from different ecosystems charges such border zones with evolutionary potential. Flying creatures here at Admiralty Inlet walk on ice. They break the pane of water with their dives to feed. Marine mammals break the pane of water coming the other way to breathe.

The edges of any landscape—horizons, the lip of a valley, the bend of a river around a canyon wall—quicken an observer's expectations. That attraction to borders, to the earth's twilit places, is part of the shape of human curiosity. And the edges that cause excitement are like these where I now walk, sensing the birds toying with gravity; or like those in quantum mechanics, where what is critical straddles a border between being a wave and being a particle, between being what it is and becoming something else, occupying an edge of time that defeats our geometries. In biology these transitional areas between two different communities are called ecotones.

The ecotone at the Admiralty Inlet floe edge extends in two planes. In order to pass under the ice from the open sea, an animal must be free of a need for atmospheric oxygen; the floe edge, therefore, is a barrier to the horizontal migration of whales. In the vertical plane, no bird can penetrate the ice and birds like gulls can't go below water with guillemots to feed on schools of fish. Sunlight, too, is halted at these borders.

To stand at the edge of this four-foot-thick ice platform, however, is to find yourself in a rich biological crease. Species of alga grow on the bottom of the sea ice, turning it golden brown with a patchwork of life. These tiny diatoms feed zooplankton moving through the upper layers of water in vast clouds—underwater galaxies of copepods, amphipods, and mysids. These in turn

feed the streaming schools of cod. The cod feed the birds. And the narwhals. And also the ringed seal, which feeds the polar bear, and eventually the fox. The algae at the bottom of this food web are called "epontic" algae, the algae of the sea ice. (Ringed seals, ivory gulls, and other birds and mammals whose lives are ice-oriented are called "pagophylic") It is the ice, however, that holds this life together. For ice-associated seals, vulnerable on a beach, it is a place offshore to rest, directly over their feeding grounds. It provides algae with a surface to grow on. It shelters arctic cod from hunting seabirds and herds of narwhals, and it shelters the narwhal from the predatory orca. It is the bear's highway over the sea. And it gives me a place to stand on the ocean, and wonder.

I walk here intent on the birds, half aware of the biological mysteries in these placid, depthless waters in which I catch fleeting silver glimpses of cod. I feel blessed. I draw in the salt air and feel the warmth of sunlight on my face. I recall a childhood of summer days on the beaches of California. I feel the wealth to be had in life in an aimless walk like this, through woods or over a prairie or down a beach.

It is not all benign and ethereal at the ice edge, however. You cannot—I cannot—lose completely the sense of how far from land this is. And I am wary of walrus. A male walrus is a huge animal, approaching the size of a small car. At close range in the water its agility and speed are intimidating. Walruses normally eat only bottom-dwelling organisms like clams, worms, and crabs, but there is an unusual sort of walrus—almost always a male, a loner, that deliberately hunts and kills seals. Its ivory tusks are crosshatched with the claw marks of seals fighting for their lives. (It is called *angeyeghaq* by the Eskimos on Saint Lawrence Island, who are familiar with its unusual behavior.) This rare carnivore will charge off an ice floe to attack a small boat, and actively pursue and try to kill people in the water. A friend of mine was once standing with an Eskimo friend at an ice edge when the man cautioned him to step back. They retreated 15 or 20 feet. Less than a minute later a

walrus surfaced in an explosion of water where they had been standing. A polar bear trick.

When I walk along the floe edge I think of that story. I have no ear educated as was his companion's to anticipate the arrival of the walrus. A native ear. Experience. I walk here susceptible as any traveler to the unknown.

I stood still occasionally to listen. I heard only the claver of birds. Then there was something else. I had never heard the sound before, but when it came, plosive and gurgling, I knew instinctively what it was, even as everyone in camp jumped. I strained to see them, to spot the vapor of their breath, a warm mist against the soft horizon, or the white tip of a tusk breaking the surface of the water, a dark pattern that retained its shape against the dark, shifting patterns of the water. Somewhere out there in the ice fragments. Gone. Gone now. Others had heard the breathing. Human figures in a camp off to the west, dark lines on the blinding white ice, gesture toward us with upraised arms.

THE first narwhals I ever saw lived far from here, in Bering Strait. The day I saw them I knew that no element of the earth's natural history had ever before brought me so far, so suddenly. It was as though something from a bestiary had taken shape, a creature strange as a giraffe. It was as if the testimony of someone I had no reason to doubt, yet could not quite believe, a story too farfetched, had been verified at a glance.

I was with a bowhead whale biologist named Don Ljungblad, flying search transects over Bering Sea. It was May, and the first bowheads of spring were slowly working their way north through Bering Strait toward their summer feeding grounds in the Chukchi and Beaufort seas. Each day as we flew these transects we would pass over belukha whale and walrus, ringed, spotted, and ribbon seals, bearded seals, and flocks of birds migrating to Siberia. I know of no other region in North America where animals can be met with in such numbers. Bering Sea itself is probably the richest of all

the northern seas, as rich as Chesapeake Bay or the Grand Banks at the time of their discovery. Its bounty of crabs, pollock, cod, sole, herring, clams, and salmon is set down in wild numbers, the rambling digits of guesswork. The numbers of birds and marine mammals feeding here, to a person familiar with anything but the Serengeti or life at the Antarctic convergence, are magical. At the height of migration in the spring, the testament of life in Bering Sea is absolutely stilling in its dimensions.

The two weeks I spent flying with Ljungblad, with so many thousands of creatures moving through the water and the air, were a heady experience. Herds of belukha whale glided in silent shoals beneath transparent sheets of young ice. Squadrons of fast-flying sea ducks flashed beneath us as they banked away. We passed ice floes stained red in a hundred places with the afterbirths of walrus. Staring all day into the bright light reflected from the ice and water, however, and the compression in time of these extraordinary events, left me dazed some evenings.

Aspects of the arctic landscape that had become salient for me —its real and temporal borders; a rare, rich oasis of life surrounded by vast stretches of deserted land; the upending of conventional kinds of time; biological vulnerability made poignant by the forgiving light of summer—all of this was evoked over Bering Sea.

