



**TUXEDO
JUNCTION**
About 2.5 million
pairs of Adélie pen-
guins inhabit Antarc-
tica's coasts, includ-
ing at Mawson, an
Australian research
station in Mac Rob-
ertson Land.

Loveⁱⁿ_a Cold

As the warm season grows longer, visitors are arriving in record numbers for spectacles like calving icebergs and marching penguins. *Sue Halpern* explores a cold continent's hot future



Climate

The penguins of Penguin Island are not observing the five-meter rule. Apparently no one drummed into them—as it was drummed into us, the 106 passengers of the Antarctic-bound ship *Corinthian II*—that they must keep their distance. They scramble over rocks, brushing up against our boots as they hurry to the water like commuters rushing to catch a train.

Or they are working their way back up the beach, bellies full of krill, stopping now and then to scan the cawing, tottering clumps of chicks for one of their own, scolding it circuitously uphill.

“I can go home,” says a passenger who has put fifty-six photographs of chinstrap and Adélie penguins on her camera’s memory card in less than ten minutes. But who of us hasn’t? And who doesn’t know what she means? Here is the natural world in its most natural state. If we

than ever before,” Frick says. “I remember years when we couldn’t land here all summer because of the snow.”

We set off single file along the path so as not to trample the fragile hair grass underfoot, passing a young elephant seal resting near the water’s edge. The only lick of shade comes from the shadow of the height of land. A small tongue of snow protrudes. Four fur seals are crowded on it, like sunbathers sharing a single towel at the beach.

“Seals and especially penguins don’t like to be hot,”



“Over there!” someone shouts, as the leading edge of a glacier shears

were to get kicked out of Eden now, it would be enough.

Happily, falling from grace is not on the extensive schedule that was slipped under the door of our cabins the night before. It is three-thirty in the afternoon, and in fifteen minutes we will be walking a stretch of the one-mile island, climbing a gentle slope to the rim of its volcanic cone, passing nesting giant petrels on the way. Though Antarctica is the coldest, windiest, and driest continent on the planet, it is midsummer and today the sun is unobstructed and the air is, comparatively speaking, hot. I shed my bulky red parka, then my hat, then my gloves, then my fleece vest. It’s my own molting ritual, and it leads me to ask the trip leader, John Frick, if it’s normal. What I mean is, the heat. It’s nearly fifty degrees. How typical is that?

“This year the snow melted off Penguin Island earlier

Frick says. “Penguins stand on snow and ice for a reason.”

A former Peace Corps volunteer and a graduate of Columbia University, Frick has been leading trips for a company called Travel Dynamics for fifteen years. This is his twenty-fifth trip to Antarctica. He has been around long enough, and is savvy enough, to know that one unseasonably warm summer, or two or even three, do not make a trend. But because Travel Dynamics specializes in what could be called intellectual adventures—arranging trips for the Yale Alumni Association or the Smithsonian, for instance, that bring naturalists and historians and experts of every stripe along for the ride—Frick is up on the science, too. That is what makes warm days like this one, and the image of four seals huddled on a shrinking mat of snow, seem like visions of the future. For here is the cruel paradox: Antarctica, which is as physically removed from human civilization as it is possible to be, is experiencing climate change more quickly and more dramatically than any other place on earth. The Antarctic Peninsula, the long tail of land west of the mainland that we’ll be cruising for almost a week, is now four and a half degrees warmer, on average, than it was fifty years ago,

PLACES & PRICES

Polar Prep

A trip to Antarctica requires more planning, determination, and fortitude than you’ll need almost anywhere else on the planet, so the right expedition is crucial. For advice, see page 125.

Photographs by Sue Halpern. Map by Joyce Penfold

and its melting season begins about three weeks earlier.

So there is a minor note of worry among us junior Shackletons as we traverse Penguin Island and later as the ship makes its way down the Bransfield Strait. It was named for Edward Bransfield, the explorer who gave Penguin Island its name at a time when the place was home to many more penguins than it is today. Maybe it's natural ebb and flow, but maybe not. The early melt is compromising the penguin population. The number of Adélies, the small, iconic penguin of penguins, has declined by more than fifty percent in three decades. As their habitat vanishes, so do they.

