

# THE GREAT THAW

Is Antarctica hostile to humans or in need of them? The answer may surprise you.

BY Gabrielle Walker

**“GREAT GOD!** This is an awful place.” This was Captain Robert Falcon Scott’s famous declaration 100 years ago as he arrived at the South Pole, only to discover that he had been beaten to it. The rival Norwegian team headed by the experienced polar explorer Roald Amundsen had arrived a month earlier, planted its flag, taken a photograph and left with just enough time to race back to the coast, and safety. Scott’s British team had started too late, and taken too long, and they finally succumbed to cold and hunger on March 29, 1912. News of their fate spread around the world, all but overshadowing Amundsen’s achievement.

But still the explorations continued—teams of men battling against extreme conditions while thinking wistfully of the comforts of home. In 1915, Thomas Orde-Lees, a member of Ernest Shackleton’s legendary trans-Antarctic expedition, wrote charmingly—and with great prescience: “I do so wish sometimes, that I could just pop home for an hour or two as easily in the flesh as in the spirit. No doubt the explorers of 2015, if there is anything left to explore, will not only carry their pocket wireless telephones fitted with wireless telescopes but

will also receive their nourishment & warmth by wireless ... but, of course, there will be an aerial daily excursion to both poles then ... ”

He was right both about the phones and the excursions. The planes that fly to the South Pole each day of the summer season aren’t exactly deluxe: They’re Hercules troop carriers on which you are well advised to wear earplugs, wedge yourself into the webbing seats and set your teeth against the constant jarring and rattling. But at least the journey is quick and warm and effortless—and if you play your cards right you can spend much of the trip up on the flight deck joshing with the pilots and sipping hot chocolate while those brutal white kilometers pass far below.

I’ve been lucky to make the trip five times now, and on first encounter the landscape still looks and feels much like the one that Scott and his men spent their last days on. I remember well stepping off the plane after my first flight in 1999, the dizziness of the high altitude atop a mountain of ice; the shock as the insides of my nostrils froze in the  $-50^{\circ}$  Celsius cold; the blinding brightness of the sun. Even today, when the many modern bases “on the ice” boast hot showers and Wi-Fi, it’s not hard to die there



“Stormy Weather,” an image of the Melchior Islands from Sebastian Copeland’s series “Antarctica: The Global Warning.”

Maybe not all that fanciful. Though they scarcely realized at the time, those early explorers had also begun to find clues to Antarctica’s earlier, softer face. Beside the three bodies in the last tent that Scott and his men pitched lay 15 kilograms of geological samples. Diaries of the explorers showed that as they climbed down from the great Antarctic ice sheet, the team had found themselves on one of the continent’s few rocky outcrops. The relief of feeling solid land beneath their feet, and the desire to show some scientific purpose to their journey, had set them to collecting samples. And among the rocks they had with them were fossilized leaves from a tree called *Glossopteris indica*, which had been extinct for more than 250 million years. In other words, there had once been forests where now there was ice. Antarctica had once been warm.

**THE SIGNIFICANCE** of Scott’s discovery was overshadowed by the drama of his death. But in the past few decades there has been a flurry of further evidence confirming that Antarctica has not always been frozen or lifeless. In January 1986, two Argentine geologists were hiking on an island just off the Antarctic Peninsula when they spotted fragments of the jawbone, teeth, skull and backbone of a new species of dinosaur—the first ever found in Antarctica. *Antarctopelta oliveroi* was 4 meters long from tip to tail with armored skin and a spike over its eye. It was also a plant eater, providing further proof that Antarctica had once been green.

Many more dinosaurs followed. One—a 7-meter carnivore—had an armament on its head shaped like an Elvis quiff, and the rib of its last meal still stuck in its jaws. Others were even larger. Some seemed to have duck bills or enlarged eye sockets. But all must have lived on the land before the ice came and wiped out the support for life this big and hungry.

What’s more, at least some of

if you make a simple mistake.