The day we saw the narwhals we were flying south, low over Bering Strait. The ice in Chukchi Sea behind us was so close it did not seem possible that bowheads could have penetrated this far; but it is good to check, because they can make headway in ice as heavy as this and they are able to come a long way north undetected in lighter ice on the Russian side. I was daydreaming about two bowheads we had seen that morning. They had been floating side by side in a broad lane of unusually clear water between a shelf of shorefast ice and the pack ice—the flaw lead. As we passed over, they made a single movement together, a slow, rolling turn and graceful glide, like figure skaters pushing off, these 50-ton leviathans. Ljungblad shouted in my earphones: "Waiting." They were waiting for the ice in the strait to open up. Ljungblad saw nearly

300 bowheads waiting calmly like this one year, some on their backs, some with their chins resting on the ice.

The narwhals appeared in the middle of this reverie. Two males, with ivory tusks spiraling out of their foreheads, the image of the unicorn with which history has confused them. They were close to the same size and light-colored, and were lying parallel and motionless in a long, straight lead in the ice. My eye was drawn to them before my conscious mind, let alone my voice, could catch up. I stared dumbfounded while someone else shouted. Not just to see the narwhals, but *here,* a few miles northwest of King Island in Bering Sea. In all the years scientists have kept records for these waters, no one had ever seen a narwhal alive in Bering Sea. Judging from the heaviness of the ice around them, they must have spent the winter here.* They were either residents, a wondrous thought, or they had come from the nearest population centers the previous fall, from waters north of Siberia or from northeastern Canada.

The appearance of these animals was highly provocative. We made circle after circle above them, until they swam away under the ice and were gone. Then we looked at each other. Who could say what this was, really?

Because you have seen something doesn't mean you can explain it. Differing interpretations will always abound, even when good minds come to bear. The kernel of indisputable information is a dot in space; interpretations grow out of the desire to make this point a line, to give it a direction. The directions in which it can be sent, the uses to which it can be put by a culturally, professionally, and geographically diverse society, are almost without limit. The possibilities make good scientists chary. In a region like the Arctic, tense with a hunger for wealth, with fears of plunder, interpretation can quickly get beyond a scientist's control. When asked to assess

* The narwhal is not nearly as forceful in the ice as the bowhead. It can break through only about 6 inches of ice with its head. A bowhead, using its brow or on occasion its more formidable chin, can break through as much as 18 inches of sea ice.

the meaning of a biological event—What were those animals doing out there? Where do they belong?—they hedge. They are sometimes reluctant to elaborate on what they saw, because they cannot say what it means, and they are suspicious of those who say they know. Some even distrust the motives behind the questions.

I think along these lines in this instance because of the animal. No large mammal in the Northern Hemisphere comes as close as the narwhal to having its very existence doubted. For some, the possibility that this creature might actually live in the threatened waters of Bering Sea is portentous, a significant apparition on the eve of an era of disruptive oil exploration there. For others, those with the leases to search for oil and gas in Navarin and Norton basins, the possibility that narwhals may live there is a complicating environmental nuisance. Hardly anyone marvels solely at the fact that on the afternoon of April 16, 1982, five people saw two narwhals in a place so unexpected that they were flabbergasted. They remained speechless, circling over the animals in a state of wonder. In those moments the animals did not have to mean anything at all.

WE know more about the rings of Saturn than we know about the narwhal. Where do they go and what do they eat in the winter, when it is too dark and cold for us to find them? The Chilean poet and essayist Pablo Neruda wonders in his memoirs how an animal this large can have remained so obscure and uncelebrated. Its name, he thought, was "the most beautiful of undersea names, the name of a sea chalice that sings, the name of a crystal spur." Why, he wondered, had no one taken Narwhal for a last name, or built "a beautiful Narwhal Building?"

Part of the answer lies with a regrettable connotation of death in the animal's name. The pallid color of the narwhal's skin has been likened to that of a drowned human corpse, and it is widely thought that its name came from the Old Norse for "corpse" and "whale," *ndr + hvalr.* A medieval belief that the narwhal's flesh was poisonous has been offered in support of this interpretation, as well as the belief that its "horn" was proof at that time against being poisoned.

The eighteenth-century naturalist Buffon characterized the animal for all the generations that would read him as one that "revels in carnage, attacks without provocation, and kills without need." Among its associations with human enterprise in the inhospitable north is the following grim incident. In 1126, Arnhald, first bishop of Iceland, was shipwrecked off the Icelandic coast. Drowned men and part of the contents of the ship's hold washed up in a marsh, a place afterward called the Pool of Corpses. Conspicuous among the items of salvage were a number of narwhal tusks, "with runic letters upon them in an indelible red gum so that each sailor might know his own at the end of the voyage."

W. P. Lehmann, a professor of Germanic languages, believes the association with death is a linguistic accident. The Old Norse *ndrhvalr* (whence the English *narivhal,* the French *narval,* the German *Narwal,* etc.), he says, was a vernacular play on the word *nahvalr*—the way *high-bred corn* is used in place of *hybrid corn,* or *sparroivgrass* is used for *asparagus.* According to Lehmann, *nahvalr* is an earlier, West Norse term meaning a "whale distinguished by a long, narrow projection" (the tusk).

Some, nevertheless, still call the narwhal "the corpse whale," and the unfounded belief that it is a cause of human death, or an omen or symbol to be associated with human death, remains intact to this day in some quarters. Animals are often fixed like this in history, bearing an unwarranted association derived from notions or surmise having no connection at all with their real life. The fuller explanations of modern field biology are an antidote, in part, to this tendency to name an animal carelessly. But it is also, as Neruda suggests, a task of literature to take animals regularly from the shelves where we have stored them, like charms or the most intricate of watches, and to bring them to life.

The obscurity of narwhals is not easily breeched by science. To begin with, they live underwater. And they live year-round in the polar ice, where the logistics and expense involved in approaching them are formidable barriers to field research, even in summer. Scientists have largely been limited to watching what takes place at

the surface of the water in the open sea adjacent to observation points high on coastal bluffs. And to putting hydrophones in the water with them, and to making comparisons with the belukha whale, a close and better-known relative. About the regular periodic events of their lives, such as migration, breeding, and calving, in relation to climatic changes and fluctuations in the size of the population, we know next to nothing.*

Scientists can speak with precision only about the physical animal, not the ecology or behavior of this social and gregarious small whale. (It is the latter, not the former, unfortunately, that is most crucial to an understanding of how industrial development might affect narwhals.) Adult males, 16 feet long and weighing upwards of 3300 pounds, are about a quarter again as large as adult females. Males are also distinguished by an ivory tusk that pierces the upper lip on the left side and extends forward as much as 10 feet. Rarely, a female is found with a tusk, and, more rarely still, males and females with tusks on both sides of the upper jaw.