OUR HABITAT, MEANWHILE, COULD NOT BE MORE congenial. Every room on the *Corinthian II* is a suite, every suite has a view, the bar is always open, and the library has picture windows and plush chairs and books you might actually want to read, if there were time. But from 7:30 A.M.—when the dulcet voice of John Frick

vasses; keep an eye on icebergs, which can roll over and catapult your raft into the frosty drink; be prepared for a katabatic wind, a gust blowing off a glacier with avalanche force. Frick wants to be perfectly clear: Despite all the accoutrements of civilization—the Jacuzzi on the top deck and the turndown service at night—we are in a wild and unpredictable place.

Paulet Island, where we are going on this particular morning, is in the Weddell Sea, a few degrees of latitude above the Antarctic Circle. Like Penguin Island, it is volcanic, with an inland spire rising more than a thousand feet above the water. Paulet is one of the most successful Adélie penguin nurseries in the Weddell Sea. About 100,000 nesting pairs breed and raise their young here, which means that if each pair has one chick, this tiny scrap of lava may be home to as many as 300,000 Adélies.

We hear them before we see them, their call and response—parent to chick, chick to parent—reaching all the way to the ship itself, the volume rising as the Zodiacs

COLD COMFORT
The luxurious *Corinthian II* approaches a gentoo penguin rookery; ice sculpted by wind and water; gentoos at rocky Neko Harbor; lounging crab-eater seals; and Adélie penguins gather on an ice floe.

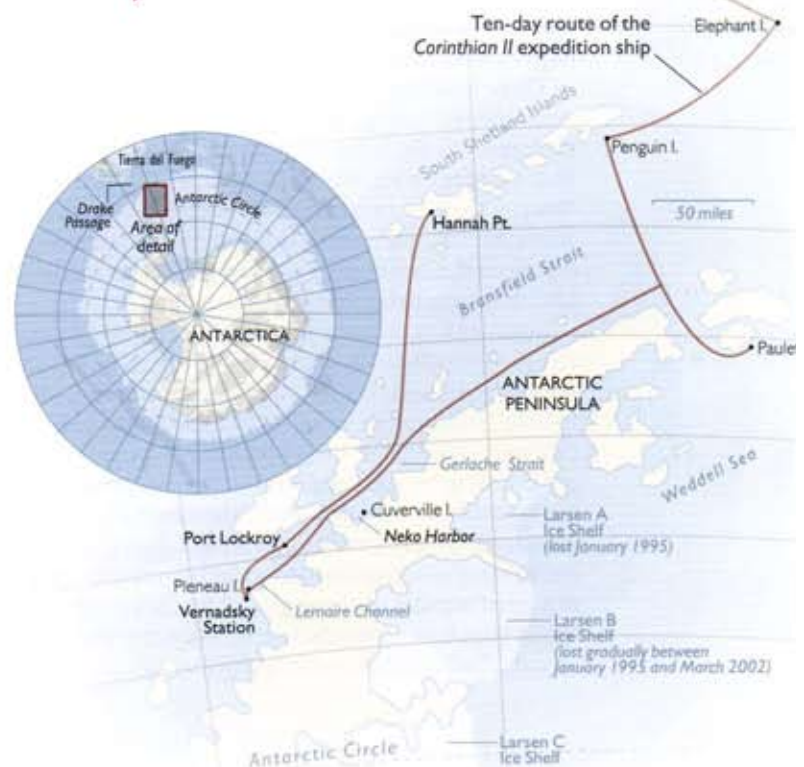


off and hurtles into the water, sending out a massive wave

is broadcast into every room, noting the time, the geographic coordinates, the weather, our cruising speed, the wind speed, the water and air temperature, and the day's events—there are places to go. There are lectures (explorer Bob Dobson talking about the 1946 American Antarctic expedition, when he was in charge of the sled dogs; naturalist Ken Wright discoursing on local birds; former Federal Reserve chairman Paul Volcker speculating on the economy and the environment) and films (*March of the Penguins*, the BBC series *Life in the Freezer*) and food (the abundant breakfast buffet, tea time, bouillon break, the even more copious lunch buffet, brandy sipping time, hot chocolate and cookies time, happy hour, pre-dinner little sandwich time, dinner, post-dinner little sandwich time). And then there are the landings, twice a day—what we've really come for—when we don life vests, red parkas, and waterproof boots and pants, and head for the Zodiac rafts.

