Antarctica

Expedition to the Frozen Continent

Text and photos by Matthew Meier

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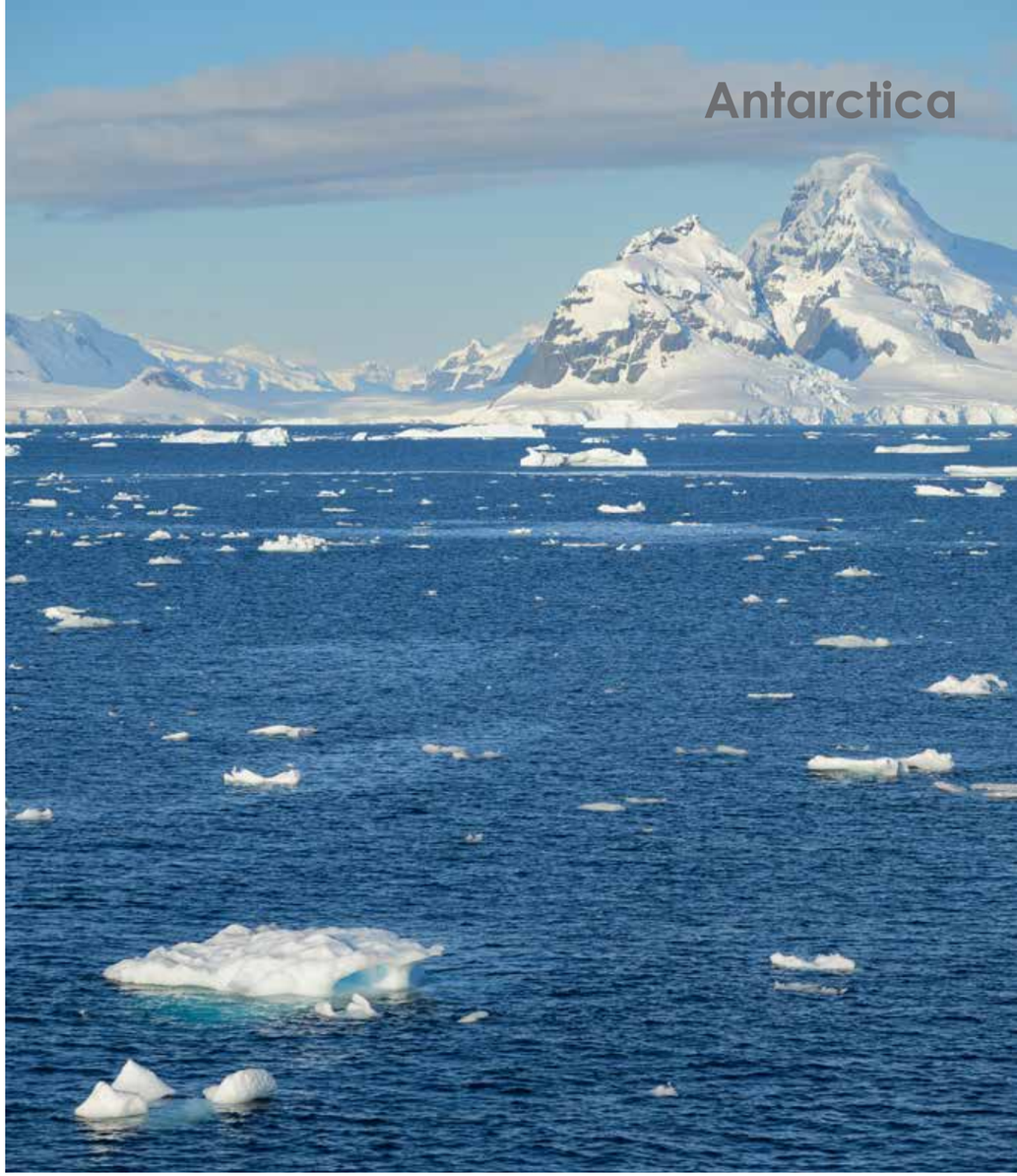
Arch in a tabular iceberg floating in the bay at Detaille Island (above)

In an adventure of a lifetime, underwater photographer Matthew Meier joined an expedition to the Antarctic Peninsula, where he observed captivating wildlife and large, sculptural icebergs, both above and below the surface. During the journey aboard the research vessel, he also participated in a citizen science program under the guidance and supervision of scientists conducting studies and collecting samples.

Trip of a lifetime, bucket list, dream destination, awestruck, magical, speechless, mind-blowing… There are simply not enough superlatives to adequately describe the spectacular experience I had on this expedition to Antarctica.

I was fortunate to team up with a group of explorers, scientists, scholarship recipients, artists, professional image-makers and musicians, as we embarked on what was meant to be an exploratory trip this past January to the Weddell Sea, off the east coast of the Antarctic Peninsula. Mild Antarctic summer weather, with less destructive winds and waves, had left the sea ice



An armada of large and small icebergs floats past snow-capped mountain peaks while passing through the Lemaire Channel (above). Gentoo penguins with their respective chicks in nests of stones on the rocks at Petermann Island (left). Over-under shot of three Adélie penguins on an iceberg floating in a shallow bay at Prospect Point, Antarctic Peninsula (previous page).

in the Weddell Sea largely intact, and we learned the day before departure that our planned route was impassable. Undaunted, the trip organizer and crew reworked our entire itinerary during the two-day transit across the Drake Passage, mapping out a route through the western portion of the Antarctic Peninsula and ultimately producing one of the most memorable adventures I have ever had the privilege to join. As the saying goes, life is what happens when you are busy making plans, and Mother Nature had other plans.