From the side, compared with the rest of its body, the narwhal's head seems small and blunt. It is dominated by a high, rounded forehead filled with bioacoustical lipids—special fats that allow the narwhal to use sound waves to communicate with other whales and to locate itself and other objects in its three-dimensional world. Its short front flippers function as little more than diving planes. The cone-shaped body tapers from just behind these flippers —where its girth is greatest, as much as eight feet—to a vertical ellipse at the tail. In place of a dorsal fin, a low dorsal ridge about five feet long extends in an irregular crenulation down the back. The tail flukes are unique. Seen from above, they appear heart-

* The knowledge and insight of Eskimos on these points, unfortunately, are of little help. Of all the areas of natural history in which they show expertise, native hunters are weakest in their understanding of the population dynamics of migratory animals. The reason is straightforward. Too much of the animal's life is lived "outside the community," beyond the geographic and phenomenological landscape the Eskimos share with them.

shaped, like a ginkgo leaf, with a deep-notched center and trailing edges that curve far forward.

Viewed from the front, the head seems somewhat squarish and asymmetrical, and oddly small against the deep chest. The mouth, too, seems small for such a large animal, with the upper lip just covering the edge of a short, wedge-shaped jaw. The eyes are located just above and behind the upturned corners of the mouth, which give the animal a bemused expression. (The evolutionary loss of facial muscles, naturalist Peter Warshall has noted, means no quizzical wrinkling of the forehead, no raised eyebrow of disbelief, no pursed lip of determination.) A single, crescent-shaped blowhole on top of the head is in a transverse line with the eyes.

Narwhal calves are almost uniformly gray. Young adults show spreading patches and streaks of white on the belly and marbling on the flanks. Adults are dark gray across the top of the head and down the back. Lighter grays predominate on top of the flippers and flukes, whites and light yellow-whites underneath. The back and flanks are marbled with blackish grays. Older animals, especially males, may be almost entirely white. Females, say some, are always lighter-colored on their flanks.

The marbled quality of the skin, which feels like smooth, oiled stone, is mesmerizing. On the flukes especially, where curvilinear streaks of dark gray overlap whitish-gray tones, the effect could not be more painterly. Elsewhere on the body, spots dominate. "These spots," writes William Scoresby, "are of a roundish or oblong form: on the back, where they seldom exceed two inches in diameter, they are the darkest and most crowded together, yet with intervals of pure white among them. On the side the spots are fainter, smaller, and more open. On the belly, they become extremely faint and few, and in considerable surfaces are not to be seen." These patterns completely penetrate the skin, which is a half-inch thick.

In the water, depending on sunlight and the color of the water itself, narwhals, according to British whaling historian Basil Lubbock, take on "many hues, from deep sea green to even an intense lake [blue] colour."

Narwhals are strong swimmers, with the ability to alter the contours of their body very slightly to reduce turbulence. Their speed and maneuverability are sufficient to hunt down swift prey—arctic cod, Greenland halibut, redfish—and to avoid their enemies, the orca and the Greenland shark.

Narwhals live in close association with ice margins and are sometimes found far inside heavy pack ice, miles from open water. (How they determine whether the lead systems they follow into the ice will stay open behind them, ensuring their safe return, is not known.) They manage to survive in areas of strong currents and wind where the movement of ice on the surface is violent and where leads open and close, or freeze over, very quickly. (Like seabirds, they seem to have an uncanny sense of when a particular lead is going to close in on them, and they leave.) That they are not infallible in anticipating the movement and formation of ice, which seals them off from the open air and oxygen, is attested to by a relatively unusual and often fatal event called a savssat.

Savssats are most commonly observed on the west coast of Greenland. Late in the fall, while narwhals are still feeding deep in a coastal fiord, a band of ice may form in calm water across the fiord's mouth. The ice sheet may then expand toward the head of the fiord. At some point the distance from its landward to its seaward edge exceeds the distance a narwhal can travel on a single breath. By this time, too, shorefast ice may have formed at the head of the fiord, and it may grow out to meet the sea ice. The narwhals are thus crowded into a smaller and smaller patch of open water. Their bellowing and gurgling, their bovinelike moans and the plosive screech of their breathing, can sometimes be heard at a great distance.

The Danish scientist Christian Vibe visited a savssat on March 16, 1943, on the west coast of central Greenland. Hundreds of narwhals and belukhas were trapped in an opening less than 20 feet square. The black surface of the water was utterly "calm and still," writes Vibe. "Then the smooth surface was suddenly broken by

black shadows and white animals which in elegant curves came up and disappeared—narwhals and white whales by the score. Side by side they emerged so close to each other that some of them would be lifted on the backs of the others and turn a somersault with the handsome tail waving in the air. First rows of narwhal, then white whales and then again narwhals—each species separately. It seethed, bobbed, and splashed in the opening. With a hollow, whistling sound they inhaled the air as if sucking it in through long iron tubes. The water was greatly disturbed . . . and the waves washed far in over the ice." The splashed water froze to the rim of the breathing hole, as did the moisture from their exhalations, further reducing the size of the savssat. In spite of the frenzy, not a single animal that Vibe saw was wounded by the huge tusks of the narwhal.*

The narwhal is classed in the suborder Odontoceti, with toothed whales such as the sperm whale, in the superfamily Delphinoidea, along with porpoises and dolphins, and in the family Monodontidae with a single companion, the belukha. In contrast to the apparently coastally-adapted belukha, biologists believe the narwhal is a pelagic or open-ocean species, that it is more ice-adapted, and that it winters farther to the north. Extrapolating on the basis of what is known of the belukha, it is thought that narwhals breed in April and give birth to a single, five-foot, 170-pound calf about fourteen months later, in June or July. Calves carry an inch-thick layer of blubber at birth to protect them against the cold water. They appear to nurse for about two years and may stay with their mothers for three years, or more. Extrapolating once again

* Eskimo hunters killed 340 narwhals and belukhas at this savssat in a week, before the ice fractured and the rest escaped. In the spring of 1915, Eskimos at Disko Bay took more than a thousand narwhals and belukhas at two savssats over a period of several months. Inattentive birds, especially thick-billed murres and dovekies which require a lot of open water to take off, may also suddenly find themselves with insufficient room and may be trapped.

from the belukha, it is thought that females reach sexual maturity between four and seven years of age, males between eight and nine years.