"In Antarctica, we both fear and respect the water," Frick warns us. "It's just above the freezing point. If you fall in, you have less than four minutes to get out."

He has other cautionary advice: Watch out for cre-



Learning by Bernard Mainzer

bring us closer. We smell them, too, the pungent odor of their guano carried like pollen on the wind, seeding our imagination. And there they are, scores of them playing on a trio of offshore icebergs, sliding headlong into the Caribbean-blue water, then hurling themselves iceward, belly first, then sliding in again, like kids in a school playground. They swim alongside our rafts, and under and around them, their wings becoming flippers that propel them with force and grace. There are even more Adélies at the shore, and more still behind them, more and more as far as the eye can see and, with binoculars, even farther. There are penguins sitting on rock nests; penguins splayed on the snow, snoozing amid the din; bugling penguins, their chests inflated, their bills wide open, pointing to the sky; and chubby baby penguins in various stages of molt, their downy gray-and-white feathers stained pink where they've dribbled their food. Eager to get their sea legs, a few of them rush down to the water's edge only to be driven back by their parents, who know

Think of a shrimp, shrink it, and you have a pretty good notion of what krill look like—miniature prawns—and what they are: petite crustaceans. Krill, which travel in swarms and dine on phytoplankton that they filter through their legs, are in turn fed upon by most of the animals we've been ticking off, day after day, on our extensive Antarctic species list: humpback whales, minke whales, blue whales, fin whales, killer whales, sei whales, black-browed albatrosses, southern giant petrels, pintado petrels, Weddell seals, fur seals, leopard seals, crabeater seals, skuas, chinstrap penguins, Adélie penguins, gentoo penguins, macaroni penguins. It stands to reason that when one group brings a lot of unexpected guests to the party—two Adélie chicks, say, instead of one—there is a lot less food to go around. This might be manageable—after all, the Adélie population is in decline—but it turns out that the krill are crashing too, and for much the same reason: the disappearance of sea ice. Krill larvae feed

A gentoo penguin with chicks on the breeding ground at Neko Harbor, a rocky environment favored for nesting. Hiking on Penguin Island, snowless in summer.



Four fur seals crowd the snow, like sunbathers sharing a towel

that a penguin must lose all of its down before it can hope to swim past the leopard seals patrolling nearby.

Three hundred thousand penguins—or 200,000 or even 100,000—is an unimaginably huge number of penguins. It's the Tokyo subway at rush hour. It's Jones Beach on the hottest day of the year. It's the Milky Way. You can see it, but you can't really take it in, except in its particulars. So while we've been told about the profound decline in the Adélie penguin population, on Paulet Island they seem to be, if anything, ascendant.

But that too, it turns out, is not necessarily something to cheer about or be cheered by, the naturalist Ken Wright points out. It takes roughly a month for a chick to hatch and another month for it to fledge, so summers that start earlier beget longer breeding seasons, and longer breeding seasons beget less infant mortality. Adélies typically lay two eggs and, whether from triage or weakness, typically only one survives. Lately, though, the warmer temperatures on Paulet Island have resulted in a good number of those second hatchlings surviving too, at least for a while, and that is putting pressure on an already challenged resource: the krill they eat.

on algae, algae grow on the underside of sea ice, without the ice there is no algae and the krill can't survive. This is no longer speculative. When scientists from nine countries working independently in the Antarctic pooled their data, they discovered that the krill population in the waters surrounding the Antarctic Peninsula had dropped eighty percent since the 1970s. The food chain, they suggested, is on the verge of coming apart.

WE TALK ABOUT THIS AMONG OURSELVES IN the lounge, or in the tiny gym, or at meals. After six days at sea, despite our obvious differences—national, regional, professional, political—we are a congenial and inclusive group. We share stories, swap photos. We also voice concerns: Will the Drake Passage, the notoriously rough waters between Tierra del Fuego and Antarctica, which gave us a pass on the way down, make us pay for it on the way back? When is a good time to use the scopolamine patch? And the kicker: Are we not only among the first “civilians” to set eyes upon Antarctica but also among the last to see it as it has been?