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Floating icebergs and exposed rock islands in a shallow bay (above) and the expedition ship, M/V *Ortelius*, anchored alongside icebergs in the bay (top right) at the Yalour Islands in the Antarctic Peninsula

Wilderness area

Antarctica is the largest wilderness area on the planet, and as such, there are no permanent settlements, no hotels, no resorts and no human inhabitants, with the exception of a limited number of international research stations that host visiting scientists for extended periods. The Antarctic Treaty, signed in 1959, declared the entire continent a natural reserve dedicated to peace and science, and those protections have expanded over time, just as the number of nations that have signed the treaty has risen from the original 12 to more than 60.

Visitor guidelines

Visitors wishing to see Antarctica for themselves are subject to a stringent set of guidelines, set forth by the International Association of Antarctica Tour Operators (IAATO), to protect the native flora and fauna. These include limiting the number of guests allowed onshore at any given location to less than 100, enforcing a 15ft (5m) safe working distance between humans and wildlife, and yielding the right of way when approached by wildlife.

Biosecurity measures are also in effect for clothes and gear, to help eliminate the introduction of foreign objects and species into the Antarctic ecosystem, as well as rules against kneeling, crouching, sitting or lying down on land, so as to limit the possibility of spreading the Avian Flu, which has now been found in elephant seals, skua birds and some penguins, by inadvertently transferring feces on clothing between landing sites.

Citizen science

At its most basic level, the term "citizen science" refers to public participation in research. Usually, that collaboration occurs during the data collection phase of a project, through observations, documentation, physical sampling and reporting. On our adventure, we had numerous opportunities to contribute to the betterment of the Antarctic knowledge base, as well as to directly assist with various studies conducted by the scientists onboard.

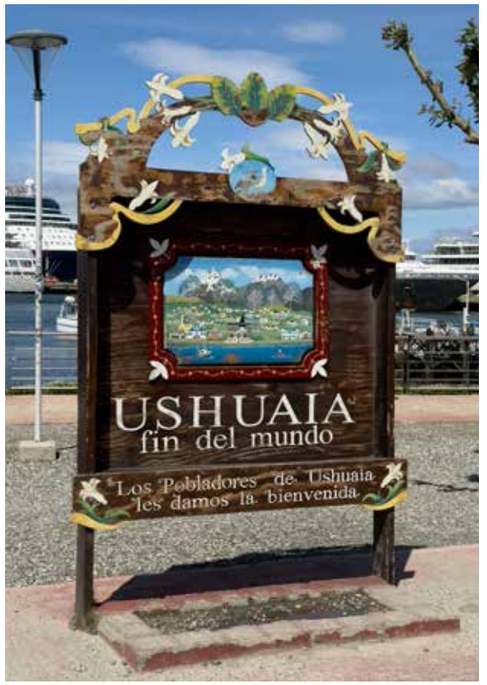
End of the World Post Office, the southernmost post office on Earth, on a pier at the Beagle Channel (below). Tierra del Fuego National Park, just outside of Ushuaia (right). Ushuaia, the expedition's departure point in Argentina, has a distinct Bavarian flavor, with a wooden sign at the marina stating that the town is at the end of the world (bottom right). Colorful lupine flowers are found all around Ushuaia (bottom left).

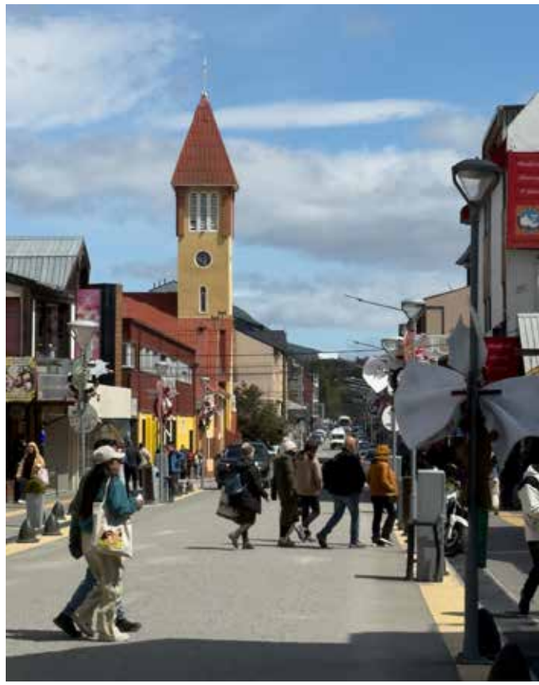
During one of our transit days down to the ice, we were introduced to Dr Gitte Kragh, an ecologist and citizen science ambassador from Denmark, who shared her passion for science and outlined several apps, such as iNaturalist, eBird, Happywhale and Globe Clouds, where the general public may upload sightings and photos to chronicle plants and animals, including specific sub-categories, such as birds, whales, marine mammals and even clouds.