Narwhals are usually seen in small groups of two to eight animals, frequently of the same sex and age. In the summer, female groups, which include calves, are sometimes smaller or more loosely knit than male groups. During spring migration, herds may consist of 300 or more animals.

Narwhals feed largely on arctic and polar cod, Greenland halibut, redfish, sculpins, and other fish, on squid and to some extent on shrimps of several kinds, and on octopus and crustaceans. They have a complex, five-chambered stomach that processes food quickly, leaving undigested the chitinous beaks of squid and octopus, the carapaces of crustaceans, and the ear bones and eye lenses of fish, from which biologists can piece together knowledge of their diets.

Two types of "whale lice" (actually minute crustaceans) cling to their skin, in the cavity where the tusk passes through the lip, in the tail notch in the flukes, and in wounds (all places where they are least likely to be swept off by the flow of water past the narwhal's body). The tracks of the sharp, hooked legs of these tiny creatures are sometimes very clear on a narwhal's skin. Older animals may carry such infestations of these parasites as to cause an observer to wince.

IF you were to stand at the edge of a sea cliff on the north coast of Borden Peninsula, Baffin Island, you could watch narwhals migrating past more or less continuously for several weeks in the twenty-four-hour light of June. You would be struck by their agility and swiftness, by the synchronicity of their movements as they swam and dived in unison, and by a quality of alert composure in them, of capability in the face of whatever might happen. Their attractiveness lies partly with their strong, graceful movements in three dimensions, like gliding birds on an airless day. An impressive form

of their synchronous behavior is their ability to deep-dive in groups. They disappear as a single diminishing shape, gray fading to darkness. They reach depths of 1000 feet or more, and their intent, often, is then to drive schools of polar cod toward the surface at such a rate that the fish lose consciousness from the too-rapid expansion of their swim bladders. At the surface, thousands of these stunned fish feed narwhals and harp seals, and rafts of excited northern fulmars and kittiwakes.

Watching from high above, one is also struck by the social interactions of narwhals, which are extensive and appear to be well organized according to hierarchies of age and sex. The socializing of males frequently involves the use of their tusks. They cross them like swords above the water, or one forces another down by pressing his tusk across the other's back, or they face each other head-on, their tusks side by side.

Helen Silverman, whose graduate work included a study of the social organization and behavior of narwhals, describes as typical the following scene, from her observations in Lancaster Sound. "On one occasion a group of five narwhals consisting of two adult males, one adult female, one [calf] and one juvenile were moving west with the males in the lead. The group stopped and remained on the surface for about 30 [seconds]. One male turned, moved under the [calf], and lifted it out of the water twice. There was no apparent reaction from the mother. The male then touched the side of the female with the tip of its tusk and the group continued westward."

Sitting high on a sea cliff in sunny, blustery weather in late June—the familiar sense of expansiveness, of deep exhilaration such weather brings over one, combined with the opportunity to watch animals, is summed up in a single Eskimo word: *quviannikumut*, "to feel deeply happy"—sitting here like this, it is easy to fall into speculation about the obscure narwhal. From the time I first looked into a narwhal's mouth, past the accordian pleats of its tongue, at the soft white interior splashed with Tyrian purple, I

have thought of their affinity with sperm whales, whose mouths are similarly colored. Like the sperm whale, the narwhal is a deep diver. No other whales but the narwhal and the sperm whale are known to sleep on the surface for hours at a time. And when the narwhal lies at the surface, it lies like a sperm whale, with the section of its back from blowhole to dorsal ridge exposed, and the rest of its back and tail hanging down in the water. Like the sperm whale, it is renowned for its teeth; and it has been pursued, though briefly, for the fine oils in its forehead.

Like all whales, the narwhal's evolutionary roots are in the Cretaceous, with insect-eating carnivores that we, too, are descended from. Its line of development through the Cretaceous and into the Paleocene follows that of artiodactyls like the hippopotamus and the antelope—and then it takes a radical turn. After some 330 million years on dry land, since it emerged from the sea during the Devonian period 380 million years ago, the line of genetic development that will produce whales returns to the world's oceans. The first proto-whales turn up in the Eocene, 45 million years ago, the first toothed whales 18 million years later, in the Oligocene. By then, the extraordinary adjustments that had to take place to permit air-breathing mammals to live in the sea were largely complete.

Looking down from the sea cliffs at a lone whale floating peacefully in the blue-green water, it is possible to meditate on these evolutionary changes in the mammalian line, to imagine this creature brought forward in time to this moment. What were once its rear legs have disappeared, though the skeleton still shows the trace of a pelvis. Sea water gave it such buoyancy that it required little in the way of a skeletal structure; it therefore has achieved a large size without loss of agility. It left behind it a world of oscillating temperatures (temperatures on the arctic headland from which I gaze may span a range of 120T over twelve months) for a world where the temperature barely fluctuates. It did not relinquish its warm-blooded way of life, however; it is insulated against the cold with a layer of blubber two to four inches thick.

The two greatest changes in its body have been in the way it now stores and uses oxygen, and in a rearrangement of its senses to suit a world that is largely acoustical, not visual or olfactory, in its stimulations.

When I breathe this arctic air, 34 percent of the oxygen is briefly stored in my lungs, 41 percent in my blood, 13 percent in my muscles, and 12 percent in the tissues of other of my organs. I take a deep breath only when I am winded or in a state of emotion; the narwhal always takes a deep breath—its draft of this same air fills its small lungs completely. And it stores the oxygen differently, so it can draw on it steadily during a fifteen-minute dive. Only about 9 percent stays in its lungs, while 41 percent goes into the blood, another 41 percent into the muscles, and about 9 percent into other tissues. The oxygen is bound to hemoglobin molecules in its blood (no different from my own), and to myoglobin molecules in its muscles. (The high proportion of myoglobin in its muscles makes the narwhal's muscle meat dark maroon, like the flesh of all marine mammals.)

