In the Lair of the Ice King

PHILIP CONKLING

PHOTOGRAPHS BY GARY COMER

CROSSING THE GREENLAND SEA
July 13–15, 2000

As our vessel cruises north from Iceland, it is hard to keep track of time when there's no difference between day and night. Most of us sleep throughout the night with the portholes covered to block out the white light while our highly competent crew moves TURMOIL, a 151-foot-long cruising vessel, through the Greenland Sea around the clock. It has been overcast and cool for most of the week since leaving Reykjavik, Iceland's largest port, where we met Gary Comer, TURMOIL's owner, and the crew. We are on an adventure of a lifetime—a voyage that will traverse the remote western coast of Iceland, then cross the Greenland and Norwegian Seas for a landfall at Spitsbergen, one of the most remote islands in the northern seas. Our intentions are to explore the fringes of the known world where few are able to go and to record our impressions of the life of the sea north of the Arctic Circle.

Throughout the day, the ship's routine goes on smoothly and unceasingly. Turmoil's four passengers find little corners in the library, main salon or up on the bridge to catch up on reading or to send e-mails back home. The satellite coverage for regular telecommunications gets patchy north of 70 degrees latitude, so today may be our last contact with our offices and families back in Maine. It is truly amazing, of course, that we can communicate so effortlessly through written messages from the middle of the Greenland Sea, and perhaps a little frightening how emotionally dependent you can get on the technology if it is available.

The weather reports also come in via electronic telecommunication, either on the fax or e-mail server. The service is called Fleet Weather, based in New York. Philip Walsh sends them our position, the visibility, sea condition, and barometric pressure and gets back a 36-hour forecast each day. The weather continues to improve throughout the afternoon and we all gather on the stern deck before dinner. There is a moderately thick cloud cover overhead, although the horizon is clear all the way around the compass. Soon even the clouds overhead begin to dissipate. Suddenly, just off the stern quarter, is a massive spout and then the long dark back of an enormous creature from the underworld emerges from the toughs in the waves. It can only be a blue whale. It surfaces once more further off and then is lost in our wake as we continue our northerly course. Shortly afterward the captain spots a tall straight silhouette many miles out that he at first mistakes for a sailboat mast. We alter course by 30 degrees to investigate. It takes us a quarter of an hour to get in the vicinity and suddenly we are surrounded by whale spouts exploding off to port and starboard.

As we angle closer in, a pair of finbacks, identified by white chevrons on their starboard sides, surfaces right off our beam. They are feeding on fish that have come to the surface. Soon two other finbacks join them as we steam side by side at 10 knots, approximating their speed. Every minute or so they burst to the surface in an explosion of spume and foam that cascades off their glistening dark backs. Then the most remarkable spectacle unfolds as three of the whales burst to surface almost touching each other, their torsos silver in the spray. One whale's mouth is so wide open its baleen plates are plainly visible. They lunge after a shoal of invisible fish, probably herring, then twist on their sides, extending flippers vertically in the air. Seconds later the tip of one of the flukes trails by like an enormous shark fin knifing through the water. The "lunge feeding" goes on and on as they chase the fish and feed. The noise of the spouts is deep and otherworldly, a cross between a shout of exuberance and a moan of despair. Although it is nearly 11:00 p.m. when

we break off from the whales, the sun is still several points above the horizon. Tonight the sun will not dip below the horizon at all, but will roll around the rim like a giant yellow marble balanced on the lip of an enormous saucer until it slowly begins to ascend on the other side of due north.

POLAR ICE AT THE 80th PARALLEL

July 19, 2000

After a quiet night in a fjord at the northern end of Spitsbergen we awake to gradually clearing skies. Turmoil heads north from her anchorage with the intention of exploring the edge of the sea ice where we might see polar bears hunting for seals. As the clouds continue to lift in the shimmering morning sunlight, we begin to see mirages of ice off to starboard. A fata morgana, a mirage that appears in polar regions caused by air temperature and density differences, now fills the entire eastern horizon, looming up like a vertical wall through the binoculars. This can only be the edge of the pack ice, although it looks like the edge of an ice escarpment—a barrier we will never be able to cross.

Soon we are nosing through what the captain calls a field of "bergy bits," little pieces of ice dotting the surface. A mile further ahead we swivel into the edge of pack ice. When we arrive, Gary calls for the jet boat so we can maneuver through the floating bergs and get a closer look at the ice field swaying on gentle arctic swells. Meanwhile puffins careen by overheard, seemingly flying through the rigging of Turmoil. The sun glints silver off the shifting ice pack. The sound of the pack ice is like a rushing wind off in the distance, as the heave and surge of the sea lifts and lowers a thousand square miles of restless ice that shifts uneasily against itself like a huge moaning diaphone. It is the dull roar from the lair of the ice king.