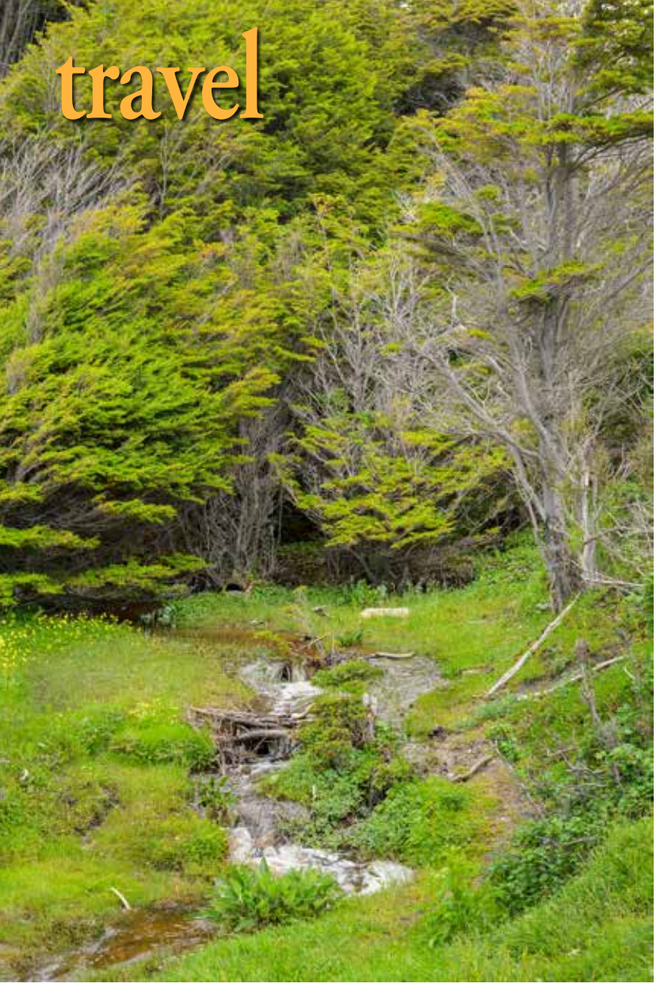
These data points allow researchers to learn more about animal migration, populations and range. With the limited number of visitors to Antarctica each year, there is not enough known about its inhabitants to properly track changes and establish appropriate conservation protocols to help ensure species survival. The Weddell Sea receives a small fraction of annual visitors compared to the rest of the continent, and this expedition was originally established to increase that data pool of knowledge.

Regardless of the change in scenery, the citizen science focus of the trip forged ahead. Guests got the chance to collect algae samples, both at the surface and underwater (benthic), for a scientist studying micro and macro algae. Several researchers used the skiffs to drag conical nets through the water column in hopes of collecting plankton, and patrons had daily opportunities to assist. There was a study examining the presence of microplastics in the Southern Ocean, and participants had the opportunity to help collect, filter and analyze the findings.

Underwater photographers had the opportunity to help document sea stars for scientists who were investigat-







Black-necked swans on the Rio Lapataia

Scenes from Tierra del Fuego National Park (clockwise): Small stream along the Senda Costera Trail; Southern lapwing at the edge of the Bahia Encerrada; Water patterns in a colorful peat bog; Patagonian sierra finch feeding on seeds; Wild horses grazing along the Sendas Del Turbal Trail

ing the presence of sea star wasting syndrome (SSWS). Samples were also collected of suspicious individuals to determine, with further analysis, if a particular bacterium existed that may link the phenomenon to the recent catastrophic outbreak along the US West Coast, which decimated several species of sea stars.

In addition, a marine explorer, educator and science communicator provided hands-on experience operating underwater ROVs, which can be used for scientific observations and collections when first-hand human interactions are either impractical or impossible. Throughout the journey, everyone was encouraged to upload photos with corresponding GPS coordinates to the various apps to help expand the known data points.

Getting there

Our journey started in Ushuaia, Argentina, the planet's southernmost city and appropriately called the "End of the World". I had arrived a few days early to help adjust to the four-hour time change and to

Chimango caracara bird of prey

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Black-browed albatross (above) and gray-headed albatross (right), both large seabirds with big wingspans, flying over the Southern Ocean at the Drake Passage

make sure my bags arrived in time for the sea voyage. But my primary goal was to tour the Tierra del Fuego National Park, which was just outside of the city. My guide and I spent the day hiking past snow-covered mountains, along streams and through wooded trails and peat bogs. Along the way, we saw numerous native bird species and wild horses (whose ancestors were left here by early explorers), plus a defunct post office, which sits on a pier over the Beagle Channel. It was a lovely day, and I was very happy to get to see the park in person.

Sea voyage

Our band of nearly 100 intrepid explorers boarded the M/V *Ortelius*, a 298ft-long (91m-long) ice-strengthened expedition vessel, which would be our home for the next 12 days. With a crew of 44, including eight guides and the ship's doctor, we were in good hands for the required 2.5-day crossing of the Drake Passage to get to Antarctica.

The Drake Passage is an approximately 600-mile (970km) swath of open ocean between the southern tip of South America and the Antarctic Peninsula. It is the narrowest point where the Southern Ocean circles the globe, as well as the convergence point of the Atlantic, Pacific and Southern Oceans, which often results in violent storms and volatile waves from the mixing of their varying water temperatures and currents.