Changes in the narwhal's circulatory system—the evolution of *rete mirabile,* "wonder nets" of blood vessels; an enlargement of its hepatic veins; a reversible flow of blood at certain places—have allowed it to adapt comfortably to the great pressures it experiences during deep dives.

There is too little nitrogen in its blood for "the bends" to occur when it surfaces. Carbon dioxide, the by-product of respiration, is effectively stored until it can be explosively expelled with a rapid flushing of the lungs.

It is only with an elaborate apparatus of scuba gear, decompression tanks, wet suits, weight belts, and swim fins that we can explore these changes. Even then it is hard to appreciate the radical alteration of mammalian development that the narwhal represents. First, ours is largely a two-dimensional world. We are not creatures who look up often. We are used to exploring "the length and breadth" of issues, not their "height." For the narwhal there are

very few two-dimensional experiences—the sense of the water it feels at the surface of its skin, and that plane it must break in order to breathe.

The second constraint on our appreciation of the narwhal's world is that it "knows" according to a different hierarchy of senses than the one we are accustomed to. Its chemical senses of taste and smell are all but gone, as far as we know, though narwhals probably retain an ability to determine salinity. Its tactile sense remains acute. Its sensitivity to pressure is elevated—it has a highly discriminating feeling for depth and a hunter's sensitivity to the slight turbulence created by a school of cod cruising ahead of it in its dimly lit world. The sense of sight is atrophied, because of a lack of light. The eye, in fact, has changed in order to accommodate itself to high pressures, the chemical irritation of salt, a constant rush of water past it, and the different angle of refraction of light underwater. (The narwhal sees the world above water with an eye that does not move in its socket, with astigmatic vision and a limited ability to change the distance at which it can focus.)

How different must be "the world" for such a creature, for whom sight is but a peripheral sense, who occupies, instead, a three-dimensional acoustical space. Perhaps only musicians have some inkling of the formal shape of emotions and motivation that might define such a sensibility.

The Arctic Ocean can seem utterly silent on a summer day to an observer standing far above. If you lowered a hydrophone, however, you would discover a sphere of "noise" that only spectrum analyzers and tape recorders could unravel. The tremolo moans of bearded seals. The electric crackling of shrimp. The baritone boom of walrus. The high-pitched bark and yelp of ringed seals. The clicks, pure tones, birdlike trills, and harmonics of belukhas and narwhals. The elephantine trumpeting of bowhead whales. Added to these animal noises would be the sounds of shifting sediments on the sea floor, the whine and fracture of sea ice, and the sound of deep-keeled ice grounding in shallow water.

The narwhal is not only at home in this "cacophony," as

possessed of the sense of a neighborhood as we might conceivably be on an evening stroll, but it manages to appear "asleep," oblivious at the surface of the water on a summer day in Lancaster Sound.

The single most important change that took place in the whale's acoustical system to permit it to live in this world was the isolation of its auditory canals from each other. It could then receive waterborne sound independently on each side of its head and so determine the direction from which a sound was coming. (We can do this only in the open air; underwater, sound vibrates evenly through the bones of our head.) The narwhal, of course, receives many sounds; we can only speculate about what it pays attention to, or what information it may obtain from all that it hears. Conversely, narwhals also emit many sounds important, presumably, to narwhals and to other animals too.

Acoustical scientists divide narwhal sound into two categories. Respiratory sounds are audible to us as wheezes, moans, whistles, and gurgles of various sorts. The second group of sounds, those associated with, presumably, echolocation and communication, scientists divide into three categories: clicking, generated at rates as high as 500 clicks per second; pulsed tones; and pure tones. (Certain of these sounds are audible to someone in a boat in the open air, like an effervescence rising from the surface of the water.)

Narwhals, it is believed, use clicking sounds to locate themselves, their companions, their prey, and such things as floe edges and the trend of leads. Pulsed tones are thought to be social in nature and susceptible to individual modification, so each narwhal has a "signature" tone or call of its own. Pure-tone signals, too, are thought to be social or communicative in function. According to several scientists writing in the *Journal of the Acoustical Society of America*, the narwhal "seems much less noisy [than the belukha], appears to have a smaller variety of sounds, and produces many that are outside the limits of human hearing." A later study, however, found narwhals "extremely loquacious underwater," and noted that tape recordings were "almost saturated with acoustic signals of highly variable duration and frequency composition." The same

study concluded, too, that much of the narwhal's acoustically related behavior "remains a matter of conjecture."

I dwell on all this because of a routine presumption—that the whale's ability to receive and generate sound indicates it is an "intelligent" creature—and an opposite presumption, evident in a Canadian government report, that the continuous racket of a subsea drilling operation, with the attendant din of ship and air traffic operations, "would not be expected to be a hazard [to narwhals] because of ... the assumed high levels of ambient underwater noise in Lancaster Sound."

It is hard to believe in an imagination so narrow in its scope, so calloused toward life, that it could write these last words. Cetaceans may well be less "intelligent," less defined by will, imagination, and forms of logic, than we are. But the *idea* that they are intelligent, and that they would be affected by such man-made noise, is not so much presumption as an expression of a possibility, the taking of a respectful attitude toward a mystery we can do no better than name "narwhal." Standing at the edge of a cliff, studying the sea-washed back of such a creature far below, as still as a cenobite in prayer, the urge to communicate, the upwelling desire, is momentarily sublime.

I stare out into Lancaster Sound. Four or five narwhals sleep on the flat calm sea, as faint on the surface as the first stars emerging in an evening sky. Birds in the middle and far distance slide through the air, bits of life that dwindle and vanish. Below, underneath the sleeping narwhal, fish surge and glide in the currents, and the light dwindles and is quenched.