But looks deceive. In the past few decades, scientists have discovered that parts of Antarctica have been warming faster than anywhere else on Earth. Icebergs appear to break away more frequently (though we don’t know for sure, since we haven’t known the continent long enough to make a fair comparison). On the northernmost and hence warmest part of the continent—the Antarctic Peninsula stretching toward the southern tip of South America—there is almost a perceptible sense of change: the drip, drip, drip of a freezer that is beginning to defrost. Entire ice shelves

there have shattered. Rather than regard Antarctica as robust and mighty, we have begun to see it as a pristine but fragile wilderness in urgent need of human protection.

Which is the true face of Antarctica? Is it that “awful place” that took the lives of Scott and his men? Or is it a vulnerable place that needs our help?

First the facts. Antarctica is the highest, driest, windiest continent on Earth. Of course it is also the coldest. A few Russian souls wintering there in 1983 recorded the lowest air temperature ever experienced by humans on our planet: minus  $89.2^{\circ}$  Celsius—so

cold that steel can shatter like glass, and diesel fuel can be cut with a chain saw. Even at “normal” Antarctic temperatures, in the minus 60s, every scrap of skin has to be protected against exposure to the air for even for an instant. You wear goggles over balaclavas over face masks over scarves, and you listen to the noise your breath makes as it freezes—a ghostly sound, like blowing softly on rice paper: *Hhhhhwwwwwwooooohhh*.

Antarctica is also the bleakest place on Earth, containing very little in the form of life. The fringes are teeming with penguins, whales, seals and snow-white seabirds,

along with the less picturesque and decidedly weirder 20-legged starfish, giant sea spiders, ghostly transparent jellies and sponges the size of cars. But these are all creatures of the sea, dependent on the water for their energy, food and even shelter. Apart from a rare few patches of rock, the continent is covered with a blanket of ice averaging nearly 1,500 meters in thickness.

It resembles a frozen ocean, the snow shaped by relentless winds into motionless white waves. Some are like porpoises caught in midleap; others are stippled as if a giant hand has blotted paint; or coiled like cobras. You focus on

these spectacular sculptures because there is nothing else to see. In from the coast there are no trees, no plants, no animals, no food, liquid water or shelter. Humans can only survive if they bring their own life support—just like on the Moon.

In fact, we didn’t know for sure that Antarctica existed until 1820, when two Russian naval ships first discovered and sailed around the continent. Long before that, there had been myths and speculation about a “Southern Land,” including some fanciful legends of a tropical paradise ringed by the ice or a giant hole leading into the center of the Earth.





## Antarctica is not so much vulnerable as dynamic, its cold outward face masking a soft, warm heart. The surface has been warm before and could be warm again.

these dinosaurs were present when Antarctica was in its current position at the South Pole. We now know that the world's continents drift slowly over its surface at about the speed that a fingernail grows. And 250 million years would be plenty of time for Antarctica to drift from balmy tropical waters down to the frigid bottom of the Earth. Some of the dinosaurs, however, are much younger than Scott's trees. *Antarctopelta oliveroi* lived about 100 million years ago, when Antarctica was already sitting at the pole. That means that Antarctica must have been warm at the time. In fact, the entire world was much, much hotter than it is today—hot enough that the ice caps were swamps.

We also know now that the world of the dinosaurs was overheated largely because its air contained very high levels of greenhouse gases—including carbon dioxide, which had been pouring out of volcanoes for millions of years. And we know that it started to cool because the Earth began to capture the carbon dioxide naturally and store it deep below ground.

There were two main ways to bury the carbon: trees fell into swampy ground and were quickly buried before they could rot; and the bodies of dead sea creatures fell to the shallow seafloors and became covered with sand. As geological time passed, the buried trees were squeezed, cooked and squeezed some more until they turned into coal. And the sea creatures similarly turned into oil and natural gas. We call these three “fossil fuels” because they are literally fossils of living creatures that once sucked carbon dioxide out of the air and used it to create their own bodies.