A short while later back aboard Turmoil in the pilothouse, there is a brief celebration at the GPS station as we cross the 80th parallel. Only 600 miles to the North Pole! For one mad moment, the same thought flashes across all our minds: Maybe we will get lucky and find a long-enough lead through the ice pack to make a dash for the Pole and get to the top of the world! Only for a moment, though. Who in his right mind would risk this boat for such an ice-crazed dream? But still . . .

POLAR ICE AT THE 80TH PARALLEL

JULY 23, 2000

Our voyage ended, Turmoil puts into the port of Longyearbyen on Spitsbergen's western coast where we will meet the plane that will take us back to the temperate world. It is a clear morning as we take off and re-cross the empty expanse of the Greenland Sea we had traversed in Turmoil a week earlier. In less than half an hour the plane is over the eastern edge of Greenland, a half continent-sized island almost completely obscured by an immense blanket of ice and snow. The morning sun pools in pockets of golden glow over the frigid waters at the white edge of the land. This eastern edge of Greenland is seemingly discharging bits of its frozen surface into the southerly trending currents that carry this flotilla of icebergs south like an endless stream of packing bits loosed in the wind.

THE VIEW BACK HOME

Several weeks after returning from the Turmoil voyage we were stunned, like many others to read a front-page story in the *New York Times* reporting that a Russian icebreaker, Yamal, had left Spitsbergen with a group of tourists in mid-August headed for the Pole. When they got there a week later, instead of ice, they discover nothing but open water at the North Pole. There were several American scientists leading the tourist expedition aboard the Yamal, including Dr. James McCarthy, an oceanographer, and director of the Museum of Comparative Zoology at Harvard University. McCarthy said that he had been at the Pole six years earlier and had encountered a completely frozen sheet of ice and reported he had never seen so much open water in the polar region. The captain of the Yamal said he had been making this passage for the past decade and generally had to cut through an ice sheet six to nine feet thick. (Other reports from prominent polar scientists published a few weeks later point out that approximately 10 percent of the polar Arctic region is open water since the ice pack constantly shifts in winds and currents to create pockets of open ocean, and that open water will appear from time to time at the Pole.)

Despite such disagreements, the evidence is mounting that an unusual amount of melting is occurring in the polar regions of the North Atlantic. What effects this might have on the rest of the ocean, including our small window on the world from the edge of the Gulf of Maine, is anyone's guess.

What we do know is that the earth's surface temperature, including the temperature of the sea's surface, has increased by about one degree since the late 19th century, and the 1990s have been the warmest decade on record. The difference in average global temperatures between a full-fledged ice age and our present interglacial climate is only about five degrees, so this global temperature increase is cause for concern, if not alarm. We also know from detailed recent measurements that the southern half of the Greenland ice sheet, the second-largest ice sheet in the world after Antarctica, has shrunk substantially in the last five years. Greenland is losing ice at a rate comparable to the size of Maryland covered by a foot of ice melting per year.

Closer to home, a story from last summer is a reminder of how interconnected life in the ocean can be. As a part of the Penobscot Bay Marine Collaborative, the Island Institute administers an interdisciplinary team of scientists, fishermen and managers trying to understand the dynamics of lobsters in the bay. Part of the project is to place college graduate "Island Fellows" and interns aboard lobster boats to collect information from cooperating fishermen. Lobstermen know that every year the habits of the world's most favored crustacean will be somewhat different than the previous year. Since anyone can remember, lobstermen in the spring have begun to set traps close to shore to intercept lobsters as they crawl into shallower, warmer waters to shed their old shells and breed. But last year was dramatically different. Fishermen set their gear as always, but catches in April, May and early June were not just low, especially in the Midcoast—they were almost nonexistent. Already nervous because of the collapse of the lobster population in Long Island Sound, N.Y., Maine fishermen feared the worst.

Then, beginning in early June, a strange thing happened. Lobstermen began catching shedders, very large numbers of them, between three or four weeks earlier than normal, in deeper waters than usual. The evidence

is anecdotal and therefore "unscientific," but a picture emerges: the early part of the lobster season was dramatically different from what many established fishermen had ever observed.

Informal observations from many sources also suggest that the deeper bottom waters along the eastern and midcoast sections of Maine were unusually warm early in the season, a state of affairs that led to an unusually early shed. Assuming that these observations prove to be accurate, the question is why warm bottom waters entered the bays of Eastern and Midcoast Maine, and what this change may be telling us about circulation patterns in the Gulf of Maine and beyond.

GLOBAL OCEAN CURRENTS AND CIRCULATION

Mariners have been studying ocean currents for centuries, but systematic observations of global ocean circulation features began in the mid-19th century when the United States Navy began to collect comprehensive current observations from fishing and commercial fleets operating throughout the world's oceans. These observations were painstakingly compiled to provide ship captains with estimates of the speed and direction of major ocean currents. Captains contributed information because no one could even begin to see the whole picture of the North Atlantic, for instance.