THE first description of a unicorn, according to British scholar Odell Shepard, appears in the writings of Ctesias, a Greek physician living in Persia in the fifth century B.C., who had heard reports of its existence from India. The existence of such an animal, a fierce, horselike creature of courageous temperament, with a single horn on its forehead, gained credibility later through the writings of Aristotle and Pliny and, later still, in the work of Isidore of Seville,

an encyclopedist. The Bible became an unwitting and ironic authority for the unicorn's existence when Greek translators of the Septuagint rendered the Hebraic term *re'em* (meaning, probably, the now extinct aurochs, *Bos primigenius)* as "the unicorn."

The legend of the unicorn, and the subsequent involvement of the narwhal, is a story intriguing at many levels. Until well into the Middle Ages the legend passed only from one book to another, from one learned individual to another; it was not a part of the folk culture of Europe. During the Renaissance, scientists, scholars, and theologians put forth various learned "explanations" for the unicorn's existence. However farfetched these explanations might have seemed to skeptics, the concrete evidence of a narwhal's tusk to hand seemed irrefutable. Furthermore, no Christian could deny the unicorn's existence without contradicting the Bible.

Scholars argue that the animal in Ctesias' original report from Persia represents the transposed idea of an oryx or a rhinoceros. It went unquestioned, they speculate, because Greeks such as Ctesias took "the grotesque monstrosities of Indian religious art" rendered in the Persian tapestries they saw for real animals. In medieval Europe, trade in rare narwhal and walrus tusks, confusion with the mythical animals of Zoroastrian as well as Christian tradition, and the bucolic practice of making bizarre alterations in the horns of domestic animals, all lent credence to the legend. The interest of the wealthy and learned in this regal animal, moreover, went beyond mere fascination; it was also practical. European royalty was besieged with politically motivated poisonings in the fourteenth and fifteenth centuries, and the unicorn's horn was reputedly the greatest proof against them.

In *The Lore of the Unicorn,* Odell Shepard writes of the great range of appreciation of Renaissance people for the unicorn's horn; it was "their companion on dark nights and in perilous places, and they held it near their hearts, handling it tenderly, as they would a treasure. For indeed it was exactly that. It preserved a man from the arrow that flieth by day and the pestilence that walketh in

darkness, from the craft of the poisoner, from epilepsy, and from several less dignified ills of the flesh not to be named in so distinguished a connection. In short it was an amulet, a talisman, a weapon, and a medicine chest all in one."

The narwhal's tusk, traded in bits and pieces as the unicorn's horn, sold for a fortune in the Middle Ages, for twenty times its weight in gold. Shepard estimates that in mid-sixteenth-century Europe there were no more than fifty whole tusks to be seen, each with a detailed provenance. They were gifted upon royalty and the church and sought as booty by expeditionary forces who knew of their existence. Two tusks stolen from Constantinople in 1204 were delivered by Crusaders to the Cathedral of Saint Mark in Venice, where they may be seen to this day.

The presence of these tusks in Europe depended upon Greenlandic and Icelandic trade. The oddity was that they were delivered to Europe by men like those who drowned with the Bishop of Iceland, sailors with no notion of unicorns and no knowledge of the value of the tusk to those who did know. On the other hand, the tusk was frequently bought by people who had not the remotest notion of the existence of such an animal as the narwhal.

The first European to bring these disparate perceptions together, it seems, was the cartographer Gerhard Mercator, who clearly identified the narwhal as the source of the unicorn's horn in 1621. In 1638, Ole Wurm, a Danish professor and a "zoologist and antiquarian of high attainment," delivered a speech in Copenhagen in which he made the same connection. But by then the story of the unicorn was simply too firmly entrenched at too many levels of European society to be easily dispelled, and the horn itself was too dear an item of commerce to be declared suddenly worthless. Besides, it was argued, was not the tusk simply the horn of the unicorn of the sea? Why shouldn't it have the same power as the horn of the land unicorn?

Over time the narwhal's tusk lost its influence in medical circles, trade dwindled, and the legend itself passed out of the hands of ecclesiastics and scholars to the general populace, where

it became dear to the hearts of romantics, artists, and poets. It was passed on, however, in a form quite different from the secular tradition in Ctesias. In its secular rendering the unicorn was a creature of nobility and awesome though benign power. It was a creature of compassion, though solitary, and indomitably fierce. It became, as such, the heraldic symbol of knights errant and of kings. It was incorporated into the British coat of arms by James I in 1603, and in 1671 Christian V became the first Danish king to be crowned in a coronation chair made entirely of narwhal tusks.

Under Christian influence, the story of the unicorn became the story of a captured and tamed beast. The animal lost its robust, independent qualities, that aloofness of the wild horse, and was presented as a small, goatlike animal subdued by a maiden in a pastoral garden. The central episode of its fabulous life, its power to turn a poisonous river into pure water so that other creatures might drink, as Moses had done with his staff at the waters of Marah, passed into oblivion. The creature of whom it was once written in Solinus' *Polyhistoria*, "It is an animal never to be taken alive-killed possibly, but not captured," became a symbol of domestic virginity and obeisance.

One winter afternoon in Vancouver, British Columbia, I spoke with the only person ever to have succeeded in putting an adult narwhal, briefly, on display. (The six animals, brought back from northern Canada in 1970, all died of pneumonia within a few months.) Murray Newman, director of the British Columbia Aquarium, explained the great difficulties inherent in capturing such animals and later of maintaining them in captivity, especially the male, with its huge tusk. He doubted any aquarium would ever manage it successfully. The description from Solinus' *Polyhistoria* seemed at that moment, as we gazed across the aquarium's trimmed lawns toward Vancouver's harbor, oddly apt and prophetic.

A narwhal's tusk, hefted in the hands, feels stout but resilient. It is a round, evenly tapered shaft of ivory, hollow for most of its length. (The cavity is filled with dental pulp in the living animal.)

A large tusk might weigh 20 pounds, be eight or nine feet long, and taper from a diameter of four inches at the socket down to a half-inch at the tip. The smooth, polished tip, two to three inches long, is roundly blunt or sometimes wedge-shaped. The rest of the tusk is striated in a regular pattern that spirals from right to left and may make five or six turns around the shaft before fading out. Often a single groove parallel to the spiraling striations is apparent. The tusk also shows a slight, very shallow ripple from end to end in many specimens.

The striated portion is rough to the touch, and its shallow grooves are frequently encrusted with algae. These microorganisms give the tusk a brindled greenish or maroon cast, contrasting with the white tip and with the 1o to 12 inches of yellower ivory normally embedded in the upper left side of the animal's skull.