The backdrop to these (*Continued on page 138*)

Photographs by Sue Halpern

Arctic Safari

Because it extends into the warm South Atlantic, the *Antarctic Peninsula* is most easily accessed by passenger ships and is the habitat of most of the continent's species.



Wandering albatross

Earth's largest seabird can live as long as sixty years.

Humpback whale

Pods migrate to tropical waters in winter for breeding.

Killer whale

Orcas emerging to do an "aerial scan" of the surface.

Emperor penguin

Spheniscidae superstor from *March of the Penguins*.

Weddell seal

Can dive 2,000 feet for 45 minutes and will chew holes in the ice to breathe.

Adelie penguin

Macaroni penguin

Earth's most common penguin, with nine million breeding pairs.

Southern giant petrel

A large seabird and effective predator, it feeds on carrion and even kills other birds.

Adelie penguin

Colonies of thousands include mated pairs who take turns incubating eggs.

Gentoo penguin

Gentooos are more likely than other penguins to keep the same mate from season to season.

Leopard seal

The only seal that feeds on warm-blooded prey, including other seals.

Killer whale

A swift, efficient carnivore, orcas are found in every ocean but prefer cooler waters.

Chinstrap penguin

Unlike most penguins, they are shallow divers and night feeders.

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(Continued from page 82) conversations is almost always ice. If a ship can be nimble, the *Corinthian II* is, dodging icebergs as it glides down the Gerlache Strait or skimming the rime of the Lemaire Channel. Among our lectures was John Frick's "Ice Primer," so we're all well versed in frazil versus brash versus sea ice versus pack ice, and we understand how the weight of the top layers of a glacier puts so much pressure on the bottom layers that the ice itself actually flows. We know that glaciers calve, breaking off in slices like generous servings of cake, and how these tumble into the water and float away as icebergs. Frick told us, but we really hear it later on, climbing four hundred feet up the slushy spine of Neko Harbor at the end of the fjordlike Andvord Bay, hear it just as we reach the height of land and stand on a par with the lapis sky, considering the massive snowfield on the other side, which is scarified like parched earth. There is a boom, a crackling like thunder, only louder. People look up, scanning for a storm. "Over there!" someone shouts, as the leading edge of a glacier shears off and hurtles into the water, sending out a massive wave when it hits.

It's possible that we will see that glacier again, in its constituent parts, when we travel back through the Gerlache Strait, or that it will be what thickens the water of Neko Harbor like a blender drink as we head out to Pleneau Island. Ice is the dominant feature of the Antarctic landscape—always present, sometimes menacingly so, often as a conduit to awe. At Pleneau Island, we ride Zodiacs between icebergs that appear to radiate blue light. Serrated or smooth, they make manifest the wind. We zip around them as if they were exhibits in a museum—here the ample Henry Moore iceberg; there, the one hosting a circus of acrobatic seals, the Calder.

"I once saw an iceberg that was seventeen miles long," Frick said. Even for Antarctica, where scale is on a whole other order of magnitude, that is a big piece of cake. The one Frick saw had actually broken off from a mass of ice the size of Rhode Island, which itself had broken off from the much bigger Larsen B Ice Shelf in 2002. The huge tabular icebergs we pass now and then, which have perfectly flat tops and could land a fleet of DC-10s, are also remnants of the Larsen B.

An ice shelf is like a deck jutting out into the water from the shore. The Larsen was 650 feet thick and possibly twelve thousand years old and protruded miles into the Weddell Sea. And then, quite suddenly, it wasn't there anymore. More than 700 billion tons of ice shattered and were set adrift. Antarctic maps needed to be redrawn. So did scientists' ideas about the consequences of cli-

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mate change. They suspected that there was a connection, since the peninsula was heating up more dramatically than anywhere else on earth, but they couldn't say how, exactly, a few degrees' temperature rise could have caused the ice shelf to become unhinged.

Four years later, in 2006, they issued their findings: Higher temperatures, along with thinning ozone over the pole, were strengthening the winds that were moving counterclockwise over the peninsula, blowing warm air across the ice, weakening it, fracturing the glacier with meltwater. Eventually it collapsed. "This is the first time that anyone has been able to demonstrate a physical process directly linking the breakup of the Larsen Ice Shelf to human activity," according to Gareth Marshall, the climatologist for the British Antarctic Survey who conducted the research.