One of the most important ocean currents is the Gulf Stream that trends northerly off eastern North America to the region south of the Grand Banks of Newfoundland. From there it flows eastward across the North Atlantic. The significance of the Gulf Stream was not lost on commercial shippers, who laid their courses to take advantage of or reduce the disadvantage of this huge river-like current.

The Gulf Stream can be viewed as a vital piece of a global thermostat that transports heat trapped in equatorial oceans northward toward the poles where it cools as it goes north. Because so much of the rainfall over the North American continent is intercepted by mountains and falls on land, the saltiness of the Gulf Stream is high relative to other ocean surface waters. As this salty, and therefore heavy, seawater is carried north and cools, it meets cold polar currents in the region south of Iceland, and it sinks. Although tongues of the Gulf Stream continue to flicker north (including along the western coast of Spitsbergen), most of this dense, cold water sinks to the abyssal depths of the North Atlantic. There it sets up a giant, deepwater conveyor belt that flows along the bottom of the Atlantic basin beyond the tip of Africa, all the way to the edge of the Antarctic shelf.

Off Antarctica, North Atlantic bottom water, called the North Atlantic Conveyor, meets sinking cold surface water trapped between the sea ice to form a deep raceway around the Antarctic continent. The cold

bottom waters of the North Atlantic Conveyor vie for dominance with the bottom waters that descend from underneath the Antarctic ice sheet. Currently, the North Atlantic Conveyor is slightly dominant and forms the source of salty bottom currents that flow through deep topographic passages to drive the circulation systems of both the Pacific and Indian oceans.

But what happens if the North Atlantic Conveyor loses its dominance? Perhaps no one has given this question as much thought as the dean of American oceanographers, Wallace Broecker, of Columbia University. Referring to the analysis of Greenland ice cores ,where a detailed record of the earth's climate during the past 60,000 years has been unraveled, Broecker points to clear evidence that the earth's climate has switched back and forth between two modes of operation. The difference in time between interglacial epochs of moderate climate, and periods of intense cold, is measured on a scale of a few decades to a few years. How can such gigantic shifts in the earth's climate occur on such short notice? Scientists like Broecker do not know for sure, but the most sophisticated climate model suggests the "trigger" is a shift in ocean circulation.

Broecker reasons that slight changes in the relative strength of the two major sources of bottom water in the North Atlantic or the Antarctic shelf can trigger a rapid reorganization of global ocean circulation. This analysis suggests the only physical mechanism that can

explain a decrease in the rate of North Atlantic bottom water production results from a reduction in saltiness, and hence density, of its surface waters. Thus, if rapid increases in the rate of melting of Greenland ice cap and the Arctic pack ice were to occur, the resulting freshwater increase in the eastern North Atlantic would reduce the dominance of the North Atlantic Conveyor. With even a moderate weakening, the deep ocean circulation patterns can flip into their other mode of operation, where the Antarctic bottom waters are dominant. The resulting ocean circulation alters global weather patterns, including the strength and direction of the Gulf Stream. The Gulf Stream no longer flickers as far to the north in the eastern North Atlantic, quickly plunging northern Europe into a much colder climate. The resulting change in atmospheric circulation leads to new storm centers that transport more water vapor to the poles. As water vapor builds up at the poles, ice sheets begin to creep outward, but the persistent storms also reduce the saltiness and density of the waters that previously drove the North Atlantic Conveyor.

While we do not know whether the North Atlantic Conveyor is slowing enough to risk major changes in global ocean circulation and global climate, major ice melting in the eastern North Atlantic is an observed fact. The changes in bottom water temperatures in the Gulf of Maine can (and will be) documented as either a trend or an anomaly.

No one has definitely linked the melting of ice in the high Arctic to the production of greenhouse gases released by the burning of fossil fuels, but it is worth asking what kind of worldwide experiment is now ineluctably under way. Global warming scientists used to model a doubling of greenhouse gases in the earth's atmosphere and try to interpret the results. Newer projections make a tripling of the volume of greenhouse gases ever more likely during the 21st century.

Those with their hands on the levers of government, at least on this side of the North Atlantic, have taken a "wait and see" approach to the debate over whether global warming is real and a cause for concern. Because scientists are unable to predict with any certainty the timing and magnitude of global climate change, nor even whether it will produce new deserts or new ice ages, some might think this strategy has the prudence of Solomon. But if you view the doubling or tripling of heat-trapping gases in the atmosphere to a global game of Russian roulette, especially when the outcome is so unpredictable, the strategy looks less like Solomon's and more like Nero's.

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See more images from Greenland and points north at www.islandinstitute.org/iceking.