Well into the nineteenth century there was a question about which of the sexes carried the tusk (or whether it might be both). Although many thought it was only the males, a clear understanding was confounded by authenticated reports of females with tusks (a female skull with *two* large tusks, in fact, was given to a Hamburg museum in 1684 by a German sea captain), and an announcement in 1700 by a German scientist, Solomon Reisel, that some narwhals carried "milk tusks." It did not help matters, either, that there was much conjecture but no agreement on the function of the tusk. (A more prosaic error further confused things—printers sometimes inadvertently reversed drawings, making it seem that the tusk came out of the right side of the head instead of the left, and that it spiraled from left to right.)

Several certainties eventually emerged. The tusk spirals from right to left. In normal development, two incipient tusks form as "teeth" in the upper jaw of both sexes, one on each side. In the female, both teeth usually harden into solid ivory rods with a protuberance at one end, like a meerschaum pipe (these were Reisel's "milk tusks"). In males, the tusk on the right remains undeveloped, "a miniature piece of pig iron," while the one on the left almost always develops into a living organ, a continually growing, fully vascularized tooth. On very rare occasions, both tusks develop like this, in both sexes. And both tusks spiral from right to left (i.e., they are not symmetrical like the tusks of an elephant or a walrus). Viewed from above, twin tusks diverge slightly from each other. In some males the left tusk never develops (nor does the right in these instances). In perhaps 3 percent of females a single tusk develops on the left.

Solving this problem in sexual systematics and physiology proved simpler than determining the tusk's purpose. It was proposed as a rake, to stir up fish on the seabed floor; as a spear to impale prey; and as a defensive weapon. All three speculations ignored the needs of narwhals without tusks. In addition, Robin Best, a Canadian biologist with a long-standing interest in the question, has argued that the tusk is too brittle to stand repeated use as a rake or probe; that attacking the sorts of fish narwhals habitually eat with the tusk would be difficult and unnecessary and getting large fish off the tusk problematic; and that there are no records of narwhals attacking other animals or defending themselves with their tusks.

The fact that narwhals frequently cross their tusks out of water and that the base of the tusk is located in the sound-producing region of the narwhal's skull led to speculation that it might serve some role in sound reception or propagation (again ignoring the female component of the population). Oral surgeons determined that the tooth's pulp does not contain the bioacoustical lipids necessary for echolocation, but this does not mean that the narwhal can't in some way direct sound with it and, as some have suggested, "sound-joust" with other males. (On their own, the oral surgeons speculated that because the tooth was so highly vascularized, the narwhal could get rid of a significant amount of body heat this way, which would presumably allow males to hunt more energetically. The biologists said no.)

William Scoresby, as bright and keen-eyed an observer as ever

went to sea, speculated in 1820 that the tusk was only a secondary sexual characteristic, like a beard in humans, and was perhaps used to fracture light ice when narwhals of both sexes needed to breathe. Scientists say narwhals are too careful with their tusks to subject them to such impact, but on the first point Scoresby was correct.

Male narwhals engage in comparative displays of their tusks, like the males of other species, but they also appear to make some kind of violent physical contact with each other occasionally. The heads of many sexually mature males are variously scarred, and scientists have even found the broken tips of tusks in wounded narwhals. (A scientist who made a detailed examination of the narwhal's musculature said the muscles are not there in the neck to allow the animals to parry and thrust with rapierlike movements. Indeed, males appear always to move their tusks with deliberation, and dexterously, as at savssats.) The circumstances under which head scarring might occur—the establishment and continual testing of a male social hierarchy, especially during the breeding season—are known; but how these wounds are suffered or how frequently they are inflicted is still widely debated. One plausible thought is that males align their tusks head-on and that the animal with the shorter tusk is grazed or sometimes severely poked in the process.

A significant number of narwhals, 20 to 30 percent, have broken tusks. Some broken tusks have a curious filling that effectively seals off the exposed pulp cavity. Oral surgeons say this rod-shaped plug is simply a normal deposition of "reparative dentine," but others have long insisted it is actually the tip of another narwhal's tusk, to which it bears an undeniable resemblance. (The broken tips of other narwhals' tusks are filled with stones and sediment.)

Exposed tooth pulp creates a site for infection, not to mention pain. That animals would try to fill the cavity (if "reparative dentine" didn't) makes sense. That one narwhal entices another into this ministration is as intriguing a notion as the thought that

males put the tips of their tusks on the opposite male's sound-sensitive melon and generate a "message" in sound-jousting. It would be rash to insist categorically that narwhals don't do *something* odd with the tusk on occasion, like prodding a flatfish off the sea bottom. (Herman Melville drolly suggested they used it as a letter opener.) But it seems clear that its principal, and perhaps only, use is social. Robin Best argues, further, that because of its brittleness, its length, and the high proportion of broken tusks, the organ may have reached an evolutionary end point.

A remaining question is, Why is the tusk twisted? D'Arcy Wentworth Thompson, a renowned English biologist who died in 1948, offered a brilliant and cogent answer. He argued that the thrust of a narwhal's tail applied a very slight torque to its body. The tusk, suspended tightly but not rigidly in its socket in the upper jaw, resisted this force with a very slight degree of success. In effect, throughout its life, the narwhal revolved slowly around its own tusk, and over the years irregularities of the socket gouged the characteristic striations in the surface of the tooth.

Thompson pointed out that the tooth itself is not twisted—it is straight-grained ivory, engraved with a series of low-pitched threads. No one has disproved, proved, or improved upon Thompson's argument since he set it forth in 1942.

BECAUSE the ivory itself dried out and became brittle and hard to work, the greatest virtue of a narwhal tusk to the Eskimos who traditionally hunted the animal was its likeness to a wood timber. Some of the regions where narwhals were most intensively hunted were without either trees or supplies of driftwood. The tusk served in those places as a spear shaft, a tent pole, a sledge thwart, a cross brace—wherever something straight and long was required.

Narwhals were most often hunted by Eskimos during their near-shore migration in spring, and in bays and fiords during the summer. To my knowledge, Eskimos attach no great spiritual importance to the narwhal. Like the caribou, it is a migratory food

animal whose spirit *(kirnniq)* is easily propitiated. The narwhal does not have the intercessionary powers or innate authority of the polar bear, the wolf, the walrus, or the raven.