Burying those trees and sea creatures in this way, capturing and

storing the carbon they contained, started the world on a cooling trajectory that it has been experiencing ever since. Or it had. We have now discovered these buried fossils and are extracting them and burning them as fast as we can to fuel our factories, heat our homes and propel our cars. And sure enough, the world is starting to warm again, reversing the thermostat back in the direction of the dinosaurs' hothouse. In the past century the average temperature of our planet has risen by 0.8° Celsius, and parts of Antarctica have heated up by three times as much.

**A**ntarctica itself has helped to confirm this worrying picture. Up on the high plateau in a site known, unromantically, as Dome C (because A and B were already taken), researchers have been drilling down into some of the thickest—and oldest—ice on Earth.

Dome C is high enough to make your head spin when you land there, and just as cold as the South Pole. It is run jointly by the French and the Italians, and their attitudes shine out from the first moment you arrive. While the Americans at the South Pole will tell you that to avoid altitude sickness you should not drink caffeine or alcohol for several days, the French at Dome C tend to greet your plane with a tray of Champagne, and the Italians will serve you espresso whose punch will take your breath away. And at the parties, the ice in your drinks crackles and pops with air that has never been breathed by humans and is escaping back into the atmosphere for the first time in nearly a million years.

The thick ice at Dome C acts as

a sort of atmospheric history book, in which layer upon layer of snow has trapped bubbles of ancient air. Scientists there are drilling into this ice to read its historical climate record—and have confirmed that carbon dioxide levels abruptly lurched upward with the Industrial Revolution.

Drilling and surveys throughout the continent have also uncovered an under-ice world of watery lakes and shifting wetlands—a wacky world where the overlying pressure of the ice makes water act in mysterious ways, with lakes sloping down mountainsides and waterfalls squirting uphill. And never forget that for ice, water is a very effective lubricant, easing its way as it slides down to the sea. Researchers have found many hints that parts of the ice sheets are already on the move.

Does all this mean that Antarctica really is a fragile place, susceptible to human influence and in need of human protection?

Well, not exactly. To my mind, it's not so much vulnerable as dynamic, that current cold, hard outward face masking a soft, warm heart. The surface has been warm before and could be warm again. Why should the continent care whether it's covered in ice or in swamps? Walking on the frozen ocean of ice near Dome C, I got the eerie feeling that life there is not so much absent as on hold, and that the continent is patiently waiting for the chance to bloom again.

The real question is: Will there still be humans to witness it? The melting ice of Antarctica (and Greenland) will raise sea levels the world over, threatening the lives of hundreds of thousands of people living on the world's megadeltas. If melted, the ice from Antarctica alone would raise sea levels by 60 meters. The same warming is already causing crops to fail across

the tropics and will make it increasingly difficult for us to feed our ballooning human population. While seawaters are rising, fresh water is receding. Droughts and water wars will become an increasing feature of our own future, unless we choose to take a different path.

To reverse the warming would mean a new energy revolution, which would also require us to act with unprecedented global cooperation. So perhaps there is one further lesson to learn from the polar ice. In 1912, it truly mattered whether the flag planted first at the South Pole was Norwegian or British. Our first relationship with the white continent was one of rivalry and ownership and conquest.

Today Antarctica is officially shared. The Antarctic Treaty System, signed by all of the 49 countries that have a presence there, proclaims the continent a scientific preserve and bans military activity. The American station that stands at the South Pole is named after both Amundsen and Scott, and flies the 12 flags of the original treaty signatories. On the ice, old enmities mean little. Russians side with South Koreans, British with Argentines. Faced with the dangers of a hostile land, what matters most is that you are human.

And this perhaps should be our focus in the face of this new danger that is threatening our own industrialized world. The bottom line is that Antarctica is neither hostile nor fragile; it is kind enough to warn us about the consequences of our actions, but largely indifferent to whether we take notice. Antarctica doesn't need to be saved from us or from anyone. But if we do listen to its warnings, and if we learn to cooperate in the rest of the world the way we do when we're on the ice, perhaps, just perhaps, we may be able to save ourselves. ■