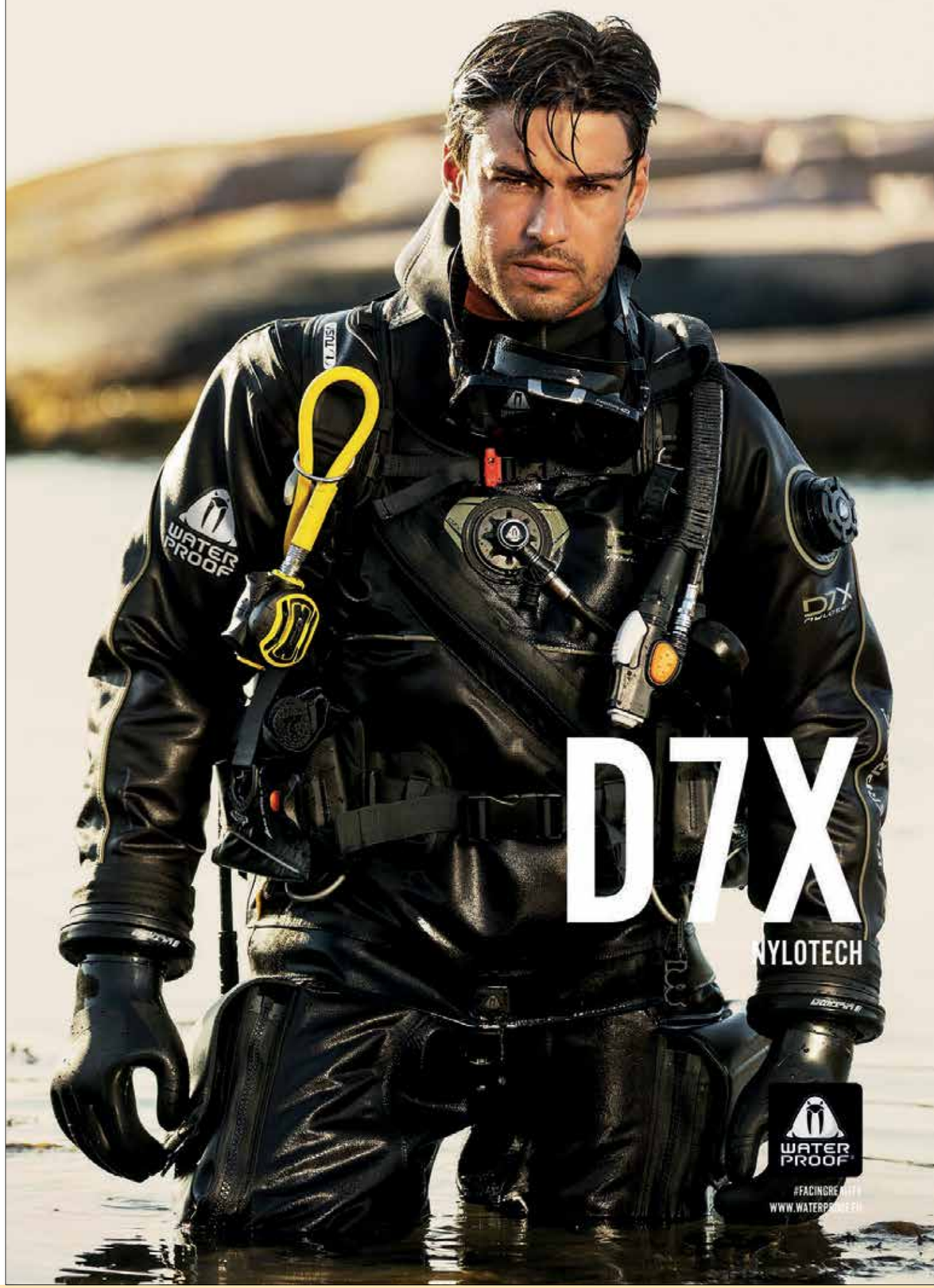
Cape petrel (below), a pigeon-sized seabird but with a larger wingspan, flying over the Southern Ocean at the Drake Passage

Prior to the construction of the Panama Canal in 1914, hundreds of ships and thousands of sailors were lost to the perilous, unpredictable sea conditions. Fortunately, we experienced a relatively calm crossing, known as a "Drake Lake", with only a 10 to 13ft (3 to 4m) swell and 20 to 30mph (32 to 48kph) winds.

Along the way, we were escorted by several species of albatross, petrels and other seabirds, flying circles around the ship, while also keeping our eyes on the horizon for the telltale spouts of whales, orcas and dolphins.

Briefings

In between wildlife viewing and abundant meals, there were several briefings to prepare us for the adventure ahead. Instructions were given on the proper procedures for boarding and disem-



Scenes from the Antarctic Peninsula: Tourists in a RHIB cruising past icebergs in the bay at the Yalour Islands (above); Yawning leopard seal resting on a small, floating iceberg at Galindez Island (top left); Colony of Adélie penguins nesting on the rocks, with dozens of fuzzy, gray chicks (top right), Adélie penguin sliding on its stomach across the snow (far right) and Adélie penguins with chicks on a nest of stones (center) at the Yalour Islands

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barking the zodiacs for our visits to shore, snorkeling and scuba diving, plus guidelines for wildlife viewing on land, visiting historical huts, proper attire and layering, life vest protocols and biosecurity for our gear and clothing.