Beyond its tusk, Greenlanders valued the narwhal's skin above all other leathers for dog harnesses, because it remained supple in very cold weather and did not stretch when it became wet. The sinews of the back were prized as thread not only for their durability but also for their great length. The outside layer of the skin was an important source of vitamin C, as rich in this essential vitamin as raw seal liver. The blubber, which burned with a bright, clean yellow flame, gave light and warmth that were utilized to carve a fishhook or sew a mitten inside the iglu in winter. A single narwhal, too, might feed a dog team for a month.

It is different now. The hunter's utilitarian appreciation of this animal is an attitude some now find offensive; and his considerable skills, based on an accurate and detailed understanding of the animal and its environment, no longer arouse the sympathetic admiration of very many people.

In the time I spent watching narwhals along the floe edge at Lancaster Sound in 1982 no whale was butchered for dog food. The dogs have been replaced by snow machines. No sinews were removed for sewing. Only the tusk was taken, to be traded in the village for cash. And muktuk, the skin with a thin layer of blubber attached, which was brought back to the hunting camp at Nuvua. (This delicacy is keenly anticipated each spring and eaten with pleasure. It tastes like hazelnuts.)

The narwhal's fate in Lancaster Sound is clearly linked with plans to develop oil and gas wells there, but current hunting pressure against them is proving to be as important a factor. In recent years Eskimo hunters on northern Baffin Island have exhibited some lack of discipline during the spring narwhal hunt. They have made hasty, long-range, or otherwise poorly considered shots and used calibers of gun and types of bullets that were inadequate to kill, all of which left animals wounded. And they have sometimes exceeded the quotas set by Department of Fisheries and Oceans

Canada and monitored by the International Whaling Commission.* On the other side, Eskimos have routinely been excluded from the upper levels of decision-making by the Canadian government in these matters and have been offered no help in devising a kind of hunting behavior more consistent with the power and reach of modern weapons. For the Eskimos, there is a relentless, sometimes condescending scrutiny of every attempt they make to adjust their culture, to "catch up" with the other culture brought up from the south. It is easy to understand why the men sometimes lose their accustomed composure.

In the view of Kerry Finley, a marine mammal biologist closely associated with the Baffin Island narwhal hunts, "It is critical [to the survival of narwhals] that Inuit become involved in meaningful positions in the management of marine resources." The other problems, he believes, cannot be solved until this obligation is met.

I would walk along the floe edge, then, in those days, hoping to hear narwhals, for the wonder of their company; and hoping, too, that they would not come. The narwhal is a great fighter for its life, and it is painful to watch its struggle. When they were killed, I ate their flesh as a guest of the people I was among, out of respect for distant ancestors, and something older than myself.

I watched closely the ivory gull, a small bird with a high, whistly voice. It has a remarkable ability to appear suddenly in the landscape, seemingly from nowhere. I have scanned tens of square miles of open blue sky, determined it was empty of birds, and then thrown a scrap of seal meat into a lead, where it would

* These charges are detailed in K. J. Finley, R. A. Davis, and H. B. Silverman, "Aspects of the Narwhal Hunt in the Eastern Canadian Arctic," *Report of the International Whaling Commission* 30 (1980): 459-464; and K. J. Finley and G. W. Miller, "The 1979 Hunt for Narwhals *(Monodon monoceros)* and an Examination of Harpoon Gun Technology Near Pond Inlet, Northern Baffin Island," *Report of the International Whaling Commission* 32 (1982): 449-460.

float. In a few minutes an ivory gull would be overhead. It is hard to say even from what direction it has come. It is just suddenly there.

So I would watch them in ones and twos. Like any animal seen undisturbed in its own environment, the ivory gull seems wondrously adapted. To conserve heat, its black legs are shorter in proportion to its body than the legs of other gulls, its feet less webbed. Its claws are longer and sharper, to give it a better grip of frozen carrion and on the ice. It uses seaweed in its nest to trap the sun's energy, to help with the incubation of its eggs. To avoid water in winter, which might freeze to its legs, it has become deft at picking things up without landing. In winter it follows the polar bear. When no carrion turns up in the polar bear's wake, it eats the polar bear's droppings. It winters on the pack ice. Of the genus *Fagophila.* Ice lover.

And I would think as I walked of what I had read of a creature of legend in China, an animal similar in its habits to the unicorn but abstemious, like the ivory gull. It is called the *ki-lin.* The *ki-lin* has the compassion of the unicorn but also the air of a spiritual warrior, or monk. Odell Shepard has written that "[ujnlike the western unicorn, the *ki-lin* has never had commercial value; no drug is made of any part of his body; he exists for his own sake and not for the medication, enrichment, entertainment, or even edification of mankind." He embodied all that was admirable and ideal.

With our own Aristotelian and Cartesian sense of animals as objects, our religious sense of them as mere receptacles for human symbology, our single-mindedness in unraveling their workings, we are not the kind of culture to take the *ki-lin* very seriously. We are another culture, and these other times. The *ki-lin,* too, is no longer as highly regarded among modern Chinese as it was in the days of the Sung dynasty. But the idea of the *ki-lin,* the mere fact of its having taken shape, is, well, gratifying. It appeared after men had triumphed over both their fear and distrust of nature and their desire to control it completely for their own ends.

The history of the intermingling of human cultures is a history of trade—in objects like the narwhal's tusk, in ideas, and in great narratives. We appropriate when possible the best we can find in all of this. The *ki-lin,* I think, embodies a fine and pertinent idea—an unpossessible being who serves humans when they have need of its wisdom, a creature who abets dignity and respect in human dealings, who underlines the fundamental mystery with which all life meets analysis.

I do not mean to suggest that the narwhal should be made into some sort of symbolic *ki-lin.* Or that buried in the more primitive appreciation of life that some Eskimos retain is an "answer" to our endless misgivings about the propriety of our invasions of landscapes where we have no history, of our impositions on other cultures. But that in the simple appreciation of a world not our own to define, that poised arctic landscape, we might find some solace by discovering the *ki-lin* hidden within ourselves, like a shaft of light.