The scientists discovered something else, too—something potentially more ruinous: The ice shelf had been acting as a kind of cork in the bottle, holding the glacier behind it at bay. Once more than half of the Larsen shelf fell away, glacial runoff began to accelerate. Not only is the glacier shrinking, but it is sending an unprecedented amount of freshwater into the ocean.

"The return of only a few feet of thickness of ice as meltwater to the oceans would have serious effects in many places; and if all the ice were melted, the sea level would rise from 150 to 200 feet. All the world's seaports and some of its most densely populated areas would be submerged," I read one morning, by chance, in an old copy of the *Geographical Review* in the ship's library. The article was written by Laurence McKinley Gould, who had been second in command on Richard E. Byrd's 1929 expedition. It was published in 1957, when this scenario of Gould's was just a fanciful idea.

MUCH OF THE DATA ON ANTARCTIC ozone is being collected by scientists who work in fourteen-month shifts at an outpost on Galindez Island called Vernadsky Station, now operated by the Ukrainian government (until 1996, it was run by the British). Galindez, at latitude 65 degrees 13 minutes 67 seconds south, is the deepest we will reach into Antarctica. The scientists welcome us into their labs and show off their instruments, but the truth is, what draws visitors to Vernadsky Station is not the remarkable science being done here but the rumors of a wild and crazy pub on its second floor. BEST BAR IN ANTARCTICA signs point the way to an open room lit by blinking Christmas lights, where disco music pounds and guys shoot pool while the bartender pours vodka shots under a

curtain of wine glasses and women's underwear. (Hand over your bra and you drink for free.) It's a whole new way to fuel science (and drinking), and judging from the number of patrons sitting on the bar stools two hours before lunch, it seems to be working.

We are also able to visit another old British research station at Port Lockroy, on Goudier Island, which was used to report on enemy activity during World War II and then given over to the ionospheric research that led to the discovery of the ozone hole. The United Kingdom Antarctic Heritage Trust restored the site, which is now a museum. In addition to seeing the ancient radio receivers and reading yellowed diary entries, we are treated to a rare zoological sighting: a young king penguin who has strayed a thousand miles from its habitat on South Georgia Island. He's tall with an upright military bearing and yellow ear patches, and forget about the five-meter rule: We're the paparazzi, he's the visiting celebrity.

Port Lockroy is the most popular destination in Antarctica. In the 2005–06 tourist season, it had more than ten thousand visitors. In 2006–07, the season was extended into April (it usually ends mid-February) and it had *sixteen* thousand. "We're getting pretty close to the saturation point if we're going to preserve the wildlife everyone is coming to see," says Rick Atkinson, who spends his summers at the station.

This is true not only at Port Lockroy, where the numbers are controlled, but throughout the peninsula. Tourism is rising hugely, from twelve thousand in 2001 to almost thirty thousand in 2006. And because Antarctica does not belong to any single nation and no government has ultimate authority, those numbers are, so far, impossible to control. There is a voluntary, self-policing tourist agency called the International Association of Antarctic Tour Operators, but not every tour operator has signed on to its guidelines. And now there is helicopter tourism as well.

"Be afraid. Be very afraid," says Trevor Potts, a member of our expedition crew.

OUR FINAL ANTARCTIC LANDING, in the South Shetland Islands, is like the study review for all the landings before it. There are chinstrap penguins, the ones with the perpetual smile; and gentoo penguins, the ones with orange beaks; and macaroni penguins, the ones with rasta head feathers. There are skuas bullying gentoo chicks, skuas bullying chinstrap chicks, skuas eyeing the sole macaroni chick. There are maybe two hundred tons of elephant seals, yawning and belching in the wallows like drunken frat boys; and basking fur

seals; and crabeater seals whose mouths are stained red from krill. There are Wilson's petrels and pintado petrels and a southern giant petrel that looks like a kite in the sky. By now we can identify them all. But this is not the real test of what we have learned. That will come later, after we've crossed the Drake Passage under escort of wheeling albatrosses, and rounded Cape Horn through a double rainbow. It will be, as we hear more and more about the effects of climate change on the penguins and the seals and the whales and the krill, to remember this icy paradise if it is lost. □

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