One of our guides had a doctorate degree in ocean physics. She gave a fascinating talk on sea ice versus glacial ice, and explained how each is formed, breaks up, melts and has different names at various sizes.

We also learned about the three species of penguins (Adélie, gentoo and chinstrap) we expected to see during our trip, along with the three species of seals (Weddell, crabeater and leopard), the possibility for whale sightings and the list of dozens of potential non-penguin bird species that we might encounter in Antarctica.

Yalour Islands

After two nights on the Southern Ocean, we awoke to a calm, overcast, 32°F (0°C) day, with icebergs on the horizon, humpback whale blows in the distance and our first penguin sighting, hitchhik-

Ornate, tabular iceberg and its reflection in a calm bay at Galindez Island (below); Reflections of glaciers and rocks in a shallow bay near Wordie House on Winter Island (right)

Gentoo penguins with chicks, Vernadsky Research Base, Galindez Island (above left); Guests disembarking at Wordie House, a former British research base (above center), sign near Wordie House claiming the area as British Crown Land (above right) and sleeping Weddell seal (top right) at Winter Island

ing past on a mountain of ice. Breakfast was a rushed and excited affair in anticipation of our first steps onshore in the land of ice and snow, and we would not be disappointed. Thousands of breeding pairs of Adélie penguins greeted us on the Yalour Islands, along with their adorable, fuzzy, charcoal-gray chicks, at one of the largest colonies in the area.

Penguins nest on bare rock and assemble individual nests with small pebbles, which are frequently stolen from neighbors. The chicks molt three times in the seven to nine weeks after hatching, at which point their feathers resemble the adults, except for the full white eye ring, which will not appear until after their first year.

A handful of chinstrap penguins were also intermixed with the colony, and they seemed a bit more curious about our presence, as several waddled over to investigate. On the skiff ride back to the mother ship, several gentoo penguins were jumping in our wake and surfing the bow, thus completing the trifecta of potential penguin species before lunch on day one.

Vernadsky Research Base

In the afternoon, we were privileged to visit the Vernadsky Research Base, a Ukrainian Antarctic Station that was originally established by the British, and whose occupants have been studying the effects of climate change on our planet

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for decades. The main building has offices, kitchen facilities, a dentist chair, a fully functioning bar and a post office. It is surrounded by a colony of nesting gentoo penguins with awkward newborn gray-and-white chicks. To limit the impact on the scientists, we invaded in shifts and spent the remaining time exploring the shallow bay out front from the skiffs, navigating stunning icebergs, watching a midair fight between kelp gulls and a skua bird, and getting up close to multiple crabeater and leopard seals as they slept on floating ice islands.

Wordie House

We also toured the Wordie House, a preserved British research hut that was established in 1947 and offered a glimpse into the life of early Antarctic scientists and researchers. The hut was named after the Scottish polar explorer James Wordie, who was the chief scientist and geologist on Shackleton's *Endurance* expedition from 1914 to 1917. Rounding out our amazing first day on the ice, we observed multiple Weddell seals resting in the snow alongside the building and spotted kelp-gull chicks hurrying along the rocks at the base of the snowpack.

Diving

I cautiously slid into the 32°F (0°C) water the next morning for my very first Antarctic snorkel, as we swam around small icebergs near Detaille Island. Scuba diving in Antarctica requires redundant, cold-water regulators and a verifiable number of recent, cold-water,

Large, crescent-shaped iceberg (top left), breaching young humpback whale (top right), resting Weddell seal (above) and Adélie penguin on large iceberg (center) in the bay at the Barcroft Islands; Resting crabeater seals at Detaille Island (far left)

drysuit dives, which I was not able to acquire in a timely fashion, so all of my time in the water was spent snorkeling. That said, my drysuit worked flawlessly, as did the 11mm hood, and I was amazed at how warm my hands were in the attached dry gloves.

The ice was breathtaking above and below the surface. With the millions of tiny bubbles escaping from the melting ice, I felt as if I was floating in champagne. After the initial shock from the cold on my face, I forgot all about the water temperature and focused on working the camera with my abnormally large, gloved fingers. It was only about an hour later, after we excitedly (but certainly not gracefully) hauled ourselves over the side of the RHIB, erupting with stories of our experiences, when I realized that my lips were so numb that I was unable to communicate!

Daily activities

The daily schedule more or less continued in a similar fashion for much of the trip, with a morning and an afternoon excursion, consisting of either a boat ride in search of icebergs and wildlife, including a boat for sample collections for citizen science, a land tour walking among penguins or historical huts, plus snorkeling and/or scuba diving trips. Close to two-thirds of the guests suited up and got in the water during the expedition, and perhaps a quarter stripped down to bathing suits and waded into the freezing water on our last day to become members of the polar-plunge club.

Weddell seal resting on Horseshoe Island, backed by the spectacular mountain scenery of Pourquoi Pas Island (top left). At The Gullet: Massive, rectangular-shaped, tabular iceberg floating past snow-capped mountains and glaciers (top right); Herd of seals resting on a low, circular iceberg floating past huge icebergs and glaciers along the coast of Graham Land (above); Flying snow petrel (center); Can you spot the solitary snow petrel perched atop this large, ornate iceberg (far right)?

At The Gullet: Massive icebergs and an armada of smaller ones float past the snow-capped mountains and glaciers of Graham Land (top, left and above); Large, floating, pyramid-shaped iceberg with several snow petrels resting on its peak (right)

Each evening before dinner, we had a recap meeting in the lounge to discuss the day's activities, get an update from the scientists on their progress and go over plans for the next day. Occasionally, we were treated to collected marine creatures, often viewed through the microscope and projected onto the television screens, for a unique perspective on the researchers' work.

Throughout our time in Antarctica, we were graced with light winds, calm seas and, with the exception of our first and last day, sunshine and blue skies. Given our extreme southern latitude, the sun was also up for over 20 hours a day and never more than 45 degrees above the horizon, providing beautiful light at almost any hour, as it never truly got dark. For my fellow photographers and me, that equated to short nights and little sleep, as we stayed on deck, capturing passing icebergs, wildlife and striking landscapes whenever possible.

The Gullet

The favorable conditions during the trip also allowed us to sail through two incredible channels, which were lined with glaciers and imposing mountain peaks, and filled with floating icebergs ranging in size from small cars to skyscrapers.

The first, called The Gullet, was 11 miles (18km) long and separated Adelaide Island and the Antarctic Peninsula. It was first surveyed and navigated in 1936 by the British Graham Land Expedition, but was not named The Gullet until 1948, as a descriptor of the powerful tidal flow through its narrow width. We slowly navigated through it on day three of our trip, starting around 2 p.m., and I was up on deck taking pictures until well after 11 p.m.

At mid-afternoon, the crew brought out hot chocolate and brownies for everyone, as the entire boat was on deck for the spectacle. At one point, we were treated to an unexpected visit from a lone emperor penguin, riding a massive iceberg, far from its breeding grounds. The structure was so large that the captain could sail our huge ship in a circle around the iceberg, so that everyone had a chance to see the emperor penguin!

Prospect Point

Hearing "Orcas on the bow! Orcas on

Split shots of a leopard seal resting on an iceberg at Pléneau Island (above) and an iceberg at Prospect Point (right)

Diving gentoo penguin, leaving a trail of bubbles (above) and over-under shot of a large floating iceberg, mountains and glacier (top left) at Pleneau Island; Underwater view of icebergs, rocks, kelp and limpets on the seafloor of a shallow bay at Prospect Point (top right)

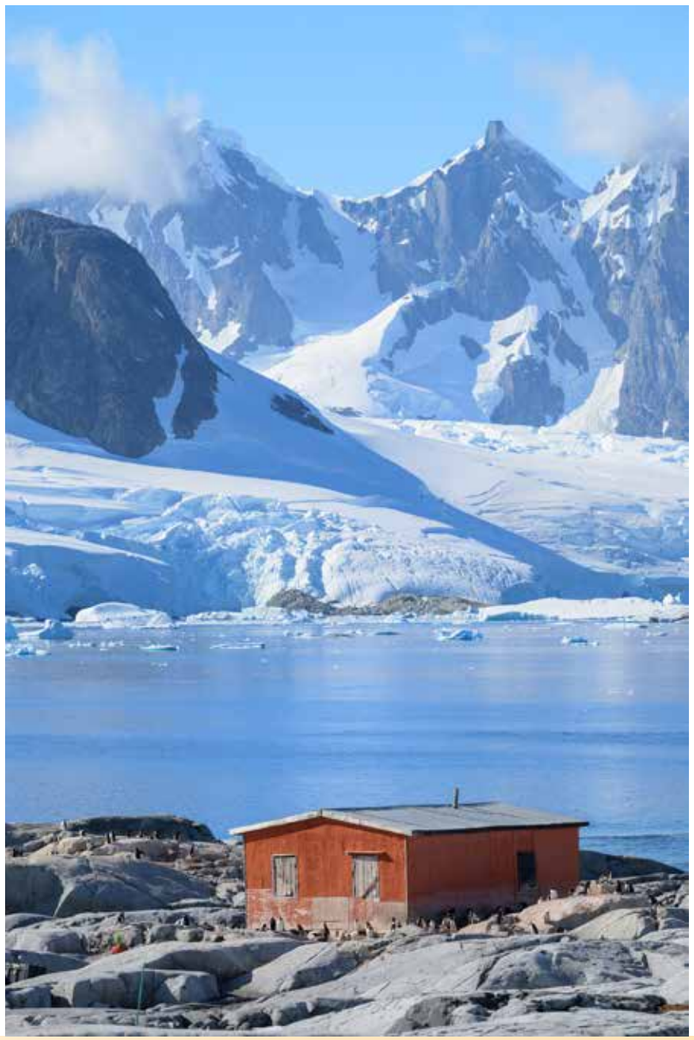
the bow!" was an exciting way to start the next day! A small pod was spotted swimming among chunks of ice in the shallow bay ahead. I raced for my camera and got up on deck in time to see a single dorsal fin slip beneath the water, never to resurface. Sad to have missed the photo opportunity, I had no idea then of how remarkable the rest of the day would be.

We were anchored near Prospect Point, off the west coast of Graham Land, and used the skiffs to shuttle divers and snorkelers toward colonies of Adélie penguins nesting on rock outcroppings with icebergs all around.

Once in the water, I got to see my first penguins swimming past and even had three of them jump up onto a floating iceberg right next to me. The rocky seafloor was covered with a mix of red and orange kelp, algae and numerous limpets, as well as grounded icebergs. Closer to the rocks, we watched as the penguins marched down to the waterline, and then waited for an extended

Two RHIBs of guests check out huge icebergs (above) and a humpback whale shows its tail fluke as it dives (top right) in the Grandidier Channel at Duchaylard Island. Near the landing to Petermann Island, the red wooden building of the Argentine Naval Refuge is surrounded by gentoo penguins and majestic scenery (right).

Gentoo penguins guard their respective chicks in their nests of stones at Petermann Island (above). Chinstrap penguins vocalize with their wings spread while standing on the rocks among the colony at Palaver Point, Two Hummock Island (right). A three-pronged iceberg floating in the iceberg graveyard of the shallow bay on the backside of Petermann Island (far right).



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period of time, surveying the situation to be sure it was safe, before diving in for a swim.

Once back in the boats, we made a short trip to shore, past magnificent blue glacial icebergs, so we could stand on the actual continent of Antarctica! All of the other landings throughout the trip were either on offshore islands or the Antarctic Peninsula.

Duchaylard Island

The day got even better after lunch, as we set out in the skiffs again to explore a huge bay with colossal icebergs near Duchaylard Island. The welcoming committee included a skua bird standing on a tiny hunk of ice, and then an unexpected trio of humpback whales, bubble-net feeding for hours.

The whales would dive down and collectively blow bubbles in a circle to confuse and trap their prey, before lunging, mouths open, toward the surface at the center of the bubble ring to feed. It was an amazing show, with synchronized blows, sky hops, arched backs and flukes dripping with water when the whales dived back underwater. We stayed with them for as long as possible, nearly two hours, before needing to return to the ship.

Over-under shot of a colony of Adélie penguins on the rocks (left), underwater view of an iceberg grounded on the rocks (top left) and rocks, kelp and limpets on the seafloor (top right) in a shallow bay at Prospect Point; Underwater view of a floating iceberg reflecting on the surface of the icy blue Southern Ocean at Pléneau Island (right)

Petermann Island

Petermann Island was home to a large colony of gentoo and Adélie penguins, as well as nesting imperial cormorants. Those not diving went ashore the next morning for a walk among the birds, and near the landing site got a bonus sighting of a young elephant seal sleeping on the rocks. Meanwhile, divers explored icebergs in the bay just offshore. Most of the gentoo nests had chicks in them, although we did see a few birds behind schedule, still arranging rocks and sitting on eggs.

Around the back of the island was an area known as an iceberg graveyard, where currents had funneled massive icebergs into a bay, only to be grounded on the shallow seafloor. After a slow climb up a snow-covered path to the overlook point, icebergs dotted the horizon as far as the eye could see.

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Scientists and guests collecting samples at Palaver Point, Two Hummock Island, as part of the citizen science program (left)

I donned the drysuit again after lunch, and we snorkeled around a few floating icebergs, as curious gentoo penguins swam circles around us. At the last iceberg, I came face to face with a leopard seal resting at the water's edge, after the group decided I should be the first to make an approach. That may have been the slowest I have ever crept up to an animal, as I consciously weighed the desire to get close with my wide lens, while also trying to adhere to the proper viewing distance restrictions, and, at the same time, attempted to suppress my immense fear of this imposing predator. In the end, the fear won out. While I got a nice picture, there was definitely some cropping involved in the final image, as I had decided it was best to keep my distance.

Lemaire Channel

Later that evening, the crew surprised us with a BBQ dinner out on one of the upper decks, as we cruised through Lemaire Channel, passing floating icebergs, towering glaciers and snow-covered mountain peaks in the beautiful, late-afternoon sunlight. The 6.8-mile (11km) strait has been frequently photographed for its majestic scenery, earning the nickname "Kodak Alley". The party went well into the night, with live music and dancing, as the guest musicians took to the stage after the tables were cleared. It was a fabulous ending to another incredible day!

Two Hummock Island

Palaver Point. Our final penguin colony landing was the next morning at Palaver Point on Two Hummock Island, and the noise from the nesting chinstraps was impressive. Thousands of fluffy, gray-and-white chicks were vying for

Seal resting on a large, flat, triangular-shaped, floating iceberg in the Lemaire Channel (left). At Palaver Point: Brown skuas flying past a glacier (right); Chinstrap penguin parent feeding its chick (below); Chinstrap penguins warming themselves in the morning sunlight (lower right)

Leopard seal resting on a floating iceberg at Galindez Island (above)

Diver at the surface photographs the protruding, rusty bow of the *Guvernøren* wreck at Foyn Harbor (right). Chinstrap penguins on the volcanic pebble shore of Whalers Bay, with geothermal steam from an active volcano at Deception Island (below). Chinstrap penguins with chicks on their nest at Palaver Point, Two Hummock Island (bottom left). Antarctic tern (center left).

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Imperial cormorant (above); Whale-oil tanks and boilers abandoned at Whalers Bay by the Norwegian Hektor Whaling Company, which ceased operations in 1931 (left)

attention and food from their parents, as the adults made frequent vocalizations while standing upright, wings spread, with their heads tilted back and their beaks pointed up to the sky.

I had been photographing one of the citizen science boats collecting samples before coming ashore, so had only ventured as far as the first rock outcropping. But there were other nesting sites on bare rock hundreds of feet higher on the snow-covered mountain that, incredibly, the penguins climbed back and forth to daily with their short, little legs. Truly a herculean feat!

Guvernøren. That afternoon, on the last snorkel swim of the trip, we circumnavigated the rusty, exposed portion of the *Guvernøren* shipwreck, in Foyn Harbor, while divers explored the collapsing hull beneath the surface. To save the crew, the former Norwegian whaling vessel was deliberately run aground after catching fire in 1915, and has been an artificial reef ever since.

Deception Island

Deception Island, an active volcanic caldera north of the Antarctic Peninsula, was the last stop on our adventure. The entrance to the horseshoe-shaped waterway inside it was guarded by an elevated colony of chinstrap penguins nesting high up on the rocky cliffs. Once inside, remnants of an abandoned Norwegian whaling factory lay rusting on the shore after operations were shut down in 1931.

Dozens of huge whale-oil tanks, collapsing structures and an expansive airplane hangar remained as evidence of the immense number of whales slaughtered for whale-oil production, many of whose bones were still scattered on the seafloor. Kelp gulls and skua birds now nested among the

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Waves crash over the bow of M/V *Ortelius* in the Drake Passage (right).

At Prospect Point, Adélie penguins head to the water's edge (above). Giant Antarctic isopod collected by divers for a scientific presentation (center). Onboard the research vessel, a scientist talks about the anatomy of a sea star, referring to an image on the monitor of a specimen as seen through a microscope (far right).

decaying buildings, while fur seals galumphed and chinstrap and gentoo penguins waddled along the steaming shoreline. The black volcanic sand was heated by geothermal activity from the volcano below, creating steam when it was exposed to the cold waters lapping the beach. For the polar-plunge participants, lying on the warm sand was an unexpected reprieve after submerging themselves in the frigid waters of the bay.

Return journey

Our penance for the unbelievable weather during our trip was a "Drake Shake" on the transit home. We departed Deception Island a few hours early to give ourselves extra time to cross the passage in what was anticipated to be a 13 to 16ft (4 to 5m) swell, but, in actuality, it grew to be 20 to 26ft (6 to 8m), with 40+mph (64+kph) winds. The crew closed and secured all of the portholes below the fourth deck before we set sail, and guests were not allowed out on deck once we hit the open ocean.

Fortunately, our path took us into the waves (head-on) rather than alongside them (beam-on), and we were largely spared the side-to-side, washing-machine effect that severely alters my equilibrium. All told, the experience felt like being on a carnival ride for several days straight, where the floor moves unexpectedly underfoot, either coming up to greet you or falling away before your foot lands, occasionally shifting from side to side or requiring a 45-degree tilt to walk down the hallway.

Research presentation

The following day, we cautiously made our way to the lounge, where we were given a presentation by each of the scientists onboard with progress updates on their findings during the trip. The phytoplankton group, with the help of numerous volunteers, had taken samples at seven different sites, at multiple depths and temperatures per area, and found both diatoms and flagellates in the water column. Back in the lab, the scientists will use microscopic analysis to determine specific species and their abundance to establish a biomass for each sample.

The other plankton group had collected over 50 samples by towing nets at different depths and mesh sizes, hoping to find both phytoplankton and zooplankton. Further analysis will allow them to create a geospatial map of the distribution of the stable isotopes found in each area.

Sadly, but not surprisingly, microplastics were found in the Antarctic waters, based on a limited number of samples. A much broader field study will be needed for more meaningful results. The algae scientist, with the assistance of many of the divers and snorkelers, had the most prolific haul, collecting over 150 samples. The goal was to identify interactions between the algae and their microbiome (environment), as well as

Gentoo penguin tending an egg adjusts its nest's stones, Petermann Island (above). Weddell seals on an iceberg at the Barcroft Islands (top).

to match specific genes with their potential functions, to help further research into product development and medicine.

Encouragingly, there was a low occurrence of sea star wasting syndrome based on observations and submitted photographs, although the scientists expected to receive a few more pictures after photographers had time to process their images. Additional work will be done with the collected samples post-trip, in search of a bacterial match for the US West Coast outbreak of sea star wasting syndrome and to map out the distribution of confirmed cases.

I thoroughly enjoyed the citizen-science aspect of this expedition and felt it provided an additional sense of purpose and fulfillment for the guests. I also believe it helped bring the group together, on top of being a fascinating opportunity to contribute and expand one's horizons while on vacation. I hope other operators are able to incorporate citizen science into their itineraries, as even a small portion of the options provided on this expedition would be a value-add for their guests.

There are still no words that can adequately put this experience into perspective, nor do the photos begin to do it justice. Antarctica was simply extraordinary, and if the opportunity arises, I will return again and again and again. If you ever get the chance, jump in with both feet and prepare to be amazed! ■

*Special thanks go to **Blue Green Expeditions** for hosting this adventure, and to **Oceanwide Expeditions** and its crew for taking such good care of all of us onboard. The author also thanks **Scubapro** for providing a drysuit and scuba gear, as well as **Seacam** for providing an underwater housing.*

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REFERENCES:
BLUEGREENEXPEDITIONS.COM
OCEANWIDE-EXPEDITIONS.COM
WIKIPEDIA.ORG

Antarctica

An ornate, three-pronged iceberg reflecting in the water's surface as it floats through The Gullet (above); Humpback whale preparing to dive underwater by arching its back at the surface in the Grandidier Channel at Duchaylard Island (top right)